



# HARMONY

TOON BOOM HARMONY 12.1 **Server**  
- Premium Edition -  
**Gaming Animation Guide**

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# Chapter 1: Introduction



Harmony is a great tool for creating character rigs and animation for games. Artists and programmers can work together to create content for many platforms, including Windows, Mac, Mobile, iOS, PS, XBOX, and so on.

The Toon Boom gaming pipeline is evolving constantly. For more information:

- Toon Boom Gaming: <https://www.toonboom.com/games>
- For information: [sales@toonboom.com](mailto:sales@toonboom.com).
- Technical inquiries: [support@toonboom.com](mailto:support@toonboom.com).

This guide is divided as follows:

- [About Gaming in Harmony](#) on page 15
- [Guidelines and Resources](#) on page 19
- [Design and Drawing Tools](#) on page 25
- [Colour Styling and Colour Models](#) on page 203
- [Timing](#) on page 257
- [Character Building](#) on page 345
- [Gaming Deformation](#) on page 435
- [Library](#) on page 459
- [Cut-out Animation](#) on page 493
- [Export Harmony Animations to Unity](#) on page 563
- [Troubleshooting](#) on page 577



## Chapter 2: About Gaming in Harmony



As gaming pipelines are constantly evolving, Toon Boom is breaking the boundaries of how to create 2D animation for games.

There are two main pipelines for exporting data from Harmony to your game engine:

- [Raw Game Data Export on page 16](#)
- [Frame-by-Frame Export on page 17](#)

### Creating Animation in Harmony

When creating character rigs and animation for games, there are a few things to think about before starting. Artists and programmers should work together to make sure their needs are met.

- What platform will your game be going on? Windows, Mac, Mobile, iOS, PS, XBOX, etc.
- What game engine will you be using?
- What is the style of the game? Hand drawn, cut-out, with textures, etc.

These are just a few of the questions to consider before getting started. They all have an impact on how you design, build, and animate characters.

For example, if you're planning a mobile game for smart phones, then you will most likely want to keep your game under 50 MB, so it can be downloaded without having to be on Wi-Fi. In that case, your most important consideration is to create efficient characters with very tight sprite sheets and reuse a lot of the animation to keep the file sizes small. During the process, you will need to:

- Rig and animate characters in Harmony.
- Extract out the Harmony data.
- Import the Harmony data into the game engine.

Keep in mind, if you're working with a custom engine, you can also process the Harmony data that's exported and use it in a custom game engine. If you need assistance with adapting data for your engine, contact [support@toonboom.com](mailto:support@toonboom.com).

If you're making a game for consoles, like the PS or Xbox, then you have the freedom to create larger textures. You may want to animate frame-by-frame, or you may want to animate with a cut-out character.

If you're simply going to export on a frame-by-frame sequence, then you can use all tool in Harmony without limitations. You can then process an exported image sequence into a sprite sheet.

## Raw Game Data Export



Raw game data export is appropriate when you want the file sizes to be as small as possible. Toon Boom lets you extract all the data from Harmony to incorporate into a game engine. You can extract the skeleton information, drawing information, and keyframe animation data, as well as deformations (bones and articulations only), cutter, transparency nodes, and timing columns.

- **Advantage:** This is the lightest export, and will keep file sizes small which is ideal for mobile applications.
- **Disadvantage:** You are somewhat limited in the tools you can use in Harmony. You can use tools like Morphing as well as Curve and Envelope deformer, but you'll need to bake it out to drawings so they're interpreted properly in the game engine. You can use Cutter effects (masking), but you cannot cascade them, meaning you cannot have more than one in a hierarchy chain. The Game Bone deformer can be used on your rig with having to bake it to drawings.

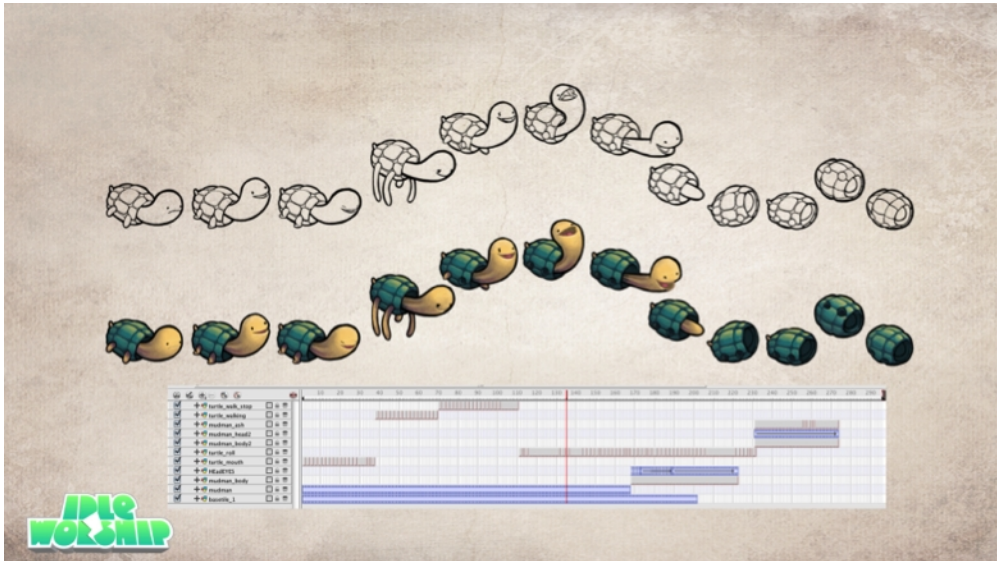
However, even with these limitations, you can create really great cut-out character animation in Harmony and extract all the data. By moving, rotating, scaling, and skewing the different drawing layers, you can create advanced looking animation.

When you extract the data, you'll have sprite sheets that contain only the drawings of the body parts used in your Harmony scene file. You can also support multiple animations, such as idle, run, and jump, and reuse the same skeleton and drawings when possible by simply exporting new animation data.



Toon Boom has fully integrated this solution with the Unity game development rendering engine. If you are creating your game in Unity, you have a seamless pipeline without the need to re-treat the data in your game engine.

## Frame-by-Frame Export



You can export from Harmony using an image sequence, which can be recompiled into a sprite sheet.

**Advantage:** You can use any of the tools in Harmony when you animate!

**Disadvantage:** These sprite sheets can become quite heavy and end up as large textures to process in the game. This may be fine for many games, like console games, but when you're doing game development for mobile devices, such as iOS or Android, you need to be very light on your texture space. Also, file sizes should be kept under 50 MB to facilitate downloading without needing to be connected to Wi-Fi.

There is a script available in Harmony that allows you to export your animation in frame-by-frame to the EaselJS game engine. EaselJS is a javascript web compatible game engine. It uses a json data structure to map each frame to an entry in the sprite sheet. The data structure is easy to understand and can be adapted or converted to a different game engine if you need to.

To export to EaselJS, you need to add the script in the Scripting toolbar (TB\_ExportToEaselJS). This script is included in Harmony. See [Export Harmony Animations to Unity on page 563](#) for more information on how to add the script to your Scripting toolbar and the interface parameters.



## Chapter 3: Guidelines and Resources



In this chapter, you'll find guidelines for rigging, deformation, cutter and many useful animation tips.

This chapter contains the following topics:

- [Rigging Guidelines on page 20](#)
- [Deformation Guidelines on page 21](#)
- [Cutter Guidelines on page 21](#)
- [Animation Tips on page 21](#)
- [Orthographic Camera on page 22](#)

## Rigging Guidelines

The following is a list of general guidelines to keep in mind when rigging your character. As you're planning the character rig for your game, keep in mind the style of the character, and create your custom colour palette. However, there are some limitations to consider if you plan to extract the game data:

- Create rigs in the Timeline view only. The Node view can have complex connections that are not always interpreted well by game engines.
- Nudge layers in Z space if you need to reorder layers. However, significant Z offsets are not supported within a character rig.
- Make every layer in your game engine a separate scene in Harmony. If you have two characters at different depths, put them in separate scene files.
- Character rigs in groups at the root level of your Harmony scene will render to a single plane in Unity, but use separate sprite sheet and animation data sets. Keep this in mind for scenes in which you may have more than one character interacting with each other.
- Don't use any effects. Effects like masks and colour overrides are not interpreted by game engines. Use only direct hierarchy, drawing swaps, and keyframe animation.
- Don't use 3D space. If you want to set things up in 3D space, you can do this when you get to your game engine.
- Set your pivot points on Peg layers using the Rotate tool to set the pivot on the entire layer. Peg pivots are recommended over drawing pivots. You should also set the pivot points on your drawing layers, even if you don't animate on them, as this will allow you to retrieve the information later on in the game engine if you need to put a locator on a drawing layer.
- Don't use Morphing. This is not yet supported in game engines.
- Both Morphing and Deform can be used and then baked out to individual drawings. These drawings will then show up as new drawings in your sprite sheet. Be wary of doing this too often as it will increase your texture space!
- For your pegs, when you animate, use Bezier curves and set them to Separate. If you use 3D Path, it's heavier than Separate.

Keeping these tips in mind will allow you to create a tight, efficient 2D game character in Harmony while taking advantage of all the great tools.

Here are some things you should do:

- Create a simple parent-child relationship hierarchy in the Timeline view.
- Use peg layers to contain keyframe animation data, set to Separate Position.
- Use drawing layers to draw on, creating new drawings when needed.
- Use the Rotate tool to set the pivot points on the peg layers.
- Name your layers properly so if you need to fetch a specific layer's pivot point later on in the game engine, you can easily recognize the layer you need. If you have a top-level Group A, which has a child group inside it (Group B), and the drawing layer is a child of Group B, then the drawing layer is exported as `A_B_DrawingLayer`.

You can use any of the drawing tools you want: Pencil and Brush tools, textured lines, solid areas, and gradients. Each individual drawing will be rendered out and assembled into a sprite sheet later.

## Deformation Guidelines

Harmony can export deformations to the game engine XML format. Only hierarchies made of Game Bones can be successfully exported. Although deformation comes equipped with a wide range of features, many were restrained to ensure that performance is on par with gaming industry standards. The following features are not compatible with the game engine SDK:

- Zones of influence
- Curve and Envelope deformations
- Only a single pose is allowed per deformation hierarchy

The deformation in the game engine SDK does not behave exactly as the deformation in Harmony.

To comply with most game engines and maintain fast calculations, the SDK implements a linear base skinning algorithm to linearly blend the bones at articulations. You may notice some differences depending on the curvature of the articulations used.

**NOTE:** \* Not currently available in the Cocos2d-x implementation of the game engine SDK.

## Cutter Guidelines

The cutter, or mask, operation in Harmony is used for cutting off drawings with custom shapes. The game engine SDK implements both cutters and inverted cutters with the following limitations:

- For a sprite, only a single cutter drawing can be applied when it is rendered. This also applies to a composite of multiple matte drawings. The game engine SDK will only use the first matte drawing during rendering and discard the others.
- A deformed drawing cannot be cut, but a cut drawing can be deformed.

**NOTE:** \* Not currently available in the Cocos2d-x implementation of the game engine SDK.

## Animation Tips

When animating for games, depending on the type of game you're creating, you may need to limit your animation. For example, if you're creating mobile games and you want to keep the file sizes small and playback fast on all devices, then limit yourself to simple keyframe animation with as few drawing swaps as possible. If you're creating console games, you have the freedom to create more drawings and have a higher complexity. You can explore with your programmer the limitations of the platforms you're exporting to, and what your game engine supports.

Here are some tips for efficient, lightweight animation:

- Use mainly transformations, such as move, rotate, scale, and skew.
- Create additional drawing swaps when needed.

- If you use Curve and Envelope deformers or Morphing, you'll need to bake out the drawings for export. Be careful when doing this, as you may want to keep the number of drawings small. Don't bake out an entire sequence, just selected drawings. You don't need to bake the Game Bone deformers.
- The bigger the drawings are in the Drawing view, the more pixels they will occupy in the texture size on the sprite sheet. When setting up your rig, make sure to not scale individual layers by using a keyframe with the Transform tool. If you want to scale things up or down, use the Select tool. This will keep things the same relative size on the sprite sheet. When you export the sprite sheets, in the script you can also set the resolution of the sprite sheet so the drawings can be downscaled for smaller devices.
- Only drawings which are exposed in the scene will be exported to the sprite sheet. For example, if you have 10 drawings in your Library view, but only two of them are showing in your scene, only those two will export out. This keeps the sprite sheet as tight as possible.

## Animating Multiple Sequences

You will always have multiple animations for your characters. For example, an idle sequence, a run sequence, an action sequence, and so on. You need to work in a specific structure so you can export all of these animations to a single sprite sheet.

First, create a scene file with the name of the character, such as **Space Duck**. This is the file where you can create or import your game rig. In the top menu, select **File > Save As New Version**, and give this new version the name of the animation. For example, **idle**.

Every time you need to do a new animation using the same character, perform a Save As New Version. In the end, you may have something like this:

**Scene:** Space Duck

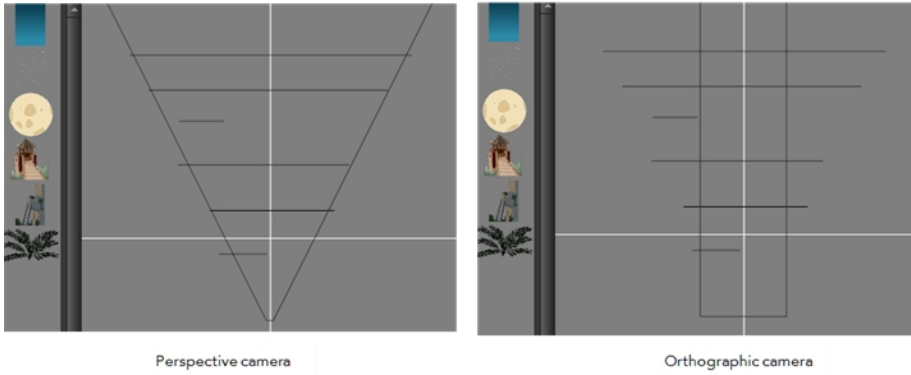
**Versions:**

- Run
- Idle
- Jump
- Shoot

When you run the export script, it will export the drawings from the current scene into the export folder. It will also let you know if there are any other scene versions that were already exported to that folder. If so, then it will recompile the sprite sheet to include all the drawings from all the animations. This allows the maximum possible reuse of drawings.

## Orthographic Camera

The orthographic camera is specific to the gaming pipeline. It changes the camera type from perspective to orthographic. It becomes a camera without vanishing points. This means there is no more perspective in the Camera view. Objects, when moved on the Z-axis, will not change in size or scale.

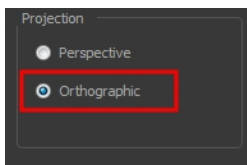


The orthographic camera can be set in the Scene Settings dialog box. In order to create scenes with the orthographic camera, by default, you need to create a new custom scene resolution. Refer to the Fundamentals Guide to learn about custom resolutions.



### How to set an orthographic camera

1. From the top menu, select **Scene > Scene Settings**.
2. Select the **Resolution** tab.
3. In the Projection section, select **Orthographic** option.







## Chapter 4: Design and Drawing Tools



Another important step in the project creation is the character, prop and location design. This determines the style and models to follow for the entire project.

This is also the step where you will need to use most of Harmony's drawing tools.

The design can be created on paper and scanned in or it can be created digitally. You can draw and even create the colours entirely on paper, while others like to design on paper and scan the drawings to create the colour model in a software program. The most popular method is to design directly in Harmony.

To save paper and time and avoid having to recreate colour palettes, Harmony gives you the ability to design all elements directly in the application. This keeps all your work within the same software, avoids using a lot of paper and losing time scanning in elements and importing them.

The character and prop design process is divided in three steps:

- [Preparation on page 25](#)
- [Sketching the Model on page 27](#)
- [Cleaning and Inking the Model on page 42](#)

Harmony has an extensive set of drawing tools that can be used to design your characters. You can learn more about this in the following topic:

- [Drawing Tasks on page 47](#)

Each drawing tool has a series of options to customize its behaviour and drawing style. You can learn more about them in the following section:

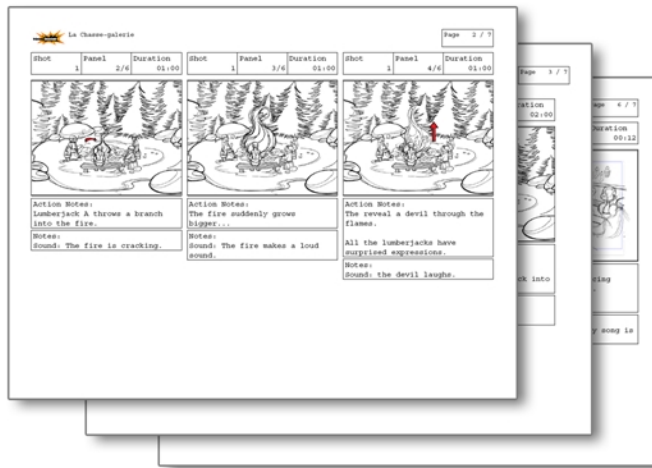
- [Drawing Tool References on page 127](#)

### Preparation

To prepare for the design task, you will need to go through a few steps:

- [Getting References on page 26](#)
- [Using the Workspace on page 26](#)

## Getting References



Creating models requires two main reference sources, the script and the storyboard. Once you have the script in hand, you can learn about the characters and their personalities, the props, the ambiances, and so on. This will be your main reference, so it is very important to read it carefully.

The storyboard is the second reference source and it can be quite useful as well. Although it will not yet be the final version of the storyboard, it will show you what the character is doing and what props need to be designed.

## Using the Workspace

Once your scene is created, you can open it and set your workspace.

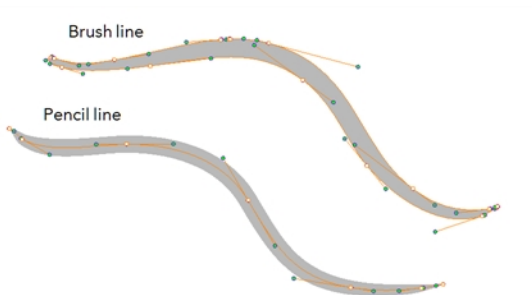
To sketch the characters, props or locations directly in Harmony, you will mostly use the Camera or Drawing views along with the Colour, Timeline and Tool Properties views.



## Sketching the Model






Now that your references and scene are created, you can start designing. To draw your characters, props and key locations, you will need to learn the following:

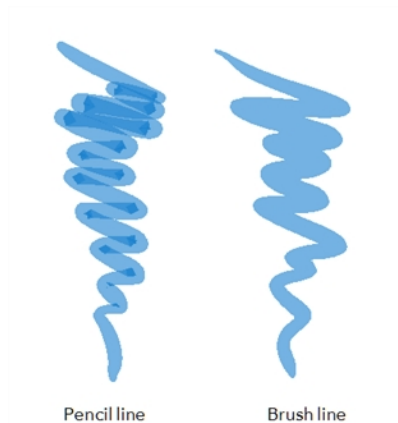
## Drawing with the Brush or Pencil Tool



The Brush  and Pencil  tools are used for drawing and sketching. Both tools support pressure sensitivity, allowing you to create lines with variable thickness. The Brush tool produces contour vector lines. The Pencil and shape tools produce central vector lines. This means that a pencil line's control points (used to deform its shape) are located along the length of the central spine, while the Brush line's control points are located along the contour.

- If you draw with the Brush tool and want to modify the thickness variation, use the Contour Editor  tool.
- If you draw with the Pencil tool and want to modify the thickness variation, use the Pencil Editor  tool.
- You can also convert a brush zone into a pencil line with the Brush Stroke to Pencil Line  option.

If you sketch a drawing using a semitransparent colour to get a paper-like feel, you should use the Brush tool as it produces a more realistic and natural feel. The pencil line is very useful for tracing clean or final drawings.

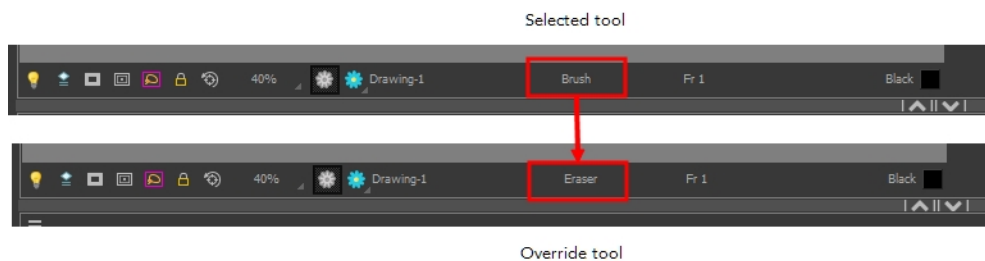


Also, it is recommended to use brush lines when designing cut-out puppet articulations which use patches.

## Override Tool

The Override tool lets you increase productivity by rapidly switching between tools used for short tasks and your previous tool. Most drawing tool shortcuts are accessed using the Alt key followed by another key, such as the Eraser tool which is accessed by pressing Alt + E.

If you are drawing with the Brush tool and need to briefly switch to the Eraser before continuing, hold down the E key while you are erasing. Once you are done, release the E key to return to the previous tool; in this case, the Brush tool. You can do the same for most drawing tools that have a shortcut composed of Alt followed by another key.



## Relative Size



The size relation between the props, characters and backgrounds is very important in maintaining consistency and structure throughout the project.

A production can contain many characters and props. It is not unusual for these to be created by different people. If there is no size control implemented, the characters and elements created by different artists can vary greatly. When this occurs, the characters that are placed together in a scene will be out of proportion. The animator or person doing the scene setup will then have to scale them to the correct size.

When a character or prop is scaled down, the outline will become increasingly thinner. By the time the element is scaled to its proper size, the outline may be so thin that a difference between one character's outline and the one beside it will not look very good.

Here are a few tips you can use to create a suitable size relation.

## Line Up

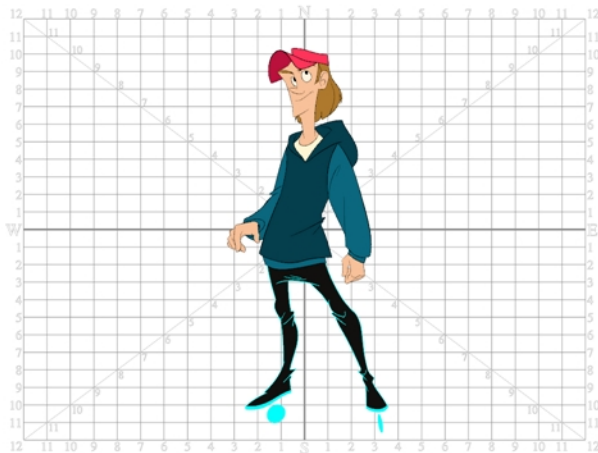


A line up consists of copying and pasting all your character designs into the same drawing and then scaling them to the correct proportion in relation to the other characters. This line up is very important and should be handed to any animator, layout and posing artist or scene setup person working on the project.

For the prop design, it is recommended that you paste one of the main character's hands or even the full body beside the prop. This enables the animator to know what size to draw the prop.

In your character design scene, it is a good idea to create a column for the character line up. The line up is usually done during the character design step. When the character builder imports the model to the breakdown scene, the size relation should be correct.

## Field Chart



Harmony includes a field chart in its Drawing and Camera views. This tool is very useful in setting the characters' and props' heights.


It is recommended that you keep the character design and breakdown inside the 12 field size. This ensures that it fits the default camera size and the template thumbnails. If some parts were drawn too big or too far apart,

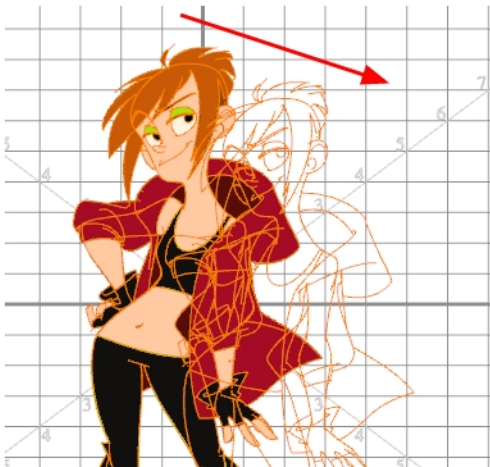
you can use the Reposition All Drawings tool and reposition, scale or rotate multiple drawings from different layers all at once.

Use the Show Grid option to display a grid in the Drawing or Camera views.

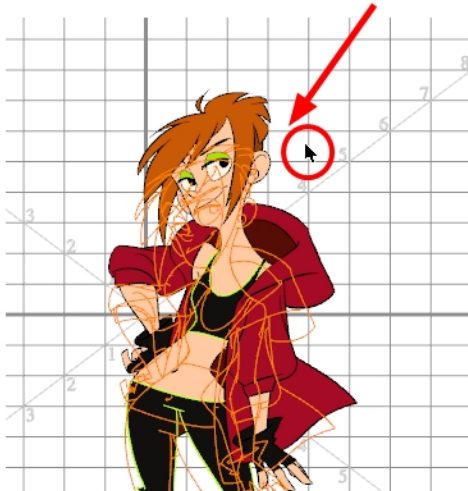
Name	Button	Description	Keyboard Shortcut
Show Grid	#	Displays the grid.	<b>View &gt; Grid &gt; Show Grid</b> Press Ctrl + ' (Windows/Linux) or ⌘ + ' (Mac OS X).
Grid Outline Only		Displays the outline of the grid only.	<b>View &gt; Grid &gt; Grid Outline Only</b>
Square	☐	Displays a standard square grid.	<b>View &gt; Grid &gt; Square</b>
12 Field Grid	12	Displays a 12-field size grid.	<b>View &gt; Grid &gt; 12 Field Grid</b>
16 Field Grid	16	Displays a 16-field size grid.	<b>View &gt; Grid &gt; 16 Field Grid</b>
Underlay	⚙️	Displays the grid under the drawing elements.	<b>View &gt; Grid &gt; Underlay</b>
Overlay	⚙️	Displays the grid over the drawing elements.	<b>View &gt; Grid &gt; Overlay</b>

### How to reposition all drawings

1. In the Tools toolbar from the Select drop-down menu, select the Reposition All Drawings  tool. This also automatically selects every stroke in your drawing in the Drawing and Camera views.
2. To deform or reposition a selection:
  - ▶ To reposition, click and drag your selection to a new area.



- ▶ To scale, pull or push on the top, side, bottom or corner control points. Hold down Shift to lock the selection's ratio.



3. When you release your cursor, every drawing contained in the drawing layer you repositioned, scaled, rotated or skewed will follow the same transformation.

### Brush Size

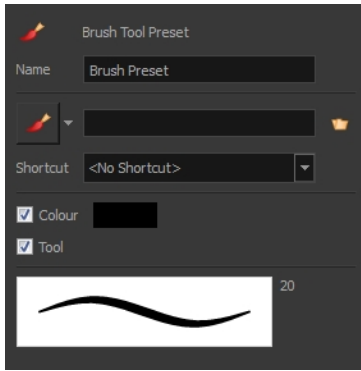
Harmony provides a variety of pens and brushes and also allows you to create and save your own through creating a tool preset.

It is a good idea to create and save pens with precise sizes and parameters to trace and design your models and breakdowns.

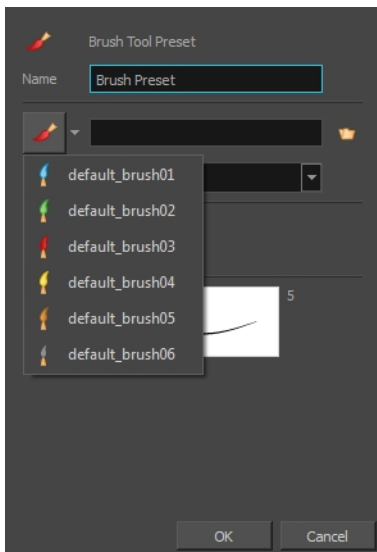
### How to create a tool preset

1. In the Tools toolbar, select a tool, for example the Brush tool.
1. Use the Tool Properties view to customize the tool.
2. To set a specific colour for your preset, in the Colour view, select the colour swatch to link to the tool. Note that when using this preset in another scene not using that colour palette, upon selecting this new preset, a colour recovery dialog box will appear asking to add this colour to your scene.
3. In the Tool Presets toolbar, click the New Tool Preset button.
4. In the New Preset dialog box, in the Name field, type a name for your new preset.





- From the icon list, select an icon to quickly identify your preset or upload your own by clicking the File 📁 button.

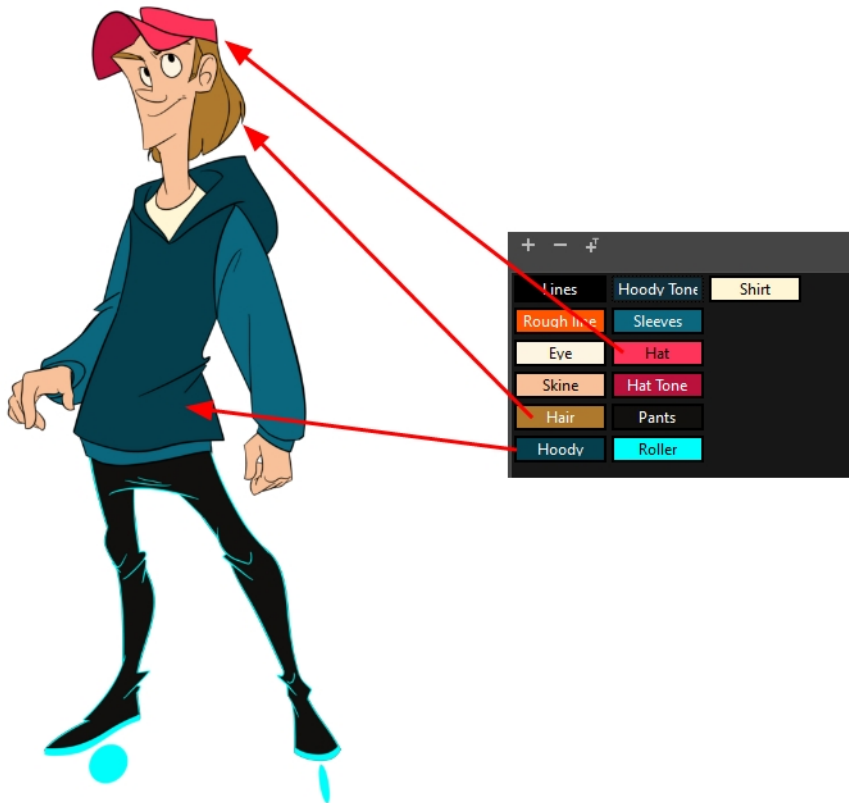


- (Optional) From the Shortcut menu, set a keyboard shortcut to quickly access your preset. By default, the shortcuts are unassigned. To assign a keyboard shortcut, go to the top menu and select **Edit > Preferences > Shortcuts > Tool Presets** (Windows/Linux) or **Stage > Preferences > Shortcuts > Tool Presets** (Mac OS X).
- When you select any of the following options, they will take effect when you use the tool preset. If an option is deselected, then using a tool preset will not override your current settings.
  - ▶ **Colour:** Saves the current colour into the tool preset.
- Click **OK**.

For more information on Tool Presets—see [Working with Tool Presets](#)

## Palettes and Colours

Harmony has an integrated palette system. Each character, prop or background can have its own set of colours and each colour in the palette can be associated to colour fill zones on a drawing. You can create as many palettes and colours as you need.




Each scene created in Harmony includes a default colour palette which contains a standard set of colours for sketching and painting.

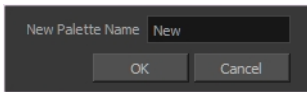
	Black
	White
	Red
	Green
	Blue
	Vectorized Line

You can sketch and design using the default palette without any problem. However, it is not recommended that you use the default palette for the colour models. A different colour palette should be created for each colour model.

To sketch and design with a different colour swatch or create a palette for each character, prop or key location, you will need to learn how to manage the Harmony palettes.

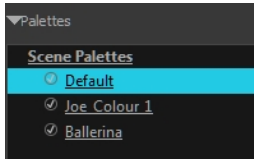
### How to create a new palette (Basic Palette Lists mode)

- From the Colour View menu, select **Palettes > New** or click the New Palette  button.
  - Make sure you have the necessary rights to modify the palette list. If not, select **Edit > Edit Palette List Mode**.
 The Create Palette window opens.
- Enter the palette name according to the model.



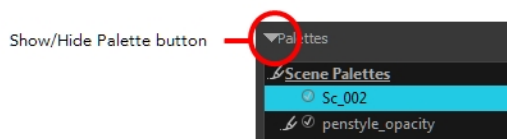
3. Click **OK**.

The palette appears in the drawing element's palette list.



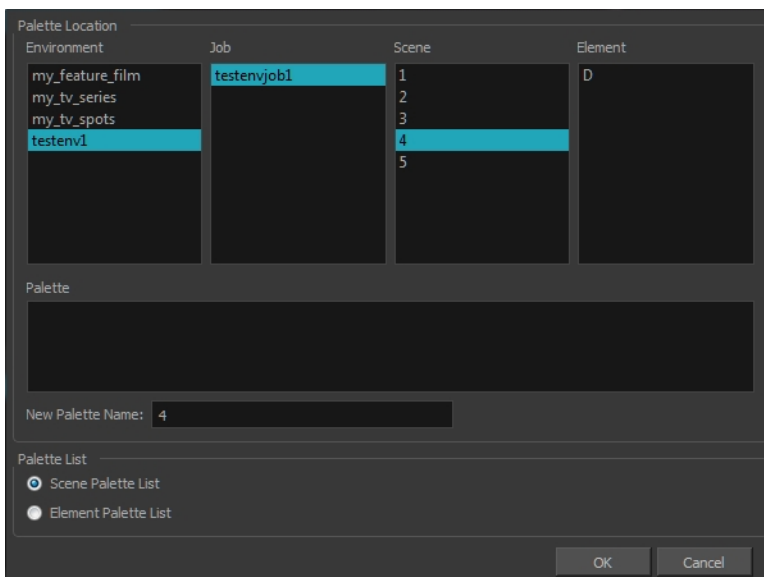
### How to create a palette from the Advanced Palette Lists mode

1. In the Timeline or Xsheet view, select the drawing that requires a palette.
2. Make sure that you have the necessary rights to modify the palette list. If you do not, select **Edit > Edit Palette List Mode**.
3. In the Colour view, click the **Show Palette List View** button to display the palette list.



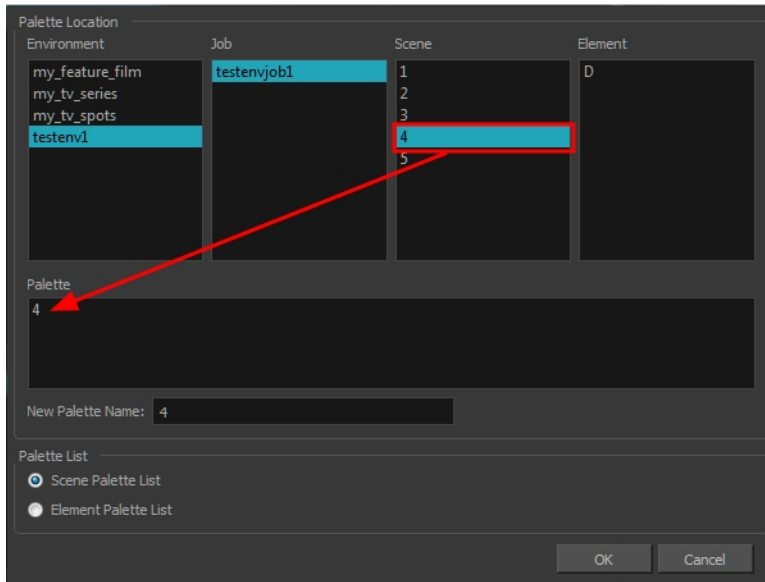
4. Do one of the following:
  - ▶ From the Colour view menu, select **Palettes > New**.
  - ▶ Click the Create Palette **+** button.

The Palette Browser: Create Palette dialog box opens.

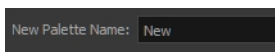


5. Select the level to store the palette file.
  - ▶ **Environment:** The palette-library folder is stored in the scene's parent environment folder.
  - ▶ **Job:** The palette-library folder is stored in the scene's parent job folder.
  - ▶ **Scene:** The palette-library folder is stored directly in the scene folder.
  - ▶ **Element:** The palette-library folder is stored directly in the drawing element folder.

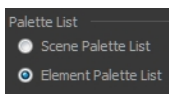
When you select a level that has a palette stored in it, the palette names are displayed in the Palette field.



6. Name the palette. There is no need to add the suffix "palette" to the name as it is always recognized as a palette file.



7. Select a Palette List option.




- ▶ The Scene Palette List is mainly used with cut-out animation. A cut-out character will often be divided in twenty to thirty different drawing elements that use the character's master palette. The palette list is stored at the scene level instead of the Element directory. This way, all palettes linked to this list will appear in every drawing element created in the scene. There is no need to manually load the palette in each element.
- ▶ The Element Palette List is mainly used with traditional and paperless animation. Unlike cut-out animation, all columns (drawing elements) contain different characters, props, backgrounds and effects. The Element Palette List is used because you do not necessarily want all of the palettes for all of your elements linked in every column.

The palette list is stored in the drawing element's directory instead of directly in the Scene level. This ensures that the links to the palettes appear only in the appropriate element. If you prefer to access a global palette list, link your palettes to the Scene Palette List.

8. Click **OK**.

The new palette appears in the palette list.

### How to lock or unlock the palette list

- ▶ In the Colour view, click the Edit Palette Mode  button.

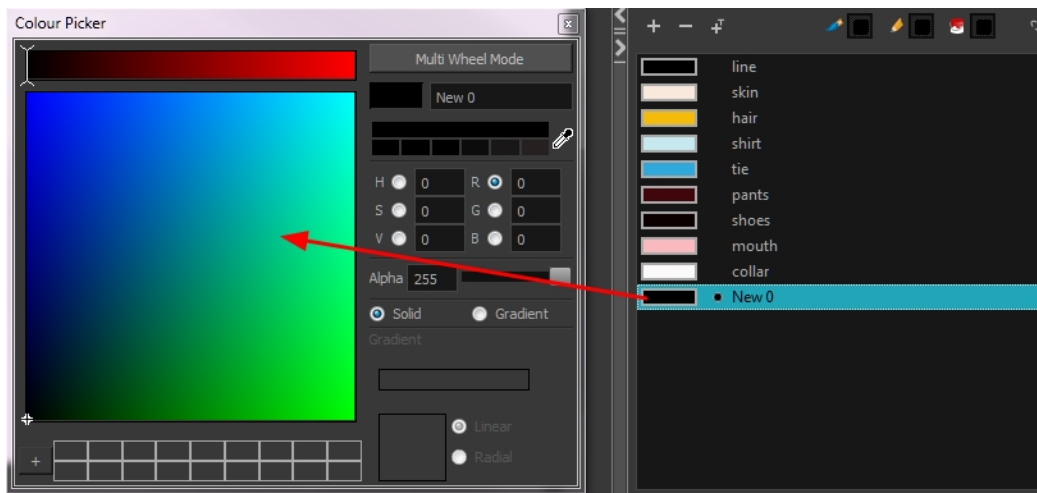
A grey pencil icon appears in the top-right corner of the Palette list.



### How to add or modify a solid colour swatch


1. In the Colour view, click the Add Colour  button.
2. From the Colour View menu, select **Colours > Edit** or double-click on the colour swatch.

The Colour Picker window opens.



3. To set your colour, do one of the following:
  - ▶ In the colour wheel, select a colour.
  - ▶ Enter the HSV or RGB values in the corresponding fields. Select the **R,G,B,H,S** or **V** options to change the look of the colour picking area.

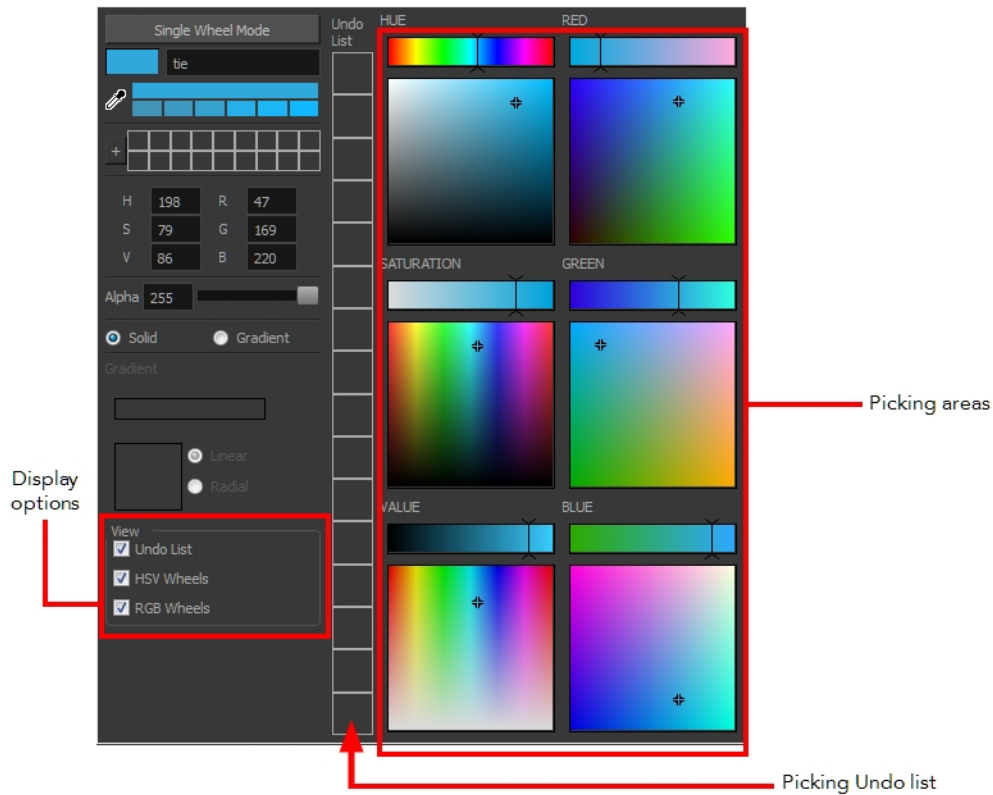


- ▶ Hold down the Dropper  button as you move along the desktop to preview colours, then release to select the colour. It can be from the Toon Boom Harmony interface, your operating system or any other open application.

**NOTE:** If the Sticky Eye Dropper option in the Preferences dialog box (Drawing tab > Options section) is selected, the dropper will not have this behaviour.



You can also click **Multi Wheel Mode** to open the Multiwheel Colour dialog box. This displays all the picking area styles together and also contains a picking undo list. To return to the regular Colour Picker window, click **Single Wheel Mode**.



- Click on the Shade Scale switches to modify the shade of the selected colour.



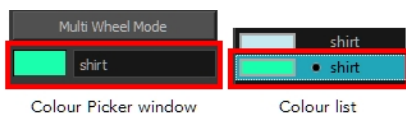
- Adjust the desired level of transparency with the Alpha slider, or type the value directly in the Alpha field.



- Click the **Add** button to add the current selected colour to the Colour Storage Library, so you can quickly access it later.



- You can rename the colour swatch in the Colour Picker window or directly in the colour list by double-clicking on its name.



## Sketching the Character



You are now ready to sketch your models. There are two tasks to perform in order to draw your characters:

- Add a drawing layer
- Sketch the model

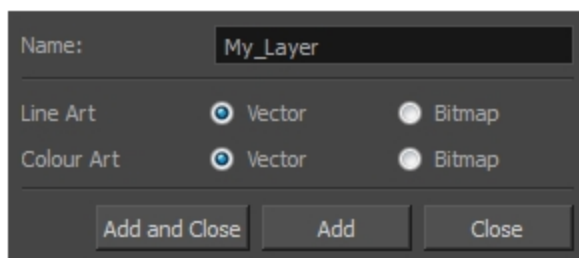
You have the choice to sketch your model as a bitmap or vector drawing. If you like the feel of drawing with bitmap lines, you can set your layer as bitmap. If you like drawing with vectors, you can set your layer as vector. If you use vector, you will be able to enlarge your drawing and zoom into it without losing quality or resolution. You can also use the Contour Editor and Select tools to resize and modify lines. If you draw with bitmap, you will not be able to scale the drawing beyond 100% of its resolution without encountering pixelization issues.

If you would like to separate your lines and colours on separated art layers, see [Art Layers on page 357](#)

### How to add a drawing layer

1. In the Timeline view, click the Add Drawing Layer  button or press Ctrl + R (Windows/Linux) or ⌘ + R (Mac OS X).

The Add Drawing Layer window opens.

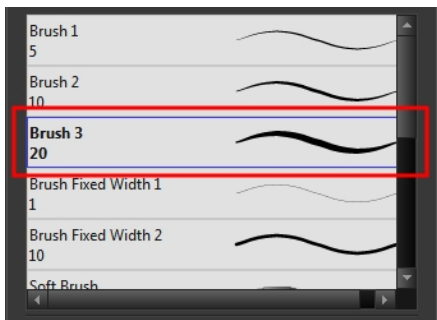




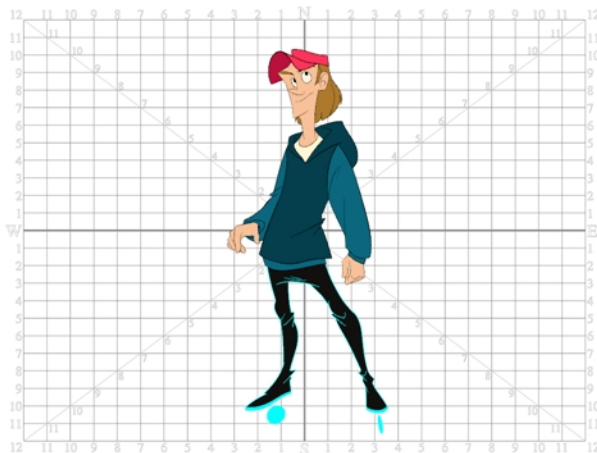
2. In the Name field, name your new layer.
3. Set the Line Art and Colour Art options to **Vector** to get a vector layer or to **Bitmap** to have a bitmap layer.
4. Do one of the following:
  - Click **Add** to add a first layer and keep the window open to add more layers.
  - Click **Add and Close** to add a new layer and close the window.
 A new drawing layer is added to the Timeline view.

## How to sketch a model

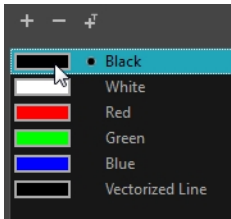
1. In the Tools toolbar, select the Brush  tool or press Alt + B.
2. In the Tool Properties view, select a brush preset and adjust its parameters.




3. In the Timeline or Xsheet view, click in the first cell of the drawing layer.
4. In the Drawing or Camera view, enable the Grid (Field Chart). You can press Ctrl + ' (Windows/Linux) or ⌘ + ' (Mac OS X).
  - Make sure the Drawing or Camera view is the active view while using the keyboard shortcut.
5. In the Drawing or Camera view, start drawing.



- To select a different colour, in the Colour view, select a different colour swatch. Double-click on the colour swatch to open the Colour Picker window and modify the colour. Remember that anything already painted with that colour swatch will update to the new colour.



- In the Camera or Drawing view, use the Rotary Table  to rotate your workspace. You can press Ctrl+Alt (Windows/Linux) or Ctrl+⌘ (Mac OS X).
  - The default keyboard shortcut to reset the workspace rotation is Shift + X.



- If you decide to draw in the next cell and need to see your previous drawing, enable the Onion Skin by pressing Alt + O.

## Cleaning and Inking the Model




When your rough models are ready, it is time to clean and ink them. You can still use the default palette and colours to do so, especially if you are not the one doing the colour styling. If you have already created a palette for your model, you can add new colours for tracing.




If you want to keep your roughs and sketches, add a new drawing layer and trace in it using the Light Table. This is the equivalent of adding a sheet of paper and tracing over the rough using the animation disk light table. You only need to disable the rough layer to prevent it from appearing in the final scene render.

If you would like to separate your lines and colours on separated art layers, see [Art Layers on page 357](#)

### How to trace your character in a new layer



1. In the Timeline view, add a new drawing layer and name it: **c1ean**.
2. If you work in the Drawing view, enable the Light Table  or press Shift + L.
3. Do one of the following:
  - ▶ In the Tools toolbar, select a drawing tool.
  - ▶ From the top menu, select **Drawing > Drawing Tools > desired tool**.
4. In the Timeline or Xsheet view, select the cell in which you want to draw.
5. Trace the model.

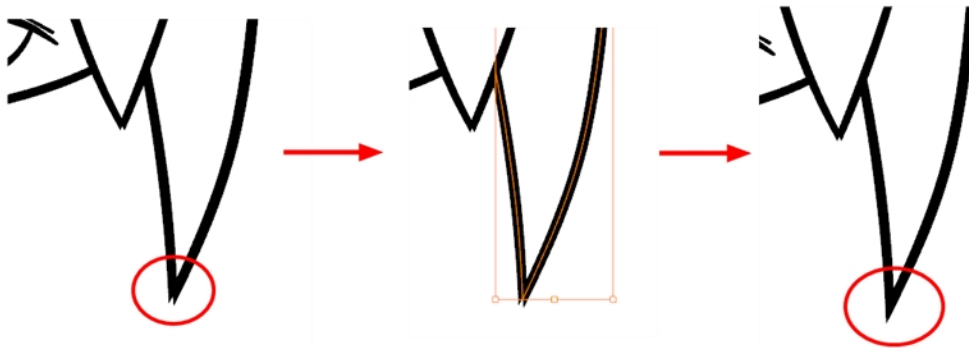


6. To make perfect points and corners, you can intersect the two strokes to create a point. Using the Cutter  tool, you can automatically trim the excess portion. In the Tool Properties view, enable the Lasso  selection type. Make sure the Use Mouse Gesture  button is enabled. In this mode, you can automatically delete any extra sections of line in your artwork by simply clicking, holding and dragging your mouse over it.

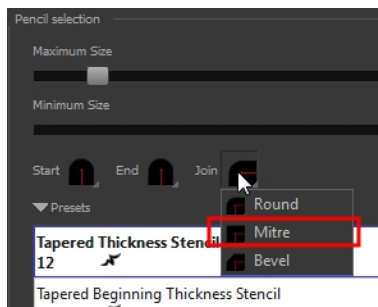


7. If you are using the Pencil tool to clean your drawing, you will need to merge your pencil lines together after cropping the points.


- ▶ In the Tools toolbar, select the Select  tool.
- ▶ In the Camera or Drawing view, select the two strokes to be merged.
- ▶ In the Tool Properties view, click the Merge Pencil Lines  button.

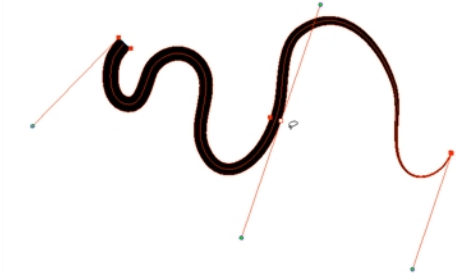


▶ You can also set the Join option to **Mitre**.

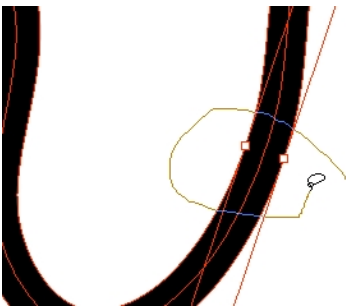


## How to add thick and thin Lines

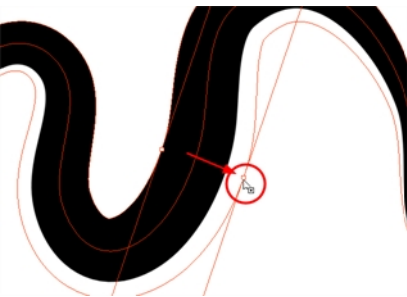
1. In the Tools toolbar, select the Pencil Editor  tool located in the Contour Editor menu.
2. In the Camera or Drawing view, select a pencil line and click the line to reshape it.



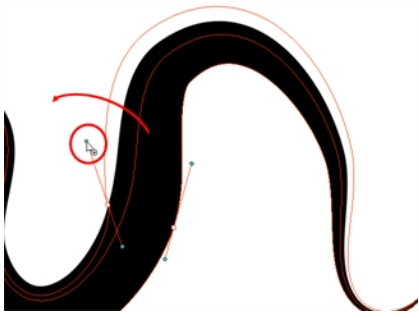
3. Select one or several points by clicking on them or circling around.



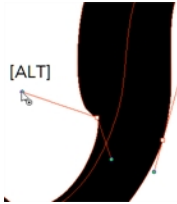
4. Press Delete to delete a selected point.
5. Press Ctrl (Windows/Linux) or ⌘ (Mac OS X) and click the central spine to add a set of points to adjust the contour.
6. To modify the shape, you can:
  - ▶ Move the selected points to a new area.



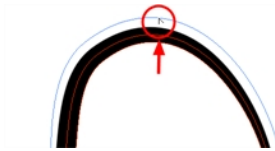
- ▶ Pull the Bézier handle to move both points' handles as one.




- ▶ Hold Alt down and pull one of the Bézier handles to move it independently from the other one.

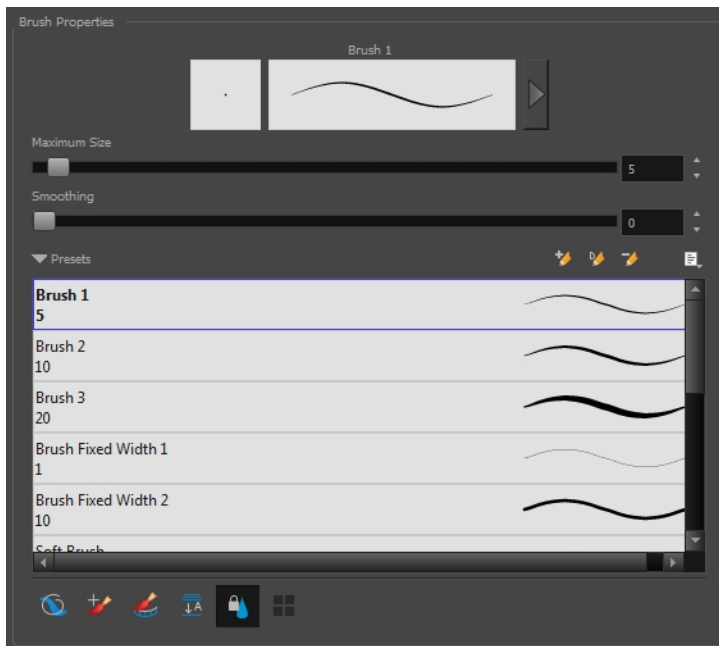


- ▶ Pull directly on the line in-between two points. No selection is necessary. Holding down the Shift key limits the contour modification to the curve between the two first points.

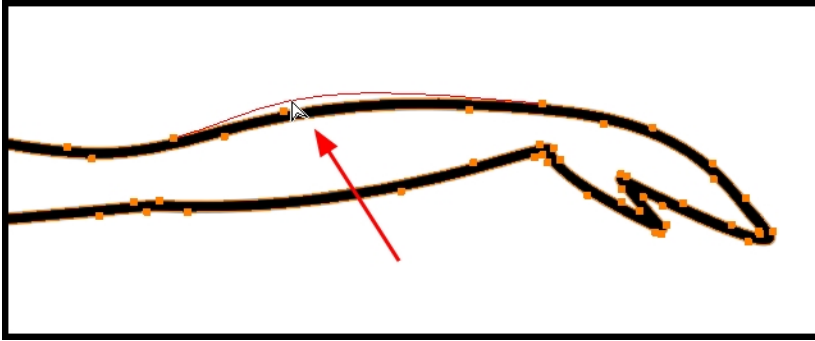


- ▶ If an anchor point has no visible bezier, hold down the Alt key to display them.

7. You can also use the Brush  tool to draw some of the lines and change the tip to an oblique shape or use a pen tablet which provides pressure sensitivity and lets you draw lines of variable thickness.



Drawing with the Brush tool does not allow you to reshape your lines as easily as with the Polyline or Pencil tool. The Brush tool creates contour vector lines (also known as *fills*) where the vector points are situated on the line's contour. Pencil lines are central vector lines in which the points follow the centre of the line.



## Drawing Tasks

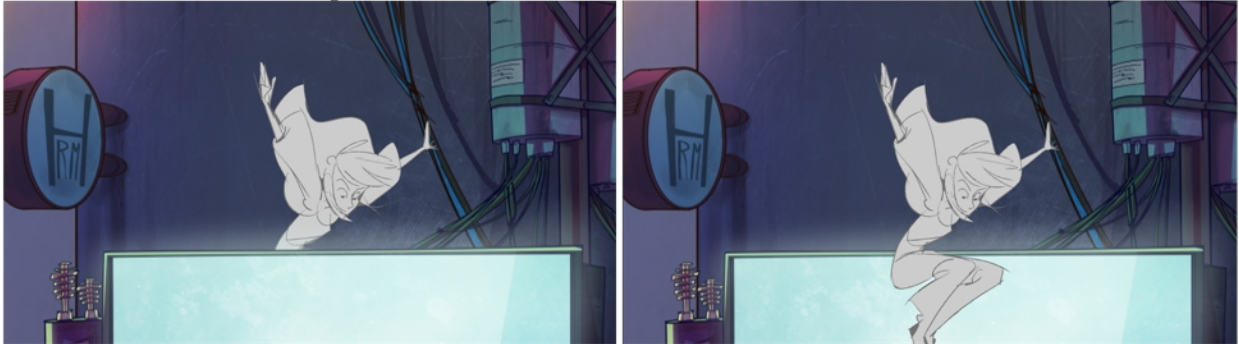
Harmony has a wide variety of drawing tools for all kinds of drawing tasks. This section covers how to use these tools. For the complete details on their options in the Tool Properties view, see [Drawing Tool References on page 127](#).

In this topic, you will learn about:

- [Current Drawing on Top](#) on page 48
- [Drawing with the Pencil Tool](#) on page 48
- [Drawing with the Brush Tool](#) on page 61
- [Drawing with Textured Brushes on Vector Drawing Layer](#) on page 68
- [Viewing the Final Lines as You Draw](#) on page 91
- [Selecting the Current Colour of a Tool](#) on page 92
- [Selecting Drawing Objects](#) on page 95
- [Erasing Parts of a Drawing](#) on page 99
- [Reshaping a Drawing Using the Contour Editor Tool](#) on page 102
- [Reshaping Pencil Lines with the Pencil Editor Tool](#) on page 104
- [Drawing with Shapes](#) on page 107
- [Drawing with the Polyline Tool](#) on page 108
- [Drawing with Invisible Lines](#) on page 109
- [Deforming a Drawing with the Perspective Tool](#) on page 111
- [Warping a Drawing with the Envelope Tool](#) on page 112
- [Cutting Drawing Parts](#) on page 114
- [Smoothing Lines](#) on page 115
- [Working With Text](#) on page 116
- [Working with Tool Presets](#) on page 117
- [More Drawing Tools](#) on page 120

## Current Drawing on Top

In Harmony, when you draw on a layer, the artwork is displayed in the correct order. For example, if the layer on which you are drawing is located behind an object on another layer, the lines you are drawing will be hidden behind that object.




This lets you display the selected drawing on top of everything while you draw. By enabling this option, each time you select a drawing tool, the selected drawing is displayed in front of everything in the Camera view. The Timeline and Node view ordering remain unchanged.

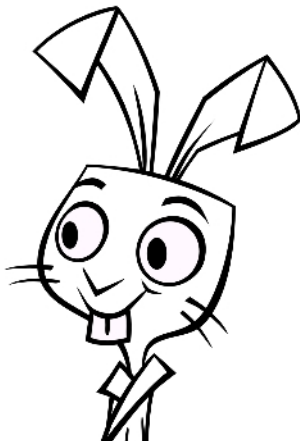
The Current Drawing on Top status (enabled or disabled) is remembered when you exit Harmony. When you restart the application, the last status will be used.

You only need to enable this option once, it is not necessary to do it each time you select a drawing tool.

### How to display the drawing on top

1. Do one of the following:
  - ▶ From the top menu, select **View > Show > Current Drawing on Top**.
  - ▶ In the Camera bottom toolbar, click the Current Drawing on Top  button.
2. In the Tools toolbar, select a drawing tool.
3. In the Camera view, start drawing.


## Drawing with the Pencil Tool

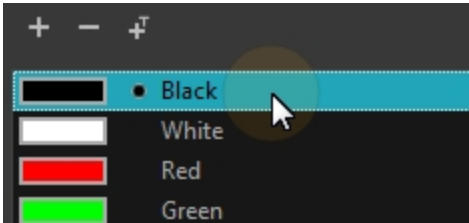




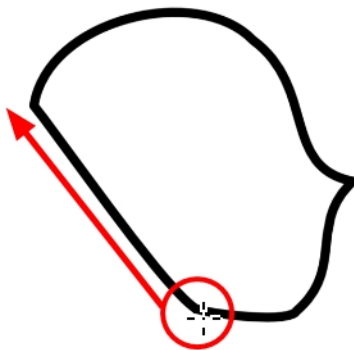
The Pencil tool is for drawing the final images, such as character nodes, cut-out puppet and clean animation. The pencil creates a central vector shape. Pencil lines support pressure sensitivity and texture.

### How to draw with the Pencil tool


1. In the Timeline or Xsheet view, select the cell on which you want to draw.
2. In the Tools toolbar, select the Pencil  tool or press Alt + /.
3. In the Colour view, click a colour swatch to select a colour.

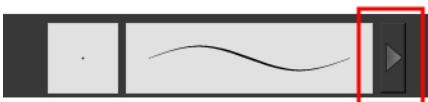


4. In the Drawing or Camera view, start drawing.
  - When you get close to an existing pencil line, hold Alt to draw and connect your stroke to the existing one. Pencil lines are central vector lines and you might think your line is connected, but in fact, only the contour is touching the other one. Also, make sure the central vector crosses the other one. To connect the start or end of your stroke, hold Alt when you start or finish drawing a line.
  - To draw a straight line, press Shift + Alt as you draw.

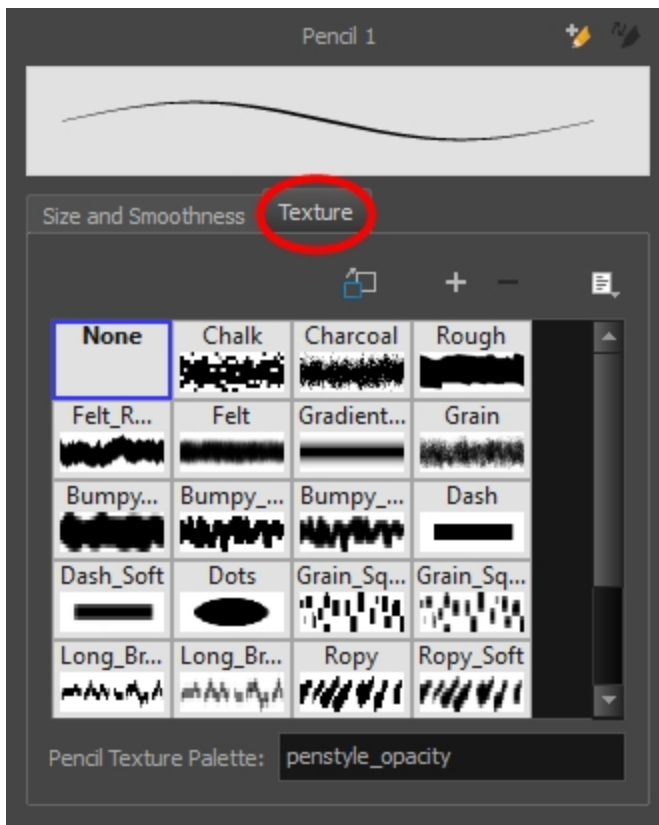
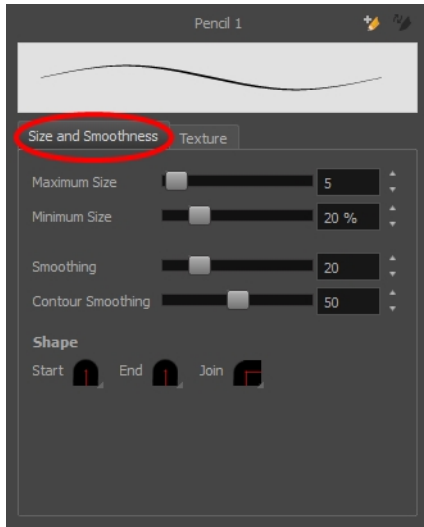


### How to modify the pencil settings

1. In the Tools toolbar, select the Pencil  tool or press Alt + /.
2. In the Tool Properties view, the preview area displays the stroke that will be produced after you customize the different parameters in the Tool Properties view. Click the arrow button.

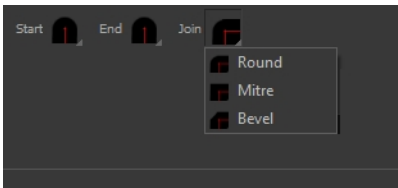


The Pencil Properties window opens.



This is where you set the minimum and maximum sizes of your drawing tool which will produce the thick and thin effect on your stroke. This works with the pressure sensitivity of a pen tablet.

Parameter	Description
Size and Smoothness tab	
Maximum Size	Sets the maximum width of the line.


Minimum Size	Sets the minimum width of the line in relation to the maximum size.
Smoothness	Lets you modify the central line smoothness of the line. This parameter smooths the initial movement of your line. Increasing the value will result in a smoother line with fewer control points.
Contour Smoothness	Optimizes the contour line smoothness of the line. This parameter will smooth the contour of the line once it has been traced; the higher the value, the fewer control points will compose your line.
Shape	 <p>You can adjust the start, end, and joint style of a selected pencil line.</p> <ul style="list-style-type: none"> <li>• <b>Start:</b> Lets you select the style of the start tip, which is the first tip you drew. You can choose between Round or Flat style.</li> <li>• <b>End:</b> Lets you select the style of the end tip, which is the last tip you drew. You can choose between Round or Flat style.</li> <li>• <b>Join:</b> Lets you select the joint style. The joints are where the line curves abruptly. You could also define the Join style as the corner style. You can choose between Round, Mitre and Bevel style.</li> </ul>
Texture tab	
Texture	See <a href="#">Pencil Line Texture</a> on page 57.

## Working with Pencil Presets







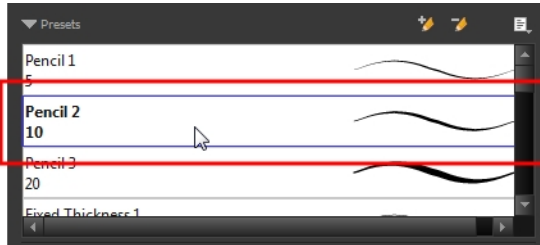
A pencil preset is a pencil with specific properties. You can work with regular pencil presets and thickness stencils.

Regular pencil presets allow you to set the size and smoothing of the line or shape. As you draw, the thickness of the line varies according to the amount of pressure you apply with a pen and tablet.

Thickness stencils that are indicated with this  icon are also set with specific properties, but disregard the pressure you use with your pen and tablet. The line thickness varies. You can access thickness stencils from the list of presets on the Tool Properties view or create your own.

### How to select a pencil preset






1. In the Tools toolbar, select the Pencil , Line , Ellipse , or Rectangle  tool.
2. In the Tool Properties view, use the Presets menu to select a pencil preset.

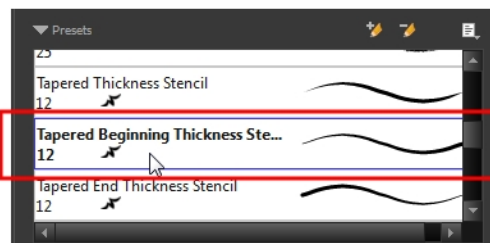


3. In the Drawing or Camera view, draw your pencil line or shape.

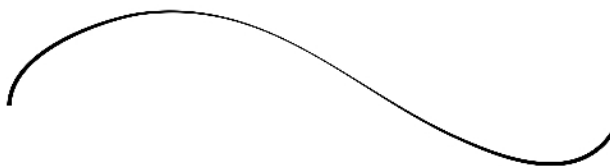


### How to select a pencil thickness stencil






1. In the Tools toolbar, select the Pencil , Line , Ellipse , or Rectangle  tool.
2. In the Tool Properties view, use the Presets menu to select a thickness stencil. They are marked with this  icon.



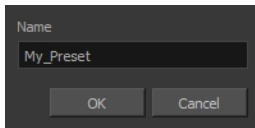
3. In the Drawing or Camera view, draw your pencil line or shape.



### How to create a pencil preset


1. In the Tools toolbar, select the Pencil , Line , Ellipse , or Rectangle  tool.
2. In the Tool Properties view, adjust your pencil settings—see [How to modify the pencil settings on page 49](#).
3. In the Tool Properties view, click the New Brush  button.

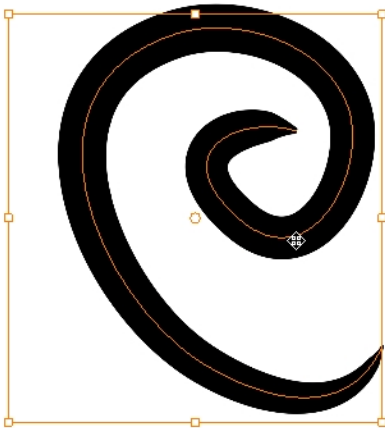
The New Preset dialog box opens.




4. Type in a name for your new pencil thickness stencil and click **OK**.
5. Start drawing in the Drawing or Camera view.

### How to create a pencil thickness stencil

1. In the Tools toolbar, select the Select  tool.
2. In the Camera view, select the pencil line or shape from which you want to take the style.




3. In the Tool Properties view, click the New Thickness Stencil  button.

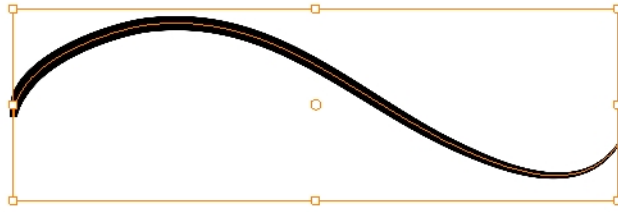
A new thickness stencil is added to the end of the list in the Presets menu.

4. In the Presets menu, select a new thickness stencil and click on a line or shape in the Drawing or Camera view to apply the thickness stencil you created.

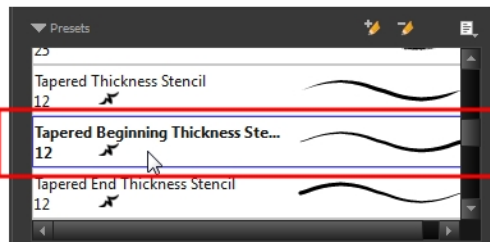
### How to apply a thickness stencil to a pencil line or shape

1. In the Tools toolbar, select the Select  tool.

- In the Drawing or Camera view, select the pencil line or shape on which you want to apply a style.








- In the Tool Properties view, select the style you want to apply from the Presets list.



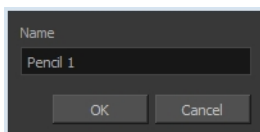
The style you selected is applied to your selection.



### How to rename a thickness stencil or pencil preset



- In the Tools toolbar, select the Pencil , Line , Ellipse , or Rectangle  tool.
- In the Presets menu, select the thickness stencil or preset you want to rename.
- From the Brush menu , select **Rename Brush**.

The Rename Preset dialog box opens.




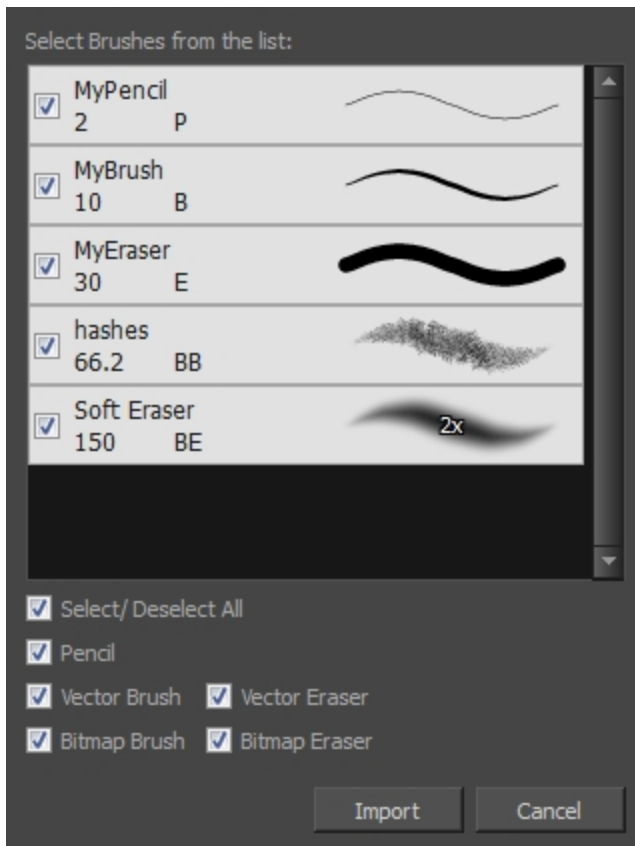
- In the Name field, type in the new name.
- Click **OK**.

### How to delete a thickness stencil or pencil preset

1. In the Tools toolbar, select the Pencil  tool.
2. In the Presets menu, select the thickness stencil or preset to delete.
3. Click the Delete Preset  button.

### How to import pencils, brushes and erasers

1. From the Brush menu , select **Import Brushes**.
2. In the browser window that appears, navigate to and select the **.xml** file.
3. Click **Open**.
4. In the Import Brushes dialog box, select the brushes brushes and erasers you want to import. You can also import pencils at the same time.

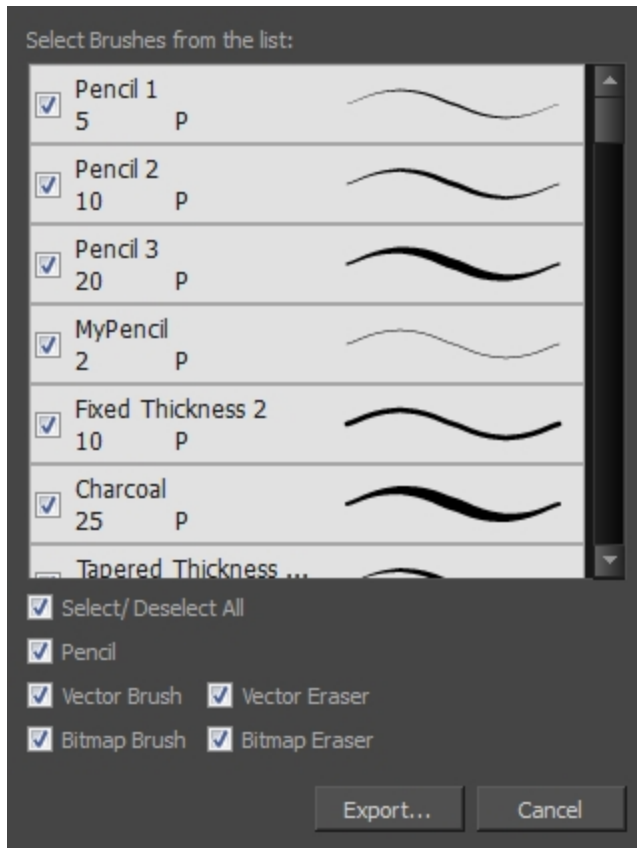


5. Click **Import**.

The imported brush, eraser and pencil styles will appear in the presets library. You can reuse any of the imported tips to create other brush, eraser and pencil style presets.

### How to export pencils, brushes and erasers

1. From the Brush menu, select **Export**.
2. In the Export Brushes dialog box, select the bitmap and vector brushes and erasers to export, as well as any pencils.



3. Click **Export**.
4. In the Export Brushes window that appears, browse to the location where you want to save the .xml file and give it a name.
5. Click **Save**.

### How to change the Presets Library thumbnail display

1. From the Brush menu, select one of the following:

Parameter	Description
Small Thumbnail	Reduces the size of the thumbnails in order to view more at the same time. Displays an image of the tool's tip and its maximum size.
Large Thumbnail	Increases the size of the thumbnails in order to see the images more clearly. Displays an image of the tool's tip, its maximum size and its name.
Stroke View	Displays the tool's name, maximum size and stroke preview.



## Pencil Line Texture


You can apply a texture to a pencil line. Pencil lines support texture. Before drawing, you can select or import a texture and apply it to your lines. You can also change it afterwards using the Select tool. Textures are independent from pencil templates.

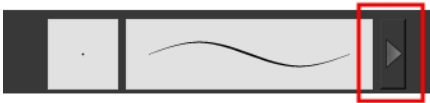
When you import a texture in your pencil styles, it is saved in your scene. If you want to add that texture to a bank that you will reuse in different scenes, you can add that texture to your preferences.

There is a pencil texture palette created in each scene. In order for this palette to be created, you need to draw a pencil stroke using texture. To see it, you need to enable the Advance Palette Lists option. Once enabled, you will see a palette named `pencilstyle_opacity` in your palette list.

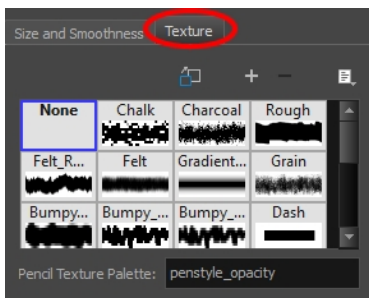
For advanced usage, you can assign a custom palette as your pencil texture palette. All textures used to draw in your scene will be added to this custom palette. This gives you the ability to save your custom palette at the Environment or Job level if you want to reuse that palette in more than one scene.

### How to apply a preset texture to a pencil line

1. In the Tools toolbar, select the Pencil  tool.
2. In the Tool Properties view, the preview area displays the stroke that will be produced after you customize the different parameters in the Tool Properties view. Click the arrow button.




3. In the Pencil Properties editor, select the Texture tab.

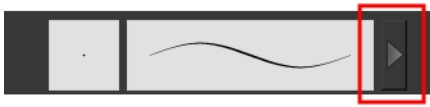






4. In the Texture library, select a texture for the pencil.
5. In the Camera or Drawing view, draw a pencil line.



### How to create a pencil texture template with the Pencil tool

1. In the Tools toolbar, select the Pencil  tool.
2. In the Tool Properties view, click the arrow button beside the stroke preview area.

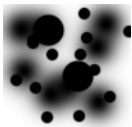


3. In the Pencil Properties editor, click the New Texture  button or select **New Texture** from the Texture  menu.
  - To delete a preset style, click the Delete Texture  button or select **Delete Texture** from the Texture  menu.
4. Browse for your bitmap texture file.

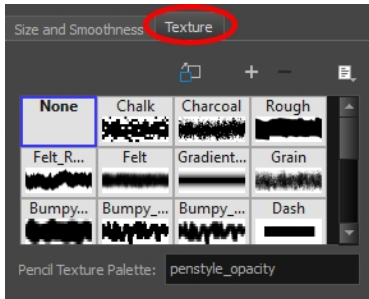
#### NOTE:


The following file formats are supported: .jpg, .png, .psd, .sgi, .tif. Your texture **MUST HAVE** an alpha channel.

5. Click **Open**.  
The imported texture is saved in your texture list.

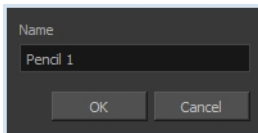


6. In the Pencil Properties editor, select your new texture.



- Click the Texture menu  and select **Rename Texture**.


The Rename Opacity Texture dialog box opens.

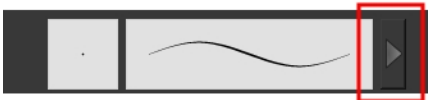



- In the Name field, type the template name and click **OK**.
- In the Camera or Drawing view, draw your pencil line with your new texture.




### How to add a texture to your preferences

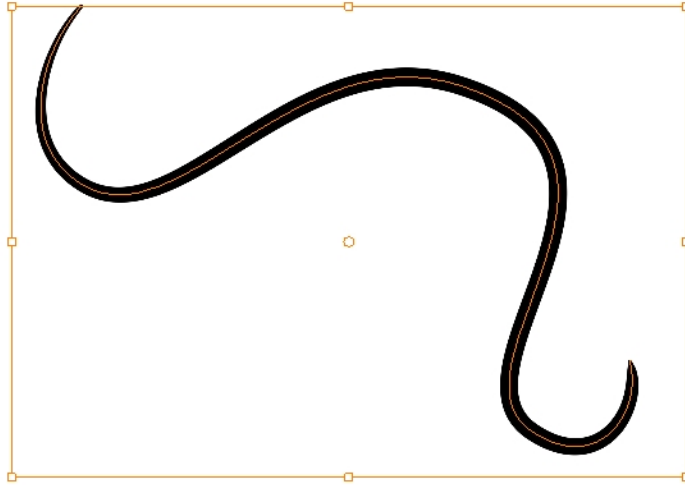
- In the Tools toolbar, select the Pencil  tool.
- In the Tool Properties view, click the arrow button beside the stroke preview area.



- In the Pencil Properties editor, select a texture from the Textures area to add to your preferences.
- Click the Copy to Preference  button.

### How to apply a preset texture to a pencil line

1. In the Tools toolbar, select the Select  tool.
2. In the Drawing or Camera view, select a pencil line.



3. In the Tool Properties view, select a texture from the Textures area to apply to the selected stroke.



### How to assign a custom palette as the Pencil Texture Palette

1. In the Colour view, create your custom palette and save it at the level of your choice.
2. Select the palette you want to assign as your pencil texture palette.
3. From the Colour view menu, select **Palette > Pencil Texture Palette**.

### How to enable the Advanced Palette Lists preference

1. From the top menu, select **Edit > Preferences** ( Windows/Linux ) or **Stage > Preferences** ( Mac OS X ).
2. In the Preferences dialog box, select the **Advanced** tab.
3. In the Advanced Options section, select the **Advanced Palette Lists** option.
4. Click **OK**.

## Drawing with the Brush Tool



The Brush tool is pressure sensitive and lets you create a contour shape with a thick and thin line effect, as if it was created with a paint brush.

With the Brush tool, you can draw as vector or bitmap, depending on your preference. When you add a drawing layer, you can simply select the vector or bitmap option. If you draw with vector, you can enlarge your drawing and zoom into it without losing quality or resolution. You can also use the Contour Editor and Select tools to resize and modify lines. If you draw with bitmap, you will not be able to scale your drawing beyond 100% of its resolution without encountering pixelization issues.

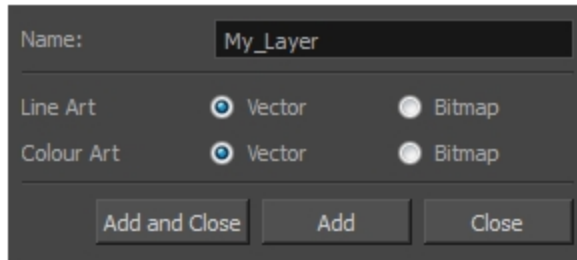
You can create your own brush styles. A variety of brush styles are provided allowing you to create and save your own. This way you can create brushes with precise sizes and parameters and save them so you can draw and design with them. Renaming a brush can make it easier to identify and access the brushes you use most frequently.

A dynamic brush can be created for drawing using patterns created from your artwork. Create a new dynamic brush to copy a pattern you have drawn to reproduce it quickly. You can create dynamic brushes using a single or multiple patterns that automatically switch through the patterns as you draw.

### How to draw with the Brush tool

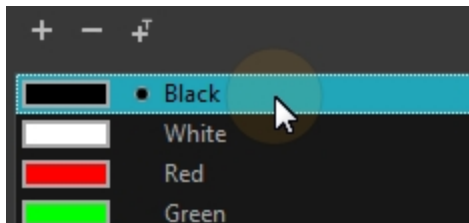
1. In the Timeline view, click the Add Drawing Layer  button or press Ctrl + R (Windows/Linux) or ⌘ + R (Mac OS X).

The Add Drawing Layer window opens.

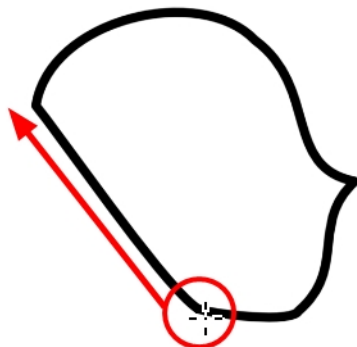


2. In the Name field, name your new layer.
3. Set the Line Art and Colour Art options to **Vector** to get a vector layer or to **Bitmap** to have a bitmap layer.
4. Do one of the following:
  - Click **Add** to add a first layer and keep the window open to add more layers.
  - Click **Add and Close** to add a new layer and close the window.
 A new drawing layer is added to the Timeline view.

5. In the Timeline or Xsheet view, select the cell on which you want to draw.
6. In the Tools toolbar, select the Brush 🖌️ tool or press Alt + B.
7. In the Colour view, click a colour swatch to select a colour.



8. In the Drawing or Camera view, start drawing.
  - Hold Ctrl (Windows/Linux) or ⌘ (Mac OS X) to force a line to join the start and end of the shape while drawing.



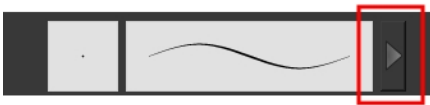
## How to select a brush style

1. In the Tools toolbar, select the Brush 🖌️ tool or press Alt + B.
2. In the Tool Properties view, select a brush style from the Presets section.

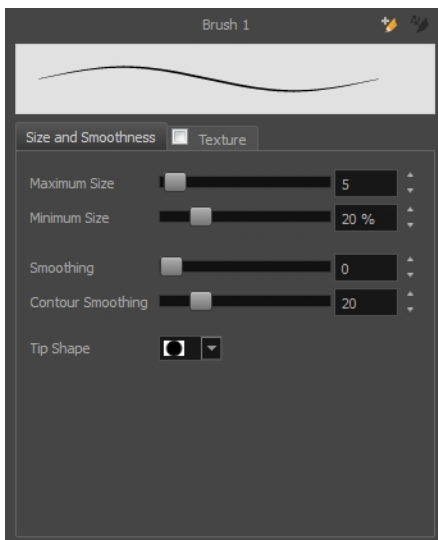


## How to modify the brush settings

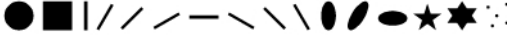
1. In the Tools toolbar, select the Brush 🖌️ tool or press Alt + B.
2. In the Tool Properties view, the preview area displays the stroke that will be produced after you customize the different parameters. Click the arrow button.



The Brush Properties window opens.




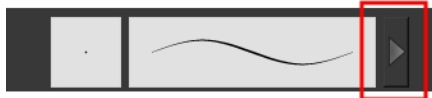
This is where you set the minimum and maximum sizes of your drawing tool which will produce the thick and thin effect on your stroke. This works with the pressure sensitivity of a pen tablet.



Parameter	Description
Size and Smoothness Tab	
Maximum Size	Sets the maximum width of the line.
Minimum Size	Sets the minimum width of the line in relation to the maximum size.
Smoothness	Lets you modify the central line smoothness of the line. This parameter smooths the initial movement of your line. Increasing the value will result in a smoother line with fewer control points.
Contour Smoothness	Optimizes the contour line smoothness of the line. This parameter smooths the contour of the line once it has been traced. The higher the value, the fewer control points will compose your line.
Tip Shape	Lets you select a tip shape—from round and square ones to star shaped. This option is disabled when using a textured brush. 
Texture Tab	
Texture	See <a href="#">Drawing with Textured Brushes on Vector Drawing Layer</a> on page 68

**NOTE:** If you are trying to create artwork on a bitmap drawing layer, and therefore with a bitmap brush, see [Drawing with Bitmap Brushes on Bitmap Drawing Layers](#) on page 79

### How to create a brush preset

1. Make sure your current brush has the settings you want in the preset you will create.
2. In the Tool Properties view, do one of the following:
  - ▶ Click the arrow button to display the Brush Properties window and click the New Brush  button in the upper-right corner.



- ▶ Click the New Brush  button.
  - ▶ From the Brush  menu, select **New Brush Preset**.
3. In the New Preset window, type a name for your new brush preset.  
The new brush is added to the end of the list of brush presets.




### How to update a brush preset

1. Select the brush preset to update and click the arrow button to display the Brush Properties window.





2. Change the brush settings and click the Update Brush Preset  button in the upper-right corner.

### How to rename a brush

1. In the Tool Properties view, select a brush to rename.
2. From the Brush  menu, select **Rename Brush**.
3. Type in a new name for the brush and click **OK**.


### How to delete a brush preset

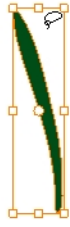
1. In the Tool Properties view, select the brush preset you want to delete.
2. Do one of the following:
  - ▶ Click the Delete Brush  button.
  - ▶ From the Brush  menu, select **Delete Brush**.




### How to create a new dynamic brush

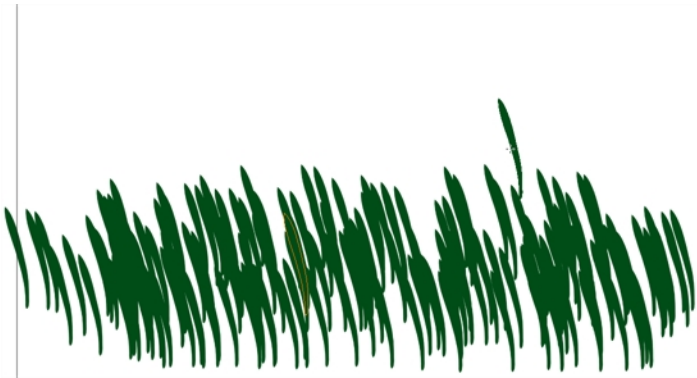
1. In the Tools toolbar, select a drawing tool.
2. In the Camera or Drawing view, draw the pattern you want to use as your dynamic brush stamp.



3. In the Tools toolbar, click the Select  tool and select the parts of the drawing you want to repeat.




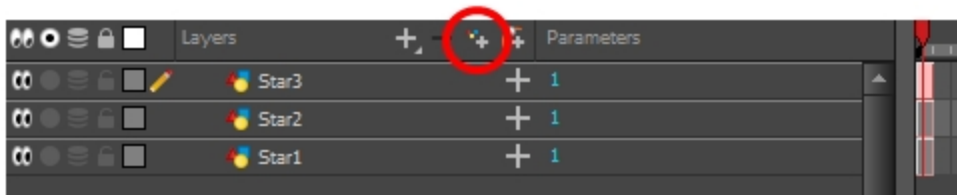
4. In the Tools toolbar, select the Brush  tool or press Alt + B.
5. In the Tool Properties view, click the Add Dynamic Brush  button to add your selection as a new dynamic brush preset.
6. From the Brush  menu, select **Rename Brush**.
7. Type in a name for the new dynamic brush and click **OK**.
8. In the Camera or Drawing view, start drawing with your dynamic brush to quickly repeat a pattern.



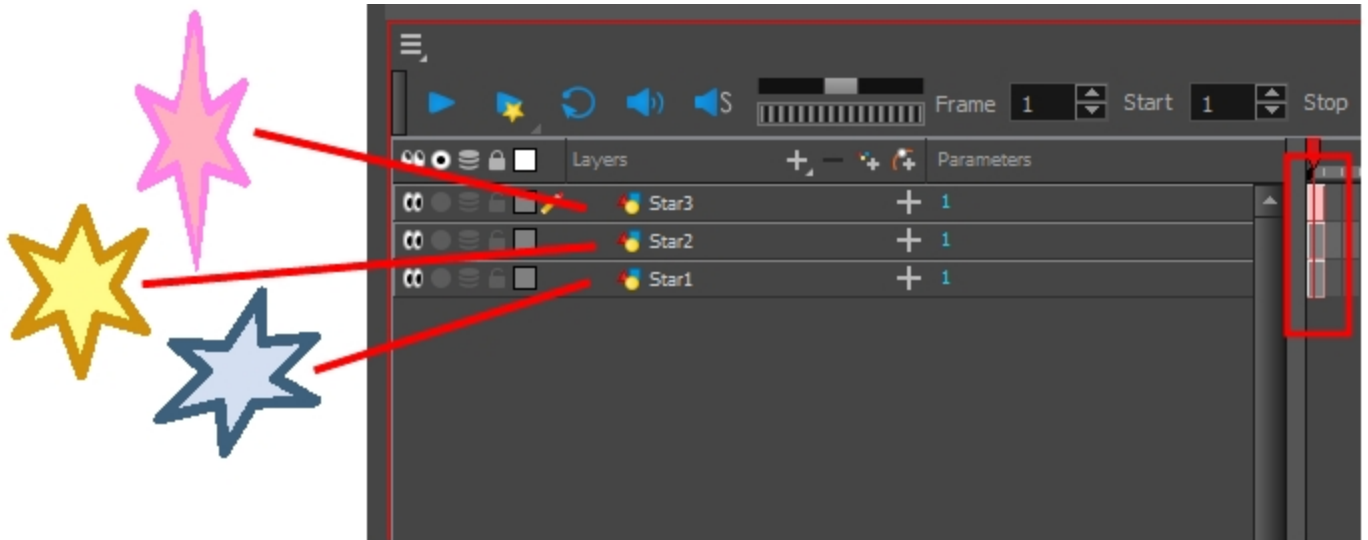
9. To adjust the scale of your pattern to make it bigger or smaller as you stamp it, adjust the Maximum Size value in the Tool Properties view.



### How to create a dynamic brush with multiple drawings

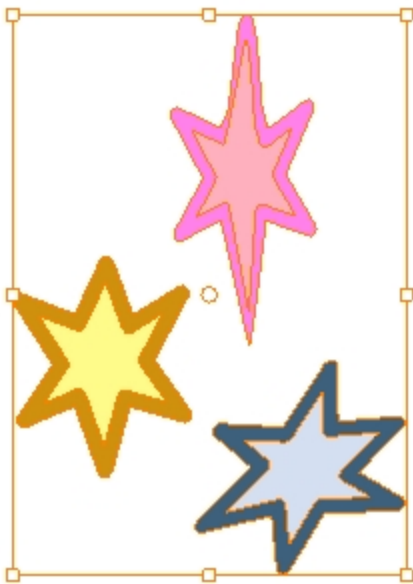
1. In the Timeline view, click the Add Drawing Layers  button to create the layers you want to use as patterns in your dynamic brush. Make sure to rename your layers.





2. In the Camera view, draw the individual drawings of your pattern on separate layers.



3. In the Tools toolbar, select the Select  tool.
4. In the Tool Properties view, disable the Works on Single Drawing  option to allow the Select tool to grab artwork on multiple layers.
5. In the Camera view, select all the drawings you want to add to your new dynamic brush.



6. In the Tools toolbar, select the Brush  tool or press Alt + B.
7. Click the Add Dynamic Brush  button to add your selection as a new Dynamic Brush preset.
8. From the Brush menu, select **Rename Brush**.  
The Rename Preset dialog box opens.

9. Type in a name for the new dynamic brush and click **OK**.
10. In the Camera or Drawing view, start drawing with your dynamic brush to quickly repeat a pattern. When you use this brush, you will cycle through the drawings.



### Drawing with Textured Brushes on Vector Drawing Layer



In Harmony, you can use the Brush  tool to draw bitmap textured lines.

In the Brush Tool Properties view, you will find a series of default textured "brushes", but you can also create and import your own custom collection. In Harmony, when using a textured brush on a vector layer, the texture of a brush is referred to as the *Paper Texture*. In other words, we are attributing the texture not to the tool, but to the texture of the surface that is revealed when a stroke passes over it. You will understand why when you work with bitmap brushes on bitmap layers, where it is possible to have both a textured brush tip and a paper texture.

To create your own textured brush, you must prepare your texture file ahead of time, either in Harmony or in a third-party software, such as Adobe Photoshop. Colour is not supported and transparency is not supported in the traditional sense. Black appears as 100% opaque, white appears as 100% transparent, and all the shades of grey in between appear as varying degrees of semitransparency. A range of file formats are supported—.jpeg, .png, .tif, .psd, .tga to name a few. Alpha channels are disregarded on import. It is recommended that you maintain the texture resolution between 100 x 100 pixels and 400 x 400 pixels.

You can import your custom paper textures in the extended Brush Properties window. Browsing for a texture file with a brush selected that is already using a paper texture will replace the file currently in use. It will not, however, replace the texture in lines already drawn. The replaced texture swatch will no longer be the selected texture, but it will remain in the texture library and not be deleted.


Harmony also allows you to import textures as an .xml file that was exported from another project. In this way, you do not have to import individual image files one-by-one to have the same texture library and brush presets as others who you are collaborating with. You can also export brush presets and textures, in order to share your default or customized textures and presets with other project collaborators.

When you use the Eraser tool to erase a portion of a textured line, the vector frame is cut straight and you lose the feather created while drawing with the Brush tool. In Harmony, a special option in the Eraser Tool Properties lets you create a soft edge on your textured lines. You can also cut or keep the vector frame as is.

At some point, you may want to modify the look of a textured drawing if you suddenly find that your lines look too hard or too light. You can adjust those parameters by using the Adjust Line Texture Opacity command.

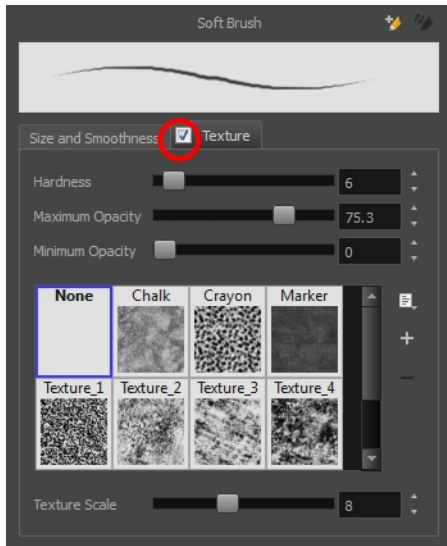
To draw with textured lines, use the Brush tool and the correct brush in the list. You can also draw with pencil line texture—see [Pencil Line Texture on page 57](#)

### How to draw with textured lines



1. In the Tools toolbar, select the Brush  tool or press Alt + B.
2. In the Tool Properties view, select a brush and click the Arrow button to open the Brush Properties view.



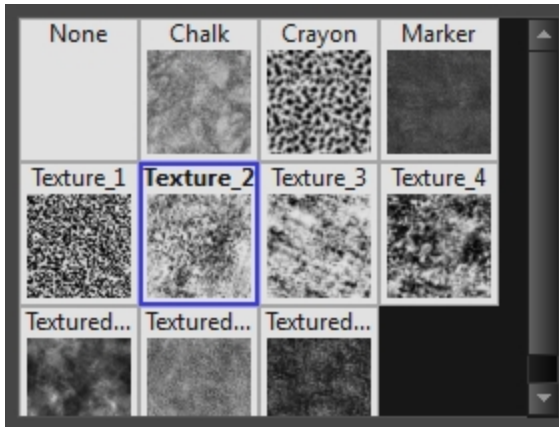
3. Click the Texture tab, select the **Texture** option.



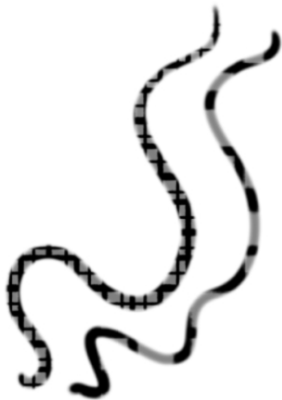
4. Set the following parameters:

Parameter	Description
Hardness	<p>The hardness value corresponds to the softness of the line edge. The lower the value, the softer the line edge will be. The higher the value, the sharper the line edge will be.</p> 
Maximum Opacity	<p>This value corresponds to the transparency of the stroke when the pressure is heavy.</p>
Minimum Opacity	<p>This value corresponds to the transparency of the stroke when the pressure is light and is a percentage of the Maximum Opacity value.</p> 

5. Select a texture for your brush from the premade textures available.



6. Adjust the Texture Scale to change the size of the texture in the lines you draw. If you are using a plaid texture, the squares will be larger if you increase the value and smaller if you decrease it.

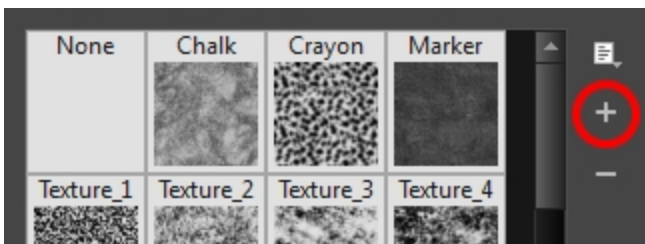


7. In the Camera or Drawing view, start drawing.



### How to add a paper texture

1. Do one of the following:
  - ▶ From the Paper Texture menu , select **Add**.
  - ▶ Click the Add Paper Texture button.



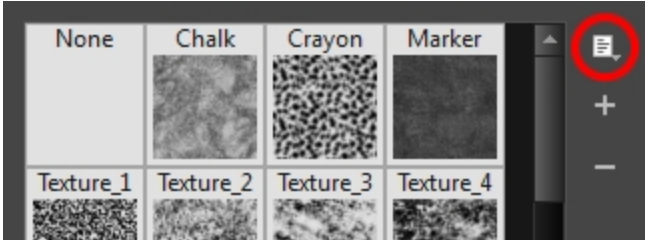
2. In the browser window that appears, navigate to where you saved your texture file.
3. Click **Open** to import the file into the Paper Texture library.

By default, an imported texture is given the name of the image file.

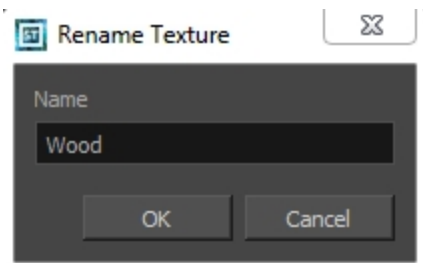


### How to rename a paper texture

1. In the Paper Texture library, select a texture.
2. From the Paper Texture menu, select **Rename**.




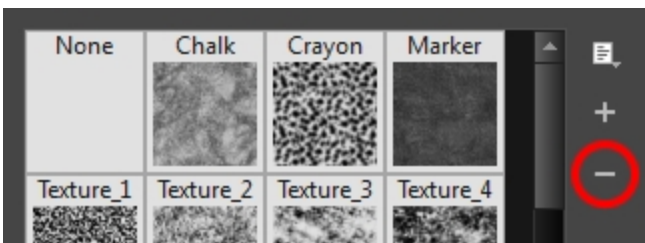
3. In the Rename Texture dialog box that appears, type in the new name for the texture.



4. Click **OK**.

### How to delete a paper texture

1. In the Paper Texture library, select a texture.
2. Do one of the following:
  - ▶ In the Paper Texture menu, select **Delete**.
  - ▶ Click the Delete  button.



**NOTE:** You can delete any texture in the texture library as long as there is no brush preset using it.

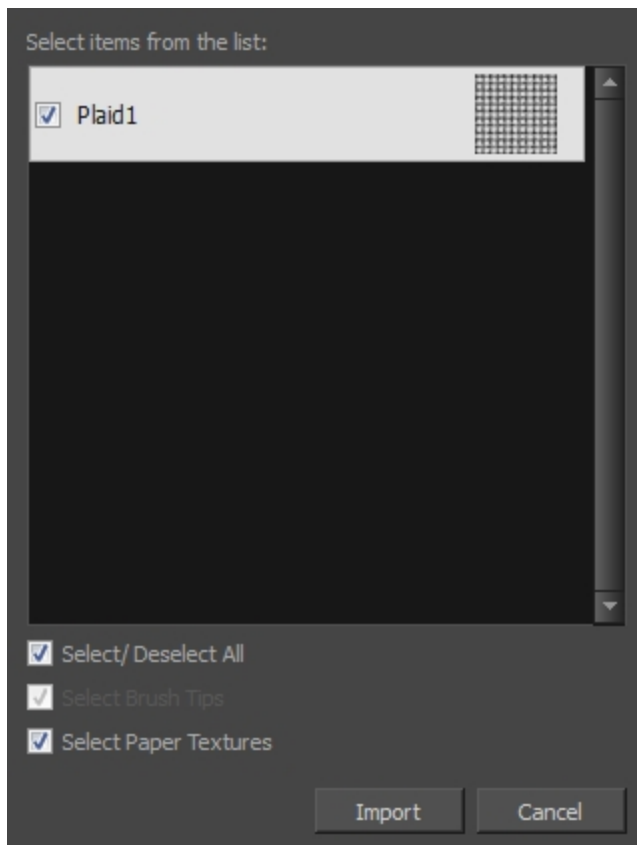
### How to change the Paper Texture thumbnail display

1. From the Paper Texture menu, select one of the following:

Parameter	Description
Small Thumbnail	Reduces the size of the thumbnails in order to view more at the same time.
Large Thumbnail	Increases the size of the thumbnails in order to see the images more clearly.
List View	Allows you to see the name, as well as the thumbnail.

### How to import paper textures

1. In the Paper Texture menu, select **Import**.
2. In the browser window that appears, navigate to and select the **.xmi1** file.
3. Click **Open**.
4. In the Import Textures dialog box, select the paper textures that you wish to import. You can import any available brush tips at the same time too.

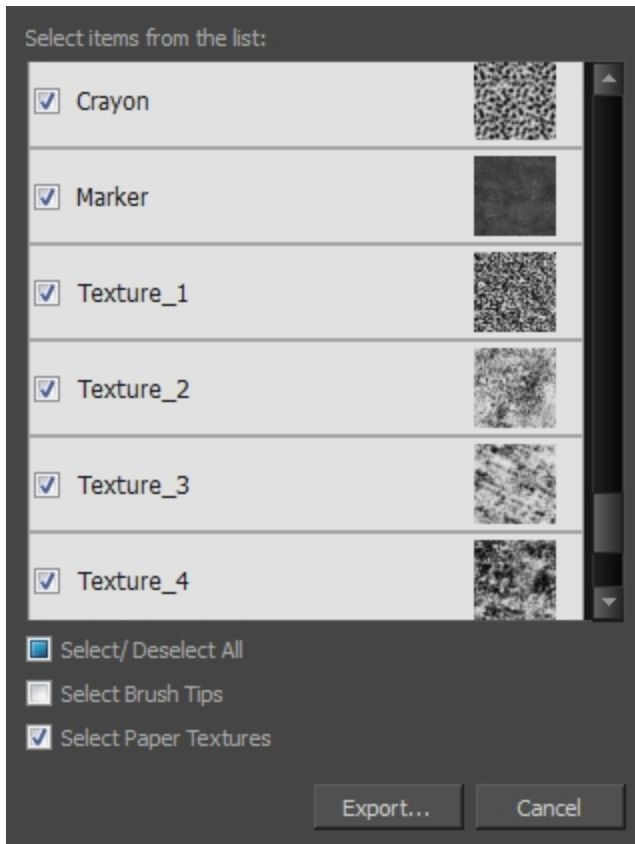


5. Click **Import**.

The imported paper textures will appear in the Paper Texture Library. You can reuse any of the imported paper textures to create other brush style presets.


## How to export paper textures

1. In the Paper Texture menu, select **Export**.
2. In the Export Tips and Textures window, scroll down the textures list to the paper textures and select or deselect any textures to create the list that you wish to export. You can export brush tips at the same time too.



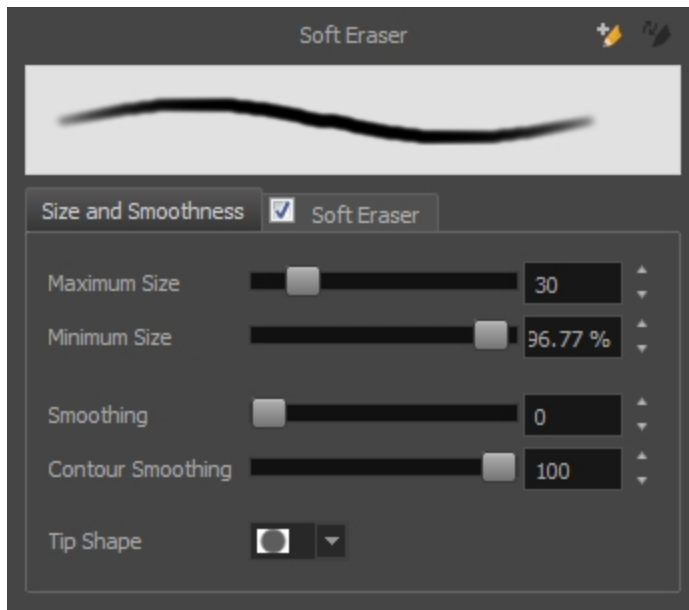
3. Click on the **Export** button.
4. In the Export Textures window that appears, browse to a location where you would like to save the .xml file and give it a name.
5. Click **Save**.

## How to erase textured lines

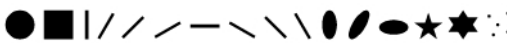
1. In the Tools toolbar, select the Eraser  tool, press Alt + E.
2. In the Tool Properties view, click the arrow button.



The Eraser Properties window opens.



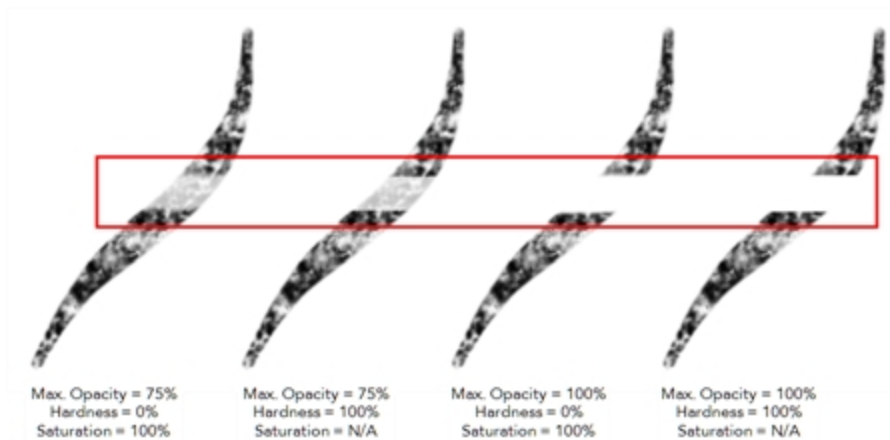
3. Adjust the following:

Parameter	Description
Size and Smoothness Tab	
Maximum Size	Sets the maximum width of the line.
Minimum Size	Sets the minimum width of the line in relation to the maximum size.
Smoothness	Lets you modify the central line smoothness of the line. This parameter smooths the initial movement of your line. Increasing the value will result in a smoother line with fewer control points.
Contour Smoothness	Optimizes the contour line smoothness of the line. This parameter smooths the contour of the line once it has been traced. The higher the value, the fewer control points will compose your line.
Tip Shape	Lets you select a tip shape—from round and square ones to star shaped. This option is disabled when using a textured brush. 

Soft Eraser Tab	
Hardness	Defines the softness of the stroke edge. The lower the value, the softer the stroke edge will be. The higher the value, the sharper the stroke edge will be.
Saturation	Lets you adjust the softness of edge feathering. Works in conjunction with the Hardness, e.g. 100% Hardness will yield no results in saturation change. 0% Hardness will allow a fine tuning of the feathering of the soft stroke edge.
Maximum Opacity	The transparency of the brush when the pressure is heavy. A smaller value will leave semi-transparent colour and texture. A larger value will ensure that

	everything is properly erased. This option is unavailable if the Keep Vectors option is disabled.
Minimum Opacity	Sets the minimum transparency of the brush, in relation to the Maximum Opacity, when the pressure is very light. A smaller value will leave semi-transparent colour and texture. A larger value will ensure that everything is properly erased. This option is unavailable if the Keep Vectors option is disabled.
Keep Vectors	Keeps the vector frames around your strokes intact, only the texture fill disappears. Disabling this option will cut the stroke's vector frame into different pieces when the Eraser tool passes over it. If you disable this option, the maximum and minimum opacity sliders are disabled as well.

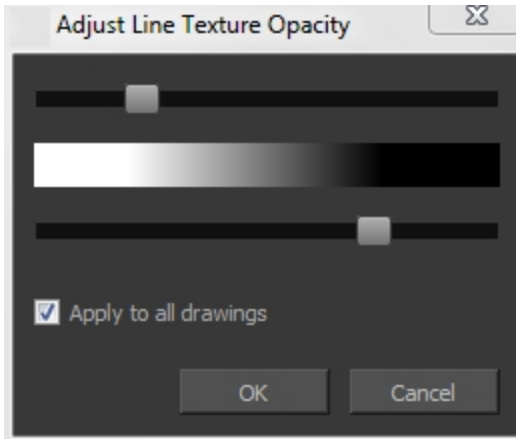
- In the Camera or Drawing view, erase your textures lines.



### How to adjust the line texture opacity

- If you are in Camera view, select the **Current Drawing on Top** option—see [Current Drawing on Top on page 48](#).
- In the Timeline or Xsheet view, select the drawing that contains the opacity you want to adjust.
- In the Camera or Drawing view menu, select **Drawing > Adjust Line Texture Opacity**.

The Adjust Line Texture Opacity dialog box opens.



4. Drag the sliders toward the middle to increase the contrast and opacity of the textured lines.
5. If you want to apply the changes to all drawings exposed on the layer, select the **Apply to All Drawings** option and click **OK**.



## Drawing with Bitmap Brushes on Bitmap Drawing Layers



With Harmony, you have the choice to draw with vector or bitmap brushes. This is decided by what modes you select for your layer. When adding a new drawing layer in Harmony, you can set your art layers (Line Art, Colour Art) to vector or bitmap. This way, you can draw in bitmap and paint in vector, draw everything in bitmap, or any other combination that suits your needs. If you are using the Overlay and Underlay layers, you can also set them to either bitmap or vector.

Not all drawing tools are available when working on a bitmap layer. You can use the following tools:

- Brush
- Cutter
- Dropper
- Edit Gradient/Texture
- Ellipse
- Eraser
- Line
- Paint
- Paint Unpainted
- Pivot
- Rectangle
- Repaint
- Reposition All Drawings
- Select
- Text
- Unpaint

Any tool that is unavailable for use will be greyed out.

On a bitmap layer, a temporary vector layer is created when painting with a gradient. Until a modification is made on your layer with a bitmap drawing tool, you can edit your last painted zone—by either editing the gradient

swatch, which is dynamically linked to the painted zone or with the Edit Gradient texture tool. The moment a bitmap drawing tool or action is used, a vector-to-bitmap conversion occurs. If there are vector elements on the layer (such as if you switched your art mode from vector to bitmap after having created vector artwork), they too will be converted to bitmap.

Here is a list of tools and actions that will trigger a vector-to-bitmap conversion:

- Brush
- Ellipse
- Eraser
- Line
- Paint
- Paint Unpainted
- Rectangle
- Repaint
- Unpaint
- Performing a paste with the Select tool selected
- Performing a paste with the Cutter tool selected

This means that certain tools, such as the Text tool or the Cutter tool, will not trigger a conversion.

If you selected the incorrect art modes for your layer, you can open the Layer Properties view and change them. If you switch the art mode for a layer that already has strokes on it, the artwork will NOT be converted for bitmap artwork, but will be for vector artwork, though not immediately. A drawing with bitmap strokes on a newly converted vector layer will remain bitmap. This means that the bitmap artwork will not be editable by some tools, such as the Eraser tool, but will be editable by other tools, such as the Cutter tool. However, a drawing with vector lines on a newly converted bitmap layer will remain vector temporarily, until a bitmap drawing tool or action is used. Then the vector-to-bitmap conversion will occur.

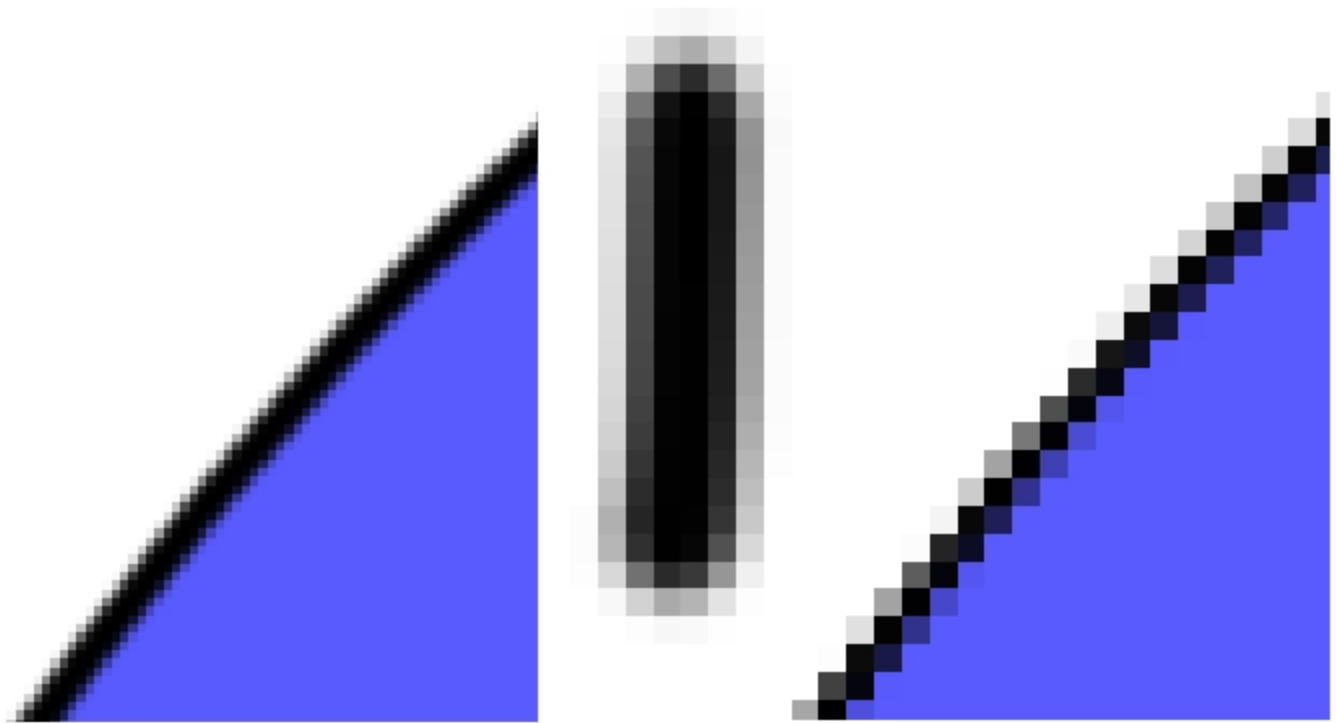
To always reuse the same art mode settings, you can adjust them in the Preferences dialog box.

If you want to be able to edit the artwork in the new mode, you need to convert the drawings.

Vector-to-bitmap conversion includes flattening individual drawings into a single image. Flattening means that it will not be possible to select non-overlapping or overlapping elements as individual objects with the Select tool. Instead, the selection of one drawing will initiate the selection of all elements, with a single vector frame surrounding them.

Resampling is also triggered on bitmap layers with the use of a bitmap drawing tool. For example, if you draw the outline of a circle, scale it down and then zoom into it, you will see tiny square pixels along the edge of the line. If you then draw a line right next to it, you will notice two things: first that the square pixels of the new line are gigantic by comparison and that the pixels in the line of your circle suddenly become the same size. This is because the circle was resampled. It was not resampled when you scaled it down. It was resampled when you used a bitmap drawing tool. It is resampled so that all the drawn objects are scaled to the same bitmap grid, in other words that their basic unit, the pixel, is the same size. The grid is defined by the bitmap layer's resolution.



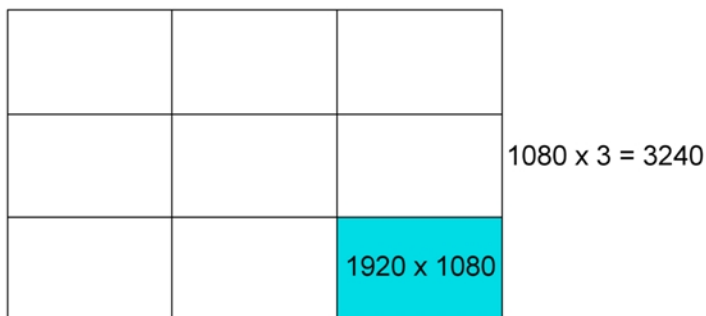


Before resampling

After resampling

Before you start drawing in bitmap, it is important to understand that your artwork will now be resolution dependent. If you zoom in your scene, your artwork will be enlarged. It is important to plan ahead and decide how high of a resolution you need your artwork to be. If you plan to zoom in your scene, the smallest section of the image that the camera will frame must be 100% the size of your scene resolution. For example, if your scene resolution is set to 1920 x 1080 and you zoom-in 300% with your camera, then the resolution of the bitmap layer also has to be set to 300%, otherwise its elements will look pixelated in the final render. It is important to change the bitmap layer resolution before you start drawing.

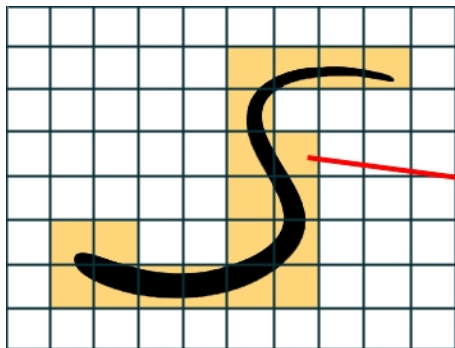
$$5760 / 1920 \times 100 = 300\%$$



$$1920 \times 3 = 5760$$

The bitmap resolution can be set at the scene level or drawing level. The setting at the scene level affects newly created bitmap art layers.

Note that even if your drawing resolution is set to be very large, it doesn't mean that your file will be very heavy. It depends on the amount of artwork you draw in it.



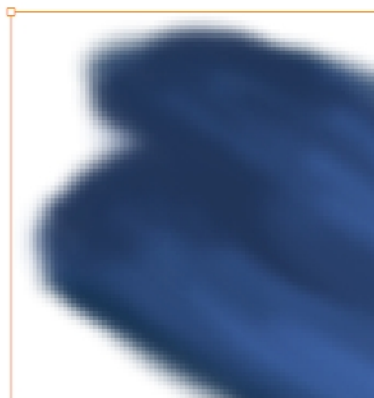
The yellow tiles are the spaces containing artwork. The white tiles are empty spaces, making the bitmap image much lighter.

The bitmap resolution (width and height) is the resolution of the tiles in relation to the project resolution.

There is a function to change the resolution of bitmap art for individual drawings. You can reduce the resolution of your bitmap file as well as increase it. Be careful because enlarging the bitmap resolution on an existing drawing will result in a loss of quality. Harmony will perform a pixel smoothing pass (resampling) and create additional pixels to avoid losing too much quality, but only to a certain extent. For example, what if you used the default scene's resolution for some bitmap art, but then discover you are zooming-in quite close? If you do not want to see the pixels appear too much when you are zoomed in, you can set the bitmap resolution to 200% and the bitmap art will have a higher resolution with smaller pixels, but will NOT retain 100% of its quality. You can use this function on multiple drawings using the Apply to All Drawings option. Changing this option will affect existing and selected bitmap art layers.

If you draw an outline on a bitmap layer, you can still vectorize it. Using a vector drawing layer, simply select your bitmap drawing and the vector cell of where you want your vectorized line to be, and use the Vectorize Line Art in Selected Drawing function.


You should avoid scaling up your bitmap strokes using the Select tool. If you do, keep in mind that when you continue drawing, your image will be resampled and your new strokes will be scaled to the scene resolution.



Scaled-up bitmap drawing before resampling



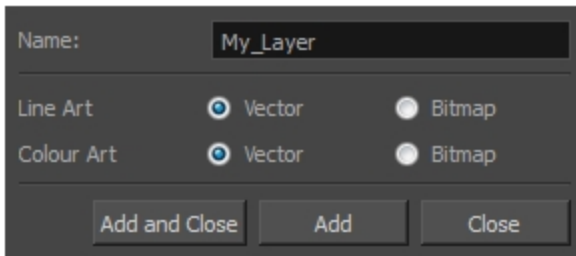
Scaled-up bitmap drawing resampled. The new brush stroke triggers the resampling.

**NOTE:** Your drawing should be scaled up using the Transform  tool when animating, instead of the Select tool, in order to avoid creating very large bitmap layers. Harmony calculates the scaling of your drawings when you use the Transform tool; your image is mathematically transformed. When you use the Select tool to scale, you are physically scaling the drawing.

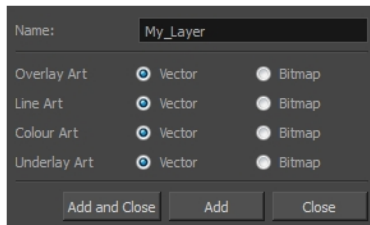
## How to add a bitmap layer

1. In the Timeline view, click the Add Drawing Layer  button,

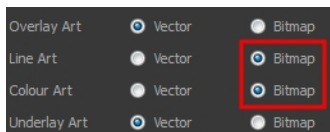
The Add Drawing Layer window opens.



If you are using the Overlay and Underlay layers, those art layers are also displayed.



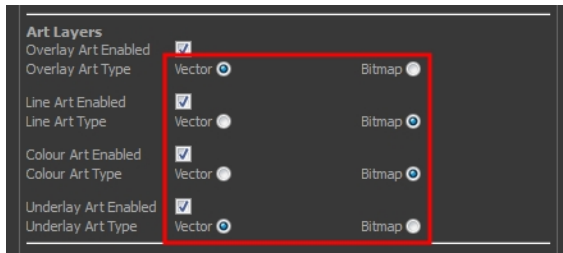
2. For each art layer, select the **Vector** or **Bitmap** option.



3. Click **OK**.

## How to change the art mode

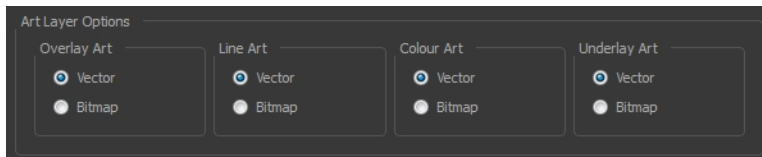
1. Open the Layer Properties view.
2. In the Timeline view, select the layer you want to edit.
3. In the Layer Properties view, select the **Drawing** tab.



4. In the Art Layers section, select the art mode for each art layer.

### How to adjust the art mode settings in the Preferences dialog box

1. From the top menu, select **Edit > Preferences** ( Windows/Linux ) or **Stage > Preferences** ( Mac OS X ).
2. Select the **Node View** tab.



3. In the Layer Drawing Options section, set the art layers to the desired art mode. Once this option is enabled, all new layers will follow these settings. It will not affect any existing layers.
4. Click **OK**.

### How to convert drawings to match the art mode

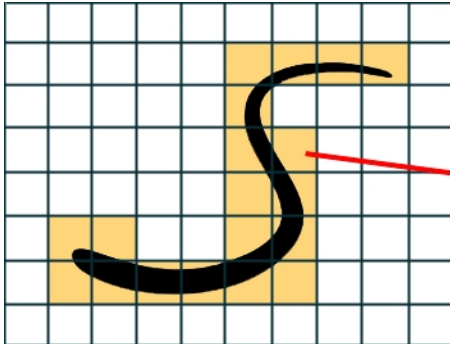
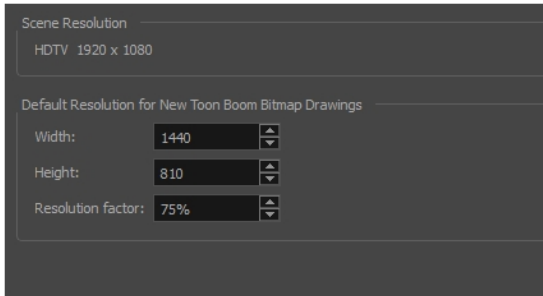
1. In the Timeline view, select the layer that contains the drawings you want to convert.
2. From the Timeline view menu, select **Layers > Convert Drawings to Match Art Layer Type**.

You can also right-click on the selected layer and select **Convert Drawings to Match Art Layer Type**. All drawings in the layer are converted to the selected art mode. Note that bitmap strokes are not vectorized when converted to a vector art layer. They are simply inserted in a square vector frame containing a bitmap texture.

### How to change the bitmap layer resolution at the scene level

1. From the top menu, select **Scene > Scene Settings**.  
The Scene Settings dialog box opens.
2. Select the **Bitmap Resolution** tab.
3. Change the bitmap resolution settings and click **OK**.

The bitmap resolution settings at the scene level affects newly created bitmap art layers.



The yellow tiles are the spaces containing artwork. The white tiles are empty spaces, making the bitmap image much lighter.

The bitmap resolution (width and height) is the resolution of the tiles in relation to the project resolution.

Parameter	Description
Scene Resolution	This is the scene resolution preset name and size in pixels.
Width	This is the width of the resolution for the bitmap that will be created. This is not the actual size of the bitmap. TVG drawings (Toon Boom drawing native format) have an infinite size. Bitmap TVGs are composed of small tiles. Therefore it does not mean that because you have artwork at the four corners of your camera frame or even quite far outside of your drawing that your bitmap image will be very large and heavy. By default, it is set to the same width as the scene resolution.
Height	This is the height of the resolution for the bitmap that will be created. By default, it is set to the same height as the scene resolution.
Resolution Factor	This is the size of the bitmap resolution in relation to the scene resolution. If you increase the percentage, the width and height fields will increase accordingly. If you plan to animate the camera and zoom into your background, you will need to set a higher resolution so that the smaller area in which you will zoom will be 100% of the scene resolution.

### How to change the bitmap resolution at the drawing level

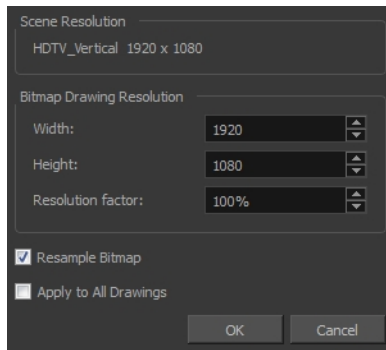
1. In the Timeline view, select the drawing whose resolution you want to change.

**NOTE:** Note that the drawing can be enlarged slightly and retain its original look, but you may lose quality if you enlarge it too much. Pixels are created and a smoothing pass is applied. You should set your resolution before

drawing. If you need to change the resolution of a drawing to be larger than the one set in the Scene Settings dialog box, create an empty drawing first and then follow this procedure.

- From the top menu, select **Drawing > Change Bitmap Drawing Resolution**.


The Change Bitmap Drawing Resolution window opens.

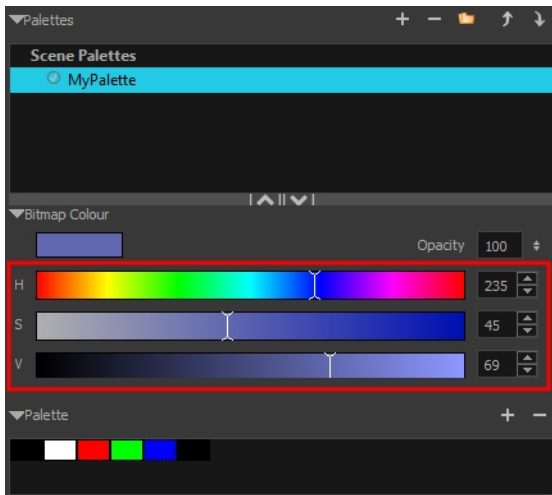


Parameter	Description
Scene Resolution	This is the scene resolution preset name and size in pixels.
Width	This is the width of the resolution for the bitmap that will be created. This is not the actual size of the bitmap. TVG drawings (Toon Boom drawing native format) have an infinite size. Bitmap TVGs are composed of small tiles. Therefore it does not mean that because you have artwork at the four corners of your camera frame or even quite far outside of your drawing that your bitmap image will be very large and heavy. By default, it is set to the same width as the scene resolution.
Height	This is the height of the resolution for the bitmap that will be created. By default, it is set to the same height as the scene resolution.
Resolution Factor	This is the size of the bitmap resolution in relation to the scene resolution. If you increase the percentage, the width and height fields will increase accordingly. If you plan to animate the camera and zoom into your background, you will need to set a higher resolution so that the smaller area in which you will zoom will be 100% of the scene resolution.
Resample Bitmap	When this option is selected, the existing bitmap image is modified to match the new resolution. If the width and height are increased, more pixels will be created to enlarge the image. Visually, the existing artwork will look the same, maybe a little bit smoothed out, but the size will look the same. When this option is deselected, the artwork is not modified. Only the reference grid is resized. If the scene resolution is 1920 x 1080 and you reduce the bitmap resolution to 960 x 540, the image will be scaled up to twice the size of the scene.
Apply to All Drawings	The modified settings are applied to all drawings in the drawing layer for a given art layer. If the Apply to Line Art and Colour Art option is enabled, it will then be applied to all bitmap art layers.

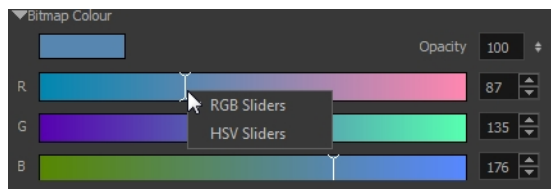
3. Change the bitmap resolution.
4. Click **OK**.

### How to draw with bitmap brushes

1. In the Timeline view, add a bitmap drawing layer—see [How to add a bitmap layer on page 83](#).
2. In the Tools toolbar, select the Brush  tool or press Alt + B.
3. In the Colour view, select a colour.



- ▶ To switch the bitmap colour picker from HSV to RGB, in the Colour view menu, select **Colour > Bitmap Colour Sliders > HSV Sliders** or **RGB Sliders**. You can also right-click on the colour sliders and select **RGB Sliders** or **HSV Sliders**.



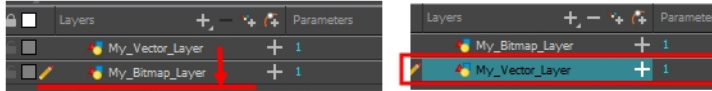
When using bitmap colours, there is no longer a link between the painted zones and selected colour. You can edit the colour as much as you want, but your drawing will not be affected. You can still select colours from your vector colour palette to use the same tint, but you will not create links between your drawing and the swatches.

4. In the Camera or Drawing view, start drawing.



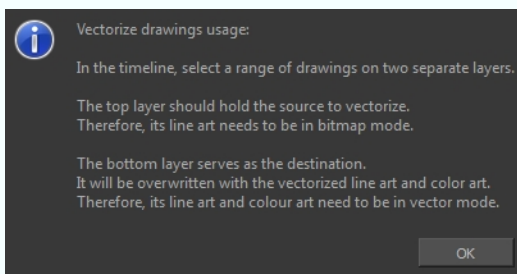
## How to vectorize a bitmap drawing

1. In the Timeline view, add a vector drawing layer **BELOW** the bitmap drawing layer containing the drawing to vectorize. In your bitmap drawing, the artwork to vectorize must be placed on the Line Art layer (default drawing layer).

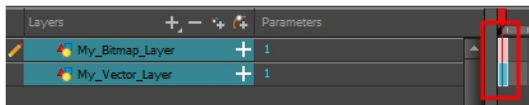


### NOTE:

If you place the vector drawing on top of the bitmap layer, you will not be able to perform the operation. A warning dialog box will display.

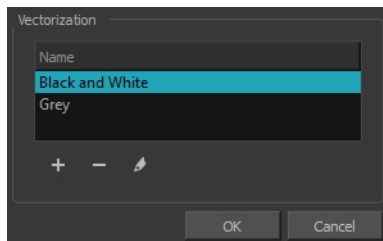


2. On the right side of the Timeline view, select the bitmap drawing and corresponding cell in the vector drawing layer.



3. Right-click and select **Drawings > Vectorize Line Art in Selected Drawing**.

The Convert to Vector Drawing dialog box opens.



4. In the Vectorization section, select a vectorization preset. You can customize your own preset using the Add or Edit buttons.
5. Click **OK**.


Your vectorized drawing is created in the vector drawing layer. Your bitmap drawing remains intact.



## Creating Bitmap Brushes

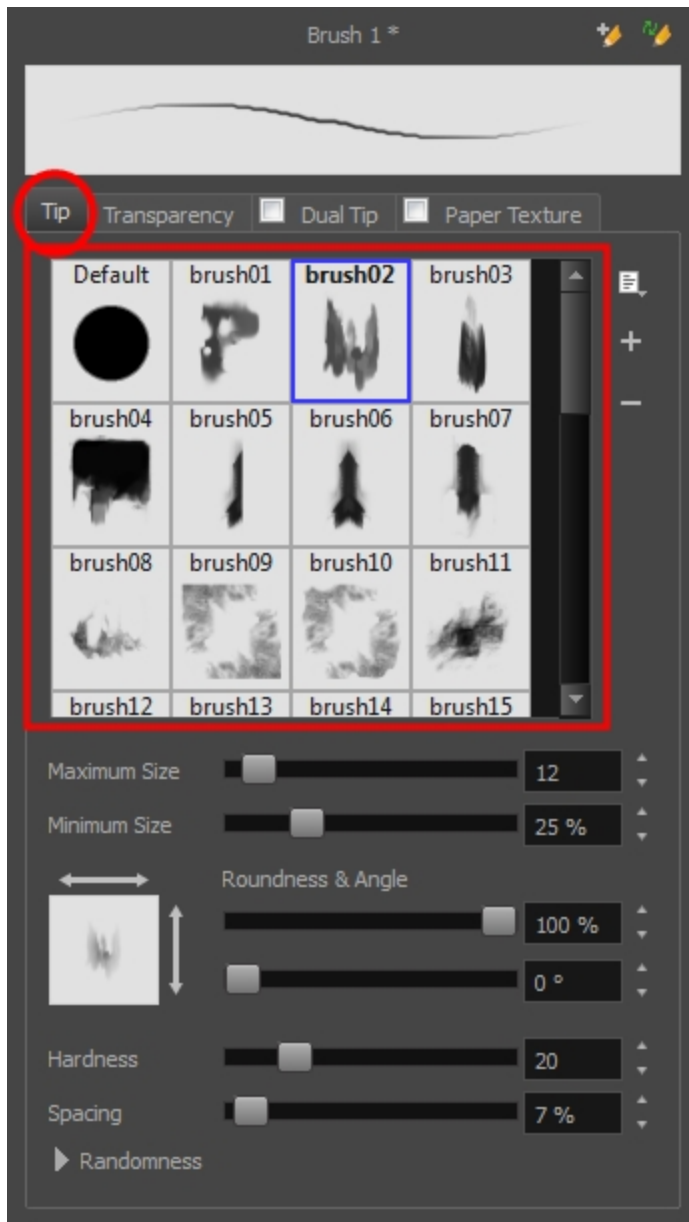
With bitmap brushes in Harmony, you can create an infinite range of fuzzy, textured and watercolour lines. You can combine two different brush tips, with separate sets of parameters, with the Dual Tip feature. You can also select a paper texture that will mimic the texture of the surface that is being painted on. Uses these features separately or in combination to create distinct, natural-looking strokes.


### How to create a Bitmap Brush

1. In the Timeline view, create a new Bitmap drawing layer.
2. In the Tools toolbar, select the Brush  tool or press Alt + B.
3. In the Tool Properties view, select a brush and click the Arrow button to open the Bitmap Brush Properties view.

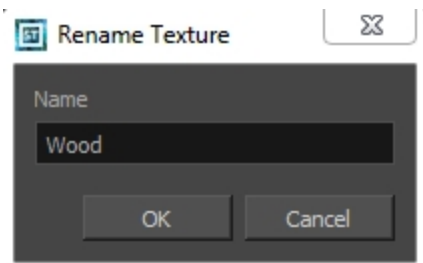


4. In the Tip tab, select a brush tip.




5. Click on the different tabs to access the options available for adjustment. You can use the brush stroke preview at the top to view all your adjustments in real time.
  - ▶ **Tip tab:** Make adjustments to size, brush tip angle, hardness and spacing—see [Bitmap Brush Tool Options](#) on page 137.
  - ▶ **Transparency tab:** Make adjustments to flow and opacity—see [Transparency Tab](#) on page 148.
  - ▶ **Dual Tip tab:** Select this option to enable the Dual Tip feature. Select a dual brush tip and make adjustments to its size, brush tip angle, hardness and spacing—see [Dual Tip Tab](#) on page 151.
  - ▶ **Paper Texture tab:** Select this option to enable the Paper Texture feature. Select a paper texture and make adjustments to its scale, alignment and additivity—see [Paper Texture tab](#) on page 155.
6. When you are satisfied with the look of your bitmap brush, click the Add New Brush Preset  button at the top-right corner of the Bitmap Brush Properties window.

7. In the New Preset dialog box that appears, enter the name for your brush preset.



8. Click **OK**.

If you continue to make adjustments to your new brush preset and want to save these changes, click the Update Preset  button. Otherwise, your modifications will only be saved until another brush preset or drawing tool is selected.

## Viewing the Final Lines as You Draw



Everything you draw in Harmony is vector-based, unless you purposely elected to draw as bitmap. Although, when you draw in the Drawing or Camera view, notice that your lines may appear jagged. This is caused by the fast real-time display called OpenGL. If you prefer to see smooth lines as you draw, you can enable the antialiasing preference.

### Full Scene Antialiasing

Full scene antialiasing is generated by your computer's graphics card. This antialiasing will not only antialias your drawings, but all your different views in the interface. Full scene antialiasing is an option you can turn on and off; by default, it is disabled.

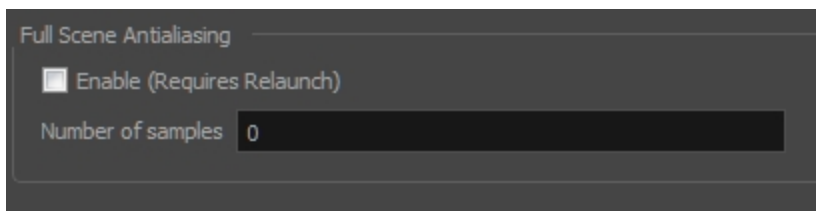
There is no need to modify your graphic card settings.

**NOTE:** Full Scene Antialiasing parameters are only valid while you work in your scene. The scene will be rendered to 100% of its resolution regardless of your preference settings or graphic card panel.

### How to customize the full scene antialiasing parameters

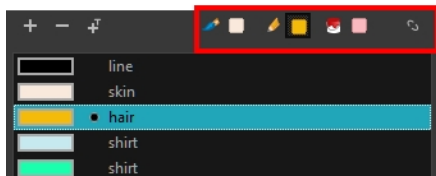
**NOTE:** You must restart Harmony after you change the parameters.

1. Do one of the following:
  - From the top menu, select **Edit > Preferences** (Windows/Linux) or **Stage > Preferences** (Mac OS X).
  - Press **Ctrl + U** (Windows/Linux) or **⌘ + U** (Mac OS X).
 The Preferences dialog box opens.
2. In the OpenGL tab, go to the Full Scene Antialiasing section.



- **Enable:** Select this option to enable/disable the Full Scene Antialiasing.
3. **Number or samples:** Enter the number of samples you want to be used for the antialiasing process. The number of samples is basically equivalent to the amount of times a pixel will be enlarged to calculate the antialiasing. This technique is called *supersampling*. The higher the number of samples, the better the antialiasing quality will be, but the longer it will take to calculate.
  4. Restart Harmony.

### Selecting the Current Colour of a Tool




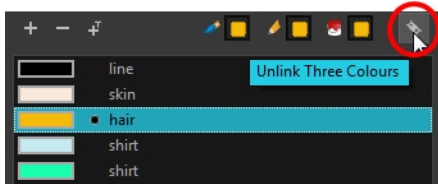
While drawing and painting, you can let Harmony retain the last colour you selected for each one of the following tools:

- Brush
- Paint
- Pencil, Ellipse, Line, Rectangle, Polyline

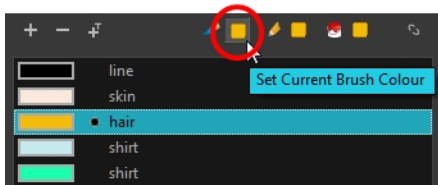
The Colour view has three swatches where you can set a colour for the Brush , Paint, and Pencil tools.


### How to unlink the storage swatches

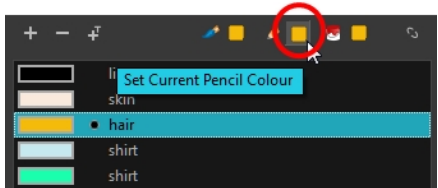
1. In the Colour view, if the storage swatches are linked, click the Link  button to unlink them.




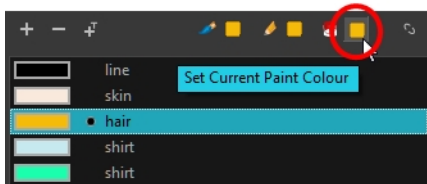
2. Click on the Brush  storage swatch.



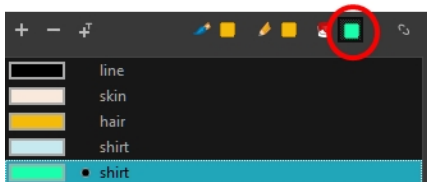
3. In the Colour list, select the desired colour.
4. Click the Pencil  storage swatch.



5. In the Colour list, select a colour.
6. Click the Paint  storage swatch.











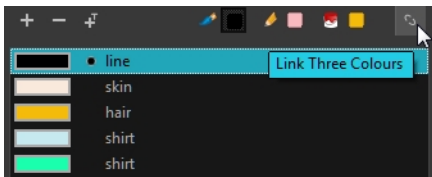
7. In the Colour list, select a colour.



**NOTE:** If you prefer to have Harmony use the same colour swatches regardless of the selected tool, you can link the three swatches together.









### How to link the storage swatches

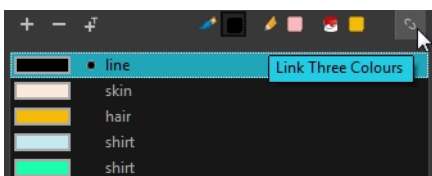
1. In the Tools toolbar, select one of the following tools:
  - ▶  Brush
  - ▶  Paint
  - ▶  Pencil
  - ▶  Polyline
  - ▶  Line
  - ▶  Ellipse
  - ▶  Rectangle
2. In the Colour view, if the storage swatches are unlinked, click the Link  button to link them.



Each time you select a new colour for your current tool, all the storage swatches are updated.

### How to link the storage swatches

1. In the Tools toolbar, select one of the following tools:
  - ▶  Brush
  - ▶  Paint
  - ▶  Pencil
  - ▶  Polyline
  - ▶  Line
  - ▶  Ellipse
  - ▶  Rectangle
2. In the Colour view, if the storage swatches are unlinked, click the Link  button to link them.



Each time you select a new colour for your current tool, all the storage swatches are updated.

## Using Independent Colours when Working with Bitmap Layers

When working in the Colour view, by default the current colour is active for both vector and bitmap layers. You can however, use different reference colours for each layer.

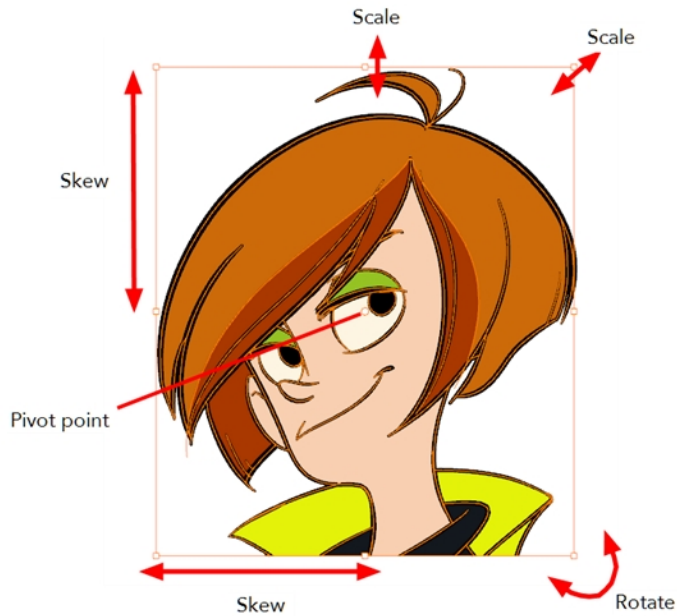
When using bitmap colours, there is no longer a link between the painted zones and selected colour. You can edit the colour as much as you want, but your drawing will not be affected. You can still select colours from your vector colour palette to use the same tint, but you will not create links between your drawing and the swatches.

### How to use independent colours

- ▶ From the Colour view menu, select **Colours > Independent Bitmap Colour**.

Whichever colour you choose as the reference color is retained for that layer type.

## Selecting Drawing Objects




The Select tool is used to select strokes in both the Drawing and Camera views, and apply basic transformations, such as repositioning, rotating, scaling or skewing using the different handles of the bounding box.

Sometimes, when you want to select multiple objects while leaving one unselected, it can be handy to select only the stroke or line that you do not want included in your selection. Then, you can invert the selection so that everything else becomes selected. This can be quite a time saver.

By default, when you draw a selection box, the Select tool will select only the drawing strokes of the current drawing. If you prefer the Select tool to select all the strokes on all layers, you can disable the Works on Single Drawing option in the Tool Properties view or the Select Tool Works on Single Drawing option in the Preferences dialog box.

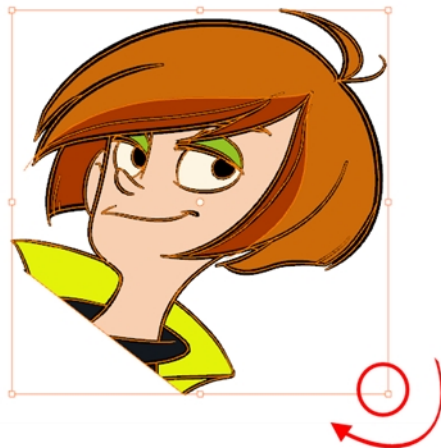
Some of the transformations, such as rotation, scale, skew, and flip are done relative to the position of the pivot point. You can temporarily reposition this pivot point for a transformation using the Select tool.

### How to select with the Select tool

1. In the Timeline view, select the cell on which you want to select drawing objects.
2. In the Tools toolbar, select the Select  tool or press Alt + S.
3. In the Camera or Drawing view, select the drawing objects.
  - ▶ You can select all the drawing objects in a drawing by using **Edit > Select All** or by pressing Ctrl + A (Windows/Linux) or ⌘ + A (Mac OS X).
4. To deform or reposition a selection:
  - ▶ To reposition, click the selected drawing object and drag the selection to a new area.

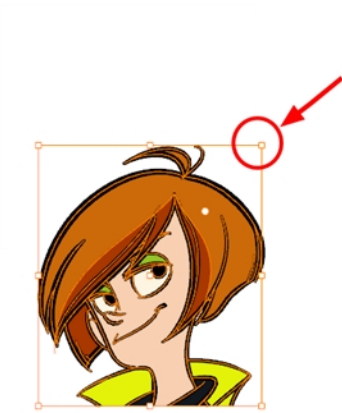


- ▶ To rotate, grab the selection box handle and rotate it.

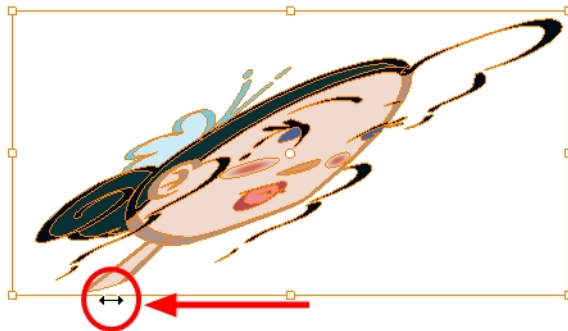


- ▶ To scale, pull or push on the top, side, bottom or corner control point. Hold down Shift to lock the selection's ratio.







- ▶ To skew, drag sideways or up and down the sides or top and bottom segments, between the control points.



### How to invert a selection

1. From the top menu, select **Edit > Invert Selection** or press Ctrl + Shift + I.
  - ▶ You can also find the Invert Selection option in the Camera or Drawing View menu by selecting **Edit > Invert Selection**.

### How to enable and disable the Select Tool Works on Single Drawing preference

1. In the Tools toolbar, select the Select  tool or press Alt + S.
2. Do one of the followings:
  - ▶ From the top menu, select **Edit > Preferences** (Windows/Linux) or **Stage > Preferences** (Mac OS X). In the Camera tab, go to the Tools section and select or deselect the **Select Tool Works on Single Drawing** option and click **OK**.
  - ▶ In the Tool Properties view, disable the Works on Single Drawing  option.
3. In the Camera view, make your selection. It is possible that you will have to restart Harmony depending on your system.



### How to temporarily reposition the pivot point

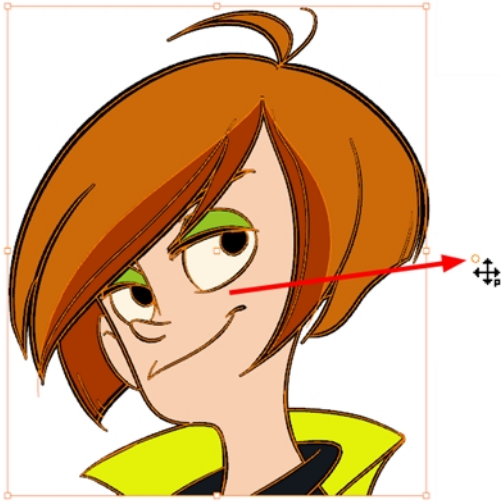
1. In the Camera or Drawing view, select the drawing object you want to transform.

The pivot point appears in the middle of your selection.



2. Click the pivot point and drag it to a new position.

This becomes the new position of the pivot point for the current transformation and will remain there until you make a new selection.

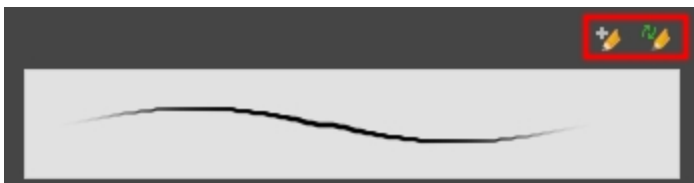


## Erasing Parts of a Drawing




The Eraser tool is pressure sensitive, like the Brush tool, giving you more precision when erasing parts of a drawing. You can also use the Select tool to select drawing objects and delete them instead of erasing.

It is a good idea to create and save erasers with precise sizes and parameters in order to save time when drawing and designing. There are two icons located at the top, right corner of the Eraser Properties window. One is to create a new preset, while the other is to update the currently selected preset. Use them after you have set all the parameters for the new eraser preset.




- **New Brush Preset:** Click on this button to create a new eraser brush style. The new eraser style will appear at the bottom of the list in the Presets section of the Tool Properties window. All the values and selected options in the Eraser Properties window will be attributed to this new style.
- **Update Preset:** Click on this button to update the selected eraser preset with any changes made in the Eraser Properties window. If you make changes and do not click on the Update Preset button, then all the changes made will only be applied to the selected eraser preset temporarily. The moment you switch to another eraser preset or to another drawing tool, these modifications to the eraser preset will disappear.

### How to erase with the Eraser tool

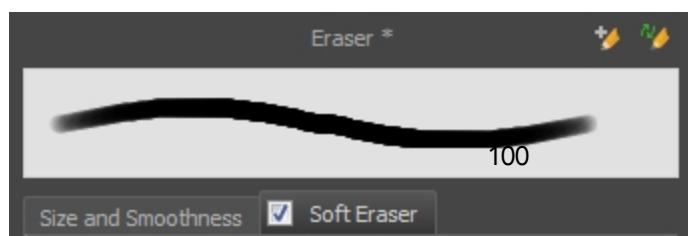
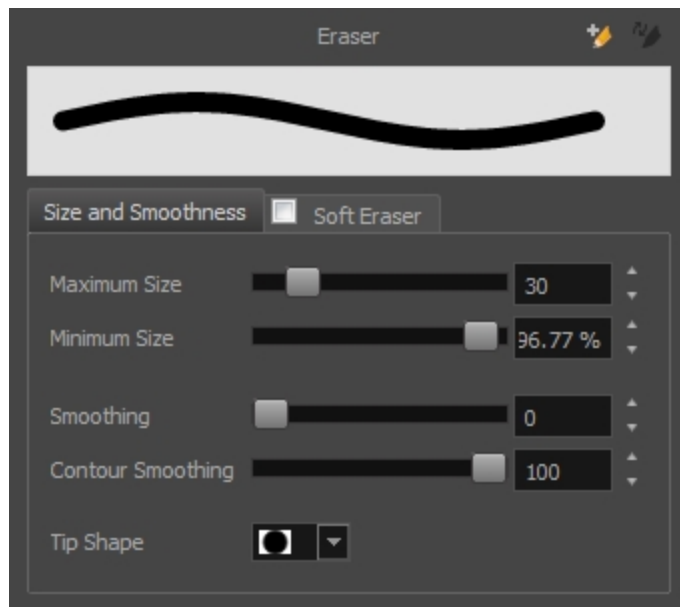
1. In the Timeline or Xsheet view, select the cell that contains objects you want to erase.
2. In the Tools toolbar, select the Eraser  tool or press Alt + E.
3. In the Camera or Drawing view, start erasing.

### How to modify the eraser settings

1. In the Tools toolbar, select the Eraser  tool .
2. In the Tool Properties view, the preview area displays the stroke that will be produced after you customize the different parameters in the Eraser Properties view. Click the arrow button.

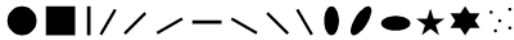


The Eraser Properties window opens.



The Size and Smoothness tab is where you set the minimum and maximum sizes of your drawing tool which will produce the thick and thin effect on your stroke.

The Soft Eraser tab needs to be enable for its parameters to become active. This feature only works on soft or textured brush strokes. Both tabs works with the pressure sensitivity of a pen tablet.

Parameter	Description
Size and Smoothness Tab	
Maximum Size	Sets the maximum width of the line.
Minimum Size	Sets the minimum width of the line in relation to the maximum size.
Smoothness	Lets you modify the central line smoothness of the line. This parameter smooths the initial movement of your line. Increasing the value will result in a smoother line with fewer control points.
Contour Smoothness	Optimizes the contour line smoothness of the line. This parameter smooths the contour of the line once it has been traced. The higher the value, the fewer control points will compose your line.
Tip Shape	Lets you select a tip shape—from round and square ones to star shaped. This option is disabled when using a textured brush. 

Soft Eraser Tab	
Hardness	Defines the softness of the stroke edge. The lower the value, the softer the stroke edge will be. The higher the value, the sharper the stroke edge will be.
Saturation	Lets you adjust the softness of edge feathering. Works in conjunction with the Hardness, e.g. 100% Hardness will yield no results in saturation change. 0% Hardness will allow a fine tuning of the feathering of the soft stroke edge.
Maximum Opacity	The transparency of the brush when the pressure is heavy. A smaller value will leave semi-transparent colour and texture. A larger value will ensure that everything is properly erased. This option is unavailable if the Keep Vectors option is disabled.
Minimum Opacity	Sets the minimum transparency of the brush, in relation to the Maximum Opacity, when the pressure is very light. A smaller value will leave semi-transparent colour and texture. A larger value will ensure that everything is properly erased. This option is unavailable if the Keep Vectors option is disabled.
Keep Vectors	Keeps the vector frames around your strokes intact, only the texture fill disappears. Disabling this option will cut the stroke's vector frame into different pieces when the Eraser tool passes over it. If you disable this option, the maximum and minimum opacity sliders are disabled as well.




## Reshaping a Drawing Using the Contour Editor Tool

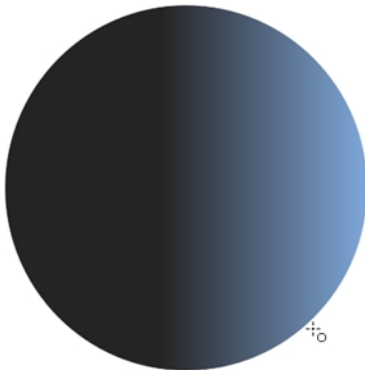



The Contour Editor tool is a powerful tool that allows you to add, remove or modify points on a vector line and control them with Bezier handles. It is used to correct line shapes and modify a single part of a colour zone. If a line is too thin or has a gap in it, you can modify and correct it with the Contour Editor tool. You can also use this tool to create elaborate shapes.

The Contour Editor displays vector points around a shape and the central vector points in a pencil line. Pulling or pushing on these points adjusts the brush's line thickness. Points can be selected and deleted. Each point has two Bezier handles for correcting the curves between two points. Shapes can be modified by pulling and pushing directly on the segment between the points. You can use it to perfect a central shape pencil line, a contour shape brush line, or even create an elaborate shape from a basic ellipse or square.

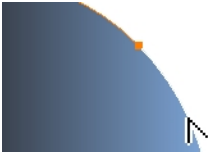
### How to reshape with the Contour Editor tool

1. In the Timeline or Xsheet view, select the cell in which you want to draw.
1. In the Tools toolbar, select a shape tool: .
2. In the Tool Properties view, click the Ellipse  button, click the Auto Fill  button and set the pencil size to 0.
3. In the Drawing or Camera view, draw a circle.

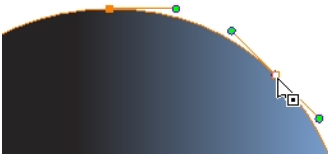


4. In the Tools toolbar, select the Contour Editor  tool.

5. In the Drawing or Camera view, click the line to reshape it.



6. Select one or several points by clicking on them or circling around.

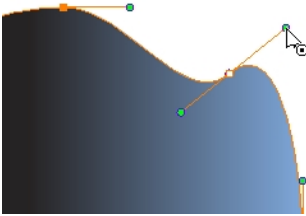


7. Press Delete to delete a selected point.

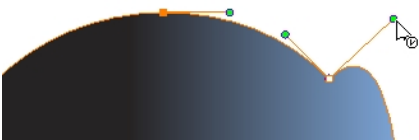
Press Ctrl (Windows/Linux) or ⌘ (Mac OS X) and click on the contour to add a new point to adjust the contour.

8. To modify the shape, you can:

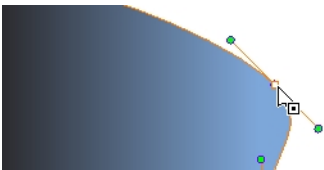
- ▶ Pull on the Bezier handle. Both point's handles will move as one.



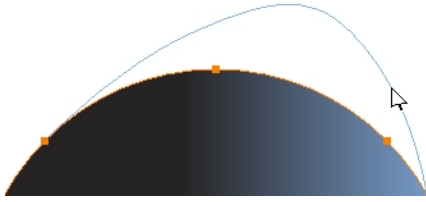
- ▶ Hold down Alt and pull on one of the Bezier handles. The point's handle will move independently from the other one.



- ▶ Move the selected points to a new area.

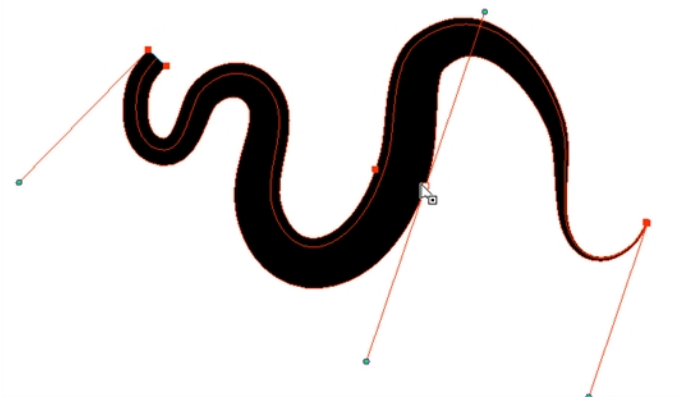


- ▶ Pull directly on the line between two points. No selection is necessary. Holding down Shift will limit the contour modification to the curve between the two first points.

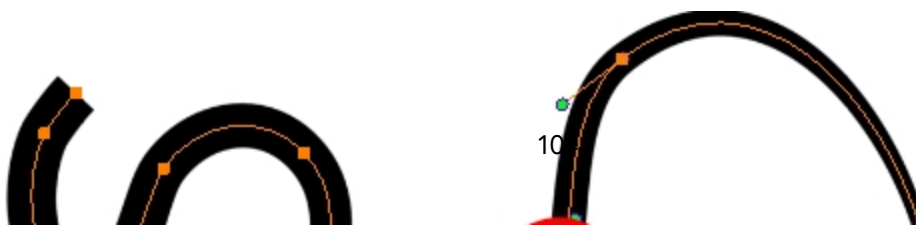
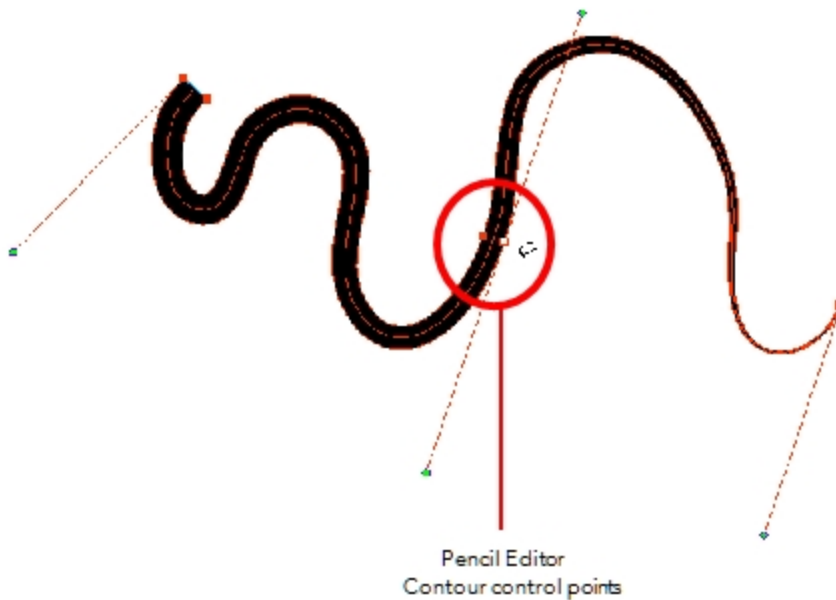


- ▶ If an anchor point has no visible Bezier handles, hold down the Alt key to display them.
- ▶ To add control points, press Ctrl (Windows/Linux) or ⌘ (Mac OS X) and click the line.
- ▶ To remove control points, select the control point and press Delete.

## Reshaping Pencil Lines with the Pencil Editor Tool




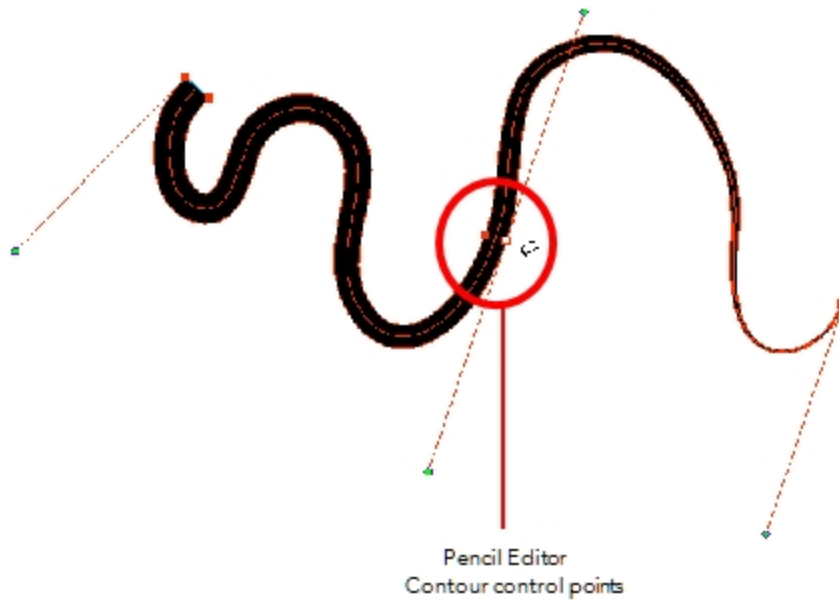
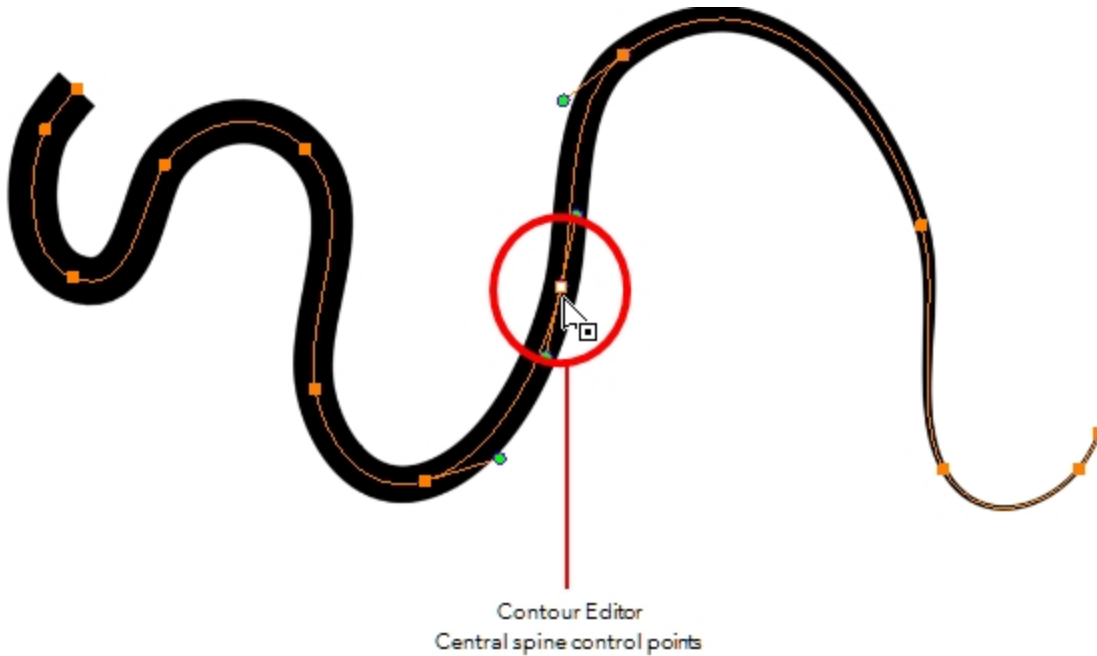
The Pencil Editor tool is used to modify the thick and thin contour of a pencil line. A pencil line is a central vector shape. The shape control points are located all along the central spine allowing you to adjust the stroke curve and position. When using the Contour Editor tool, you can reposition the spine of the stroke. When using the Pencil Editor tool, you can adjust the thick and thin areas of lines.





## How to use the Pencil Editor tool

1. In the Tools toolbar, select the Pencil Editor  tool or press Alt + W.
2. In the Camera or Drawing view, select a pencil line and click the line to reshape it.



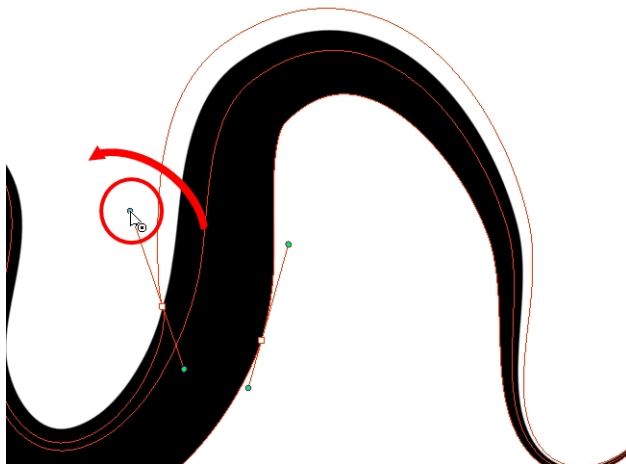
3. Select one or several points by clicking them or circling around.



4. Press Delete to delete a selected point.
5. Press Ctrl (Windows/Linux) or ⌘ (Mac OS X) and click the central spine to add a set of points to adjust the contour.
6. To modify the shape, you can:
  - ▶ Move the selected points to a new area. If you select matching points on each side of the line, holding the Shift key will move them both. This way you can thicken or thin a line from both sides at the same time.



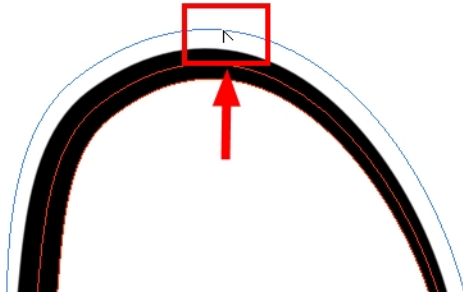
- ▶ Pull on the Bezier handle to move both points' handles s one.



- ▶ Hold down Alt and pull on one of the Bezier handles. It moves the handle independently from the other one.

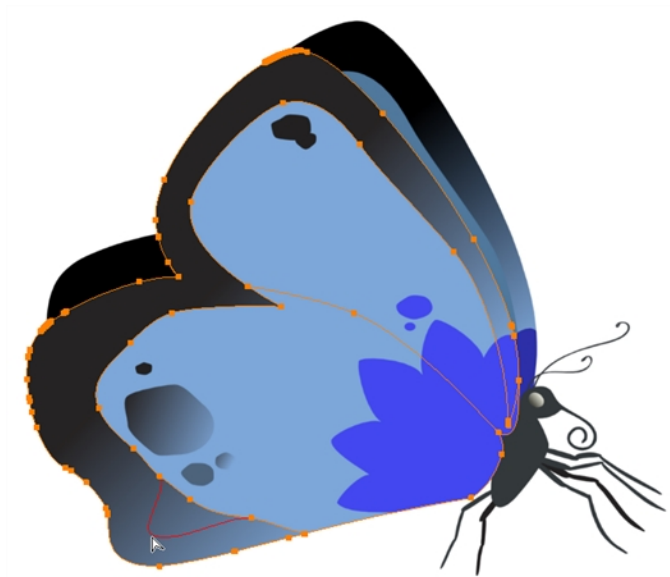


- ▶ Pull directly on the line between two points. No selection is necessary. Holding down the Shift key will limit the contour modification to the curve between the two first points.




- ▶ If an anchor point has no visible Bezier handle, hold down Alt to display them.


## Drawing with Shapes

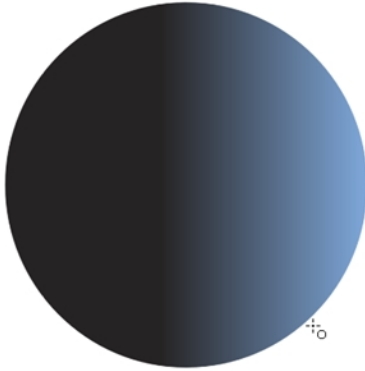



In Harmony, you can use the shape tools to draw circles, lines and squares. You can also easily reshape a square or circle into a much more complex drawing such as these butterfly wings—see [Reshaping a Drawing Using the Contour Editor Tool](#) on page 102 and [Reshaping Pencil Lines with the Pencil Editor Tool](#) on page 104.

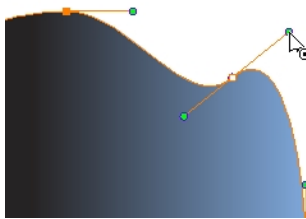
### How to draw with a Shape tool

1. In the Timeline or Xsheet view, select the cell on which you want to draw.
2. In the Tools toolbar, select a shape tool: .

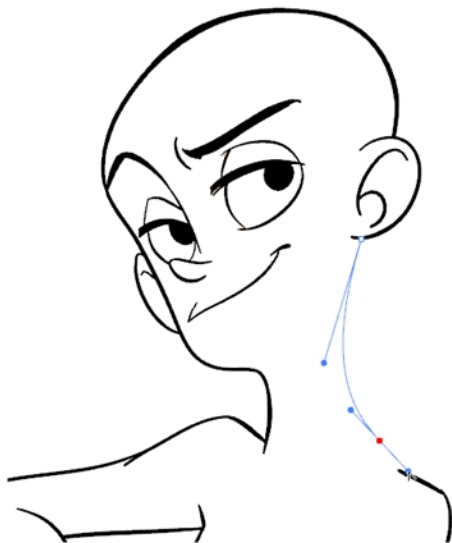
3. To automatically fill the shape, in the Tool Properties view, select the Auto Fill  option.
4. In the Camera view, click and drag to draw the shape.



- ▶ Hold down Shift to lock the rectangle or the ellipse ratio to 1:1.
  - ▶ Hold down Alt to draw the rectangle or ellipse from its centre.
  - ▶ Hold down Shift to snap the line every 15 degrees.
  - ▶ Hold down Alt to snap the start or end of the line to a nearby stroke.
5. Use the Contour Editor  tool to deform the shape and create your drawing.




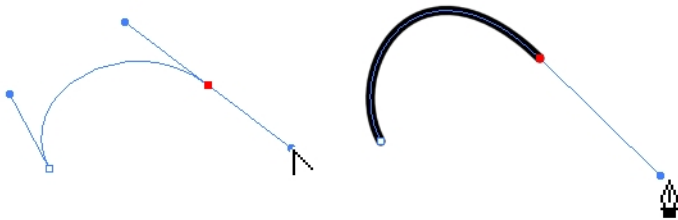
## Drawing with the Polyline Tool




The Polyline tool is used to draw shapes with a central vector type of line. To form a shape, you click to add a point and then, without releasing the mouse, pull the handle in the desired direction before adding the next point and repeat the operation. To edit the shape, you can use the Contour Editor tool.

### How to draw with the Polyline tool

1. In the Timeline view, select the cell on which you want to draw.
2. In the Tools toolbar, select the Polyline  tool or press Alt + \_.
3. In the Camera or Drawing view, click and drag to create a point and a Bezier handle to shape your line.
  - ▶ Press Alt to pull only one handle, instead of two.
  - ▶ Press Shift to snap the handles to 45, 90, or 180 degrees.
4. Click a new area and drag to create a second point and Bezier handle.



5. Repeat the previous step until your shape is completed.
6. Press Ctrl (Windows/Linux) or ⌘ (Mac OS X) and click to release the Polyline tool from the current path or shape that it is creating. Continue to use the tool to make multiple, independent paths or shapes.
7. If necessary, reshape the lines using the Contour Editor  tool—see [Reshaping a Drawing Using the Contour Editor Tool](#) on page 102.

### Drawing with Invisible Lines



There are two different ways to draw invisible lines.



Using the Pencil tool, you can draw as strokes only, meaning that the line will be invisible. This can be useful for drawing tones and highlights directly on the character.

The Stroke tool draws invisible lines only. You cannot add thickness to the line. Unlike the Close Gap tool that creates a short, straight line between two points, the stroke line will stay exactly where you draw it. This tool can be useful for closing a zone in a particular way or creating some hard shadows or highlight areas.

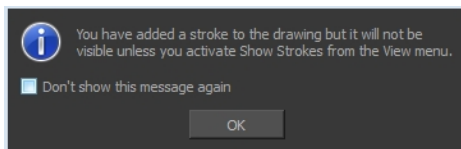


Sometimes, it may be difficult to see your strokes, especially if your colours are similar to the blue stroke colour. In Harmony, you can display the strokes in washed-out colours so that the invisible lines stand out.


#### How to draw invisible lines with the Pencil tool

1. In the Timeline or Xsheet view, select the cell on which you want to draw.
2. In the Tools toolbar, select the Pencil  tool or press Alt + /.
3. From the top menu, select **View > Drawing > Show Strokes**  or press K.
4. In the Tool Properties view, set the Pen Style size to **0**. You can also adjust the smoothness.
5. In the Camera or Drawing view, start drawing.

If you forgot to enable the Show Strokes option before drawing, as soon as you draw a first stroke, a Message dialog box opens.





Select the **Don't Show This Message Again** option if you do not want the dialog box to notify you about the Show Strokes option.

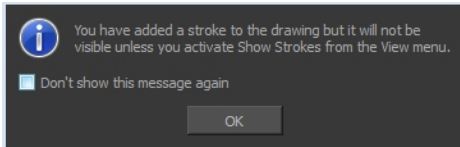
6. Click **OK**.
7. You can modify the stroke shape with the Contour Editor  tool.

#### How to draw invisible lines with the Stroke tool


1. In the Timeline or Xsheet view, select the cell on which you want to draw.

2. In the Tools toolbar from the Paint drop-down menu, select the Stroke  tool or press Alt + V.
3. From the top menu, select **View > Show Drawing > Show Strokes**  or press K.
4. In the Tool Properties view, you can adjust the smoothness.
5. In the Camera or Drawing view, start drawing.

If you forgot to enable the Show Strokes option before drawing, as soon as you draw a first stroke, a Message dialog box opens.



Select the **Don't Show This Message Again** option if you do not want the dialog box to notify you about the Show Strokes option.

6. Click **OK**.
7. You can modify the stroke shape with the Contour Editor  tool.

### How to show the strokes with washed-out colours


- ▶ From the top menu, select **View > Show > Show Stroke With Colour Wash**.

## Deforming a Drawing with the Perspective Tool



The Perspective tool lets you deform a drawing selection and alter its perspective.

### How to deform a drawing with the Perspective tool

1. In the Tools toolbar, select the Perspective  tool from the Contour Editor drop-down menu or press Alt + 0.
2. In the Camera or Drawing view, select a drawing to deform.
3. Click and drag the different anchor points to deform the shape.



### Warping a Drawing with the Envelope Tool

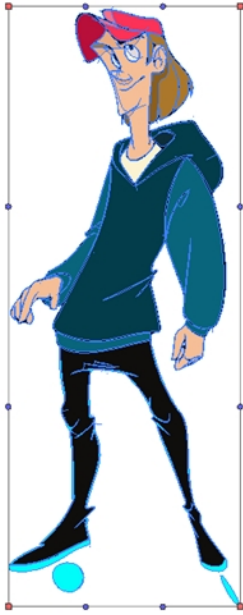


The Envelope tool lets you deform and warp part of a drawing using a grid envelope and Bezier handles.

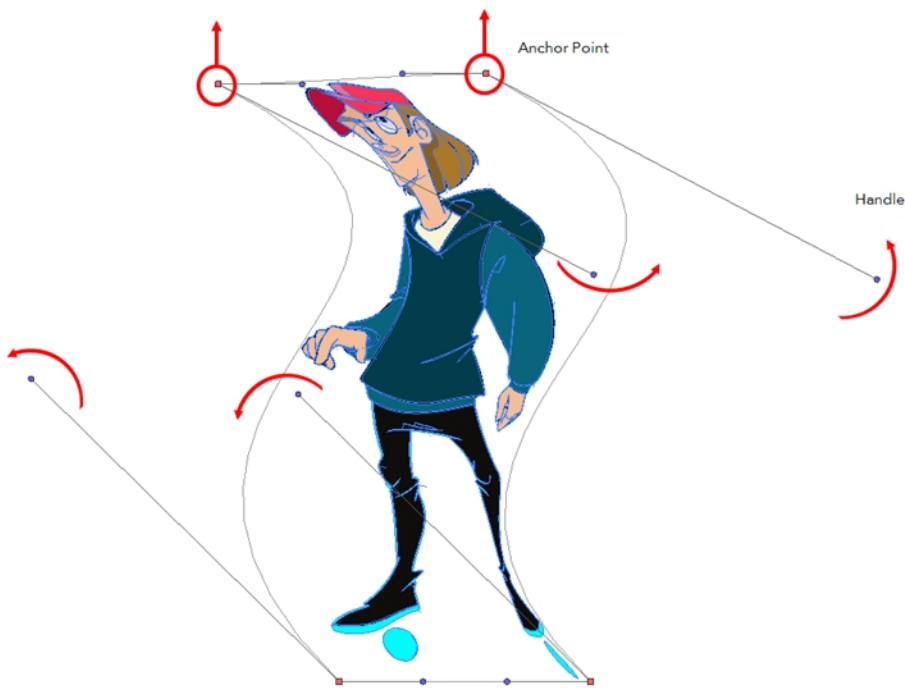
### How to warp a drawing with the Envelope tool


1. In the Tools toolbar, select the Envelope  tool from the Contour Editor drop-down menu.
2. In the Timeline view, select a drawing to deform.
3. In the Camera or Drawing view, select the region you want to deform

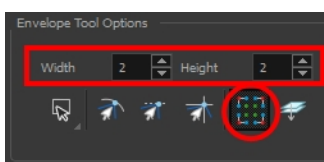




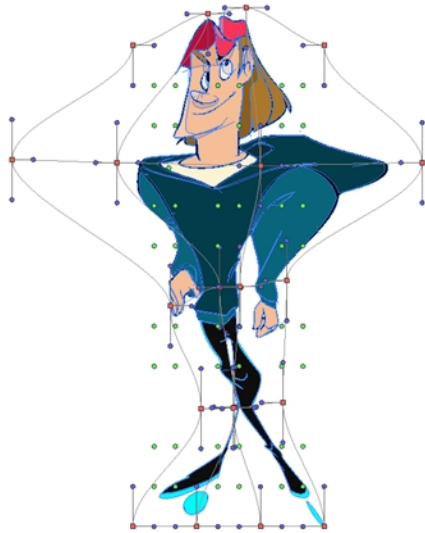
4. Click and drag the different anchor points and handles to deform the image.



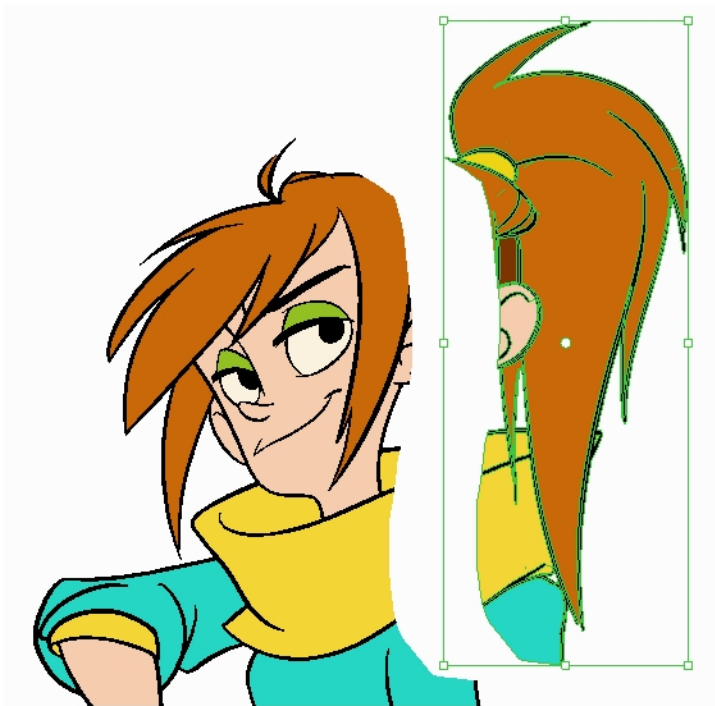
5. To display more controls, in the Tool Properties view, click the Show Advanced Controls  button.



6. Increase the height and width of the grid to get more control points to deform your image.




## Cutting Drawing Parts



The Cutter tool lets you cut a drawing area to move, copy, cut or delete it.

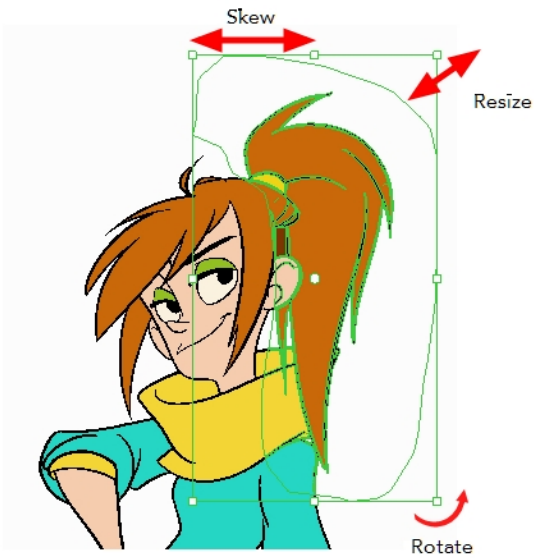
### How to cut with the Cutter tool

1. In the Tools toolbar, select the Cutter  tool or press Alt + T.

2. In the Camera or Drawing view, make a selection around an area to cut away.



- ▶ To delete the selected zone, press Delete.
- ▶ To move the selection, click the selection and drag it to a new area.
- ▶ Use the bounding box controls to scale, skew, or rotate the cut piece.




## Smoothing Lines

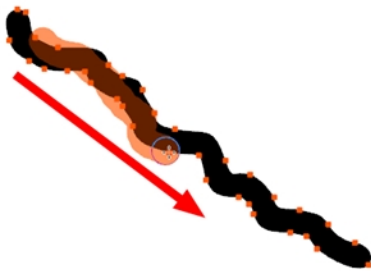


When drawing in a digital application, it is not like drawing on a sheet of paper. Sometimes the lines you draw may look as if they were drawn with an unsteady hand. When this occurs, you may need to correct the look of your lines.

Harmony has a very powerful tool you can use to optimize contours and reduce the number of points on the lines, the Smooth Editor tool.

### How to optimize lines with the Smooth Editor tool

1. In the Tools toolbar, select the Smooth Editor  tool or select **Drawing > Tools > Smooth Editor**.
2. In the Camera or Drawing view, place your pointer over the lines to smooth. You may need to pass over the same line several times to remove more points and make the line smoother. Note that by default, the Smooth Editor tool colour is yellow, it was changed to orange for screen grab clarity—see [Smooth Editor Tool Options](#) on page 194 to learn about the various settings available.




## Working With Text



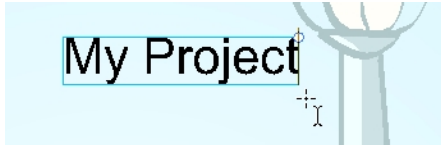
With the Text tool, you can type text in your project using various fonts and texts attributes. Text objects are part of a drawing, so you can manipulate them in the same way. OTF fonts are also supported.

### How to add text to drawings


1. Do one of the following:
  - In the Tools toolbar, select the Text  tool.
  - From the top menu, select **Drawing > Tools > Text**.
  - Press Alt + 9.
2. In the Timeline view, select the cell containing the drawing on which you want to add text.
3. In the Drawing or Camera view, click on the location you want the text to begin.



4. You can use the Tool Properties view to select the font, font size and format of the text you will type—see [Text Tool Options on page 196](#).
5. Type in the desired text.



6. Click outside the text box to exit the typing mode.

If you want to create another text object, click outside the currently active text box. You can always return to edit the text by selecting the Text  tool and clicking in the text.

## Working with Tool Presets

Tool presets let you save a variety of settings and are very handy and efficient for accessing the tools you use most often. That way, the tool is already set with the desired properties, such as colour, line thickness, whether to enable Draw Behind or Auto Flatten mode, and so on. You can create presets for these tools and many more: Brush, Pencil, Eraser, Rectangle, Ellipse, and Line. First, select a tool, adjust the properties, and then create a tool preset for it. Once you have created a tool preset, you can always make adjustments to fine-tune it, as well as create a keyboard shortcut for it.

What's the difference between a tool preset and a brush preset? When you save a tool preset, you have the option of saving the colour, which you cannot do with brush presets.

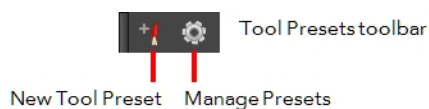
### The Tool Presets Toolbar



The Tool Presets toolbar lets you create new tool presets and manage them.

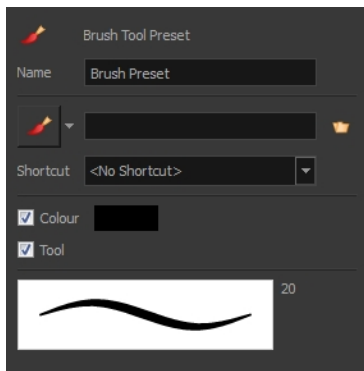
#### How to display the Tool Presets toolbar


1. Do one of the following:
  - From the top menu, select **Windows > Toolbars > Tool Presets**.
  - Right-click an empty area below the top menu and select **Tool Presets**.

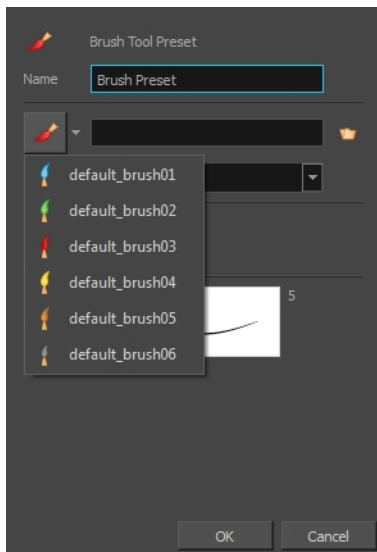


## How to create a tool preset

1. In the Tools toolbar, select a tool, for example the Brush tool.
1. Use the Tool Properties view to customize the tool.
2. To set a specific colour for your preset, in the Colour view, select the colour swatch to link to the tool. Note that when using this preset in another scene not using that colour palette, upon selecting this new preset, a colour recovery dialog box will appear asking to add this colour to your scene.
3. In the Tool Presets toolbar, click the New Tool Preset button.
4. In the New Preset dialog box, in the Name field, type a name for your new preset.




2. From the icon list, select an icon to quickly identify your preset or upload your own by clicking the File  button.




5. (Optional) From the Shortcut menu, set a keyboard shortcut to quickly access your preset. By default, the shortcuts are unassigned. To assign a keyboard shortcut, go to the top menu and select **Edit > Preferences > Shortcuts > Tool Presets** (Windows/Linux) or **Stage > Preferences > Shortcuts > Tool Presets** (Mac OS X).

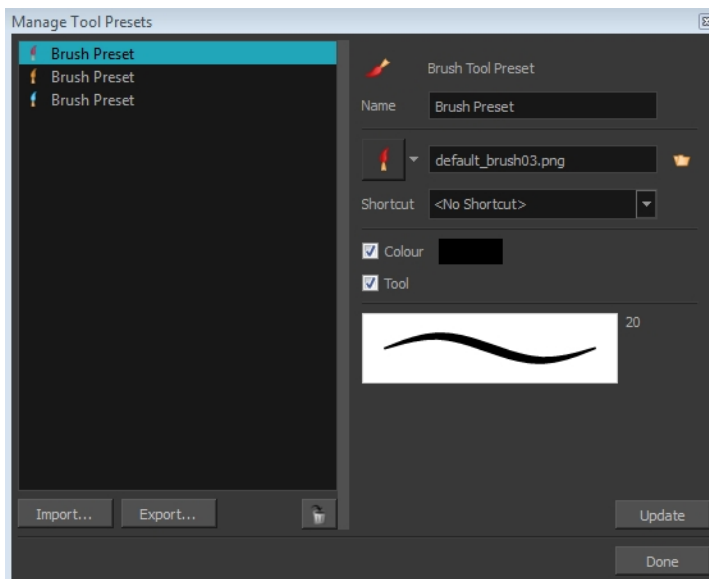
6. When you select any of the following options, they will take effect when you use the tool preset. If an option is deselected, then using a tool preset will not override your current settings.
  - **Colour:** Saves the current colour into the tool preset.
7. Click **OK**.

### How to select a tool preset

- In the Tool Presets toolbar, click the tool preset  icon you assigned when creating the preset. Note that when using this preset in a new scene not using the assigned colour swatch, a colour recovery dialog box appears prompting you to add the colour to the scene.


### How to delete a tool preset

1. In the Tool Presets toolbar, click the Manage Tool Presets  button.




2. From the list of tool presets on the left, select a preset to delete and click the Trash icon.

### How to import a tool preset

1. In the Tool Presets toolbar, click the Manage Tool Presets  button.
 


The Manage Tool Presets dialog box opens.
3. Click **Import**.
4. In the Select Folder window that opens, locate and select the preset(s) to import and click **Select Folder**.

### How to export a tool preset

1. In the Tool Presets toolbar, click the Manage Tool Presets  button.

- The Manage Tool Presets dialog box opens.
5. Click **Export**.
  2. In the Export Brush Presets window that opens, click **Export**.
  6. Select a folder and click **Select Folder**.

### How to update a tool preset

1. To update the colour of your preset, you must first select it in the Colour view.
2. In the Tool Presets toolbar, click the Manage Tool Presets  button.
3. In the Manage Tool Presets dialog box that opens, select the tool preset from the left side of the dialog box.
4. Make any changes you would like to the preset.
5. Click **Update**.

## More Drawing Tools





Harmony offers a wide variety of useful tools to optimize your drawings and work more efficiently; tools such as Group, Arrange, and the animation disk to rotate your workspace.

- [Arrange](#) on page 120
- [Convert Brush Strokes to Pencil Lines](#) on page 121
- [Pencil Lines to Brush Strokes](#) on page 122
- [Strokes to Pencil Lines](#) on page 122
- [Optimize](#) on page 122
- [Remove Extra Strokes](#) on page 123
- [Reduce Drawing Texture Resolution](#) on page 123
- [Crop Brush Textures](#) on page 124
- [Create Contour Stroke](#) on page 125
- [Remove Contour Stroke](#) on page 125
- [Grid](#) on page 126
- [Group/Ungroup](#) on page 126
- [Hand](#) on page 126
- [Rotate View](#) on page 127

## Arrange

The different Arrange options let you reorder drawing objects inside a single layer in the Drawing or Camera view.



Name	Button	Description	Access Method
Bring to Front		Moves the selected art to the front (on top).	From the top menu, select <b>Drawing &gt; Arrange &gt; Bring to Front</b> . Press Ctrl + Shift + PgUp (Windows/Linux) or ⌘ + Shift + PgUp (Mac OS X).
Bring Forward		Moves the selected art one level forward (closer to the front).	From the top menu, select <b>Drawing &gt; Arrange &gt; Bring Forward</b> . Press Ctrl + PgUp (Windows/Linux) or ⌘ + PgUp (Mac OS X).
Send Backward		Moves the selected art one level lower (behind).	From the top menu, select <b>Drawing &gt; Arrange &gt; Send Backward</b> . Press Ctrl + PgDown (Windows/Linux) or ⌘ + PgDown (Mac OS X).
Send to Back		Moves the selected art behind everything (bottom / back).	From the top menu, select <b>Drawing &gt; Arrange &gt; Send to Back</b> . Press Ctrl + Shift + PgDown (Windows/Linux) or ⌘ + Shift + PgDown (Mac OS X).

### Convert Brush Strokes to Pencil Lines



The Brushes Strokes to Pencil Lines operation converts selected contour strokes into centreline pencil strokes. The brush stroke thickness will be lost.

#### How to convert brush strokes to pencil lines

- ▶ From the top menu, select **Drawing > Convert > Brush Strokes to Pencil Lines** or press ^.
- ▶ Right-click on the selection, select **Convert > Brush Strokes to Pencil Lines** or press ^

## Pencil Lines to Brush Strokes



The Pencil Lines to Brush Strokes operation converts the selected centreline pencil strokes into contour strokes brush lines.

### How to convert pencil lines to brush strokes

- ▶ From the top menu, select **Drawing > Convert > Pencil Lines to Brush Strokes** or press &.
- ▶ Right-click on the selection, select **Convert > Pencil Lines to Brush Strokes** or press &

## Strokes to Pencil Lines

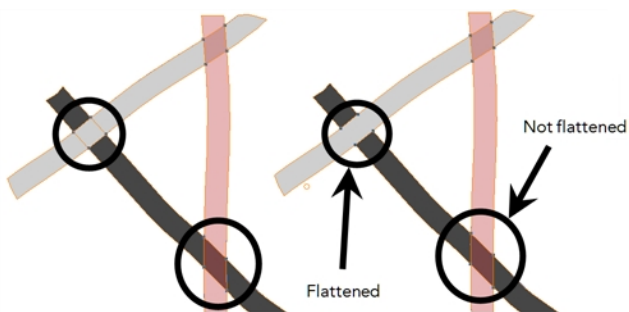


The Strokes to Pencil Lines operation converts the selected invisible line to a pencil line.

### How to convert strokes to pencil lines

- ▶ From the top menu, select **Drawing > Convert > Strokes to Pencil Lines** or press Shift + F12 (Windows/Linux only).
- ▶ Right-click on the selection, select **Convert > Strokes to Pencil Lines** or press Shift + F12 (Windows/Linux only)

## Optimize



The Optimize command reduces the number of layers, such as overlapping brush strokes, in the selected drawing objects. Drawing objects will only be flattened and optimized if the selected objects do not change the appearance of the final image when they are merged.

For example, if you have selected a number of partially transparent objects, which you layered to create an additive colour effect, the selected transparent drawing objects will not be merged. This is because merging the transparent drawing objects will cause them to lose the effect of the layered transparent colours.

### How to optimize

- ▶ Use the Select tool to select the drawing objects you want to optimize.
- ▶ From the top menu, select **Drawing > Optimize > Optimize**.
- ▶ From the Camera or Drawing view menu, select **Drawing > Optimize > Optimize**.

### Remove Extra Strokes

The Remove Extra Strokes option let you remove the invisible lines in your selection.

### How to remove extra strokes

1. In the Tools toolbar, select the Select tool.
2. In the Camera or Drawing view, use the Select tool to select the drawing objects you want to remove invisible lines from.
3. From the top menu, select **Drawing > Optimize > Remove Extra Strokes**.
  - ▶ From the Camera or Drawing view menu, select **Drawing > Optimize > Remove Extra Strokes**.

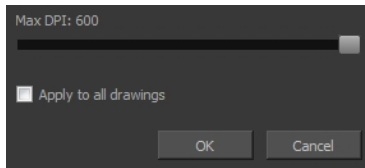
### Reduce Drawing Texture Resolution

When you import and vectorize as texture (colour) a high resolution image, the size of your drawing can be heavy. You can reduce the size and resolution of the textures in a drawing.

When you import and vectorize drawings using the grey or colour preset styles, you don't have control on the size of the bitmap texture. You can reduce that bitmap texture.

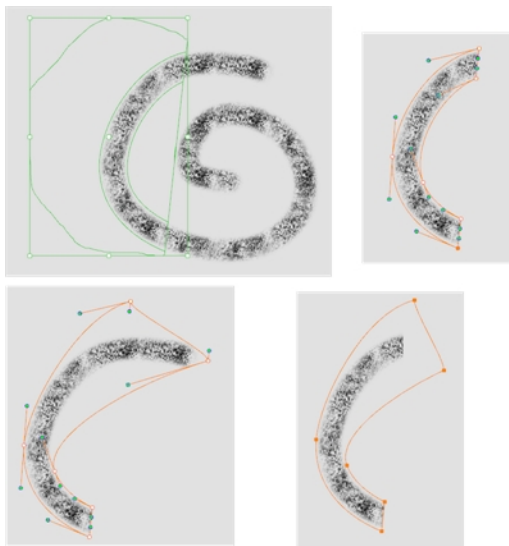
### How to reduce the drawing texture resolution

1. In the Tools toolbar, select the Select tool.
2. In the Camera or Drawing view, use the Select tool to select the drawing objects you want to reduce the texture resolution for.
3. From the top menu, select **Drawing > Optimize > Reduce Drawing Texture Resolution**.
  - ▶ From the Camera or Drawing view menu, select **Drawing > Optimize > Reduce Drawing Texture Resolution**.



4. In the dialog box, drag the slider toward the left to reduce the texture resolution.
5. Enable the **Apply to All Drawings** option if you want the modification to be applied to all the drawings in your layer.
6. Click **OK**.

### Crop Brush Textures



The Crop Brush Textures option is used to crop an unnecessarily large texture bitmap that lies unseen beneath the vector contour of a textured line. This often occurs when you cut and paste textured lines from one drawing into another. If you cut a portion from a textured line and paste it into a different drawing, Harmony pastes the entire unseen texture bitmap from the source drawing into the new one, even if you only took a small portion of the source drawing. Using the Crop Brush Texture command will crop away extraneous texture that does not touch the vector area. If there are many textured lines in your scene, this will greatly reduce the file size.

In the example shown above, a textured line is cut from a drawing and pasted into a new drawing. At first, it appears as if only a cropped section of the underlying texture bitmap was cut and pasted as well. However, using the Contour Editor tool to expand the vector envelope of the textured line, it is revealed that more texture bitmap exists beyond the cropped boundary. If you use the Crop Brush Texture command, the bitmap texture is cropped to the boundaries of the textured line's vector contour (as seen in the fourth image where the vector envelope has been pulled out to reveal empty space).

#### How to crop the brush texture

1. In the Timeline or Xsheet view, select the drawing whose texture you want to crop.

2. From the top menu, select **Drawing > Optimize > Crop Brush Textures**.
3. From the Camera or Drawing menu, select **Drawing > Optimize > Crop Brush Textures**.

## Create Contour Stroke





Before unpainting




Unpainting without strokes



Unpainting with contour

The Create Contour Stroke  option is used to add a permanent invisible line around a shape that was drawn directly in Harmony. This allows you to unpaint your lines with the Paint  tool but maintain the shape of the lines, should you need to repaint later.

This command is useful when inking and painting and using the Apply to All Drawings in Layer  option.

### How to create contour strokes

1. In the Tools toolbar, select the Select tool.
2. In the Camera or Drawing view, use the Select tool to select the drawing objects you want to create contour strokes for.
3. From the top menu, select **Drawing > Optimize > Create Contour Strokes**.

## Remove Contour Stroke

The Remove Contour Stroke option is used to remove any permanently invisible lines that were created while scanning and vectorizing drawings or manually adding contour strokes. This is useful if you want to remove the intersection triangles created during vectorization.

### How to remove contour strokes

1. In the Tools toolbar, select the Select tool.
2. In the Camera or Drawing view, use the Select tool to select the drawing objects you want to remove contour strokes for.
3. From the top menu, select **Drawing > Optimize > Remove Contour Strokes**.

## Grid



Use the Show Grid option to display a grid in the Drawing or Camera views.

Name	Button	Description	Keyboard Shortcut
Show Grid	#	Displays the grid.	<b>View &gt; Grid &gt; Show Grid</b> Press Ctrl + ' (Windows/Linux) or ⌘ + ' (Mac OS X).
Grid Outline Only		Displays the outline of the grid only.	<b>View &gt; Grid &gt; Grid Outline Only</b>
Square	☐	Displays a standard square grid.	<b>View &gt; Grid &gt; Square</b>
12 Field Grid	12	Displays a 12-field size grid.	<b>View &gt; Grid &gt; 12 Field Grid</b>
16 Field Grid	16	Displays a 16-field size grid.	<b>View &gt; Grid &gt; 16 Field Grid</b>
Underlay	⚙️	Displays the grid under the drawing elements.	<b>View &gt; Grid &gt; Underlay</b>
Overlay	⚙️	Displays the grid over the drawing elements.	<b>View &gt; Grid &gt; Overlay</b>


## Group/Ungroup

Use the Group option to group selected drawing objects. This can help in the selection, repositioning, re-scaling and other transformations to be applied to multiple objects of a drawing.


- From the top menu, select **Edit > Group > Group** or **Edit > Group > Ungroup**.
- From the Camera or Drawing view menu, select **Edit > Group > Group** or **Edit > Group > Ungroup**.
- Press Ctrl + G and Ctrl + Shift + G (Windows/Linux) or ⌘ + G and ⌘ + Shift + G (Mac OS X).

## Hand

Use the Hand tool to pan through the Drawing or Camera view.


- In the Tools toolbar, select the Hand  tool, click in the Drawing or Camera view and drag.
- You can also Hold down the Spacebar, click in the Drawing or Camera view and move your mouse in the direction you want to pan the view.

## Rotate View

The Rotate View  tool lets you rotate the Drawing or Camera view, the same way as you would do with a real animation disc. This tool can also be used in the Perspective view.



### How to use the Rotate View tool

1. Do one of the following:
  - ▶ From the top menu, select **Drawing > Tools > Rotate View**.
  - ▶ Press Ctrl + Alt (Windows/Linux) or ⌘ + Alt (Mac OS X).
  - ▶ In the Tools toolbar, select the Rotate View  tool.
  - ▶ In the Drawing or Camera view, right-click and select **Drawing Tools > Rotate View**.
2. In the Drawing or Camera view, click and drag to rotate the space.


## Drawing Tool References

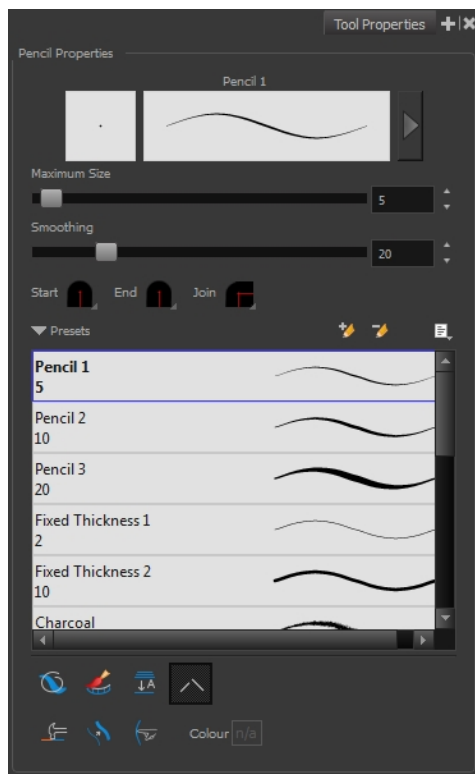
Harmony has a wide variety of drawing tools and each one of them has a series of options and modes available. This section covers these options. For details on how to use these tools, see [Drawing Tasks on page 47](#).

- [Pencil Tool Options on page 128](#)
- [Vector Brush Tool Options on page 133](#)
- [Bitmap Brush Tool Options](#)
- [Select Tool Options on page 161](#)
- [Eraser Tool Options on page 170](#)
- [Bitmap Eraser Options](#)

- [Contour Editor Options](#) on page 174
- [Pencil Editor Options](#) on page 177
- [Shape Tool Options](#) on page 181
- [Polyline Tool Options](#) on page 185
- [Stroke Tool Options](#) on page 187
- [Perspective Tool Options](#) on page 188
- [Envelope Tool Options](#) on page 189
- [Cutter Tool Options](#) on page 192
- [Smooth Editor Tool Options](#) on page 194
- [Text Tool Options](#) on page 196
- [Drawing Pivot Tool](#) on page 200

## Pencil Tool Options

When you select the Pencil  tool, its properties and options appears in the Tool Properties view.

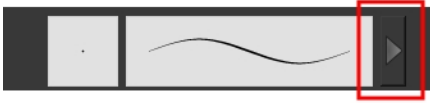


### Previewing the Stroke

The Preview area lets you see a preview of the stroke that will be produced after you customize the different parameters in the Tool Properties view.



1. Select a brush style from the Presets section. It's a good idea to choose a brush preset that is closest to the style you want to create.
2. Click on the Show Extended Properties arrow to display advanced customization parameters.

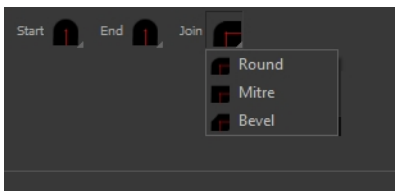


### Maximum Size and Smoothing

This is where you set the maximum size of your drawing tool.

- **MaximumSize:** Defines the width of the stroke.
- **Smoothing:** Defines the number of control points added to the centre line. The fewer the control points the smoother (but less faithful) the line.

### Adjusting the Pencil Line Style



You can adjust the start, end, and joint style of a selected pencil line.

- **Start:** Lets you select the style of the start tip, which is the first tip you drew. You can choose between Round or Flat style.
- **End:** Lets you select the style of the end tip, which is the last tip you drew. You can choose between Round or Flat style.
- **Join:** Lets you select the joint style. The joints are where the line curves abruptly. You could also define the Join style as the corner style. You can choose between Round, Mitre and Bevel style.

### Pencil Presets and Thickness Stencils

Harmony provides a variety of pencil presets and thickness stencils and also lets you create and save your own. It is a good idea to create and save pencils with precise sizes and parameters when you draw and design for efficiency and consistency.

A thickness stencil saves the thickness information across the length of the line. When drawing with a thickness stencil, the pressure sensitivity of the tablet is discarded. A thickness stencil can be used while drawing, or applied afterwards.

You also have the possibility to apply different textures to your lines by either using the default presets or importing your own—[See \*Pencil Line Texture\* on page 57.](#)

You can export the pencil presets that you have created and import those that others have created. This is a good way for you and project collaborators to keep a consistent look for the project—see [Working with Pencil Presets on page 51](#)

### Pencil Line Texture

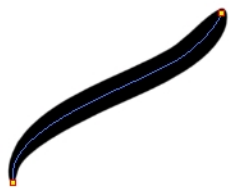
You can apply a bitmap texture on your pencil line and adjust it as needed—see [Pencil Line Texture on page 57](#)


### Draw Behind




When drawing on vector layers, the Draw Behind  mode lets you paint behind existing art. By default, strokes appear over your work until you release the tool.

### Create Colour Art Automatically



As you draw in the Line Art layer, the Create Colour Art Automatically  option automatically creates the corresponding strokes in the Colour Art layer.

### Auto-Flatten Mode

When drawing on vector layers, lines do not usually become one object. The Auto-Flatten  mode automatically merges lines created with the existing ones into one single object as you draw.

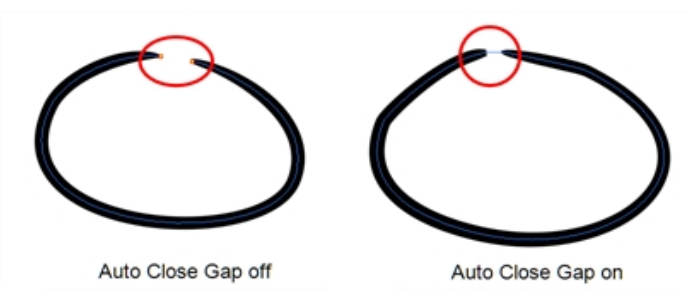
When drawing on a bitmap layer, you are laying down the bare pixels, so they are always flattened. You can no longer access the individual stroke after you draw it.

#### NOTE:

Using the Select tool, you can use select and remove a segment of flattened pencil lines. Overlapping pencil lines drawn with the Auto-Flatten mode enabled are essentially cut into segments by the overlap and can therefore be treated as individual lines.



## Auto-Close Gap





When using the pencil tool, you can automatically close strokes with an invisible stroke.

It is recommended to keep this option enabled when drawing with the Pencil tool.

## Line Building Mode

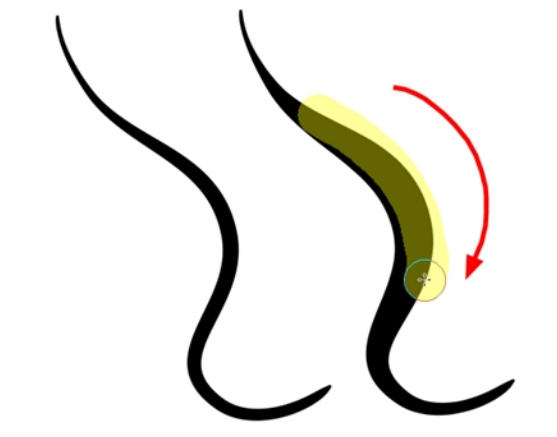



The Line Building  mode is very useful when drawing long lines and curves in small increments with pencil lines or the line  tool. As the pencil lines are central vector lines, it may be difficult to align the line tips perfectly to create a uniform stroke and close all gaps.

In this mode, you can draw lines in small increments and the tips are merge into one single stroke.

**NOTE:** This mode only works with pencil lines or the line tool.



## Auto Adjust Thickness

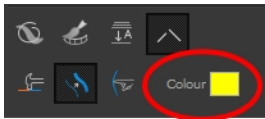


The Auto Adjust Thickness  tool is useful when you want to render a portion of a line thicker. When tracing a drawing on paper, you will often go back to a section of a curve to make it thicker to add dynamism to the line. Using the Auto Adjust Thickness tool, you can draw highlight strokes over the section to make thicker. Once you release the pen or mouse, the line becomes thicker following the shape and curve of the original stroke. This way is much faster and smoother than using the Pencil Editor tool. You do not have to add extra points and adjust the position and Bezier handles.

The default overlay colour is light yellow. If this colour is difficult to see because of the background or drawing colour, you can adjust the colour.

### How to change the Auto Adjust Thickness Colour


1. In the Tools toolbar, select the Pencil  tool.
2. In the Tool Properties view, click the Auto Adjust Thickness  button.
3. Click the colour swatch.



The Colour Picker window opens.


4. In the Colour Picker window, select a new colour.

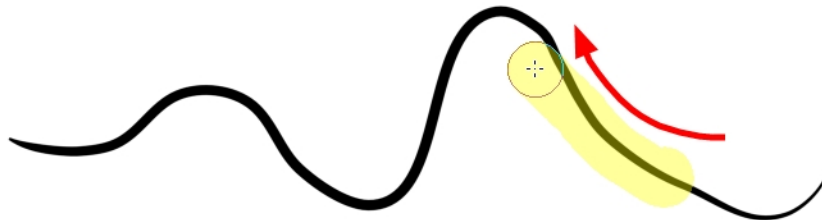
### Line Pushing Mode

The Line Pushing Mode  option lets you draw highlight strokes over existing pencil lines. You can reshape the curves. Depending how you draw the pushing stroke over your line, the highlighted section will be reshaped in one direction or the other.

The default overlay colour is light yellow. If this colour is difficult to see because of the background or drawing colour, you can adjust the colour.

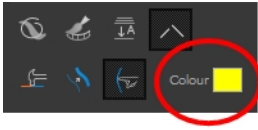
### To change the Line Pushing Mode colour

1. In the Tools toolbar, select the Pencil  tool.



2. In the Tool Properties view, select the Line Pushing Mode  button.


- Click the colour swatch.

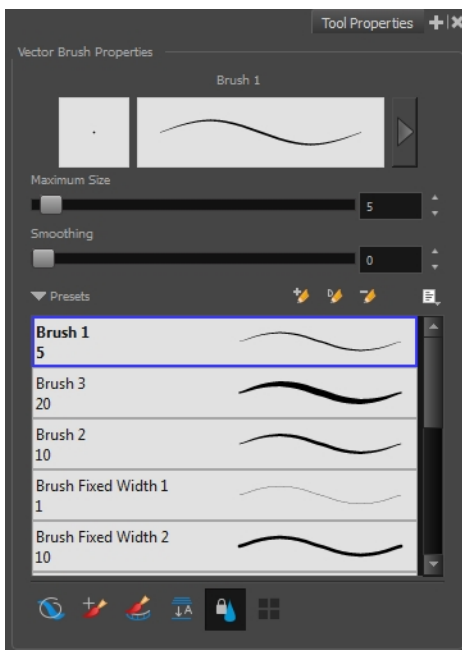


The Colour Picker window opens.

- In the Colour Picker window, select a new colour.

## Vector Brush Tool Options

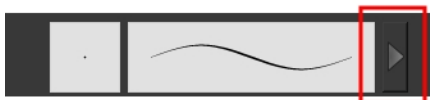
When you're drawing on a vector layer and select the Brush  tool, its properties and options appear in the Tool Properties view.



### Previewing the Stroke

The Preview area lets you see a preview of the stroke that will be produced after you customize the different parameters in the Tool Properties view.

- Select a brush style from the Presets section. It's a good idea to choose a brush preset that is closest to the style you want to create.
- Click on the Show Extended Properties arrow to display advanced customization parameters.



## Maximum Size and Smoothing


This is where you set the maximum size of your drawing tool.

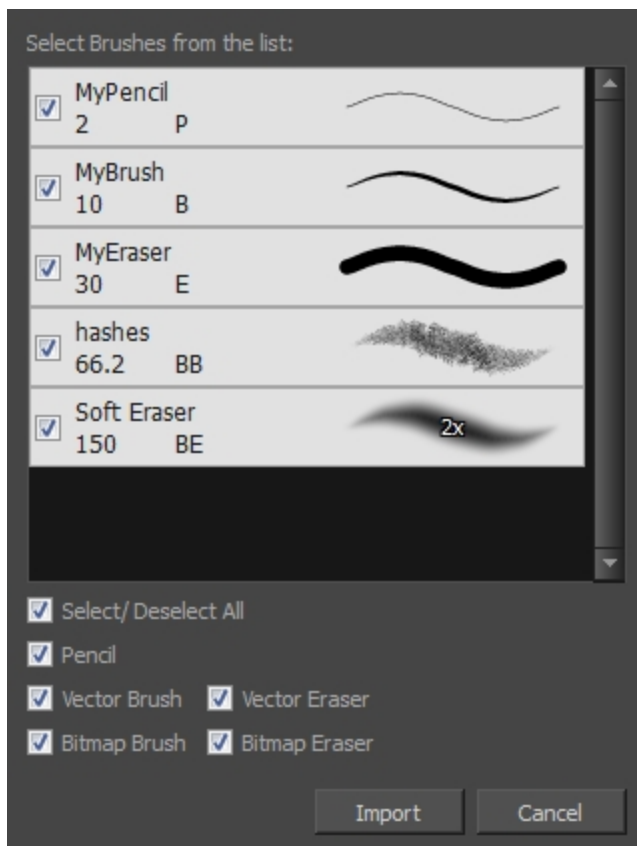
- ▶ **MaximumSize:** Defines the width of the stroke.
- ▶ **Smoothing:** Defines the number of control points added to the centre line. The fewer the control points the smoother (but less faithful) the line.

## Brush Presets

Brush presets are created by saving the properties of the current brush to a new preset, which you can reuse for repeated tasks. You can create as many brush presets as you need—see [Drawing with the Brush Tool](#) on page 61.

## How to import pencils, brushes and erasers

1. From the Brush menu , select **Import Brushes**.
2. In the browser window that appears, navigate to and select the **.xml** file.
3. Click **Open**.
4. In the Import Brushes dialog box, select the brushes brushes and erasers you want to import. You can also import pencils at the same time.

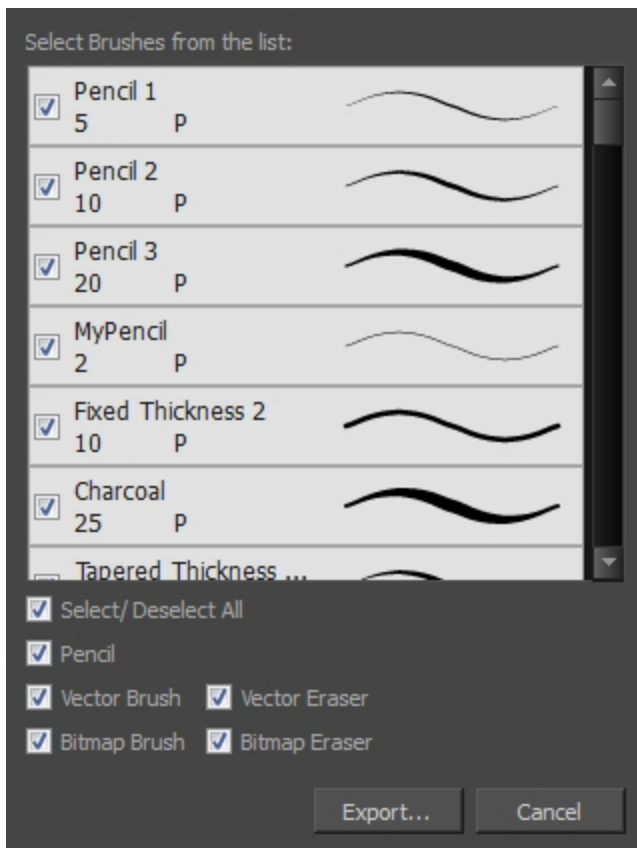


5. Click **Import**.

The imported brush, eraser and pencil styles will appear in the presets library. You can reuse any of the imported tips to create other brush, eraser and pencil style presets.

### How to export pencils, brushes and erasers

1. From the Brush menu, select **Export**.
2. In the Export Brushes dialog box, select the bitmap and vector brushes and erasers to export, as well as any pencils.



3. Click **Export**.
4. In the Export Brushes window that appears, browse to the location where you want to save the .xml file and give it a name.
5. Click **Save**.

### How to change the Presets Library thumbnail display


1. From the Brush menu, select one of the following:

Parameter	Description
Small Thumbnail	Reduces the size of the thumbnails in order to view more at the same time. Dis-

	plays an image of the tool's tip and its maximum size.
Large Thumbnail	Increases the size of the thumbnails in order to see the images more clearly. Displays an image of the tool's tip, its maximum size and its name.
Stroke View	Displays the tool's name, maximum size and stroke preview.


### Draw Behind



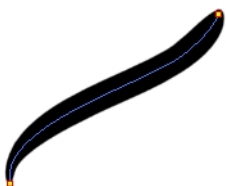
When the Draw Behind  mode is enabled, the lines you draw will appear behind the art that already exists.


### Repaint Brush Mode



The Repaint Brush  is used to repaint zones that have already been painted, it will not affect empty zones or pencil lines. It also automatically flattens each of its brush lines so it does not add new brush lines on top of existing ones. You can use this mode to paint tones or highlights onto your character.

### Create Colour Art Automatically




As you draw in the Line Art layer, the Create Colour Art Automatically  option automatically creates the corresponding strokes in the Colour Art layer.


### Auto-Flatten Mode

When enabled, the Auto-Flatten




 mode automatically flattens the new lines created with the existing artwork as you draw in the Drawing or Camera view. Brush strokes will flatten with brush strokes and pencil lines will flatten with pencil lines.


### Respect Protected Colour

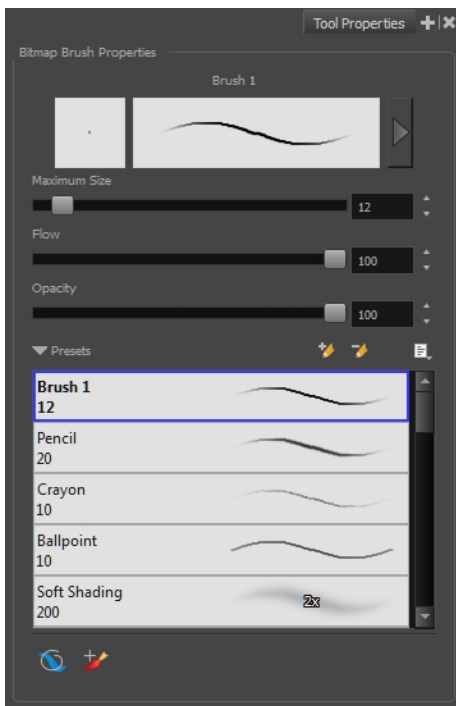
The Respect Protected Colour  option prevent the colours you marked as protected, in the Colour view, to be repainted using the Repaint Brush mode or any of the painting tools.

### Use Stored Colour Gradient

The Use Stored Colour Gradient  option makes your tool use the previously stored gradient position. This way, every new brush line or colour fill will use the stored gradient position.

## Bitmap Brush Tool Options

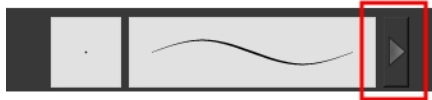
When you're drawing on a bitmap layer and select the Brush  tool, its properties and options appear in the Tool Properties view.



### Previewing the Stroke

The Preview area lets you see a preview of the stroke that will be produced after you customize the different parameters in the Tool Properties view.

1. Select a brush style from the Presets section. It's a good idea to choose a brush preset that is closest to the style you want to create.
2. Click on the Show Extended Properties arrow to display advanced customization parameters.



### Maximum Size

This is where you set the maximum size of your drawing tool. This parameter defines the width of the stroke.

### Flow

The Flow parameter lets you set the range for the rate at which paint flows from your brush. The analogy works better with a pen. The greater the flow, the more ink comes out, hence the more consistent the colour and texture of the line. If the flow is light, then the colour and texture of the line may look spotty. This feature works with the pressure sensitivity of a pen tablet.


### Opacity

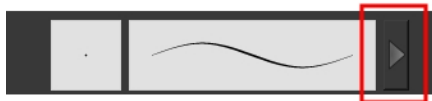
The Opacity parameter are where you set the opacity for a brush mark. This works with the pressure sensitivity of a pen tablet.



### Brush Presets

Brush presets are created by saving the properties of the current brush to a new preset, which you can reuse for repeated tasks. You can create as many brush presets as you need.

### How to create a brush preset

1. Make sure your current brush has the settings you want in the preset you will create.
2. In the Tool Properties view, do one of the following:
  - Click the arrow button to display the Brush Properties window and click the New Brush  button in the upper-right corner.



- Click the New Brush  button.
  - From the Brush  menu, select **New Brush Preset**.
3. In the New Preset window, type a name for your new brush preset.  
The new brush is added to the end of the list of brush presets.

### How to update a brush preset


1. Select the brush preset to update and click the arrow button to display the Brush Properties window.



2. Change the brush settings and click the Update Brush Preset  button in the upper-right corner.


## Draw Behind



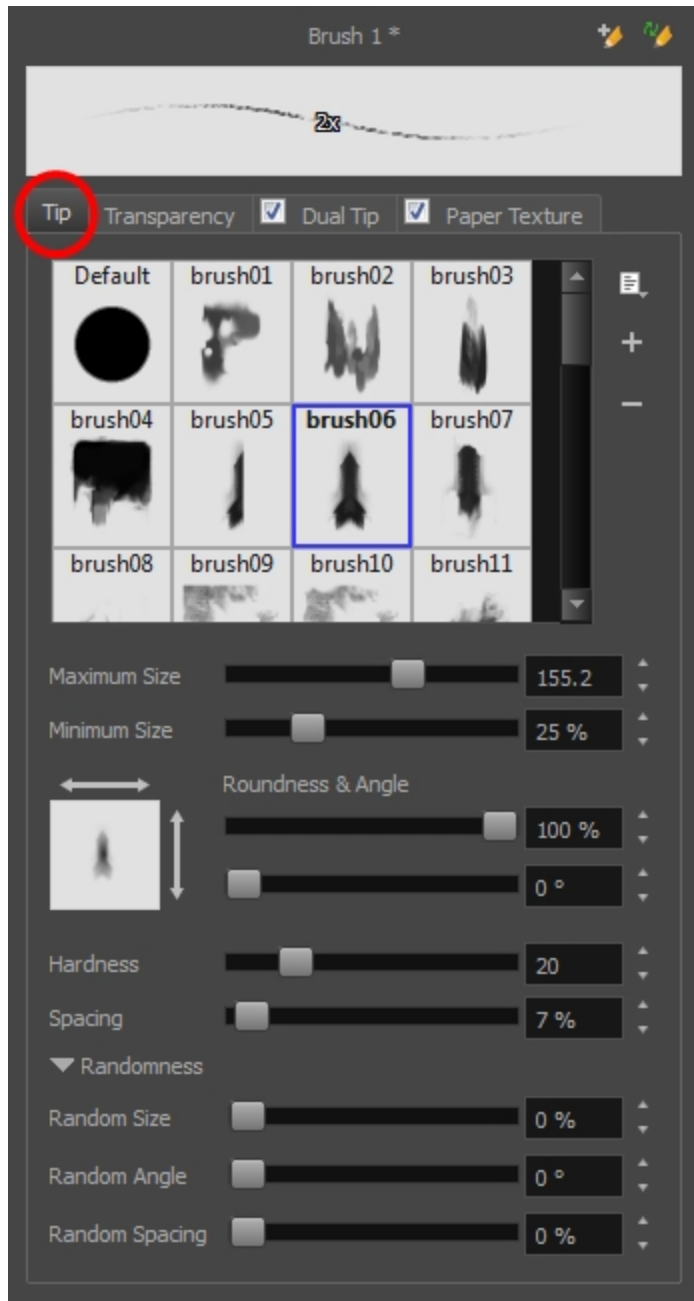
When the Draw Behind  mode is enabled, the lines you draw will appear behind the art that already exists.

## Repaint Brush Mode

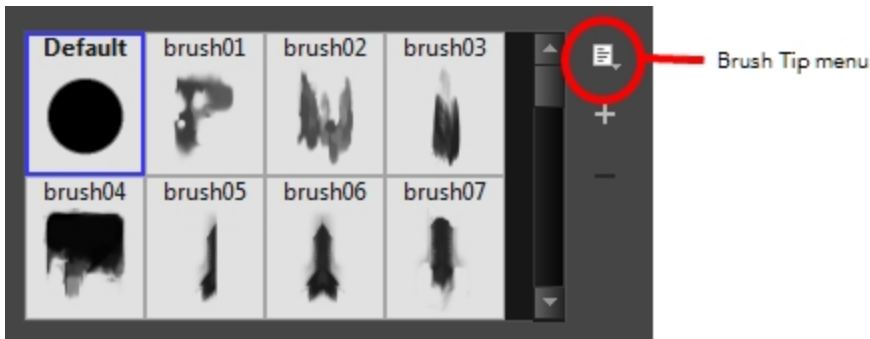


The Repaint Brush  is used to repaint zones that have already been painted, it will not affect empty zones or pencil lines. You can use this mode to paint tones or highlights onto your character.

### Tip Tab



## Brush Tips Library



This is where you select the shape of the brush tip. By default it is round. Note that some tips are designed to have semitransparent areas, even when the maximum brush opacity is set to 100%.

To create a custom brush tip, you must prepare the file ahead of time, either in Harmony or in a third-party software, such as Adobe Photoshop. Colour is not supported and transparency is not supported in the traditional sense. Black appears as 100% opaque, white appears as 100% transparent and all the shades of grey in between appear as varying degrees of semitransparency. A range of file formats are supported—.jpeg, .png, .tif, .psd, .tga to name a few. Alpha channels are disregarded on import. It is recommended that your file be between 100 x 100 pixels and 400 x 400 pixels.

You can also import brush tips that you exported from Harmony, so you can share them with colleagues.

### How to add a brush tip


1. Do one of the following:
  - From the Brush Tip menu, select **Add**.
  - Click the Add **+** button.
2. In the browser window that appears, navigate to where you saved your file.
3. Click **Open** to import the file into the Brush Tip Library.
 

By default, an imported brush tip is given the name of the image file.

### How to rename a brush tip

1. In the Brush Tip Library, select a brush tip.
2. From the Brush Tip menu, select **Rename**.
3. In the Rename dialog box that appears, type in the new name of the brush tip.
4. Click **OK**.

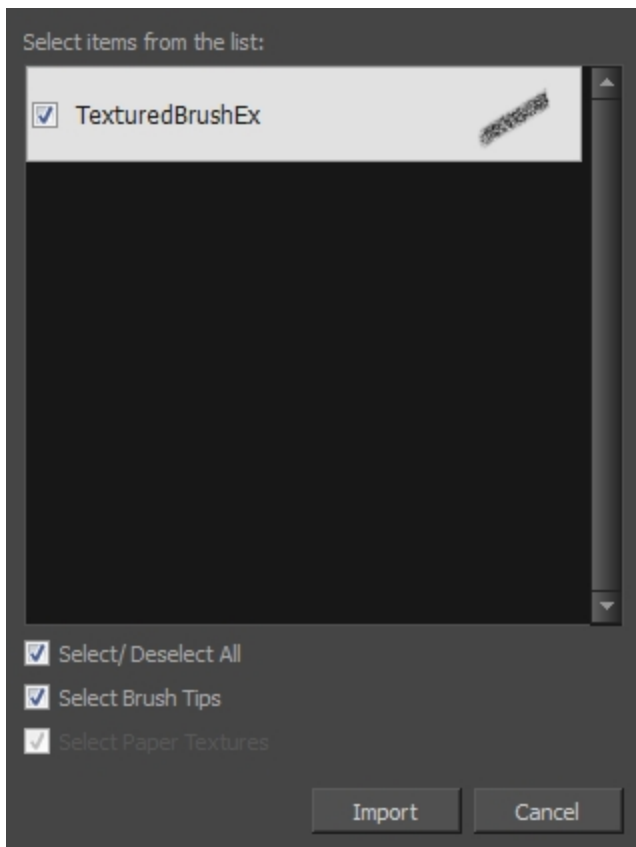
### How to delete a brush tip

1. In the Brush Tip Library, select a brush tip.
2. Do one of the following:
  - ▶ In the Brush Tip menu, select **Delete**.
  - ▶ Click the Delete  button.

The linked brush tip file does not get deleted and can therefore be reimported.

### How to import brush tips

1. In the Brush Tip menu, select **Import**.
2. In the browser window that appears, navigate to and select the **.xml** file.
3. Click **Open**.
4. In the Import Textures dialog box, select the brush tips to import. You can also import paper textures at the same time.

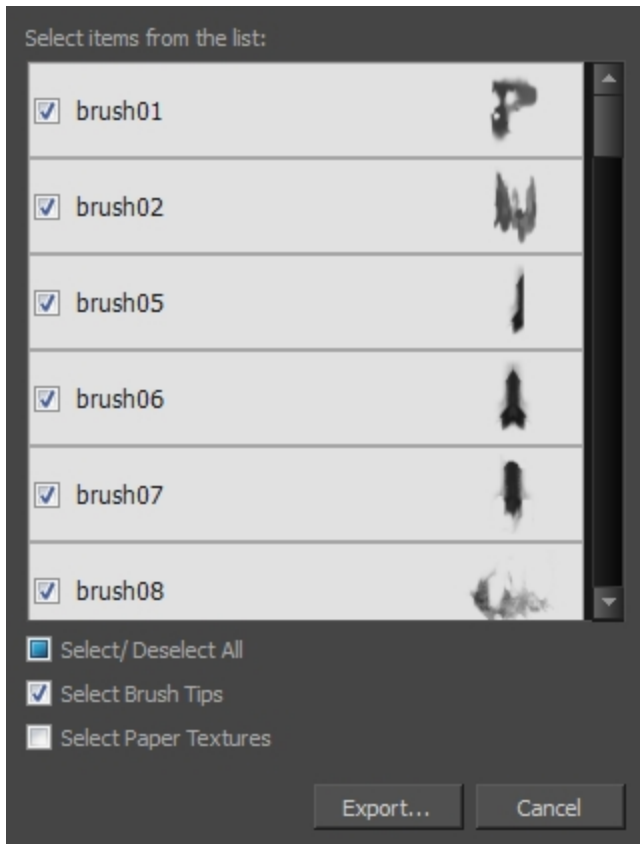


5. Click **Import**.

The imported brush tips appear in the Brush Tips Library. You can reuse any of the imported tips to create other brush style presets.

### How to export brush tips

1. In the Brush Tip menu, select **Export**.
2. In the Export Tips and Textures window, select or deselect any of the brush tips to create the list to export. You can also export paper textures at the same time.



3. Click **Export**.
4. In the Export Textures window that appears, browse to a location where you want save the **.xml** file and give it a name.
5. Click **Save**.

### How to change the Brush Tips thumbnail display

1. From Brush Tip menu, select one of the following options:

Parameter	Description
-----------	-------------

Small Thumbnail	Reduces the size of the thumbnails in order to view more at the same time.
Large Thumbnail	Increases the size of the thumbnails in order to see the images more clearly.
List View	Allows you to see the name, as well as the thumbnail.

### Minimum and Maximum Size

The minimum and maximum sizes of your drawing tool produce the thick and thin effect on your stroke. This works with the pressure sensitivity of a pen tablet.

- ▶ **Maximum Size:** Defines the maximum width of the stroke.
- ▶ **Minimum Size:** Defines the minimum width of the stroke in relation to and as a percentage of the maximum size.

**NOTE:** Setting the Minimum Size value to 100% eliminates the possibility of creating width variation on your stroke. In other words, you would be forcing a uniform line width using the Maximum Size value.

### Roundness and Angle

The Roundness and Angle parameters allow you to change the shape and orientation of the brush tip.

- ▶ **Roundness:** Squashes the height of the brush tip from its centre point. 100% roundness = the native height of the brush tip. A smaller percentage will make the brush tip look flatter and more narrow. The squashing is NOT relative to the angle value—if the brush tip is rotated, the squashing function still uses the brush tip's original orientation.
- ▶ **Angle:** Rotates the brush tip counter-clockwise. 0° = the brush tip's native orientation.



Roundness = 100%  
Angle = 0°



Roundness = 33%  
Angle = 0°



Roundness = 100%  
Angle = 45°



Roundness = 33%  
Angle = 45°

### Hardness and Spacing

The Hardness and Spacing parameters allow you to change the softness and spacing of the marks made by the brush tip. You can preview the hardness and spacing at the top of the Bitmap Brush Properties window, stroke preview area.

- ▶ **Hardness:** The hardness value corresponds to the softness of the brush tip's edges. The lower the value, the softer the tip edge. The higher the value, the sharper the tip edge. Be aware that some brush tips are not 100% opaque, so they will always appear somewhat soft, even at 100% hardness.



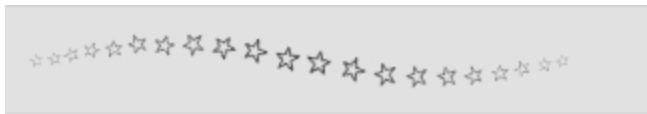


100% Hardness



10% Hardness

- ▶ **Spacing:** Defines the amount of space between each stamp of the brush. A value of 100% sets the stamp marks edge to edge, if there is no white space around the shape. The larger the value, the greater the space between marks. A really large value can make the brush stroke appear as a string of individual marks. Conversely, a small spacing value will give the appearance of a fluid brush stroke. Spacing is only evident when making a continuous stroke.



Spacing = 100%



Spacing = 10%

## Randomness

The Randomness parameters let you create a varied bitmap brush stroke. Refining these options can give your stroke a lovely, non-mechanical look.

- ▶ **Random Size:** You can create variation between the thick and thin of your brush stroke just by setting the Maximum and Minimum Size values. If you add randomness to the mix, pressure sensitivity from your drawing tablet will still be applied. Light pressure will create random values around the minimum, while heavy pressure will create random values closer to the maximum. The larger the percentage, the larger the range of random variation.

**NOTE:** Setting the Minimum Size to 100% eliminates the possibility of creating width variation on your stroke, whether you are applying randomness or not. Therefore, you would be forcing a uniform line width using the Maximum Size value.

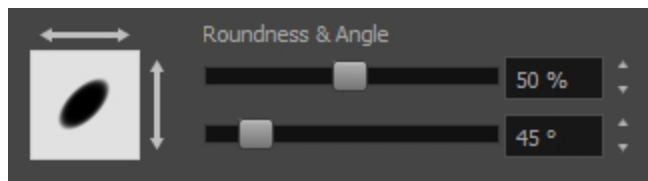


Random Size = 0%  
Spacing = 10%



Random Size = 50%  
Spacing = 10%

- ▶ **Random Angle:** Sets the range for random rotation around the set Angle value. For example, if the Angle is set to 45° and the Random Angle set to 10°, the software will choose values between 40°–50° (plus or minus 5 degrees, equaling a total of 10 degrees).



Random Angle = 0%

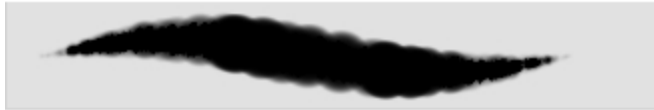


Random Angle = 60%

- ▶ **Random Spacing:** Sets the range for random spacing around the set Spacing value. For example, if the Spacing is set to 50% and the Random Spacing is set to 10%, then Harmony will choose values between 45%–55% (plus or minus 5 percent, equaling a total of 10 percent).



Spacing = 10%  
Random Spacing = 0%



Spacing = 10%  
Random Spacing = 80%

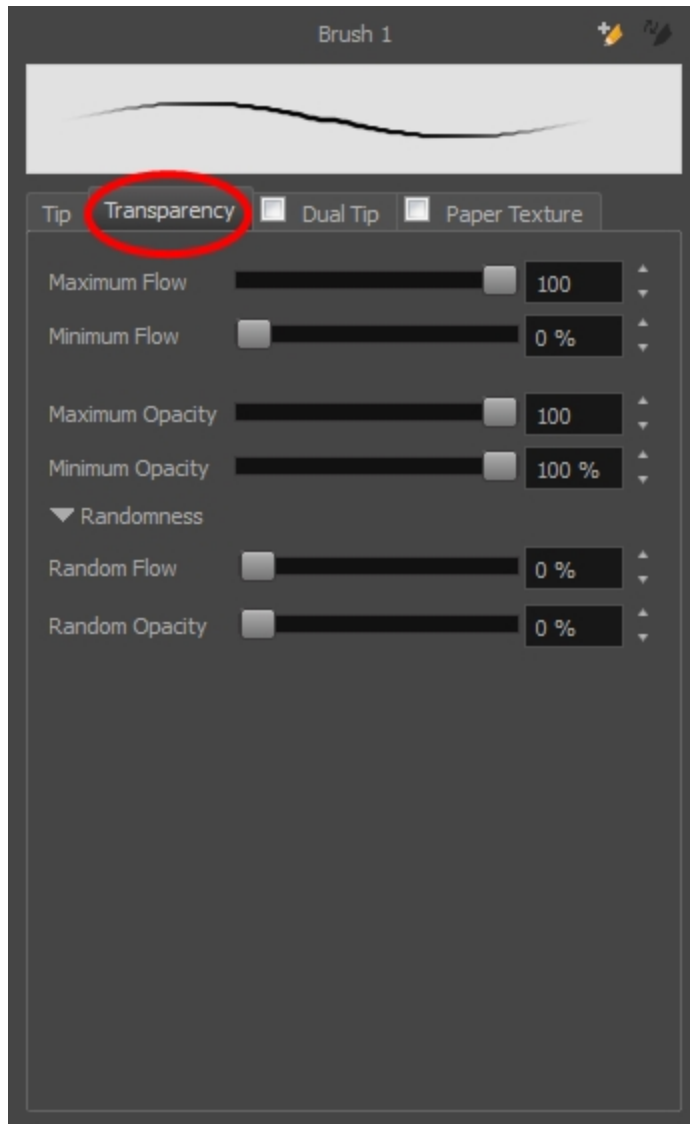


Spacing = 100%  
Random Spacing = 0%



Spacing = 100%  
Random Spacing = 80%

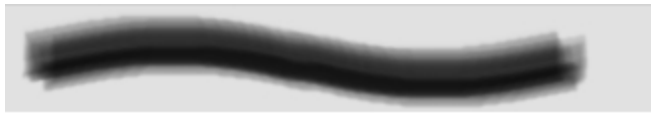
## Transparency Tab



### Maximum and Minimum Flow

The Maximum and Minimum Flow parameters let you set the range for the rate at which paint flows from your brush. The analogy works better with a pen. The greater the flow, the more ink comes out, hence the more consistent the colour and texture of the line. If the flow is light, then the colour and texture of the line may look spotty. This feature works with the pressure sensitivity of a pen tablet.

- ▶ **Maximum Flow:** Sets the maximum rate at which colour and texture are applied as you create a fluid stroke.
- ▶ **Minimum Flow:** Sets the minimum rate at which colour and texture are applied as you create a fluid stroke. It is defined as a percentage of the Maximum Flow value. If the Minimum Flow value is set to 100%, then tablet pressure sensitivity will no longer be applicable. The flow will be set to the constant rate of the Maximum Flow value.



Maximum Flow = 8  
Opacity = 100%



Maximum Flow = 100  
Opacity = 100%

### Maximum Opacity and Minimum Opacity

The Maximum and Minimum Opacity parameters are where you set the opacity range for a brush mark. This works with the pressure sensitivity of a pen tablet.

- ▶ **Maximum Opacity:** Sets the transparency limit of the brush mark when the pressure is heavy.
- ▶ **Minimum Opacity:** Sets the transparency limit of the brush mark when the pressure is very light. It is defined as a percentage of the Maximum Opacity value. If the Minimum Opacity value is set to 100%, then tablet pressure sensitivity will no longer be applicable. The opacity will be set to the constant rate of the Maximum Opacity value.



Maximum Flow = 8  
Opacity = 25%



Maximum Flow = 100  
Opacity = 25%

### Randomness

The Randomness parameter lets you set the range for the randomness of the flow and opacity. This works with the pressure sensitivity of a pen tablet.

- ▶ **Random Flow:** You can create variation in the flow of your brush stroke just by setting the Maximum and Minimum Flow values. If you add randomness to the mix, pressure sensitivity from your drawing tablet will still be applied. Light pressure will create random values around the minimum, while heavy pressure will create random values closer to the maximum. The larger the percentage, the larger the range of random variation.

**NOTE:** Setting the Minimum Flow value to 100% eliminates the possibility of creating flow variation on your stroke, whether you are applying randomness or not. That is, you would be forcing a uniform flow using the Maximum Flow value.

---



Maximum Flow = 100  
Random Flow = 0%



Maximum Flow = 100  
Random Flow = 100%



Maximum Flow = 50  
Random Flow = 100%

- ▶ **Random Opacity:** You can create variation in the opacity of your brush stroke just by setting the Maximum and Minimum Opacity values. If you add randomness to the mix, pressure sensitivity from your drawing tablet will still be applied. Light pressure will create random values around the minimum, while heavy pressure will create random values closer to the maximum. The larger the percentage, the larger the range of random variation.

**NOTE:** Setting the Minimum Opacity value to 100% eliminates the possibility of creating opacity variation on your stroke, whether you are applying randomness or not. That is, you would be forcing a uniform opacity using the Maximum Opacity value.

---



Maximum Opacity = 100  
 Minimum Opacity = 10%  
 Random Opacity = 0%



Maximum Opacity = 100  
 Minimum Opacity = 10%  
 Random Opacity = 10%



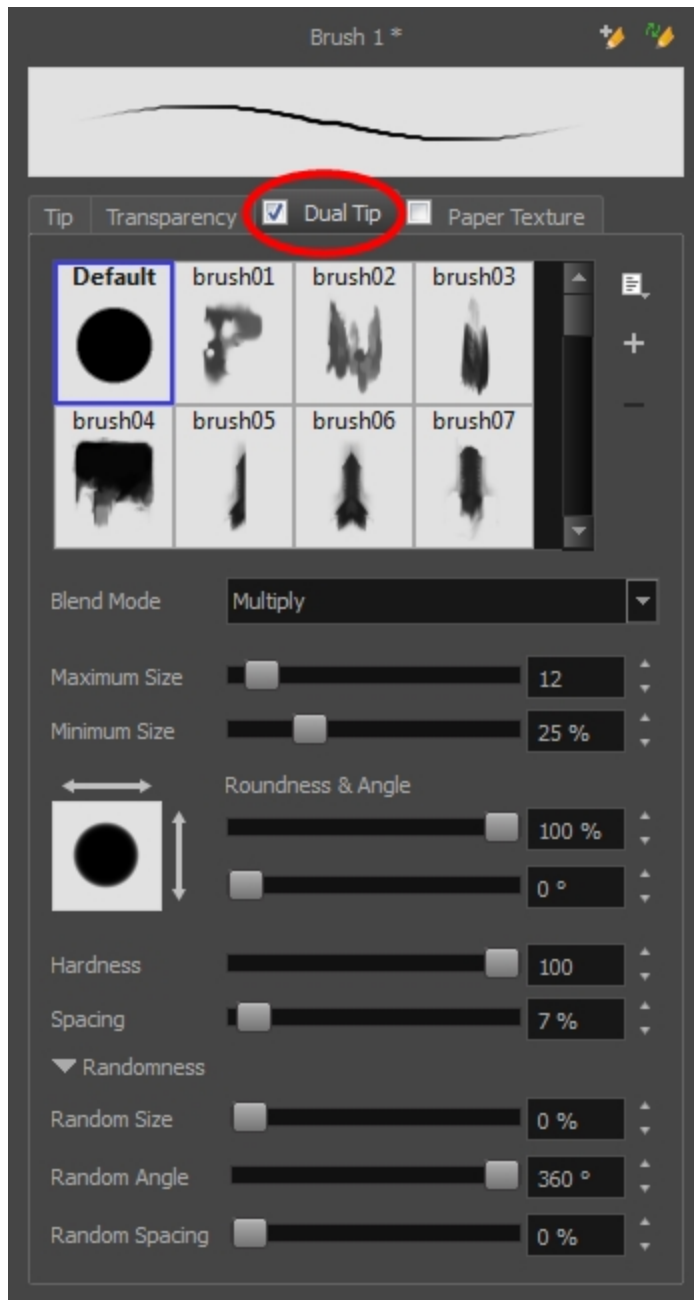
Maximum Opacity = 100  
 Minimum Opacity = 10%  
 Random Opacity = 50%

### Dual Tip Tab

The Dual Tip tab lets you set the parameters for creating a dual tip brush. The primary bitmap brush tip and the dual tip always work together. You can set the parameters for the primary tip in the Tip tab and those for the dual tip in the Dual Tip tab. The Blend mode you select determines how the tips are combined.

You must select the Dual Tip option to access the tab's parameters.

By default, the Blend Mode is set to Multiply and the Random Angle to 360°.



## Blend Mode

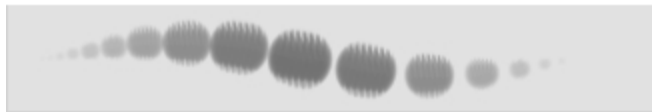
The Blend modes let you decide how the primary tip and the dual tip are combined.

- ▶ **Multiply:** This is the default blend mode. When the two brush tips are combined in this mode, they essentially cut each other out in overlapping areas, where one or both tips have an area of 100% transparency. The less opaque the brush tips are, the lighter their combination.





### Combined

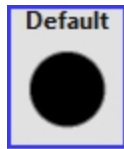


Blend Mode = Multiply

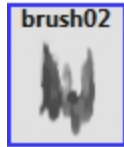


Blend Mode = Multiply  
Random.Angle = 360°

- ▶ **Colour Dodge:** In this mode, the primary tip cuts out the shape of the dual tip. Where the tip shapes overlap, within the boundaries of the primary shape, the colour and opacity appear darker.



Primary tip



Dual tip



### Combined

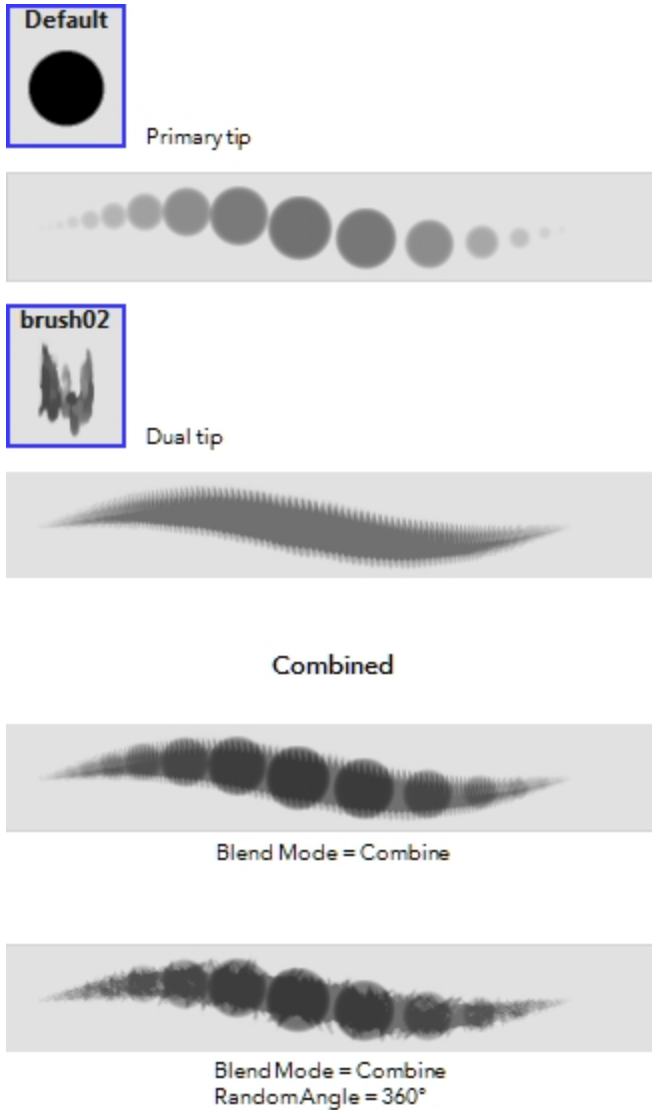


Blend Mode = Colour Dodge



Blend Mode = Colour Dodge  
Random.Angle = 360°

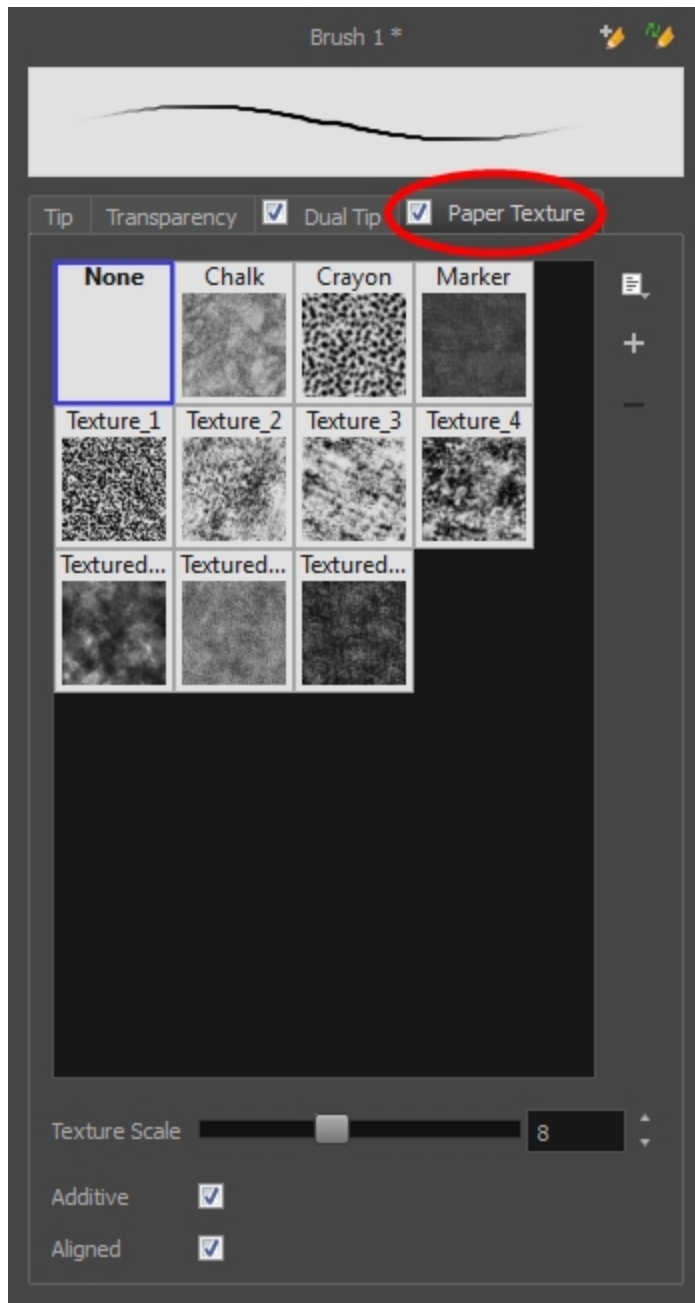
- ▶ **Combine:** This mode treats the two tips as two different and separate brushes that have the same colour and follow the same path.



### Paper Texture tab

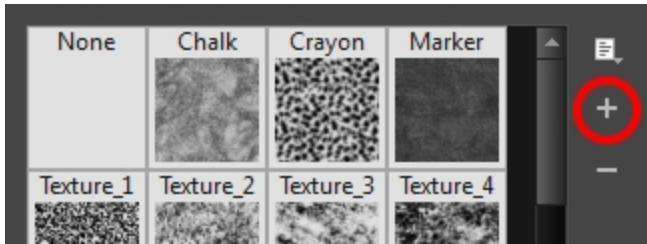
The Paper Texture tab lets you view and select a paperlike texture for your brush. You can also import paper textures that were previously exported.

You must select this option to access the tab's parameters.



### How to add a paper texture

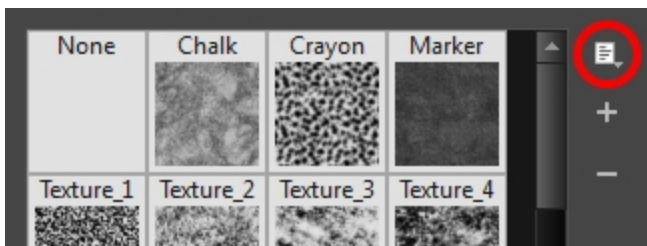
1. Do one of the following:
  - ▶ From the Paper Texture menu , select **Add**.
  - ▶ Click the Add Paper Texture button.



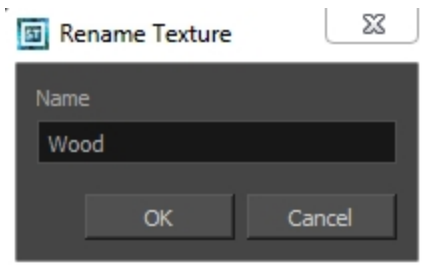
2. In the browser window that appears, navigate to where you saved your texture file.
3. Click **Open** to import the file into the Paper Texture library.  
By default, an imported texture is given the name of the image file.

### How to rename a paper texture

1. In the Paper Texture library, select a texture.
2. From the Paper Texture menu, select **Rename**.




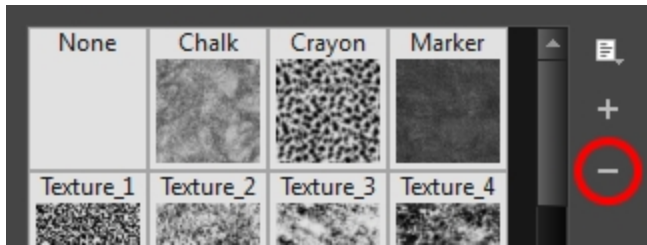
3. In the Rename Texture dialog box that appears, type in the new name for the texture.



4. Click **OK**.

### How to delete a paper texture

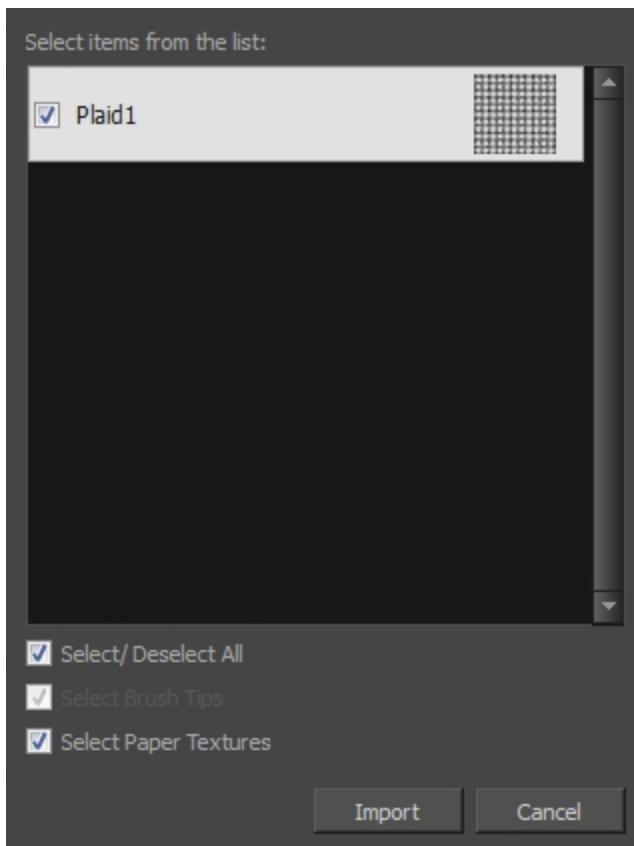
1. In the Paper Texture library, select a texture.
2. Do one of the following:
  - In the Paper Texture menu, select **Delete**.
  - Click the Delete  button.



**NOTE:** You can delete any texture in the texture library as long as there is no brush preset using it.

### How to import paper textures

1. In the Paper Texture menu, select **Import**.
2. In the browser window that appears, navigate to and select the **.xml** file.
3. Click **Open**.
4. In the Import Textures dialog box, select the paper textures that you wish to import. You can import any available brush tips at the same time too.

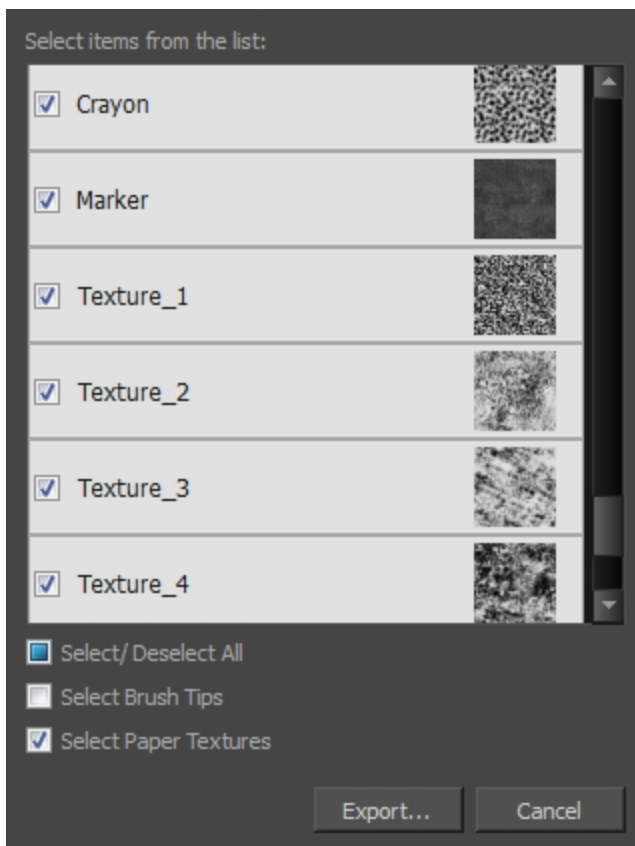


5. Click **Import**.

The imported paper textures will appear in the Paper Texture Library. You can reuse any of the imported paper textures to create other brush style presets.

### How to export paper textures

1. In the Paper Texture menu, select **Export**.
2. In the Export Tips and Textures window, scroll down the textures list to the paper textures and select or deselect any textures to create the list that you wish to export. You can export brush tips at the same time too.



3. Click on the **Export** button.
4. In the Export Textures window that appears, browse to a location where you would like to save the .xml file and give it a name.
5. Click **Save**.

### How to change the Paper Texture thumbnail display

1. From the Paper Texture menu, select one of the following:

Parameter	Description
Small Thumbnail	Reduces the size of the thumbnails in order to view more at the same time.
Large Thumbnail	Increases the size of the thumbnails in order to see the images more clearly.
List View	Allows you to see the name, as well as the thumbnail.

- ▶ **Texture Scale:** Increase or decreases the size of the paper texture.
- ▶ **Additive:** This option layers the texture on top of itself as you scribble overlapping lines in one continuous stroke. If this option is turned off, areas of overlapping lines from a single, continuous stroke will appear the same, in terms of darkness and texture, as non-overlapping areas.

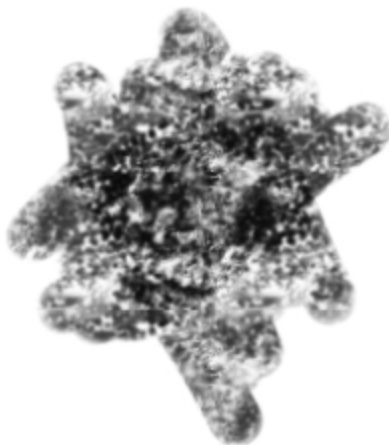


Additive enabled

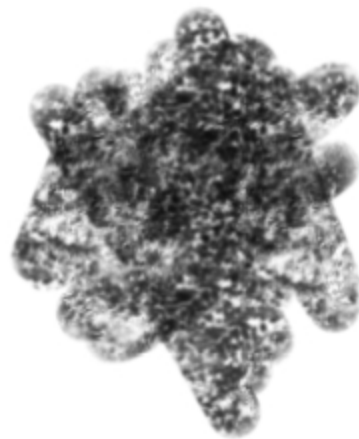


Additive disabled

- ▶ **Aligned:** This option defines the way separate, overlapping strokes behave. If this option is enabled, the paper texture's position does not change with each sweep of the brush. If this option is disabled, each sweep of the brush produces a different texture position. The texture orientation always stays the same.




Aligned enabled

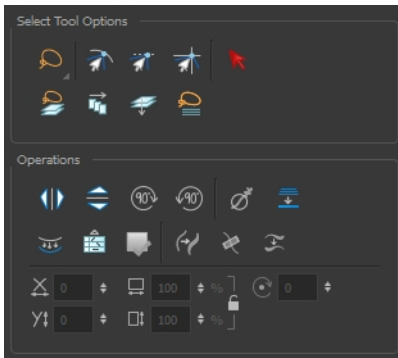


Aligned disabled



## Select Tool Options

When you use the Select  tool, its properties and options appear in the Tool Properties view.






### Lasso and Marquee

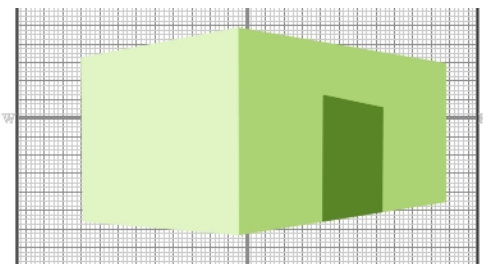
Choose between the Lasso  and Marquee  options to change the selection style of the tool.

- Click and hold Alt to temporarily switch from the current mode to the other.

### Snap Options



You can enable different snapping modes to help you when repositioning drawings using the Select tool.

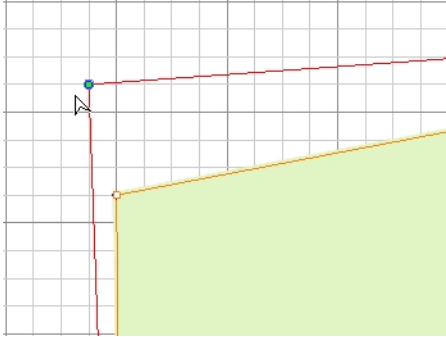
-  **Snap to Contour:** Snaps your selection or point to any line you position it on. As soon as you move it close enough to another line, your point or selection will snap to it.
-  **Snap and Align:** Snaps the selected anchor point to any existing line while displaying temporary rulers as a guide that you can also snap your anchor point to.
-  **Snap to Grid:** Snaps your selection following the currently enabled grid.



### How to snap to the grid

1. Do one of the following:
  - ▶ Select **View > Grid > Show Grid** to display the grid in the Camera or Drawing view or press Ctrl + ' (Windows/Linux) or ⌘ + ' (Mac OS X).
  - ▶ Select **View > Grid > Square Grid, 12 Field Grid** or **16 Field Grid** for your current needs.

2. In the Tools toolbar, select the Contour Editor  tool or press Alt + Q.
3. In the Tool Properties view, click the Snap to Grid  button.
4. In the Camera or Drawing view, click on the anchor point you want to snap to the grid, drag it to the desired position and release.





### Selecting by Colour



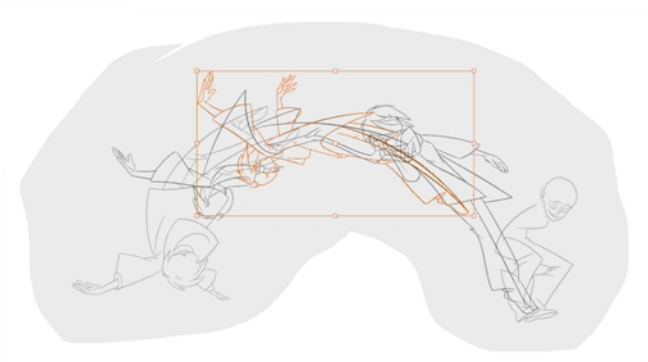
The Select by Colour mode lets you select all the zones and lines in your drawing painted with the same colour swatch.


**NOTE:** Only the zones painted with the **SAME** colour swatch will be selected. If another zone is coloured with the exact same RGB value (same colour), but not painted with the same colour swatch, it will not be selected.

## How to select areas by colour

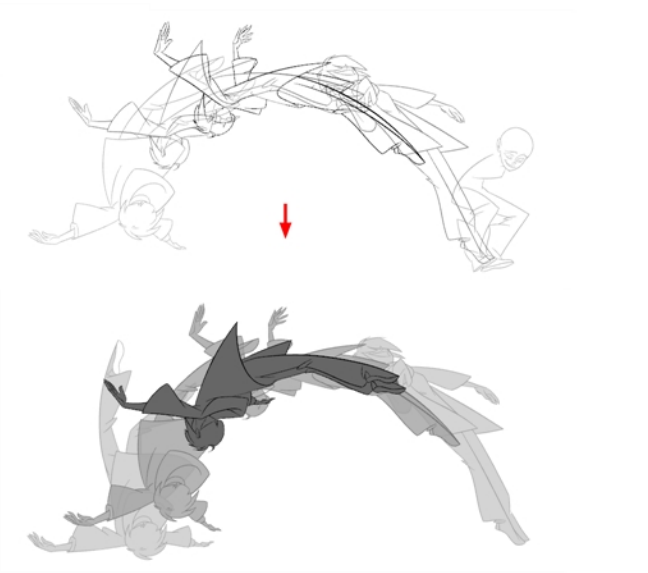
1. In the Tools toolbar, select the **Select**  tool or press Alt + S.
2. In the Tool Properties view, click the Select by Colour  button.
3. In the Camera or Drawing view, click on any zone or line in your drawing.  
All zones and lines of the same colour are selected.
4. Click the Select tool again to return to the regular Select mode.


## Permanent Selection




The Permanent Selection  option lets you maintain a selection over multiple drawings. Once this option is enabled, the selection zone made using the Select tool will remain as you navigate through drawings of the same layer and drawings from other drawing layers. This option can be used to simultaneously delete artwork inside or outside of the selection on several drawings when combined with the Apply to Multiple Drawings option.

## Apply to All Drawings in Layer



The Apply to All Drawings in Layer  option is used to perform an action on all the drawings contained in a layer. For example, you could enable the option to paint a section on all the drawings simultaneously. The Apply Tool to All Drawings option must be activated before performing the action and will stay enabled only for the next action.

### Apply to Line and Colour Art

The Apply to Line and Colour Art  option uses the concept of Line Art and Colour Art layers. Use this option to apply an action such as selecting, resizing or erasing a drawing on both Line Art and Colour Art layers, as well as the Overlay and Underlay layers.


### Single Mode



By default, when you draw a selection box in the Camera view, the Select tool will select only the drawing strokes of the current drawing. If you prefer the Select tool to select all the strokes on all layers, you can disable the Works on Single Drawing  option in the Tool Properties view or disable the Select tool Works on Single Drawing preference. To do this, go to the top menu, select **Edit > Preferences > Camera** (Windows/Linux) or **Stage > Preferences > Camera** (Mac OS X) and uncheck the Select tool Works on Single Drawing option.

### Flip Horizontal and Vertical



The Flip Horizontal  and Flip Vertical  operations flip the current selection horizontally or vertically.

- ▶ From the top menu, select **Drawing > Flip Horizontal** and **Flip Vertical**.

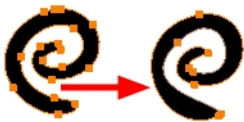
### Rotate 90 Degrees CW and CCW




The Rotate 90 Degrees CW  and Rotate 90 Degrees CCW  operations rotate the current selection 90 degrees clockwise or counter-clockwise.

- ▶ From the top menu, select **Drawing > Transform > Rotate 90 Degrees CW** and **Rotate 90 Degrees CCW**.
- ▶ Press Ctrl + 7 and Ctrl + 9 (Windows/Linux) or ⌘ + 7 and ⌘ + 9 (Mac OS X).

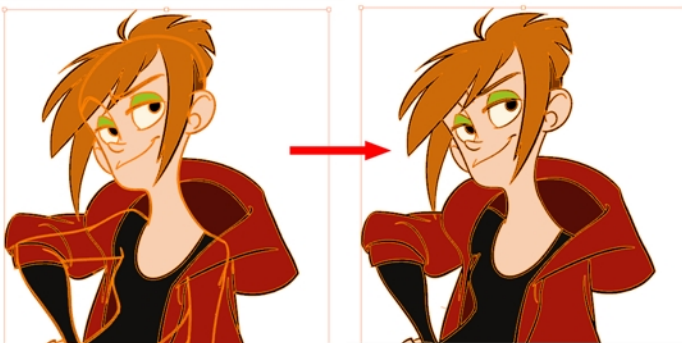
### Smooth




The Smooth  operation lets you smooth out selected drawing strokes and remove extra points.

- ▶ From the top menu, select **Drawing > Optimize > Smooth** or press Alt + Shift + S.

### Flatten



The Flatten  operation is used to merge drawing objects and brush strokes into a single layer. If you draw new lines to fix a drawing or line with many brush strokes, it can be useful to flatten them all into a single shape. By

default, lines are drawn one on top of each other. If you intend to repaint the lines or modify their shape, it will be easier if they are flattened.



- ▶ From the top menu, select **Drawing > Optimize > Flatten** or pres Alt + Shift + F.

### Create Colour Art from Line Art



Lets you use the outline you traced on one of the four embedded layers (line art, colour art, overlay, underlay) and create invisible strokes to paint your drawings on separate layers. This provides more inking and painting flexibility.

You can also configure this option to create the invisible strokes on any of the four embedded layers.

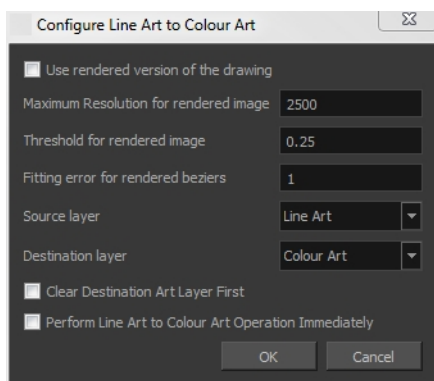
### How to create Colour Art zones out of the Line Art content

1. In the Tools toolbar, select the Select  tool or press Alt + S.
2. In the Camera or Drawing view, select the artwork to transfer to the Colour Art.
3. In the Tool Properties view or the Drawing View toolbar, click the Create Colour Art from Line Art  button or press \*.

### How to configure the Create Colour Art from Line Art option

1. In the Tools toolbar, select the Select  tool or press Alt + S.
2. In the Tool Properties view or the Drawing View toolbar, Shift + click the Create Colour Art from Line Art  button.




The Configure Line Art to Colour Art dialog box opens.





Parameter	Description
Use rendered version of the drawing	Renders the drawing and vectorize it to calculate the position of the centreline that will produce the colour art stroke.
Maximum Resolution for rendered image	The size of the rendered image.

Threshold for rendered image	The value of grey processed to create the rendered vectorized arts.
Fitting error for rendered Bezier	This value represents how precise the fitting of the colour art zone in relation to the line art will be.
Source layer	Lets you select the layer (Line Art, Colour Art, Underlay or <b>Overlay</b> ) you want the colour art to be created from.
Destination layer	Lets you select the layer (Line Art, Colour Art, Underlay or <b>Overlay</b> ) you want the colour art to be created on.
Clear Destination Art Layer First	Deletes the content before the colour art is added. This is useful when you already have artwork on the destination layer.
Perform Line Art to Colour Art Operation Immediately	Performs the <b>Create Colour Art from Line Art</b> command when you click OK.

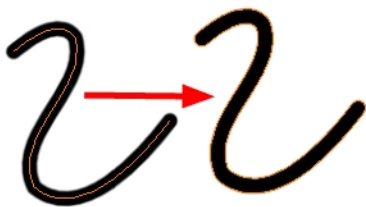
### Distribute to Layers


The Distribute to Layers  option is used to separate the selected art strokes and send them to new drawing layers. In the Camera view, once you have drawn your artwork, you can select the strokes you want to distribute using the Select  tool and click on the Distribute to Layers  button; you can also select **Drawing > Distribute to Layers**. It will automatically take every stroke from the drawing selection made in the Camera view and separate them into a different layer for each. If an artwork is composed of several strokes, you must group them using **Edit > Group > Group** before using the Distribute to Layers option. This option cannot be done from the Drawing view.

### Store Colour Gradient

Use the Store Colour Gradient  operation to record the selected gradient's position. This reuses the stored position of the gradient when drawing new brush lines or painting colour zones. Enable the Use Stored Colour Gradient  option in the Paint or Brush Tool Properties view to do this.

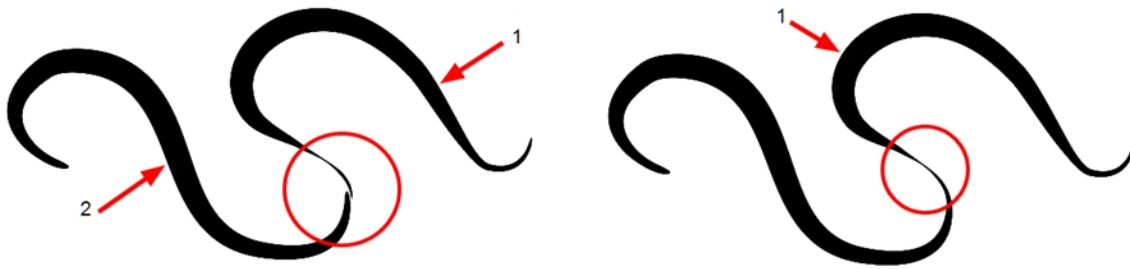
### Pencil to Brush




The Pencil to Brush  operation converts the selected centre line pencil strokes into contour strokes brush lines.

From the top menu, select **Drawing > Convert > Pencil Lines to Brush** or press &.

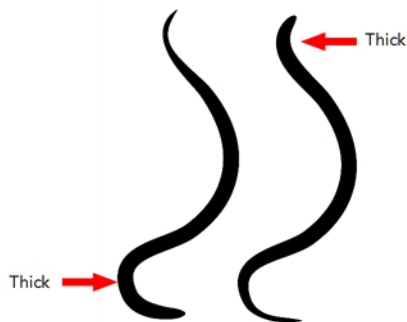
### Merge Pencil Lines




Pencil lines are central vector lines and it might be difficult to match pencil line's tips properly to align them and make it look like it is one single line. With the Select tool, you can select several pencil lines and merge them as one single object using the Merge Pencil Lines  option. The ends of your lines are adjusted to form one single line.

**NOTE:** Points must be close enough to be merged. If there is a large gap between the lines, they will not be merged.

### Reverse Pencil Thickness



The Reverse Pencil Thickness  option inverts the thick and thin section on a selected pencil line. This option will take the thickest size on the line and apply it to the thinnest, and it will apply the thinnest to the thickest.

### Offset X and Y

Use the Offset X and Offset Y operation fields to enter specific values and precisely reposition the selected shape.

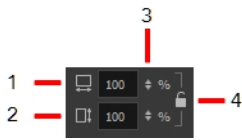


1. **X:** Type a value in this field to reposition your selection along the X-axis.
2. **Y:** Type a value in this field to reposition your selection along the Y-axis.
3. **Up/Down arrows:** Use the up and down arrows to modify the value in the X or Y value field.



## Width and Height

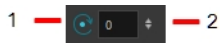
Use the Width and Height operation fields to enter specific values to resize the selected shape with precision.



1. **Width:** Type a value in this field to resize the width of your selection.
2. **Height:** Type a value in this field to resize the height of your selection.
3. **Up/Down arrows:** Use the up and down arrows to modify the value in the Width or Height fields.
4. **Lock icon:** Click the lock icon to lock or unlock the ratio between the Width and Height values.

## Angle

The Angle operation lets you to enter specific values and accurately rotate the selected shape.

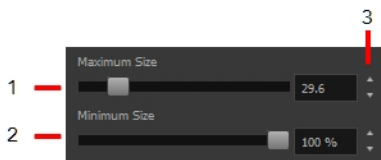


1. **Angle:** Type a degree value in this field to rotate your selection.
2. **Up/Down arrows:** Use the up and down arrows to modify the value in the Angle value field.

When you select a pencil line with the Select tool, additional options appear in the Tool Properties view.

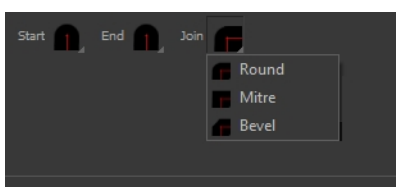
## Adjusting the Pencil Line Thickness

Use the Adjusting the Pencil Line Thickness operation field to resize the selected centreline strokes. This operation is not permitted on contour line shapes, such as brush strokes or shape fills.



1. **Minimum Size:** Type a value in this field to set the minimum thickness of the selected centreline stroke.
2. **Maximum Size:** Type a value in this field to set the maximum thickness of the selected centreline stroke.
3. **Up/Down arrows:** Use the up and down arrows to modify the value contained in the Thickness value field.

## Adjusting the Pencil Line Style



You can adjust the start, end, and joint style of a selected pencil line.

- **Start:** Lets you select the style of the start tip, which is the first tip you drew. You can choose between Round or Flat style.
- **End:** Lets you select the style of the end tip, which is the last tip you drew. You can choose between Round or Flat style.
- **Join:** Lets you select the joint style. The joints are where the line curves abruptly. You could also define the Join style as the corner style. You can choose between Round, Mitre and Bevel style.

## Pencil Stencils



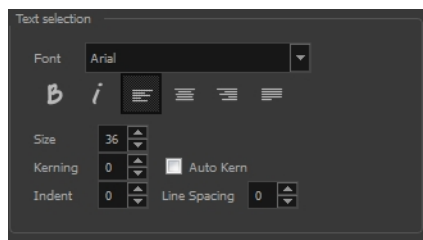
Toon Boom Harmony gives you the flexibility to change the style and thickness of your pencil lines even after they are drawn. You can apply preset pencil stencils or create your own—see [Working with Pencil Presets on page 51](#).

## Adding Texture to a Pencil Line


Pencil lines support texture. Once a pencil line is drawn, you can apply a preset texture or load your own. Textures are independent from pencil stencils—see [Pencil Line Texture on page 57](#).

## Adjusting the Text Selection

When you select text with the Select tool, the tool properties will display the Text tool options on the bottom of the view. You can also press Alt + 9 to display only the Text properties in the Tool Properties view—see [Text Tool Options on page 196](#).

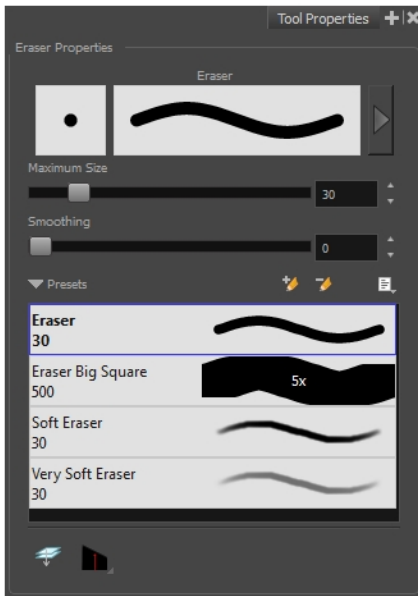


## Eraser Tool Options

When you're drawing on vector layer and you select the Eraser  tool, its properties and options appear in the Tool Properties view.

For information on erasing textured lines—see [See How to erase textured lines on page 75](#).

For information on Bitmap Eraser tool options—see [See Bitmap Eraser Options on page 174](#).



## Previewing the Stroke

The Preview area lets you see a preview of the stroke that will be produced after you customize the different parameters in the Tool Properties view. Click on the Show Extended Properties arrow to display advanced customization parameters,



## Maximum Size and Smoothing

This is where you set the maximum size of your drawing tool.

- **MaximumSize:** Defines the width of the stroke.
- **Smoothing:** Defines the number of control points added to the centre line. The fewer the control points the smoother (but less faithful) the line.


## Eraser Presets

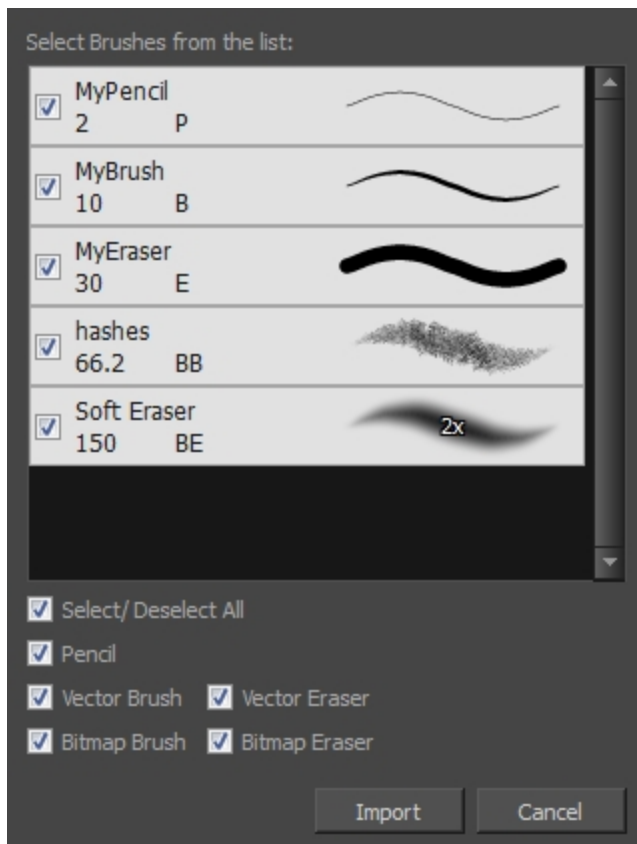
It is a good idea to create and save erasers with precise sizes and parameters in order to save time when drawing and designing. Toon Boom Harmony provides you with a variety of default eraser styles and allows you to create and save your own.

Eraser presets are created by saving the properties of the current eraser as a preset, in order to reuse it again and again. You can create a new preset from the Eraser Tool Properties view, but it is better to do it from the Eraser Properties—see [Erasing Parts of a Drawing on page 99](#).

The Eraser tool uses its own preset list, separated from the Brush tool.

### How to import pencils, brushes and erasers

1. From the Brush menu , select **Import Brushes**.
2. In the browser window that appears, navigate to and select the **.xml** file.
3. Click **Open**.
4. In the Import Brushes dialog box, select the brushes brushes and erasers you want to import. You can also import pencils at the same time.

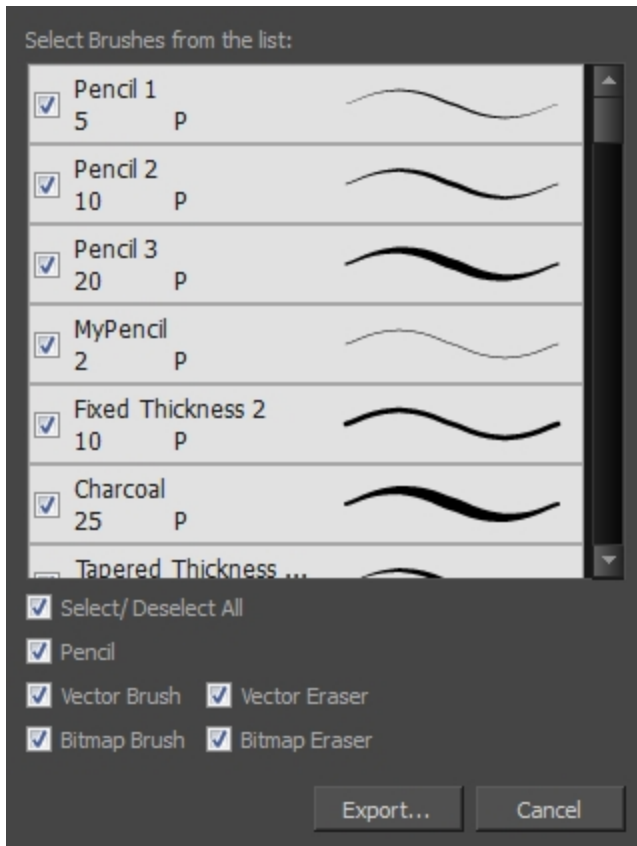


5. Click **Import**.

The imported brush, eraser and pencil styles will appear in the presets library. You can reuse any of the imported tips to create other brush, eraser and pencil style presets.

### How to export pencils, brushes and erasers

1. From the Brush menu, select **Export**.
2. In the Export Brushes dialog box, select the bitmap and vector brushes and erasers to export, as well as any pencils.



3. Click **Export**.
4. In the Export Brushes window that appears, browse to the location where you want to save the .xml file and give it a name.
5. Click **Save**.

### How to change the Presets Library thumbnail display

1. From the Brush menu, select one of the following:

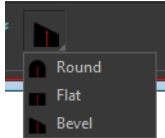
Parameter	Description
Small Thumbnail	Reduces the size of the thumbnails in order to view more at the same time. Displays an image of the tool's tip and its maximum size.
Large Thumbnail	Increases the size of the thumbnails in order to see the images more clearly. Displays an image of the tool's tip, its maximum size and its name.
Stroke View	Displays the tool's name, maximum size and stroke preview.

### Apply to Line and Colour Art

The Apply to Line and Colour Art  option uses the concept of Line Art and Colour Art layers. Use this option

to apply an action such as selecting, resizing or erasing a drawing on both Line Art and Colour Art layers, as well as the Overlay and Underlay layers.

### Tip Style



If you erase the end of a pencil line or erase a pencil line through the centre, new line tips or line ends are created. Use the Tip Style option to customize the shape of the new line tips that are created.

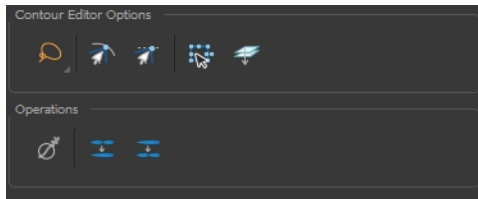
### Bitmap Eraser Options

The bitmap eraser options are identical to those of the bitmap brush with one obvious exception. Instead of customizing the parameters of a mark or stroke, you will be customizing the parameters for the absence of a mark or stroke.

It is a good idea to create an eraser preset with the identical properties of a brush preset and to use them as a pair. That way, when part of a stroke is erased, its soft textured look is not interrupted with a hard edged eraser mark.

### Contour Editor Options

When you select the Contour Editor  tool, its properties and options appear in the Tool Properties view.




### Lasso and Marquee

Choose between the Lasso  and Marquee  options to change the selection style of the tool.



- Click and hold Alt to temporarily switch from the current mode to the other.

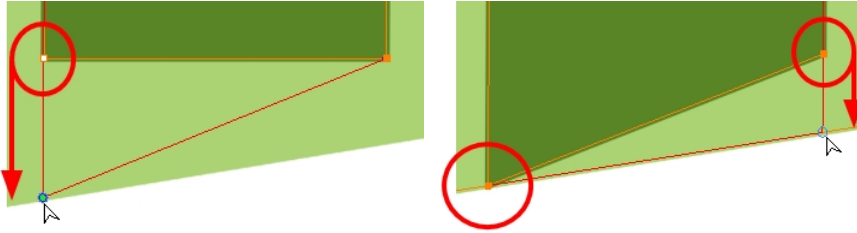
### Snap to Contour



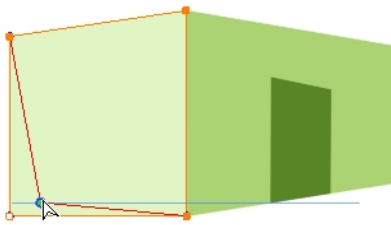
The Snap to Contour  option will snap the selected anchor point to any line you position it on.


### How to snap two shapes together

1. In the Tools toolbar, select the Contour Editor  tool or press Alt + Q.
2. In the Tool Properties view, click the Snap to Contour  button.
3. In the Camera or Drawing view, click on an anchor point you want to snap to the other shape, drag it on top of the contour line area and release it.





### Snap and Align



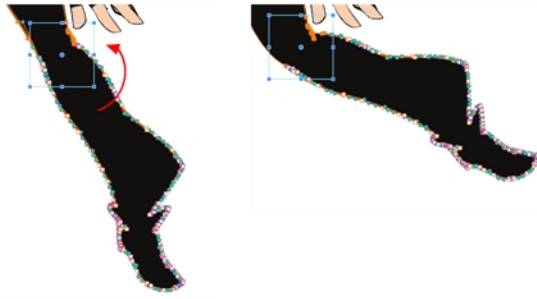
The Snap and Align  option lets you snap the selected anchor point to any existing line while displaying temporary rulers as a guide that you can also snap your anchor point to.


### How to snap and align

1. In the Tools toolbar, select the Contour Editor  tool or press Alt + Q.
2. In the Tool Properties view, click the Snap and Align  button.
3. In the Camera or Drawing view, click on an anchor point you want to snap, drag it until a ruler is displayed, position it on the ruler or on the contour line and release.




### Show Contour Editor Controls




Use the Show Contour Editor Controls  option to show the contour editor controls. You can use these controls to scale, reposition and rotate the selected anchor points.

### Apply to Line and Colour Art

The Apply to Line and Colour Art  option uses the concept of Line Art and Colour Art layers. Use this option to apply an action such as selecting, resizing or erasing a drawing on both Line Art and Colour Art layers, as well as the Overlay and Underlay layers.

### Smooth Selection



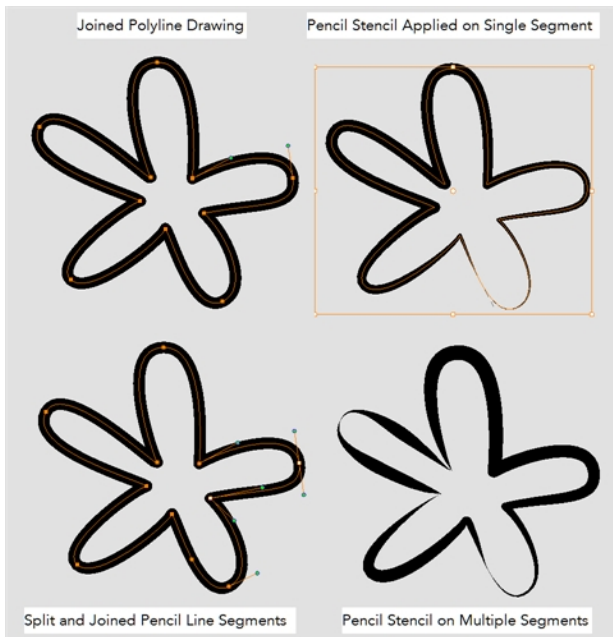
The Smooth  operation lets you smooth out selected drawing strokes and remove extra points.

- ▶ From the top menu, select **Drawing > Optimize > Smooth** or press Alt + Shift + S.

### Split Pencil Line and Join Pencil Lines

When drawing with the Polyline tool, your drawing has an even line thickness. You can use the Pencil Editor to adjust the thickness point by point, but if you want to adjust it quicker, you can use the Split Pencil Line and Point Pencil Lines options to create segments and apply a pencil stencil to your drawing. Note that if you did not join the pencil lines on your polyline stroke, the segments between the points will act as separated segments.



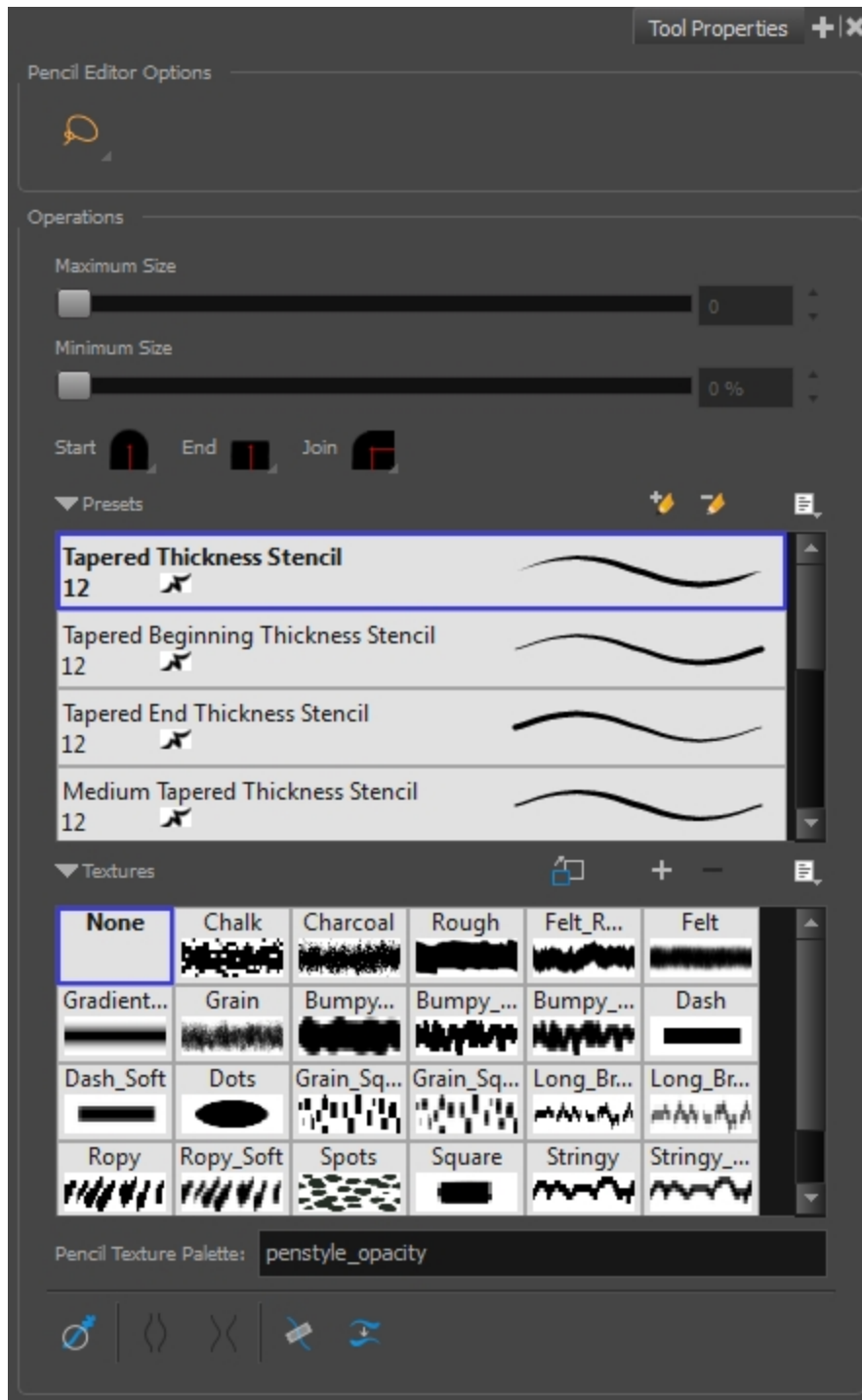


### How to split and join pencil lines

1. In the Tools toolbar, select the Contour Editor tool.
2. In the Drawing or Camera view, select the contour points you want to split or join.
3. In the Tool Properties view, click on the Join Pencil Lines or Separate Pencil Line buttons.

### Pencil Editor Options

When you select the Pencil Editor  tool, its properties and options appear in the Tool Properties view.



### Lasso and Marquee

Choose between the Lasso  and Marquee  options to change the selection style of the tool.

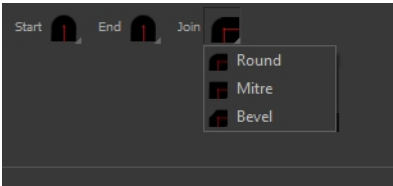
- Click and hold Alt to temporarily switch from the current mode to the other.

### Maximum Size and Smoothing

This is where you set the maximum size of your drawing tool.

- ▶ **MaximumSize:** Defines the width of the stroke.
- ▶ **Smoothing:** Defines the number of control points added to the centre line. The fewer the control points the smoother (but less faithful) the line.

## Adjusting the Pencil Line Style



You can adjust the start, end, and joint style of a selected pencil line.

- **Start:** Lets you select the style of the start tip, which is the first tip you drew. You can choose between Round or Flat style.
- **End:** Lets you select the style of the end tip, which is the last tip you drew. You can choose between Round or Flat style.
- **Join:** Lets you select the joint style. The joints are where the line curves abruptly. You could also define the Join style as the corner style. You can choose between Round, Mitre and Bevel style.

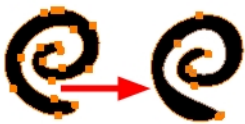
## Preset


To work with Pencil line presets, see [Working with Pencil Presets on page 51](#).

## Textures

To work with Pencil Line Texture, see [Pencil Line Texture on page 57](#)

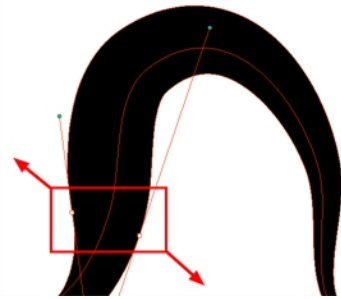
## Smooth




The Smooth  operation lets you smooth out selected drawing strokes and remove extra points.

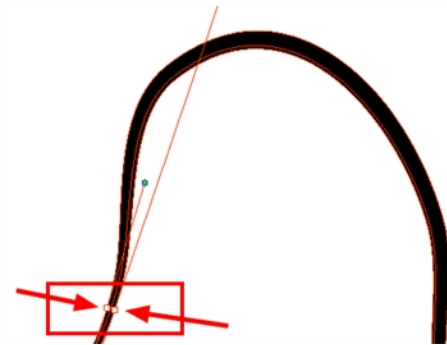
- ▶ From the top menu, select **Drawing > Optimize > Smooth** or press Alt + Shift + S.


### Pump Pencil Pressure



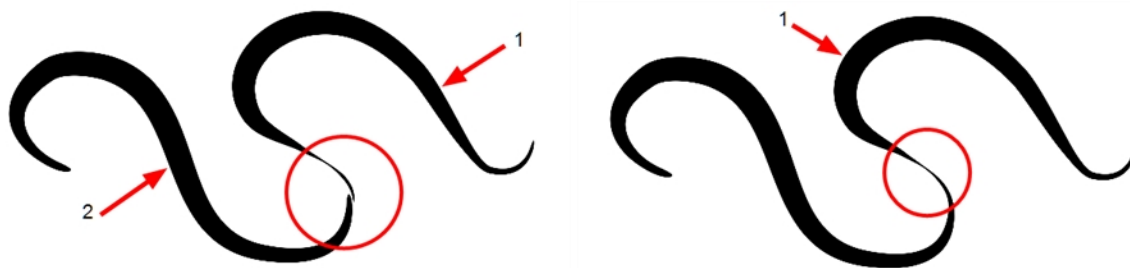
The Pump Pencil Pressure  option is used to increase the line thickness of a selected area on a pencil line.


### Deflate Pencil Pressure



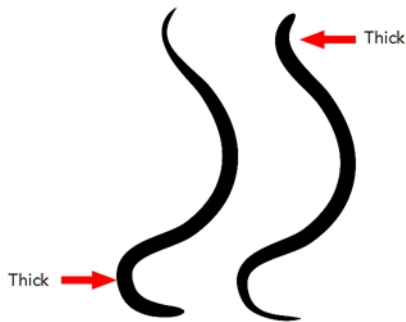
The Deflate Pencil Pressure  option is used to decrease the line thickness of a selected area on a pencil line.


### Merge Pencil Lines



Pencil lines are central vector lines and it might be difficult to match pencil line's tips properly to align them and make it look like it is one single line. With the Select tool, you can select several pencil lines and merge them as one single object using the Merge Pencil Lines  option. The ends of your lines are adjusted to form one single line.

## Reverse Pencil Thickness

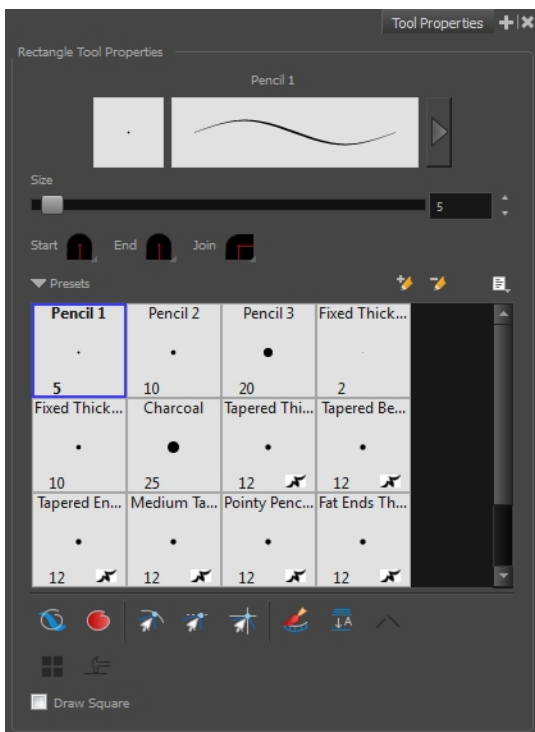


The Reverse Pencil Thickness  option inverts the thick and thin section on a selected pencil line. This option will take the thickest size on the line and apply it to the thinnest, and it will apply the thinnest to the thickest.

## Shape Tool Options

When you select a shape tool (Rectangle, Ellipse, Line), its properties and options appear in the Tool Properties view.

If the Tool Properties looks different than the image below, you maybe on a bitmap drawing layer instead of a vector drawing layer. If you want to use a shape tool on a bitmap drawing layer—[See \*Bitmap Brush Tool Options\* on page 137.](#)

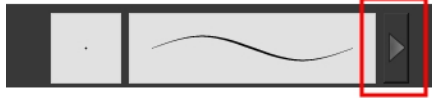


## Previewing the Stroke

The Preview area lets you see a preview of the stroke that will be produced after you customize the different

parameters in the Tool Properties view.

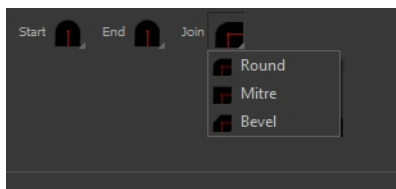
1. Select a brush style from the Presets section. It's a good idea to choose a brush preset that is closest to the style you want to create.
2. Click on the Show Extended Properties arrow to display advanced customization parameters.



## Size

Move the Size slider left to reduce the line thickness and to the right to increase its width.

## Adjusting the Pencil Line Style



You can adjust the start, end, and joint style of a selected pencil line.

- **Start:** Lets you select the style of the start tip, which is the first tip you drew. You can choose between Round or Flat style.
- **End:** Lets you select the style of the end tip, which is the last tip you drew. You can choose between Round or Flat style.
- **Join:** Lets you select the joint style. The joints are where the line curves abruptly. You could also define the Join style as the corner style. You can choose between Round, Mitre and Bevel style.

## Pencil Presets and Thickness Stencils

Harmony provides a variety of pencil presets and thickness stencils and also lets you create and save your own. It is a good idea to create and save pencils with precise sizes and parameters when you draw and design for efficiency and consistency.


A thickness stencil saves the thickness information across the length of the line. When drawing with a thickness stencil, the pressure sensitivity of the tablet is discarded. A thickness stencil can be used while drawing, or applied afterwards.

You also have the possibility to apply different textures to your lines by either using the default presets or importing your own—[See \*Pencil Line Texture\* on page 57.](#)

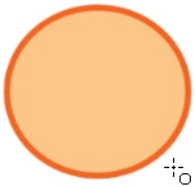
You can export the pencil presets that you have created and import those that others have created. This is a good way for you and project collaborators to keep a consistent look for the project—see [Working with Pencil Presets on page 51](#)


## Draw Behind



When the Draw Behind  mode is enabled, the lines you draw will appear behind the art that already exists.




## Automatic Filling



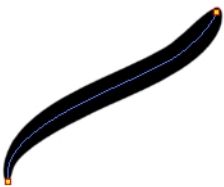
Use the Automatic Filling  option to automatically fill your shape with the selected colour as you draw. By default, the Shape tool creates the outline of an empty shape that you can later fill using the Paint tool. This option is unavailable for the line tool.


## Snap Options

When drawing a shape, you can enable different snap modes to help you create your shape.

- The Snap to Contour  option snaps your shape to any line you position it on.
- The Snap and Align  option snaps the selected anchor point to any existing line, while displaying temporary rulers as a guide that you can also snap your anchor point to.
- The Snap to Grid  snaps your shape to the currently enabled grid.


## Create Colour Art Automatically



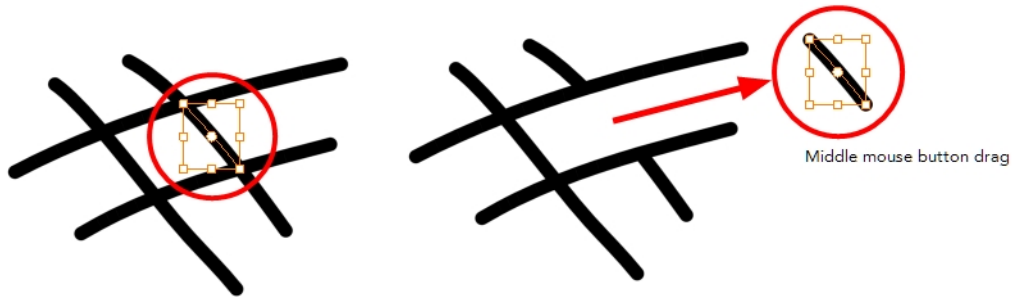
As you draw in the Line Art layer, the Create Colour Art Automatically  option automatically creates the corresponding strokes in the Colour Art layer.

## Auto-Flatten Mode

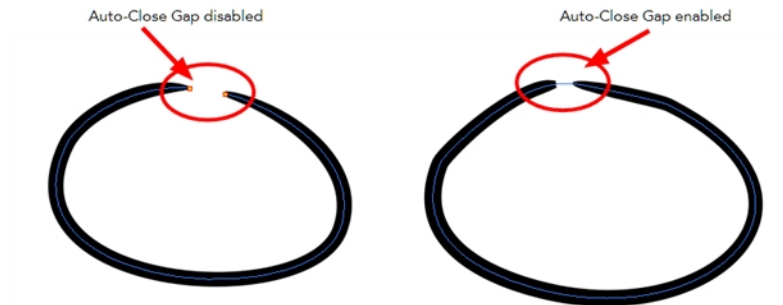
When enabled, the Auto-Flatten


 mode automatically flattens the new lines created with the existing artwork as you draw in the Drawing or Camera view. Brush strokes will flatten with brush strokes and pencil lines will flatten with pencil lines.

Using the Select tool, you can use the middle mouse button to select a segment of flattened pencil line. This creates a nice finish on the lines and corners of your artwork.




### Auto-Close Gap



When enabled, the Auto-Close Gap  mode automatically connects, with an invisible stroke, the pencil lines you draw close to each other in the Camera or Drawing view.

**NOTE:** It is recommended to leave this option enabled when drawing with the Pencil tool.



### Use Stored Colour Gradient

The Use Stored Colour Gradient  option makes your tool use the previously stored gradient position. This way, every new brush line or colour fill will use the stored gradient position.

### Line Building Mode





The Line Building  mode is very useful when drawing long lines and curves in small increments with pencil lines or the line  tool. As the pencil lines are central vector lines, it may be difficult to align the line tips perfectly to create a uniform stroke and close all gaps.

In this mode, you can draw lines in small increments and the tips are merge into one single stroke.

**NOTE:** This mode only works with pencil lines or the line tool.

## Keep Proportion

Draw Square

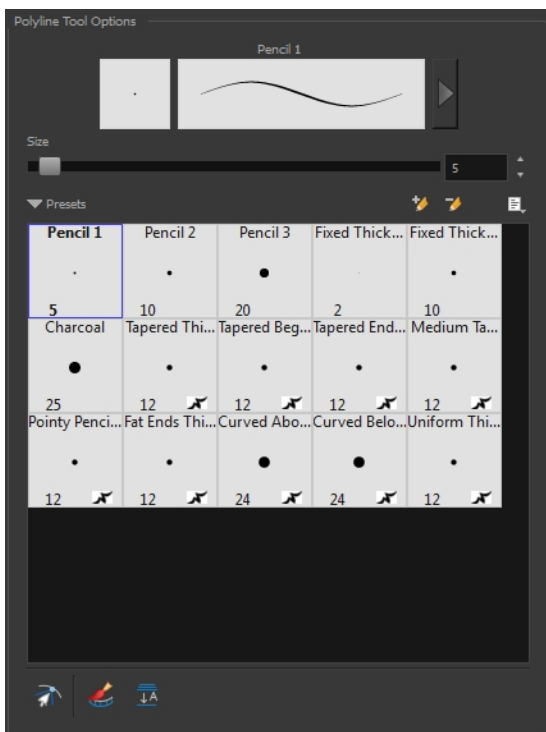
Draw Circle

When the Ellipse or Rectangle mode is enabled in the Tool Properties view, the Draw Circle or Draw Square option appears. When selecting these options, the shape produced will be a perfect circle or square (as opposed to an oval or rectangle).

Enabling this option is a good idea if you plan to create many squares or circles. However, if you only need to create one, holding down the Shift key as you create your shape will maintain the proportion in the same way.

## Polyline Tool Options

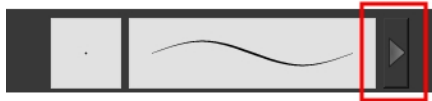
When you select the Polyline  tool, its properties and options appear in the Tool Properties view.



## Previewing the Stroke

The Preview area lets you see a preview of the stroke that will be produced after you customize the different parameters in the Tool Properties view.

1. Select a brush style from the Presets section. It's a good idea to choose a brush preset that is closest to the style you want to create.
2. Click on the Show Extended Properties arrow to display advanced customization parameters.



## Size

The Size parameter lets you set the size of the polyline that you will draw.



## Pencil Presets and Thickness Stencils


Harmony provides a variety of pencil presets and thickness stencils and also lets you create and save your own. It is a good idea to create and save pencils with precise sizes and parameters when you draw and design for efficiency and consistency.

A thickness stencil saves the thickness information across the length of the line. When drawing with a thickness stencil, the pressure sensitivity of the tablet is discarded. A thickness stencil can be used while drawing, or applied afterwards.

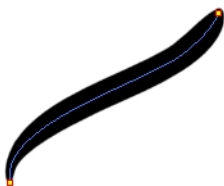
You also have the possibility to apply different textures to your lines by either using the default presets or importing your own—[See \*Pencil Line Texture\* on page 57.](#)


You can export the pencil presets that you have created and import those that others have created. This is a good way for you and project collaborators to keep a consistent look for the project—see [Working with Pencil Presets on page 51](#)

## Snap to Contour


The Snap to Contour  option will snap your selection to any line you position it on.

## Create Colour Art Automatically



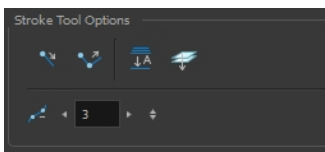
As you draw in the Line Art layer, the Create Colour Art Automatically  option automatically creates the corresponding strokes in the Colour Art layer.

### Auto-Flatten Mode


When enabled, the Auto-Flatten  mode automatically flattens the new lines created with the existing artwork as you draw in the Drawing or Camera view. Brush strokes will flatten with brush strokes and pencil lines will flatten with pencil lines.

## Stroke Tool Options


When you select the Stroke tool, its properties and options appears in the Tool Properties view.




### Draw Stroke as Straight Lines

Enable the Draw Stroke as Straight Lines  option if you want the new strokes you draw to be a perfect straight line. Disable the option if you want the stroke to follow the mouse gesture.


### Connect Line Ends

Enable the Connect Line Ends  option if you want the start or end point of your new stroke to connect to your existing strokes to make sure no gaps are left in your drawing.

### Auto-Flatten Mode

When enabled, the Auto-Flatten  mode automatically flattens the new lines created with the existing artwork as you draw in the Drawing or Camera view. Brush strokes will flatten with brush strokes and pencil lines will flatten with pencil lines.

### Apply to Line and Colour Art

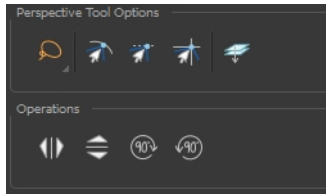
The Apply to Line and Colour Art  option uses the concept of Line Art and Colour Art layers. Use this option to apply an action such as selecting, resizing or erasing a drawing on both Line Art and Colour Art layers, as well as the Overlay and Underlay layers.

### Smoothness

You can modify the central line smoothness of your line using this option. This parameter smooths the initial movement of your line. Increasing the value will result in a smoother line with fewer control points. Use the left and right arrows to increment the value by one full unit. Use the Up - Down slider to quickly increment the value.

## Perspective Tool Options

Selecting the Perspective tool displays its properties and options in the Tool Properties view.






### Lasso and Marquee


Choose between the Lasso  and Marquee  options to change the selection style of the tool.

- Click and hold Alt to temporarily switch from the current mode to the other.

### Snap Options

- The Snap to Contour  option will snap the selected anchor point to any line you position it on—see [Contour Editor Options on page 174](#).
- The Snap and Align  option lets you snap the selected anchor point to any existing line while displaying temporary rulers as a guide that you can also snap your anchor point to—see [Contour Editor Options on page 174](#).
- The Snap to Grid  option snaps your selection according to the currently enabled grid.

### Apply to Line and Colour Art

The Apply to Line and Colour Art  option uses the concept of Line Art and Colour Art layers. Use this option to apply an action such as selecting, resizing or erasing a drawing on both Line Art and Colour Art layers, as well as the Overlay and Underlay layers.

### Flip Horizontal and Vertical



The Flip Horizontal  and Flip Vertical  operations flip the current selection horizontally or vertically.

- ▶ From the top menu, select **Drawing > Flip Horizontal** and **Flip Vertical**.

### Rotate 90 Degrees CW and CCW

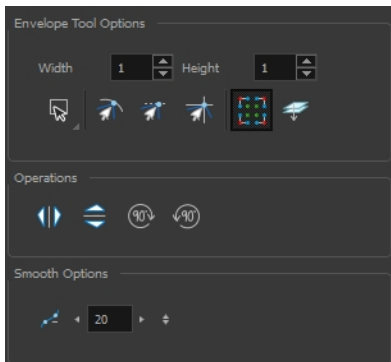


The Rotate 90 Degrees CW  and Rotate 90 Degrees CCW  operations rotate the current selection 90 degrees clockwise or counter-clockwise.

- ▶ From the top menu, select **Drawing > Transform > Rotate 90 Degrees CW** and **Rotate 90 Degrees CCW**.
- ▶ Press Ctrl + 7 and Ctrl + 9 (Windows/Linux) or ⌘ + 7 and ⌘ + 9 (Mac OS X).

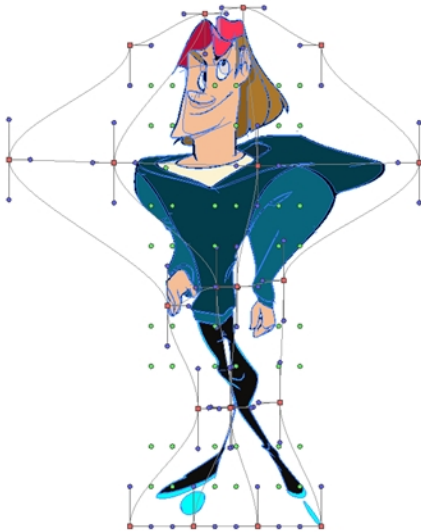
## Envelope Tool Options

Selecting the Envelope tool displays its properties and options in the Tool Properties view.



### Width and Height

Increase the width and height values to add more columns and rows to the deformation grids.






### Lasso and Marquee


Choose between the Lasso  and Marquee  options to change the selection style of the tool.

- Click and hold Alt to temporarily switch from the current mode to the other.

### Snap Options


- The Snap to Contour  option will snap the selected anchor point to any line you position it on—see [Contour Editor Options on page 174](#).
- The Snap and Align  option lets you snap the selected anchor point to any existing line while displaying temporary rulers as a guide that you can also snap your anchor point to—see [Contour Editor Options on page 174](#).
- The Snap to Grid  option snaps your selection according to the currently enabled grid.

### Show Advanced Controls

To display more controls, you can click on the Show Advanced Controls  button.




### Apply to Line and Colour Art

The Apply to Line and Colour Art  option uses the concept of Line Art and Colour Art layers. Use this option to apply an action such as selecting, resizing or erasing a drawing on both Line Art and Colour Art layers, as well as the Overlay and Underlay layers.

### Flip Horizontal and Vertical



The Flip Horizontal  and Flip Vertical  operations flip the current selection horizontally or vertically.

- ▶ From the top menu, select **Drawing > Flip Horizontal** and **Flip Vertical**.

### Rotate 90 Degrees CW and CCW



The Rotate 90 Degrees CW  and Rotate 90 Degrees CCW  operations rotate the current selection 90 degrees clockwise or counter-clockwise.

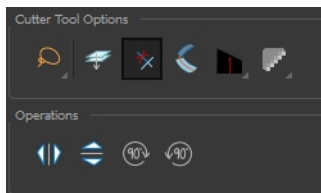
- ▶ From the top menu, select **Drawing > Transform > Rotate 90 Degrees CW** and **Rotate 90 Degrees CCW**.
- ▶ Press Ctrl + 7 and Ctrl + 9 (Windows/Linux) or ⌘ + 7 and ⌘ + 9 (Mac OS X).

### Smoothness

You can modify the central line smoothness of your line using this option. This parameter smooths the deformed lines. Increasing the value will result in a smoother line with fewer control points. The more you increase the value, the less details and curves you will get. Use the left and right arrows to increment the value by one full unit. Use the Up - Down slider to quickly increment the value.

### Cutter Tool Options

When you select the Cutter  tool, its properties and options appear in the Tool Properties view.




### Lasso and Marquee

Choose between the Lasso  and Marquee  options to change the selection style of the tool.

- Click and hold Alt to temporarily switch from the current mode to the other.



### Apply to Line and Colour Art

The Apply to Line and Colour Art  option uses the concept of Line Art and Colour Art layers. Use this option to apply an action such as selecting, resizing or erasing a drawing on both Line Art and Colour Art layers, as well as the Overlay and Underlay layers.

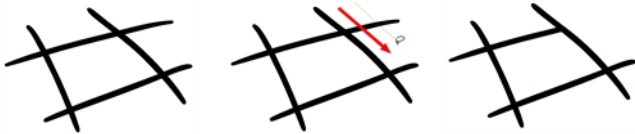
### Use Mouse Gesture

When using the Lasso





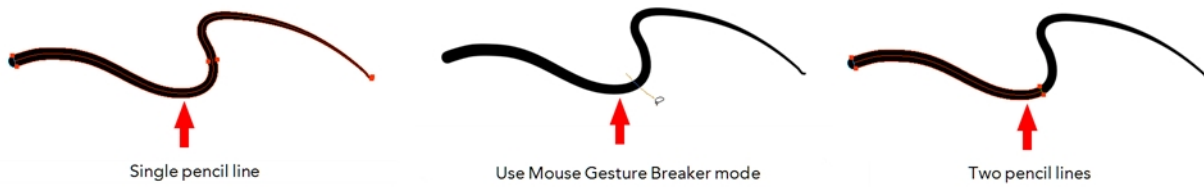
 selection type, the Use Mouse Gesture  option lets you automatically delete any extra sections of line in your artwork by simply dragging your mouse over it.

**NOTE:** For this operation to work, you lines **CANNOT** be flattened.



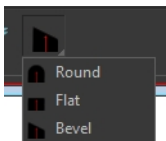
### Use Mouse Gesture Breaker Mode

When using the Lasso  selection type, the Use Mouse Gesture Breaker Mode  option lets you draw an invisible stroke on a pencil line to cut it in two individual objects. Once a pencil line is cut with this option, you will be able to select the two portions independently with either the Cutter tool, Pencil Editor tool or Select tool.



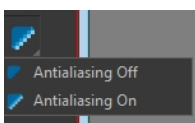
**NOTE:** This option only works with pencil lines.

### Tip Style



If you erase the end of a pencil line or erase a pencil line through the centre, new line tips or line ends are created. Use the Tip Style option to customize the shape of the new line tips that are created.



### Antialiasing



When drawing on a bitmap layer, lines are no longer clean vector shapes. For the edges to be smooth, a slight amount of antialiasing is used. When using the Cutter tool, you can cut a portion of your drawing with or without antialiasing. By default, the option is enabled. If you want to cut your drawing using a hard edge, you can select the Antialiasing Off option.

### Flip Horizontal and Vertical



The Flip Horizontal  and Flip Vertical  operations flip the current selection horizontally or vertically.

- ▶ From the top menu, select **Drawing > Flip Horizontal** and **Flip Vertical**.

### Rotate 90 Degrees CW and CCW

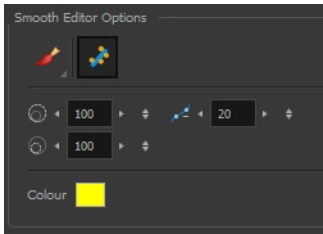


The Rotate 90 Degrees CW  and Rotate 90 Degrees CCW  operations rotate the current selection 90 degrees clockwise or counter-clockwise.

- ▶ From the top menu, select **Drawing > Transform > Rotate 90 Degrees CW** and **Rotate 90 Degrees CCW**.
- ▶ Press **Ctrl + 7** and **Ctrl + 9** (Windows/Linux) or **⌘ + 7** and **⌘ + 9** (Mac OS X).

## Smooth Editor Tool Options

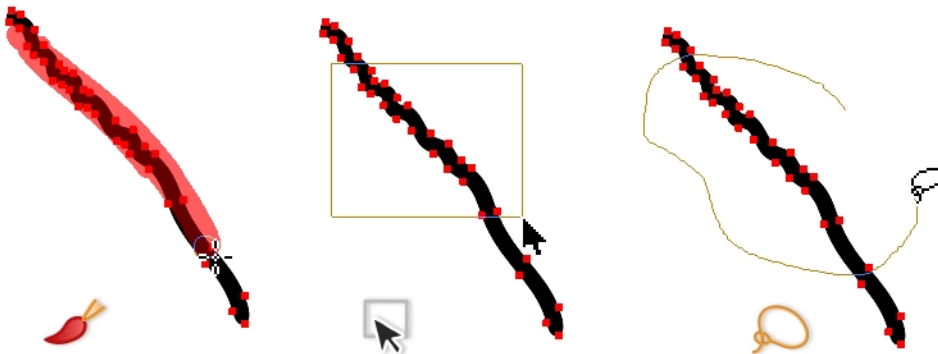
When you select the Smooth Editor tool, its properties and options appear in the Tool Properties view.




## Brush, Marquee and Lasso Smoothing Style

The Smoothing Style options allow you to smooth a portion of your drawing by tracing a smoothing stroke over the zone to optimize or by selecting an area of the drawing with the Marquee or Lasso.

Note that by default, the Smooth Editor tool colour is yellow, it was changed to orange for screen grab clarity.



## Show Control Points

The Show Control Points  option allows you to show or hide the Bezier points around lines. When the Bezier points are displayed, you can see the result of your smoothing and the number of points left on the curve. When it is turned off, only the original artwork is displayed.


## Minimum Size and Maximum Size

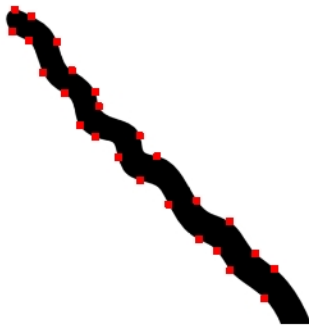
This is where you set the minimum and maximum sizes of your drawing tool which will produce the thick and thin effect on your stroke. This works with the pressure sensitivity of a pen tablet.

This options is available while using the Brush Smoothing  style.

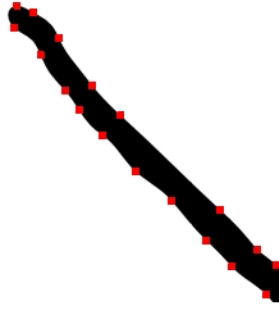
- **Maximum and Minimum Size:** Defines the maximum and minimum width of the stroke.
- **Up/Down arrows:** Use the up and down arrows to set the minimum and maximum size value.

## Smoothness

The Smoothness  impacts the strength of the smoothing result. The higher the value, the more points are removed and the smoother the curve. The Smoothness range is from 0 to 100; the default value is 20.



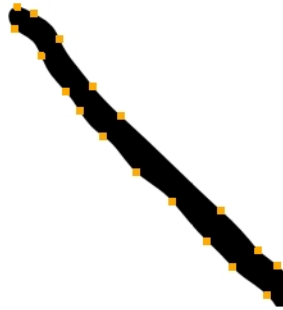
Smoothness = 2



Smoothness = 10

## Colour

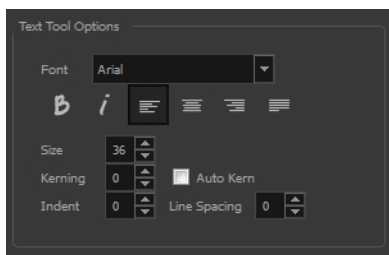
You can modify the colour of the control points displayed on the artwork while working with the Smooth Editor tool by double-clicking on the colour swatch.



## Text Tool Options

Use the Text tool's properties to select the font type and other formatting options you want to apply to the text.

If you already wrote your text, you must first use the Text tool and select the text portion you want to format.



## Font Type

Use the Font drop-down menu to select a font. OTF fonts are supported.

Vivaldi

Copperplate Gothic Light



## Font Style

Use these buttons to select a style for your text:

-  Bold





-  Italic



## Alignment

Use these buttons to align the paragraph.

<p> Left</p> <p>LOREM IPSUM DOLOR SIT AMET, CONSECTETUR ADIPISCING ELIT. AENEAN VESTIBULUM, METUS AC FERMENTUM PORTTITOR, ODIO TURPIS PORTTITOR NIBH, ID CONSEQUAT MAGNA LIGULA ET ELIT. CURABITUR SOLLICITUDIN ELIT AC LOREM MOLLIS ACC UMSAN.</p>	<p> Centered</p> <p>LOREM IPSUM DOLOR SIT AMET, CONSECTETUR ADIPISCING ELIT. AENEAN VESTIBULUM, METUS AC FERMENTUM PORTTITOR, ODIO TURPIS PORTTITOR NIBH, ID CONSEQUAT MAGNA LIGULA ET ELIT. CURABITUR SOLLICITUDIN ELIT AC LOREM MOLLIS ACC UMSAN.</p>
<p> Right</p> <p>LOREM IPSUM DOLOR SIT AMET, CONSECTETUR ADIPISCING ELIT. AENEAN VESTIBULUM, METUS AC FERMENTUM PORTTITOR, ODIO TURPIS PORTTITOR NIBH, ID CONSEQUAT MAGNA LIGULA ET ELIT. CURABITUR SOLLICITUDIN ELIT AC LOREM MOLLIS ACC UMSAN.</p>	<p> Justified</p> <p>LOREM IPSUM DOLOR SIT AMET, CONSECTETUR ADIPISCING ELIT. AENEAN VESTIBULUM, METUS AC FERMENTUM PORTTITOR, ODIO TURPIS PORTTITOR NIBH, ID CONSEQUAT MAGNA LIGULA ET ELIT. CURABITUR SOLLICITUDIN ELIT AC LOREM MOLLIS ACC UMSAN.</p>

## Font Size

Enter a size for the text.

# small text **big text**

## Kerning

Use the kerning field to modify the spacing between letters and characters. You can select the Auto Kern option to set the kerning automatically based on the font's predefined standard. A negative value decreases spacing between each character, creating a letter overlap and a positive value increases it.

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## Indent

Enter a value in the Indent field to increase or decrease the indentation on the first line of your text. A positive value sets the first line of your paragraph farther to the right and a negative value sets it farther to the left.

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## Line Spacing

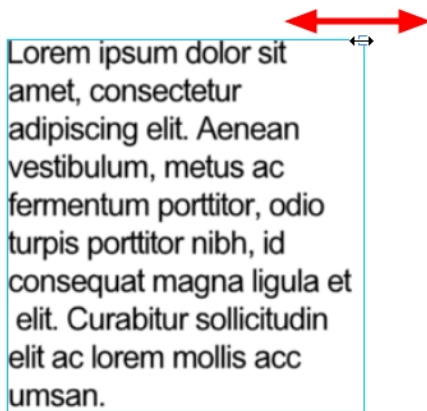
Enter a value in the Line Spacing field to decrease or increase the space between each line of text.

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## Resizing the Text Box


You can resize the text box by selecting your text box with the Text **T** tool and moving the anchor point right or left. Using the Select tool will distort and scale your text itself rather than changing the width and height of your text box.



### Converting Text into Separate Objects

Text contained in a text field is treated as a single drawing object. You can easily separate the text so each character becomes an individual drawing object that you can select and modify independently.

#### How to break a text object

1. In the Tools toolbar, click the Select  tool or press Alt + S.
2. In the Drawing or Camera view, select the text object you want to break.



3. From the top menu, select **Drawing > Convert > Break Apart Text Layers**.
  - ▶ From the Drawing or Camera view menu, select **Drawing > Convert > Break Apart Text Layers**.




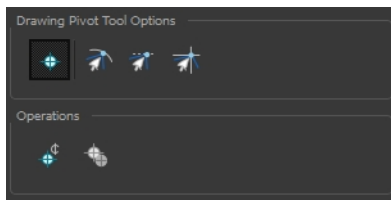
Each character is surrounded by a bounding box that you can modify; they remain text objects that you can edit.

4. If you want to convert your independent letter to a complete vector object that you can deform, use the Select tool to select the letters to convert.
5. From the top menu, select **Drawing > Convert > Break Apart Text Layers** to break the selection into a regular drawing object, with no more text attributes.
  - ▶ From the Drawing or Camera view menu, select **Drawing > Convert > Break Apart Text Layers** to break the selection into a regular drawing object, with no more text attributes.




## Drawing Pivot Tool

The Drawing Pivot  tool lets you set the pivots on your character. You can set the drawing pivots on drawings and symbols.



### Setting the Drawing Pivot for Symbols on All Frames

The Set the Pivot for Symbol on All Frames  option is enabled by default. When you set a drawing pivot on a symbol, all of its cells use the same drawing pivot. This means you do not have to set a drawing pivot on all frames. Once you set it, it is done.

If you prefer to set a different drawing pivot for a series of cells, you can deselect the option and set your pivots on each cell or cell range.

**NOTE:** If you have already set several different pivots on your symbol's cells and selected the Set the Pivot for Symbol on All Frames option, once you set a new pivot on the same symbol, all of its pivots will be reset and will use your new pivot.

### Snapping




When you drag the drawing pivot around, you can enable a snap option so that when the drawing pivot is released, it either snaps to the reference grid, drawing's contour, or aligns with an existing drawing stroke.

### Reset Pivot

When you click the Reset Pivot  option, the drawing pivot of the selected drawing or symbol is reset to the centre of the Camera view.

### Copying Pivot on Parent Symbol

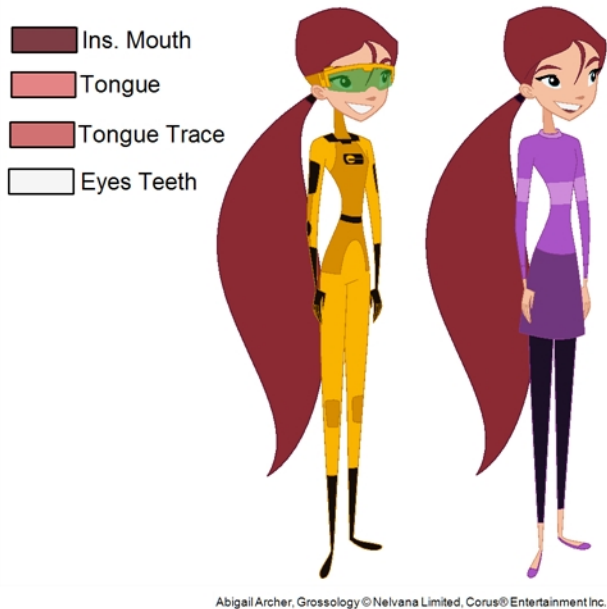
When you import new extra drawings, such as hands and mouths, you can use the drawing pivot that was set on your drawings and report them to the symbol's cells. Use the Copy Pivot to Parent Symbol  command for this.



**NOTE:** When you copy drawing pivots to the parent symbol, there is no link between the drawings' pivots and the symbol's pivots. If you modify the drawing pivot later, it will not link to the symbol. You would need to perform the operation again. If you need to modify the symbol's pivots, you can do it directly on the symbol's cells.



## Chapter 5: Colour Styling and Colour Models



Once the characters, props and locations are designed, it's time for the colour styling and colour models creation. This is when the colours and moods are determined. The line models created during the design step are painted and organized as colour models for the colourists.

Harmony has a great concept of colour palettes. Each character can have its own set of colours that is carried through the entire project called the *master palette*. If the master is modified, the colours in the entire project are updated simultaneously.

By doing the colour styling in Harmony, your master palette will be created at the same time, so you do not need to use third party software. Also you will not have to recreate the colour palette again in Harmony. It is possible to create this step in an external software, but it is a great time saver to do it directly in Harmony.

To create the colour style and colour models, follow these steps:

- [Preparation on page 203](#)
- [Working with Palettes on page 208](#)
- [Colours on page 232](#)
- [Painting the Model on page 249](#)

### Preparation

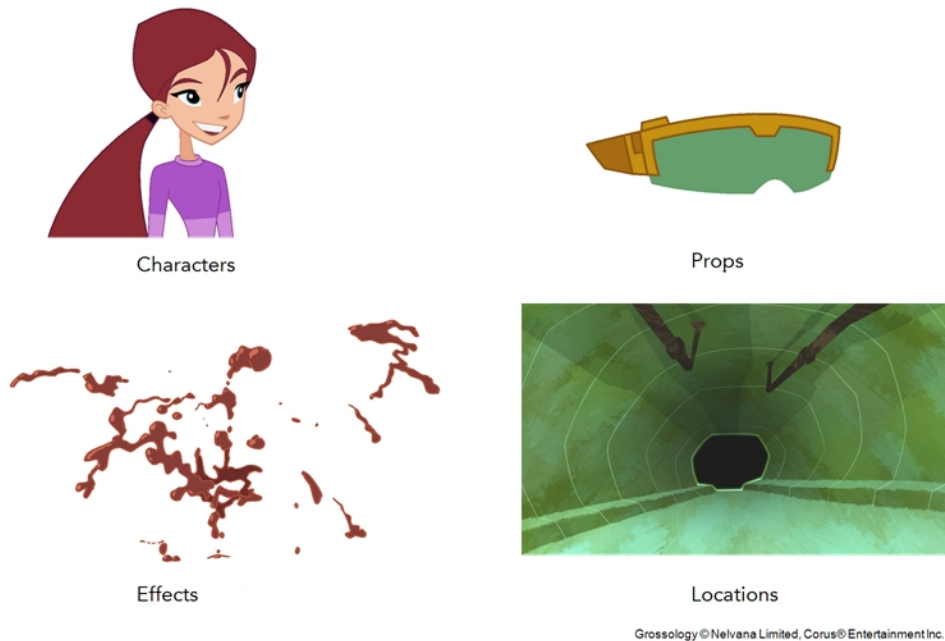
Before painting, you need to organize the colour model scenes and bring in your references. The colour styling preparation is done in five steps:

- [Colour Model Storage on page 204](#)
- [Scene Creation on page 204](#)
- [Setting Up the Workspace on page 205](#)
- [Naming on page 205](#)

## Colour Model Storage

First, you will need to create a storage location for all your models and palettes. The best way to do this is to create a colour model scene. There are different possibilities available to structure your designs and colour model scenes. We strongly recommend that you put all of your colour models in the same scenes. It is important to maintain a structure for your models so they do not end up scattered throughout the project.

There are four main model categories:



If you have a small project, such as a short or an advertising contract, you can always place all the characters, props, effects, and locations in the same scene. For large projects such as feature-length productions or series, you should create four separate model scenes following these categories.

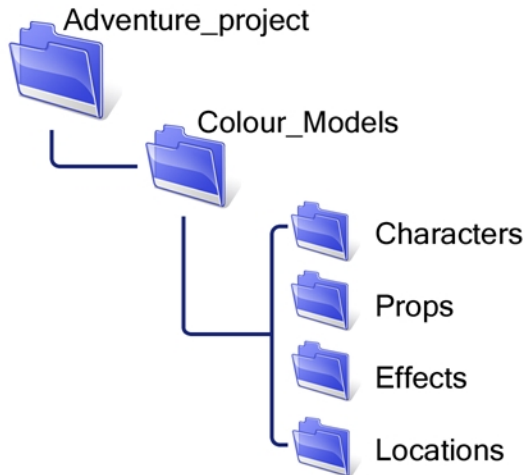
## Scene Creation

In order to create colour models, you need to create your scenes.

When working on a paperless or cut-out animation project, if you have designed your characters, props, effects and locations directly in Harmony, you can paint your models directly in your design scene. You can also create a new colour model scene and import your designs in that one. Refer to the Fundamentals Guide to learn more about creating a scene.

If you have not already done so, refer to the Fundamentals Guide to learn about production structure, file organization, and how to create a Project root directory. We recommend storing your colour model scenes in the root directory or in a colour models subdirectory for even better organization.

A useful way to name your colour model scene is to include the project name, then the colour model type such as characters, props, effects, or locations, and finally `colourmodel1`. For example, a character colour model scene for the Adventure project would be named `adventure_characters_colourmodel1`. This ensures that you always know what scene corresponds to what.



To learn how to create environment, job, and scene for your colour models, refer to the Control Center Guide.

### Colour Model Scene Structure

To store your colour models in a scene, you should create one drawing layer for each character, prop, effect, or location. You should name these according to the model.

You can also load other colour references in the scene to balance your overall colours. For example, if you work in a character colour model scene, it's a good idea to import some of the key locations to compare and adjust the colours so they match well.

### Setting Up the Workspace

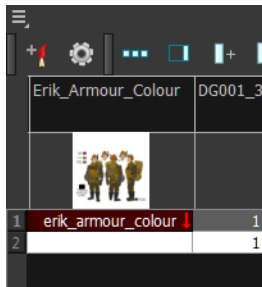
Now that your scenes are created and structured, you can open the corresponding colour model scene. For the optimal workspace for inking and painting, set up your workspace with these views:

- Xsheet
- Camera
- Drawing
- Colour
- Model

### Naming

Now that your models are imported, you can rename them appropriately. You should rename elements (layers) and drawings corresponding to the model. This will help keep the work organized and make it easy for others to follow.

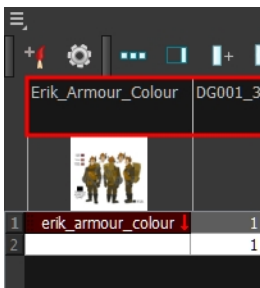
For example, if there is a black and white character model called **Erik** in one drawing element and its colour models in another one, rename your elements to include the character's name. For example, the colour model for Erik's armour could be named: **erik\_armour\_colour**.



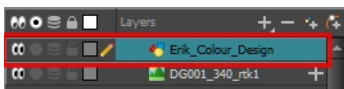
### How to rename a drawing element

1. Do one of the following:

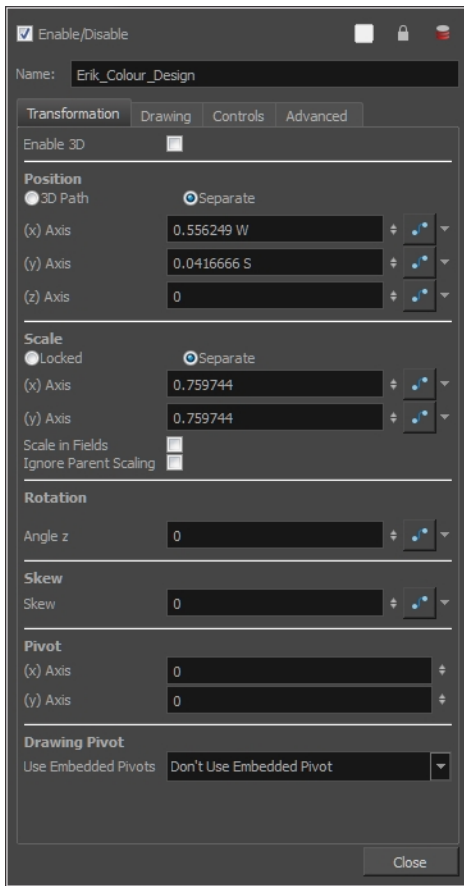
- ▶ In the Xsheet view, double-click on the column header of the drawing element.



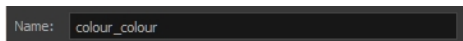
- ▶ In the Timeline view, double-click on the drawing element's layer.



The Layer Properties window opens.



2. Type in a new name.



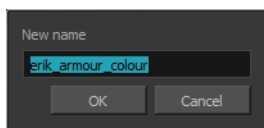
## How to rename a drawing

1. In the Xsheet view, click on a drawing name.



2. Do one of the following:
  - ▶ From the Xsheet view menu, select **Drawings > Rename Drawing**.
  - ▶ Right-click on the drawing name and select **Drawings > Rename Drawing**.
  - ▶ Press **Ctrl + D** (Windows/Linux) or **⌘ + D** (Mac OS X).

The Rename Drawing dialog box opens.



3. Type in a new name and click **OK**.

## Working with Palettes

In animation, specific colours are used to paint each particular character. In order to maintain absolute consistency, a colour palette is created for each character, prop and effect throughout the production. This is referred to as a **master palette**<sup>1</sup>.

Master palettes contain a colour swatch for each zone to colour with a precise RGBA colour value.

Using a master colour palette has many benefits, including:

- Each character consistently retains their dedicated colours.
- You cannot accidentally use a colour which is not in the master palette.
- Standardization and colour consistency throughout the production
- Multiple artists can use the same colour palette and produce the same results.

Toon Boom Harmony uses palettes to hold all the colours needed to paint your elements, allowing complete control and consistency in your painting process.

A **palette**<sup>2</sup> is created by assigning a set of colours to each character, prop or effect. You will create a new palette and add a new colour, known as a *colour swatch*, for each zone of the character, such as the skin, hair, tongue, shirt, pants, and so on.

In Harmony, palettes are individual files that you can copy, transfer, and store. Palettes have a **\*.plt** file name extension—see [Palette File Storage](#) on page 213.

When a zone on the character is painted with the colour contained in a colour swatch, a link is automatically created between that colour swatch and the zone. This means that if the tint of the colour in the colour swatch is changed, any zone linked to it will update to the new tint. This is one way that colour palettes can save time and money in your production.

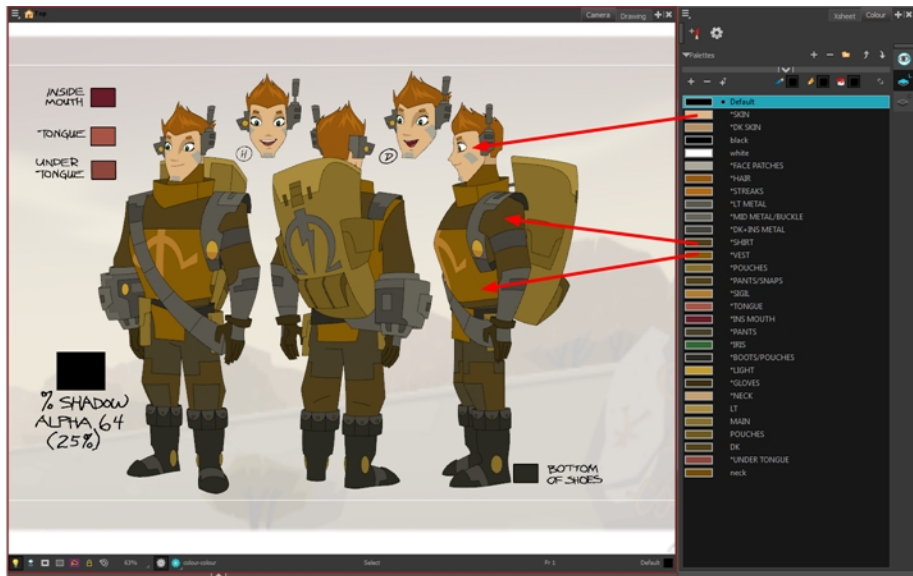
Another advantage of this system is that you can create complete palettes for different lighting situations. For instance, in addition to the regular palette for a character, you could have one for that character in the rain using colours that are duller and less vibrant than the dry daytime colours, or yet another for using in a night scene. Using palettes linked to your character in this way allows you to instantly change its colouring to suit the mood and atmosphere of the scene without tediously repainting each element.

---

<sup>1</sup>A master palette is a group of colours attributed to a character or a prop. The palette is used throughout the entire production to maintain consistency in the look and to ensure that the same colours are used throughout the production. Also known as palette.

<sup>2</sup>A palette or master palette is a group of colours attributed to a character or a prop. The palette is used throughout the entire Toon Boom Studio project to maintain a consistency in the look and avoid the colour changing during the animation. Also referred to as a master palette.





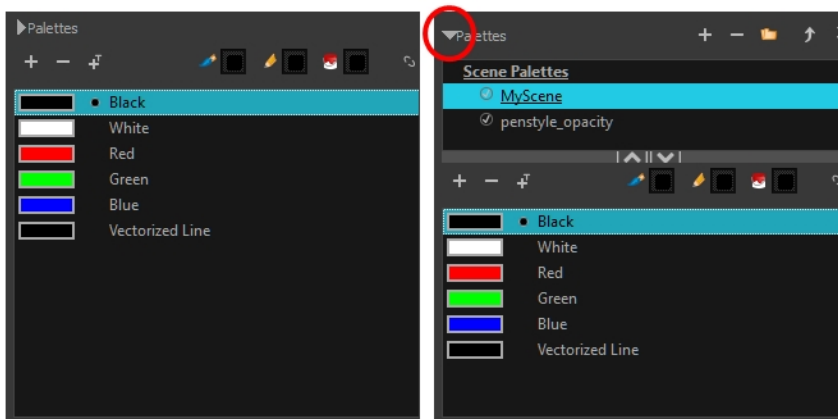
Erik, Di-Gata Defenders © Nelvana Limited, Corus® Entertainment Inc.

This section is divided as follows:

- [Palette Lists](#) on page 209
- [Palette File Storage](#) on page 213
- [Creating a Colour Palette](#) on page 215
- [Duplicating a Colour Palette](#) on page 219
- [Cloning a Colour Palette](#) on page 221
- [Palette Operations](#) on page 223
- [Importing and Linking Palettes](#) on page 227

## Palette Lists

The Colour view has two modes: basic and advanced.



Basic mode

Advanced mode

- **Basic Mode**

The Colour view's basic mode only shows the Colour list. When you open Toon Boom Harmony, you only see the colours available in the Default palette which contains six basic colour swatches and is automatically named the same as your scene. For simple projects, you can manage with the default palette, but for movies, series, or shorts it is recommended that you create palettes for your characters. To create a palette, you have to switch to the Advanced mode of the Colour view and show the Palette list.

- **Advanced Mode**

The Advanced mode displays the list of all palettes that are linked to the scene. To create palettes for your characters, you must display the Palette list.

A palette list is a file containing all of the links to the original palette files. Every drawing layer has a palette list. The scene also has a palette list. For example, a drawing layer can use three different palettes stored in three different locations, while another drawing layer can use two of these palettes plus another one coming from another scene. The palette list keep track of the locations of the palettes.

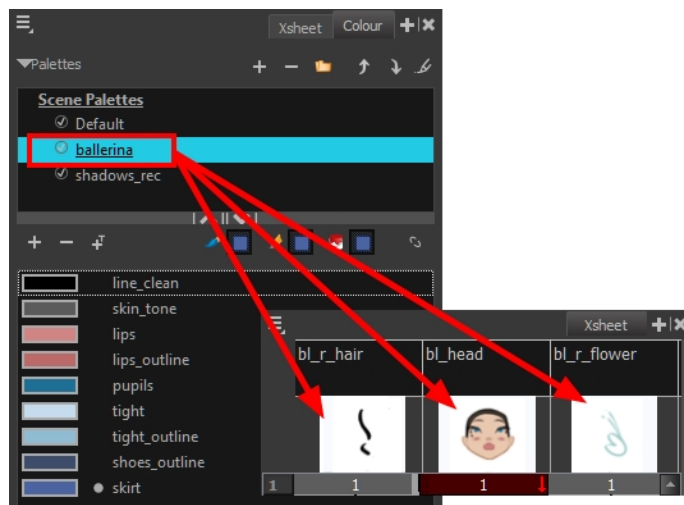
There are two types of palette lists:

- **Scene Palette List**

The Scene Palette list is mainly used with cut-out animation, but is also very useful for paperless and traditional animations. A cut-out character will often be divided into 20 to 30 different drawing elements that use the character's master palette.

The palette list is stored at the scene level instead of the Element directory. This way, all palettes linked to this list will appear in every drawing element created in the scene. There is no need to manually load the palette in each element.

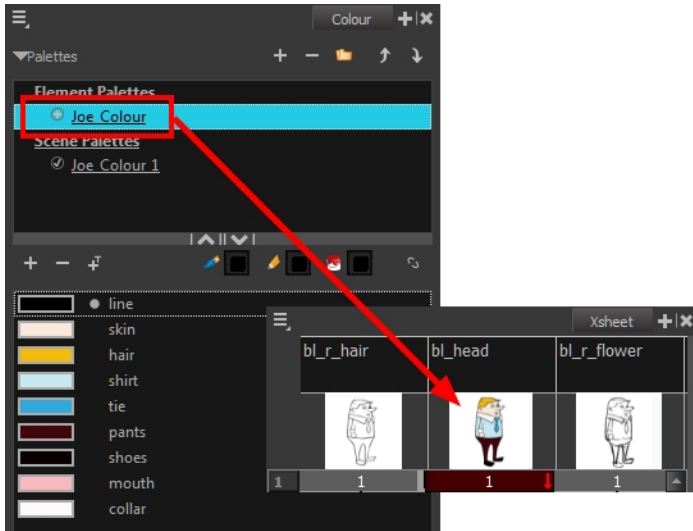
The Scene Palette list is the simplest one to use. By default, Toon Boom Harmony is set to use only Scene Palette lists.



- **Element Palette List**

In Toon Boom Harmony, you can switch to Advanced Palette List mode and choose to save your palette at an element's level. The Element Palette list is mainly used with traditional and paperless animation. Unlike cut-out animation, all columns (drawing elements) contain different characters, props, backgrounds, and effects. The Element Palette list is used when you do not necessarily want all of the palettes for all of your elements linked in every column.

The palette list is stored in the drawing element's directory instead of directly in the Scene level. This ensures that the links to the palettes appear only in the appropriate element. If you prefer to access a global palette list, link your palettes to the Scene Palette list.



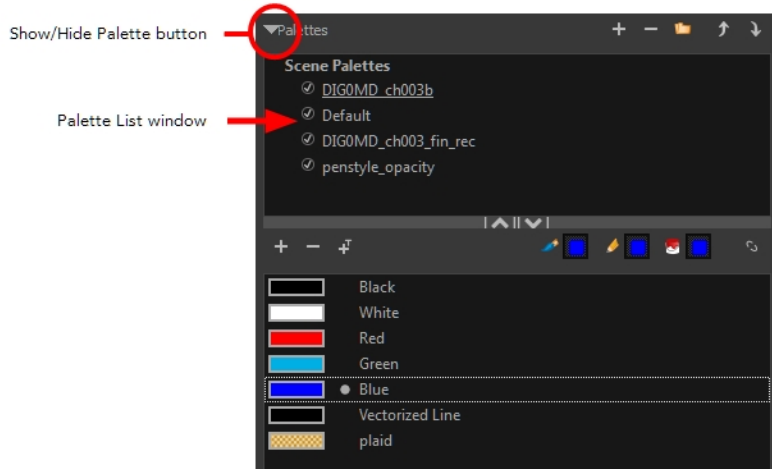
To prevent users from accidentally removing a link to a palette, the palette lists are locked. To link or create a new palette, the palette list must first be unlocked.

When you are using several cloned palettes that are related to the same original palette, Toon Boom Harmony uses the palette located highest in the list to determine the colour of the painted zones—see [Cloning a Colour Palette on page 221](#).

### How to show or hide the Palette list

- ▶ In the Colour view, click the Show/Hide Palette List View  button to expand or collapse the Palette List area.

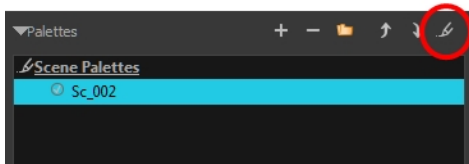
The Palette List window opens and displays all your palettes.



### How to lock and unlock to the palette list

- ▶ From the top menu, select **Edit > Edit Palette List Mode**.

A grey pencil appears on the top-right corner of the Palette list to indicate that it can be modified.





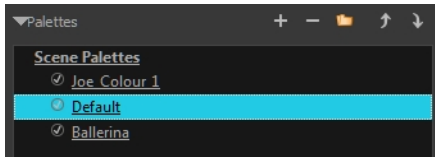
### How to set the Advanced Palette Lists mode

1. Do one of the following:
  - ▶ From the top menu, select **Edit > Preferences** (Windows/Linux) or **Stage > Preferences** (Mac OS X).
  - ▶ Press **Ctrl + U** (Windows/Linux) or **⌘ + U** (Mac OS X).
1. Select the **Advanced** tab.
2. In the Advanced Options section, select the **Advanced Palette Lists** option.
3. Click **OK**.

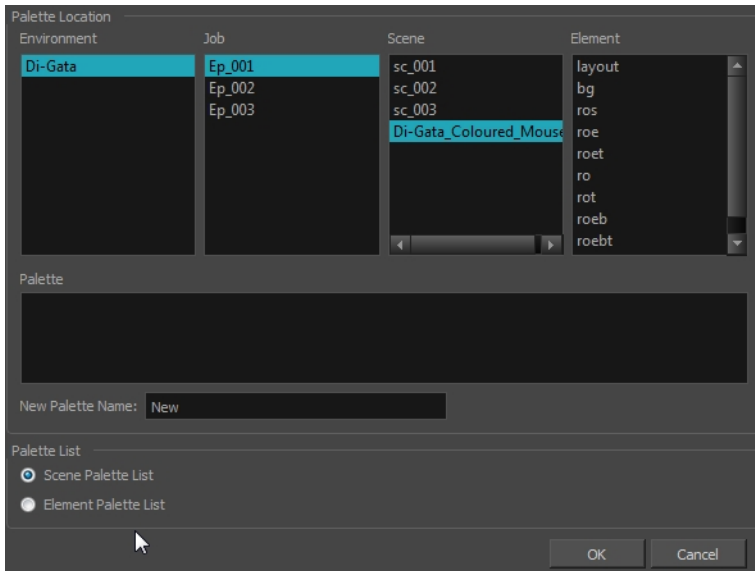
### How to reorder palettes in the Palette list

Do one of the following:

- ▶ From the Colour View menu, select **Palettes > Move Up** or **Move Down**.
- ▶ In the Palette list, click the Up  and Down  buttons.



## Palette File Storage



In Harmony, palettes are individual \*.p1t files that can be copied, transferred and stored. When a palette is created from Harmony, it needs to be stored somewhere. By default, the palette file is stored in the scene directory in a palette-library folder unless you specify a different location. There are four locations where you can find palette-library folders:

- **Element:** The Palette Library folder is stored directly in the drawing Element folder.
- **Scene:** The Palette Library folder is stored directly in the Scene folder.
- **Job:** The Palette Library folder is stored in a Job folder contained in the Scene folder.
- **Environment:** The Palette Library folder is stored in an Environment folder contained in the Scene folder.

By default, the palette is stored at the scene level. For simple projects and standalone projects, it is recommended to keep it as is. If you work with a larger studio, it is recommended to verify with them on the file structure.

This existing structure is compatible with Harmony Server. Harmony's database has a leveled structure starting from the Environment down to the Element. Its client-server configuration allows all data, such as palettes and scenes, to be shared between a series of client machines.

### Element Level

Working with Harmony Stand Alone, the Element level is very useful when there are a lot of different palettes. When a colour model drawing is created, it is stored in its element folder. By storing the corresponding palette file with the colour model, the colourist can load them both from the same location. This also creates a more organized structure.

## Scene Level

Working with Harmony Stand Alone, a palette file can also be saved at the scene level, so that all of the palettes from the scene are stored together. The palette naming must be structured so the colourist or character builders can find the correct one. Saving the palettes at the scene level makes it very easy to back up the palettes and retrieve their location.

The scene level can also be useful for cut-out animation. Instead of creating a colour model scene that includes all of the characters, props, effects, and location, the colour palette or model will often be directly imported to, or created in, the character building scene. Just as with a cut-out character building scene, each element uses the same palette so it would not be efficient to save the palette inside one element. Instead, it is saved at the scene level. This prevents a palette overload because all of the models are in different scenes. It also allows each scene to have its own set of palettes corresponding to its model.

When working on a cut-out animation production, it is highly recommended that you work with the Scene level.

## Where to Save the Palette File

The palette storage location depends on the type of production and the backup plan being used. Some studios like to store their palettes at the Element level and others at the Environment level as this will not create a problem so long as the scene is in the Harmony structure. In fact, as long as the Harmony structure is maintained it can be stored at any level. However, difficulties may occur when the scene is backed up or transferred to another studio or database and removed from the structure.

## What happens when you export a palette file?

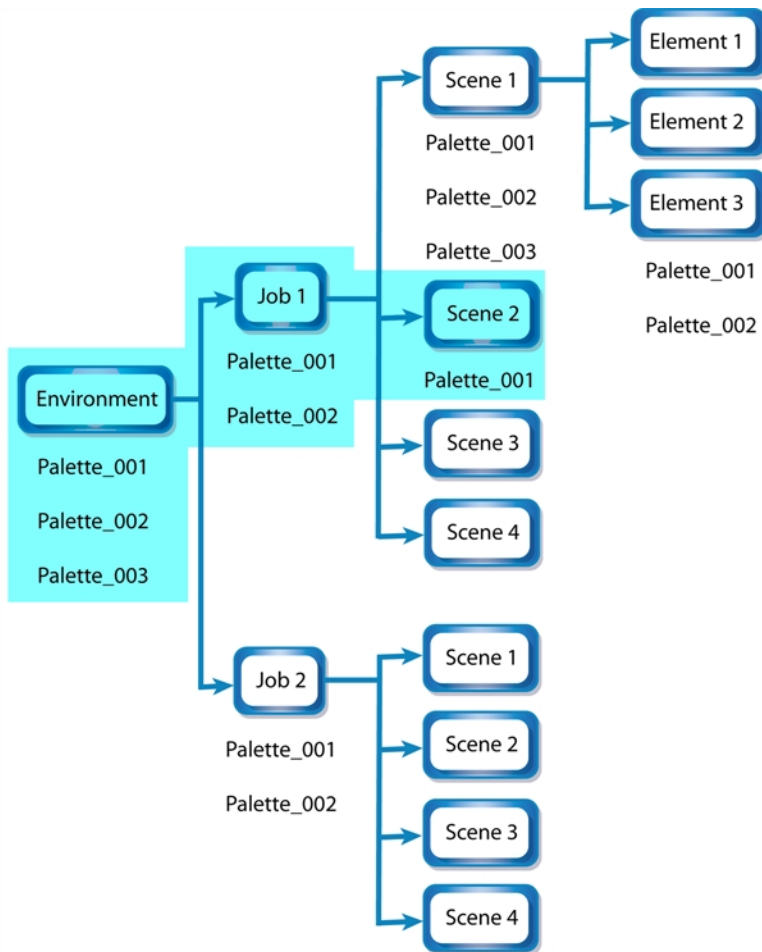
It is important to understand what is happening to a palette file when the scene is exported.

Because of the Harmony client-server configuration, all of the data can be shared through all of the scenes in the database. This also includes the palette files, even if they are stored at the Element, Scene, Job, Drawing or Environment level. The palette files can be accessed from any scene of any project.

When you export scenes from Harmony to either archive or send them to other users or studios, the palettes stored in external scenes, jobs or environment will **NOT** be exported.

An exported scene will carry palettes stored in its own Element's Palette Library, scene's palette library, the Job and the Environment where it is stored. Any other palette from other Environments, Jobs, Elements or Scenes (even from the same job) will **NOT** follow. Instead a recovery palette will be created when the scene is reopened in another Harmony system. A recovery palette is a local palette created by the system when palettes and colours are missing. This palette is no longer shared with the rest of the project.

For example, in the following chart, if you export Scene 2 from Job 1, the package will carry the palettes from Scene 2, Job 1 and Environment. It **WILL NOT** carry the palettes from Element 3 in Scene 1, Scene 1 and Job 2. If Scene 2 was linked to any of these, the system will create a recovery palette the next time Scene 2 is opened in another Harmony system.



The best place to store your palette is:

- Environment level for a movie or series
- Job level for a publicity or small project
- Scene level for a student exercise

To store your palette with their colour models, you can use the Element level, however, it will require more structure when exporting the scenes. The scene will have to be exported along with its colour model scene. The other studio you are working with must recreate an identical structure to yours, then import the received scenes into the same location as you have them in order to maintain the links.

## Palette Backup

When sharing palettes between scenes, some users may accidentally modify the colours, even though the palettes are locked by default. That is why it is a good idea to copy and back up your palette libraries and master palette directories.

When a palette file is copied, it automatically becomes a clone palette, so there will not be any trouble replacing an altered file. Harmony automatically updates all of the files and drawings linked to it.

## Creating a Colour Palette

You can create a palette in either Basic or Advanced mode.

By default, Toon Boom Harmony is set to the Basic mode. For simple productions, it is recommended to use the Basic mode. This setting stores the palettes automatically for you and saves them at the Scene level. When you use the Advanced Palette Lists mode, you can decide at which level you want to store your palettes: Environment, Job, Scene, or Element.

If you are using Harmony Server, see [Palette File Storage](#) on page 213.

Before you can create a palette in the Advanced Palette Lists mode, you must first set your preferences to Advanced Palette Lists mode in the Preferences dialog box. You also need to have the rights to modify the palette list. If you do not, select **Edit > Edit Palette List Mode** from the top menu.

You can remove palettes from your Palette list if they're not needed in your scene. The actual palette file will not be deleted and you can reimport it in your Palette list later on.

### How to set the Advanced Palette Lists mode

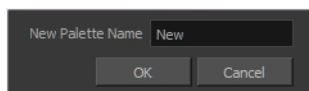
1. Do one of the following:
  - From the top menu, select **Edit > Preferences** (Windows/Linux) or **Stage > Preferences** (Mac OS X).
  - Press Ctrl + U (Windows/Linux) or ⌘ + U (Mac OS X).
1. Select the **Advanced** tab.
2. In the Advanced Options section, select the **Advanced Palette Lists** option.
3. Click **OK**.

### How to create a new palette (Basic Palette Lists mode)

1. From the Colour View menu, select **Palettes > New** or click the New Palette **+** button.
  - Make sure you have the necessary rights to modify the palette list. If not, select **Edit > Edit Palette List Mode**.

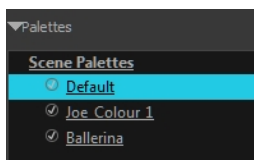
The Create Palette window opens.

2. Enter the palette name according to the model.



3. Click **OK**.

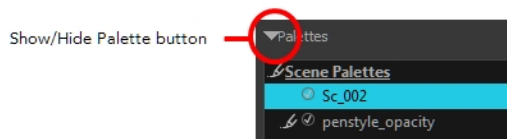
The palette appears in the drawing element's palette list.





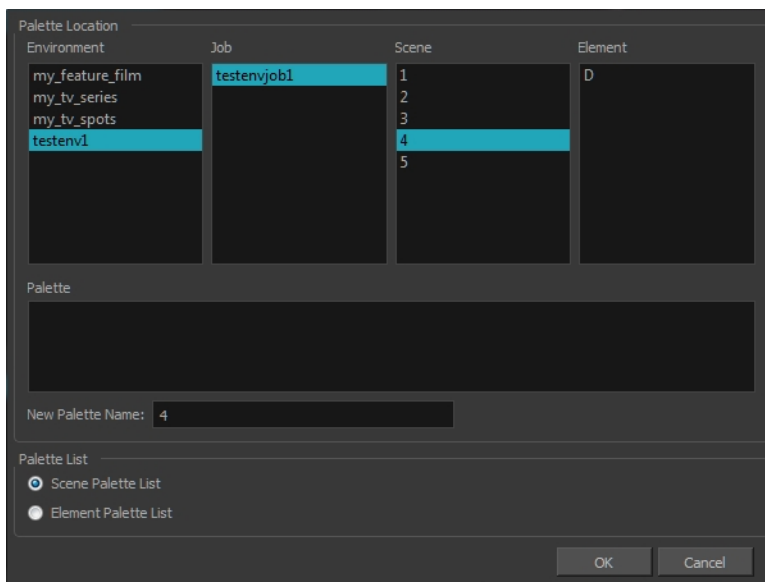
## How to create a palette from the Advanced Palette Lists mode

1. In the Timeline or Xsheet view, select the drawing that requires a palette.
2. Make sure that you have the necessary rights to modify the palette list. If you do not, select **Edit > Edit Palette List Mode**.
3. In the Colour view, click the **Show Palette List View** button to display the palette list.



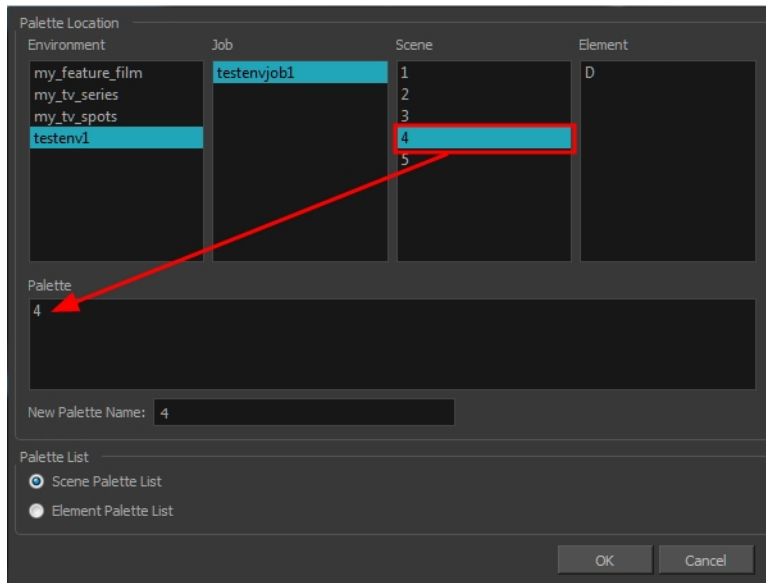
4. Do one of the following:
  - ▶ From the Colour view menu, select **Palettes > New**.
  - ▶ Click the Create Palette **+** button.

The Palette Browser: Create Palette dialog box opens.

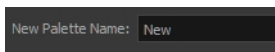


5. Select the level to store the palette file.
  - ▶ **Environment:** The palette-library folder is stored in the scene's parent environment folder.
  - ▶ **Job:** The palette-library folder is stored in the scene's parent job folder.
  - ▶ **Scene:** The palette-library folder is stored directly in the scene folder.
  - ▶ **Element:** The palette-library folder is stored directly in the drawing element folder.

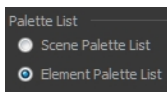
When you select a level that has a palette stored in it, the palette names are displayed in the Palette field.



- Name the palette. There is no need to add the suffix "palette" to the name as it is always recognized as a palette file.



- Select a Palette List option.



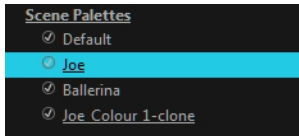
- ▶ The Scene Palette List is mainly used with cut-out animation. A cut-out character will often be divided in twenty to thirty different drawing elements that use the character's master palette.  
The palette list is stored at the scene level instead of the Element directory. This way, all palettes linked to this list will appear in every drawing element created in the scene. There is no need to manually load the palette in each element.
- ▶ The Element Palette List is mainly used with traditional and paperless animation. Unlike cut-out animation, all columns (drawing elements) contain different characters, props, backgrounds and effects. The Element Palette List is used because you do not necessarily want all of the palettes for all of your elements linked in every column.  
The palette list is stored in the drawing element's directory instead of directly in the Scene level. This ensures that the links to the palettes appear only in the appropriate element. If you prefer to access a global palette list, link your palettes to the Scene Palette List.

- Click **OK**.

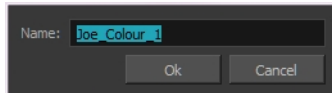
The new palette appears in the palette list.

### How to rename a palette

- In the Colour view, select the palette to rename.

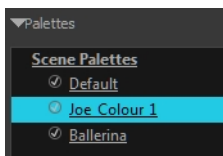



2. Do one of the following:
  - Right-click and select **Rename**.
  - From the Colour View menu, select **Palettes > Rename**.
3. In the Rename dialog box, give the palette a new name and click **OK**.



## How to remove a palette

1. In the Colour view, select the palette to remove.



2. Do one of the following:
  - From the Colour View menu, select **Palettes > Remove**.
  - Right-click on the selected palette and select **Remove**.
  - Click the Remove Palette  button located above the Palette list.

If the palette was used in your scene, the zones painted with its colours turn red.



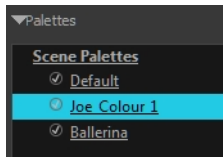
## Duplicating a Colour Palette

A duplicated palette is a simple copy of the original palette. It uses the same names, colour values, but has a different ID and is independent from the original palette. This ensures that both palettes are completely independent.

This option is used when there are similar models and you want to avoid recreating and naming all the colours. You can change the values and the names afterward without affecting the original palette. You can also keep some RGBA values, such as the eyes, teeth, tongue, inside mouth, etc.

## How to duplicate a palette

1. In the Colour view, select the palette to be duplicated.

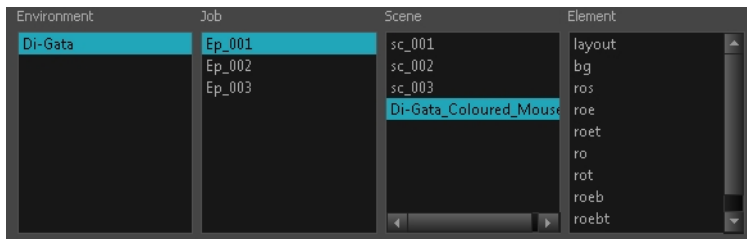


2. Do one of the following:

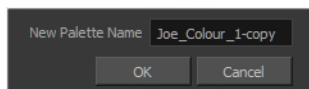
- ▶ From the Colour menu, select **Palettes > Duplicate**.
- ▶ Right-click on the selected palette and select **Duplicate**.

The Palette Browser: Duplicate Palette window opens.

3. If you are in Advanced Palette List mode, select the palette storage level—see [Palette File Storage](#) on page 213.



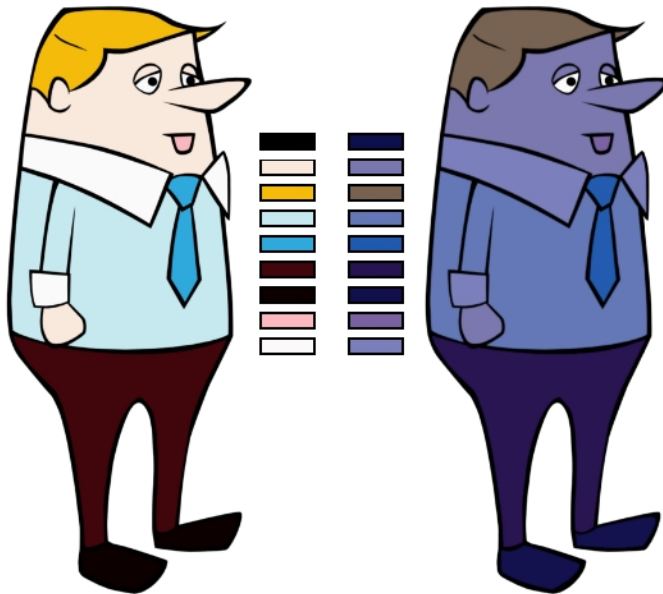
4. In the New Palette Name field, name the palette.



5. In the New Palette Name field, name the palette.
6. Click **OK**.

The palette appears in the palette list.

## Cloning a Colour Palette

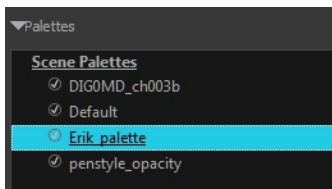


A character usually has only one master palette, although there are times when the characters are placed in different lighting conditions and require a different colour shading. The night palette is a popular choice when a scene or sequence changes from day to night. It can be difficult and time-consuming to repaint everything and creating two independent palettes can be quite complex. As an alternative, Toon Boom Harmony provides clone palettes.

The clone palette is a copy of the master palette. The colours in each palette have the same properties. The colours have the same identification number pointing to the same colour zones, but they can have different names and RGBA values. Depending on the palette (night or day) you're currently using, the painted drawing will update. So there's no need to repaint the animation. All you have to do is create or import a clone palette (palette style).

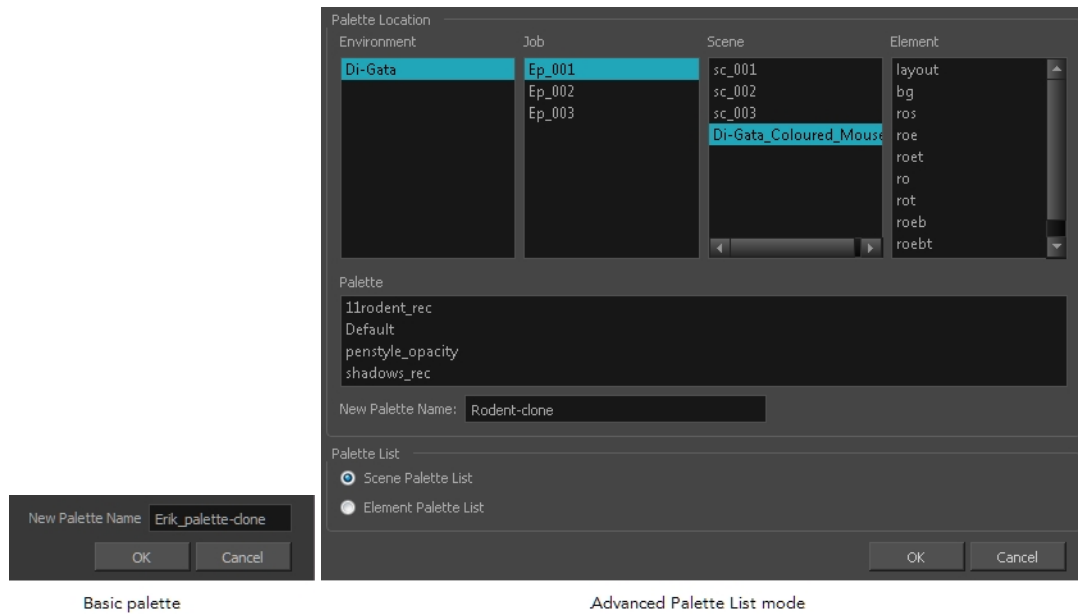
### How to clone a palette

1. In the Colour view, select a palette to clone.

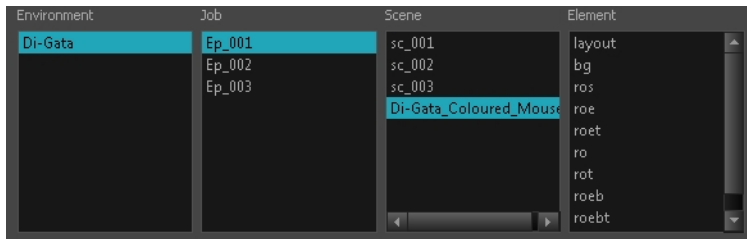


2. From the Colour menu, select **Palettes > Clone** or right-click and select **Clone**.

The Palette Browser: Clone Palette dialog box opens.

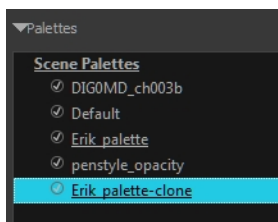


3. If you're in Advanced Palette List mode, select the palette storage level—see [Palette File Storage](#) on page 213.



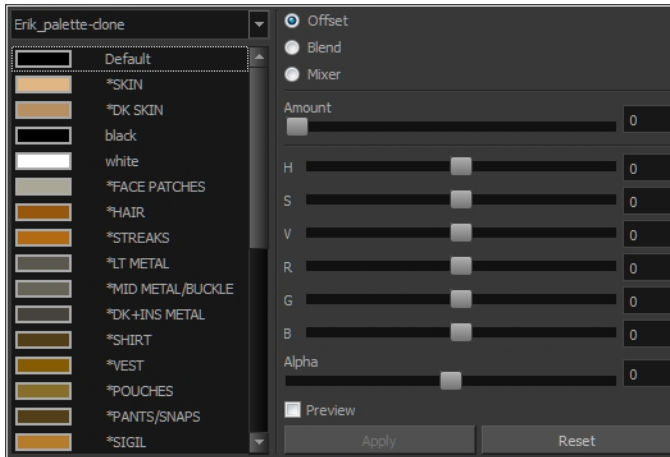
4. In the New Palette Name field, name the palette. We recommend keeping the "-clone" in the name.
5. Click **OK**.

The cloned palette appears in the palette list.

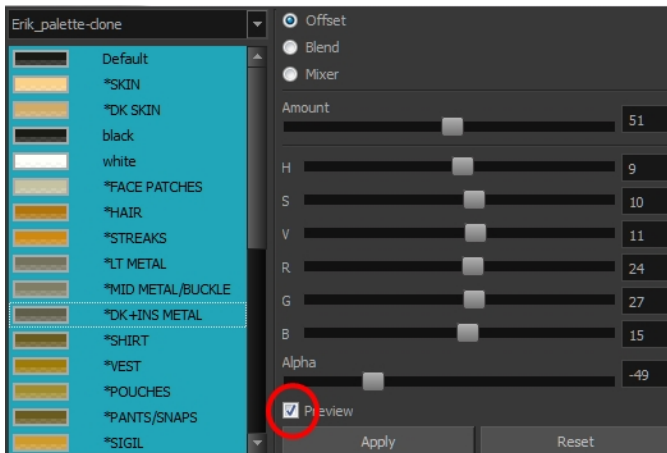


6. In the Palette list, select the clone palette you created to offset or blend colours—see [Mixing Colours](#) on page 247.
7. From the Colour View menu, select **Palettes > Tint Panel** or right-click and select **Tint Panel**.

The Blend/Offset Tint panel opens.



8. Select one or more colours to modify. You can select all your colours by pressing Ctrl + A (Windows/Linux) or ⌘ + A (Mac OS X).
9. Offset, blend, or mix the colours using the sliders and increasing the Amount value.



10. Select the **Preview** option to see a preview of the colours while you adjust them.

**NOTE:** You can also modify the colours individually with the Colour Picker window.

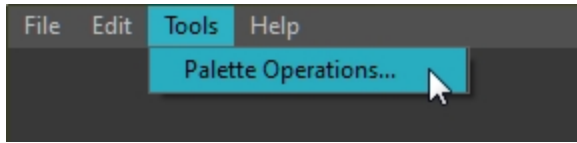
## Palette Operations

When you start Toon Boom Harmony connected to the database, you can access the Palette Operations dialog box which lets you clone, rename, or delete palettes.

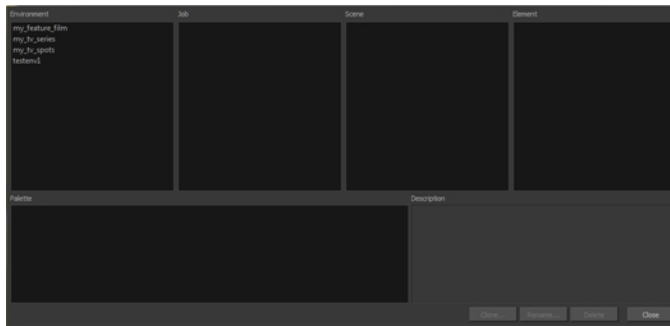
### How to open the Palette Operations dialog box

1. Start Harmony and log in.

2. Close the Database Selector dialog box.
3. From the top menu, select **Tools > Palette Operations**.

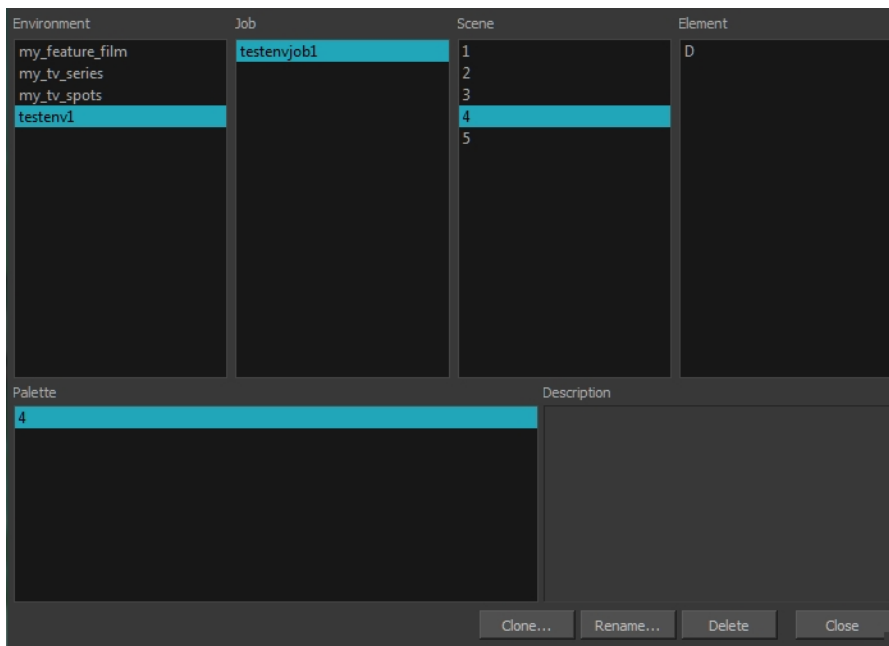


The Palette Operations dialog box opens.



### How to clone a palette in the Palette Operations dialog box

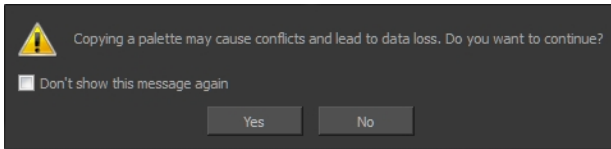
1. Select the palette you want to clone at the location and level in which it was stored.



2. Click **Clone**.

A Warning dialog box opens.



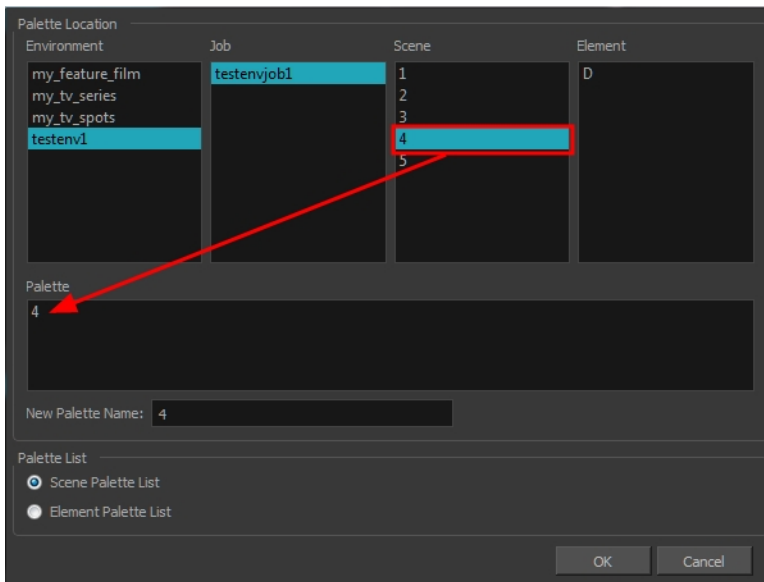


3. Select the **Don't show this message again** option if you do not want to see this message every time you perform this operation.

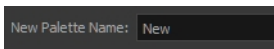
4. Click **Yes**.

The Palette Browser dialog box opens.

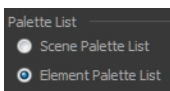
5. Select the level to store the palette file.



6. Name the palette. There is no need to add the suffix "palette" to the name as it is always recognized as a palette file.



7. Select a Palette List option.



- ▶ The Scene Palette List is mainly used with cut-out animation. A cut-out character will often be divided in twenty to thirty different drawing elements that use the character's master palette.

The palette list is stored at the scene level instead of the Element directory. This way, all palettes linked to this list will appear in every drawing element created in the scene. There is no need to manually load the palette in each element.

- ▶ The Element Palette List is mainly used with traditional and paperless animation. Unlike cut-out animation, all columns (drawing elements) contain different characters, props, backgrounds and

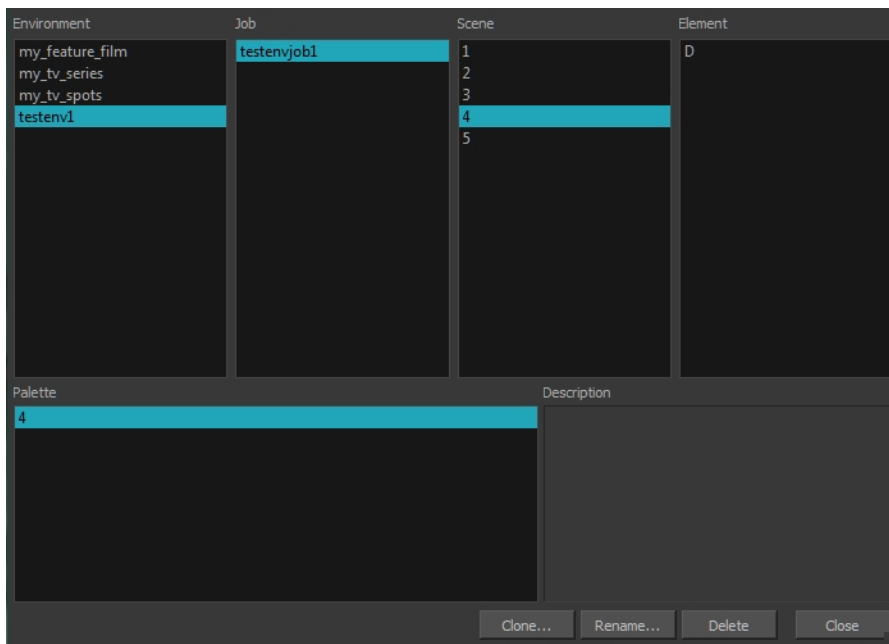
effects. The Element Palette List is used because you do not necessarily want all of the palettes for all of your elements linked in every column.

The palette list is stored in the drawing element's directory instead of directly in the Scene level. This ensures that the links to the palettes appear only in the appropriate element. If you prefer to access a global palette list, link your palettes to the Scene Palette List.

8. Click **OK**.

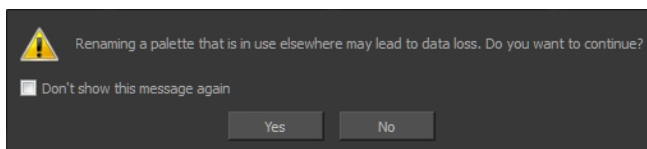
### How to rename a palette in the Palette Operation dialog box

1. Select the palette you want to rename at the location and level in which it was stored.



2. Click **Rename**.

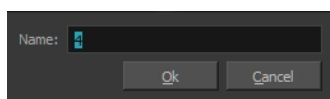
A Warning dialog box opens.



3. Select the **Don't show this message again** option if you do not want to see this message every time you perform this operation.

4. Click **Yes**.

The Rename Palette dialog box opens.

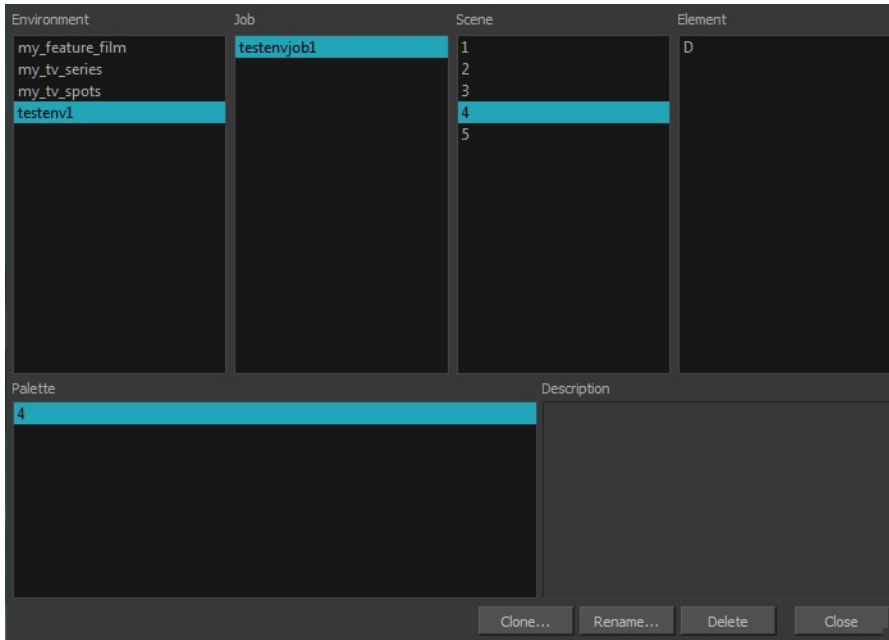


5. Type in a name for the palette.

- Click **OK**.

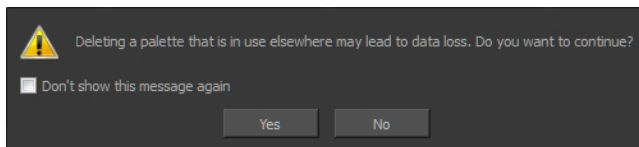
### How to delete a palette in the Palette Operation dialog box

- Select the palette you want to delete at the location and level in which it was stored.



- Click **Delete**.

A Warning dialog box opens.



- Select the **Don't show this message again** option if you do not want to see this message every time you perform this operation.

**NOTE:** It is not recommended to disable the warning message as deleting a palette cannot be undone.

- Click **Yes**.

## Importing and Linking Palettes

Before starting colouring work such as ink and paint or even creating new colour models, you may want to load existing colour palettes to your scene. You can do so by linking colour palettes to your palette lists.





You may encounter a case where only a colour palette is visible when a layer is selected. If you need that palette in a second layer, you can link the palette to the second layer's palette list. A good example would be a scene where

there is a character on one layer and its arm is on another. In order for both layers to access the palette, you must link both Element Palette lists to that palette. If your palette is linked to the Scene Palette list, it will be accessible by all layers.


If you created a palette in another project and you want to import it in your current project, you can browse for the palette file on your computer and add it to your scene. When the palette is imported in your scene, the file is copied in the project's directory. It is not linked to the original file.

Harmony lets This method is not recommended. It is always safer to have the palettes contained within the database to avoid data loss if the source palette were to be deleted or the project exported without including the external palettes.

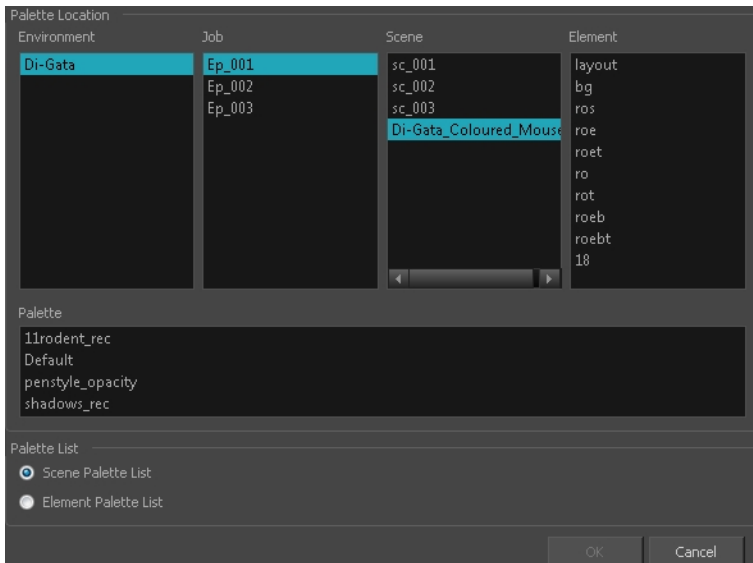
You will notice that when you create or link a palette, a small icon appears on its left. These icons represent the palette's link status.

Icon	Description
	Indicates that the palette is safe.  There won't be any problems once the scene is exported. For example, the palette file is stored in the scene folder and is linked to the Scene Palette List.
	Indicates that the palette file is stored in a directory external to the scene's structure.  The palette file is probably stored in a Master Palette directory on a hard drive external to the palette-libraries planned for the palette storage. The warning in this case is that if you move your Master Palette directory to another location, you may lose the palette in your scene.
	Indicates that a palette file stored in a level such as Element, Scene, Job or Environment is linked to a Palette list that is not on the same level.  For example, a palette file is stored into the Environment folder and is linked to the Element Palette list. The palette is shared.
	Indicates a potentially dangerous situation.  Problems may occur when trying to export or link to the palette file. For example, a palette file is stored into the element folder and is linked to the Scene Palette list. The issue in this case is that if you decide to delete the layer containing the palette, it will be lost from your scene.

### How to link a colour palette

- Do one of the following:
  - From the Colour View menu, select **Palettes > Link**.
  - Right-click and select **Link**.
  - Click the Import  button.

The Palette Browser: Link Palette dialog box opens.



2. Select the level where the palette file is stored—see [Palette File Storage](#) on page 213.
3. Select the palette list linking level by enabling either **Scene Palette List** or **Element Palette List**—see [Palette Lists](#) on page 209.

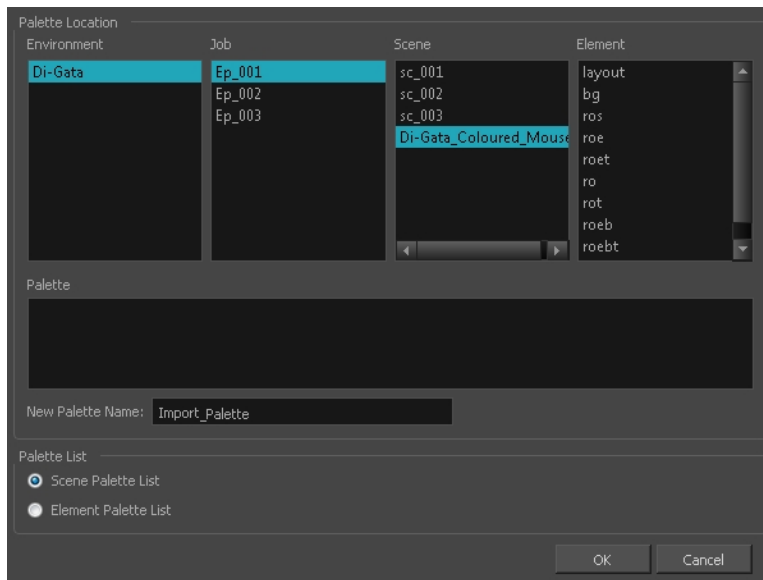
The palette appears in the Colour view.

### How to import a palette into your project

1. Do one of the following:
  - ▶ From the Colour menu, select **Palettes > Import**.
  - ▶ Right-click and select **Import**.

The Browser window opens.
2. Browse for a palette file located (**\*.plt**) on your hard drive. You will generally find the palettes in your project's palette-library directory.
3. Click **Open**.



The Palette Browser opens.

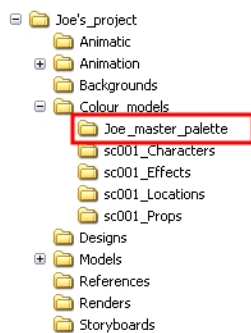


4. If you're in Advanced Palette mode, select the level where the palette file is stored—see [Palette File Storage](#) on page 213.
5. If you're in Advanced Palette mode, select the palette list linking level by enabling either **Scene Palette List** or **Element Palette List**—see [Palette Lists](#) on page 209.
6. In the New Palette Name, name the imported palette.

The palette appears in the Colour view and the file is copied in your project.

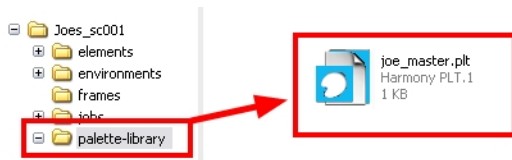
### How to link to an external palette

1. In the Colour view, click on the **Create Palette**  button to create a palette to be used as external.
2. Save your scene by selecting **File > Save** from the top menu or by clicking the Save  button or press Ctrl + S (Windows/Linux) or ⌘ + S (Mac OS X).
3. On your computer or server, create a master directory. Ideally, this should be created in your Root folder to keep it within the project directory. You could also place it inside your Colour Model's sub-directory—see *Chapter 6: Project Organization and File Structure* in the Fundamentals Guide.

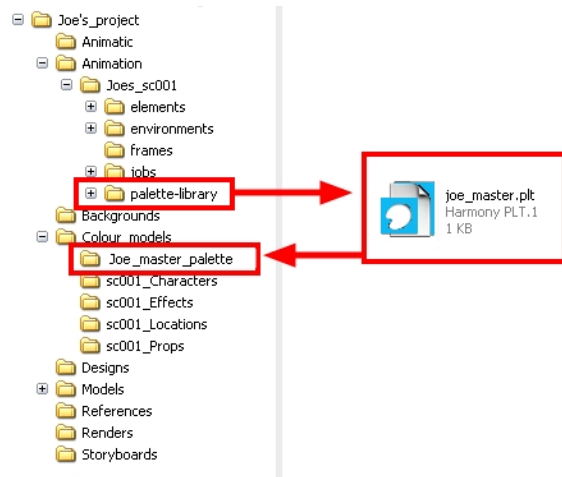


4. Name the folder appropriately, for example: **Joe\_master\_palette**.

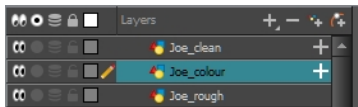
- From your operating system, browse to your Toon Boom Harmony scene and open the palette-library folder.



- Select and copy your palette \*.plt file to copy it to the master palette directory.

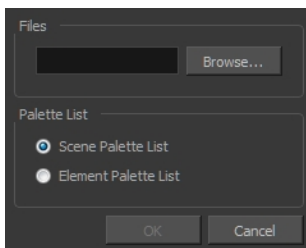


- Create a new Toon Boom Harmony scene or open the scene where you will link this palette.
- In the Timeline or Xsheet view, select the element to link the palette to.




- From the Colour View menu, select **Palettes > Link to External**.

The Link to External Palette dialog box opens.



- Click **Browse** to search for your master palettes folder and select the palette \*.plt file you want to link.
- In the Palette list section, select how you want to load the palette; at the scene or element level.
- Click **OK**.

The linked palette appears in the Colour view.

If a palette is outside the scene, the External  icon appears beside the palette name.

**NOTE:** To link an element (such as a colour model) to the palette that is stored in the external palette directory, you must remove the original palette from the element's palette list. You will then load the duplicated palette into the palette list using the Link to External command, like you did for the other elements.

## Colours

Toon Boom Harmony has some very powerful colouring features when it comes to painting. To paint your drawings, you will use different colour swatches, unlike some other painting programs where you modify the main swatch each time you want to paint with a different colour.



In the Colour view, you choose a different colour swatch for each colour you want to paint in your drawing. You can add as many swatches as you want. You can also rename them and modify existing ones.





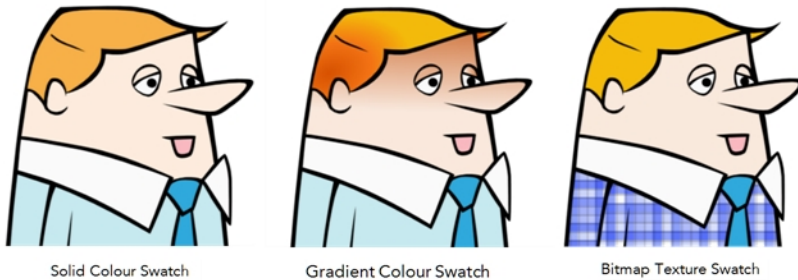
When you modify the colour of an existing swatch, it automatically updates all the zones painted with this swatch throughout the entire project. The colour swatch has a unique ID number that associates it with the painted zones. This way, you can change the look of your character at any time without having to repaint it!

This section is divided as follows:

- [Adding a Colour Swatch](#) on page 233
- [Editing Gradients and Textures](#) on page 240
- [Colour Display Modes](#) on page 245
- [Copying and Pasting Colours](#) on page 246
- [Mixing Colours](#) on page 247

## Adding a Colour Swatch

You can use several different types of colour swatches, including solid colour, gradient colour and bitmap texture swatches.

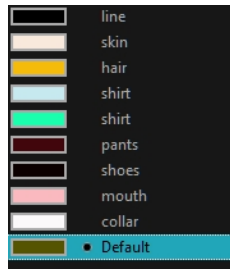


A colour palette is an actual file on the hard drive. These palette files can be stored in a different location on the server. They can be stored in the Environment, Job, Scene, or Element folder and linked to any palette list. This means that if the original palette file is modified, it will update in every drawing element the palette is linked to.


To avoid accidentally modifying the palette, the palette files can be locked. If a palette must be modified, you must get the rights to modify them before doing so.

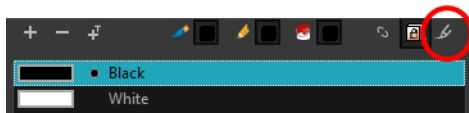
In Toon Boom Harmony, when you click the Add Colour **+** button, a new colour swatch is created using the colour of the currently selected swatch from your palette. However, you can set a default colour to be used every time you create a new colour in your colour palette. This is useful for creating different shades of the same basic colour.

The default colour is also the colour used when you choose to vectorize images you're scanning into your scene, however you add the Default colour swatch to your palette in a different way, so it's unique. It has a unique ID number that makes it easily recognizable from all the other colours in your colour palettes. Being able to change this colour allows you to change the basic colour of all scanned drawings. This can be useful on more than just an aesthetic level as sometimes when you go to NTSC or PAL, pure colours, such as pure black, can create problems.



### How to lock and unlock the palette list

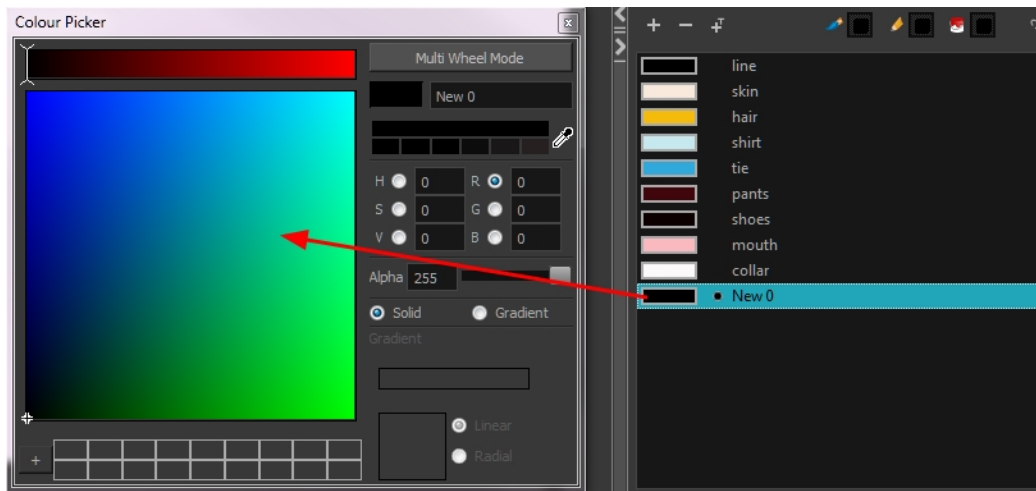
- ▶ In the Colour view, click the Edit Palette Mode  button.
- A grey pencil icon appears in the top-right corner of the Palette list.



### How to add or modify a solid colour swatch


1. In the Colour view, click the Add Colour  button.
2. From the Colour View menu, select **Colours** > **Edit** or double-click on the colour swatch.

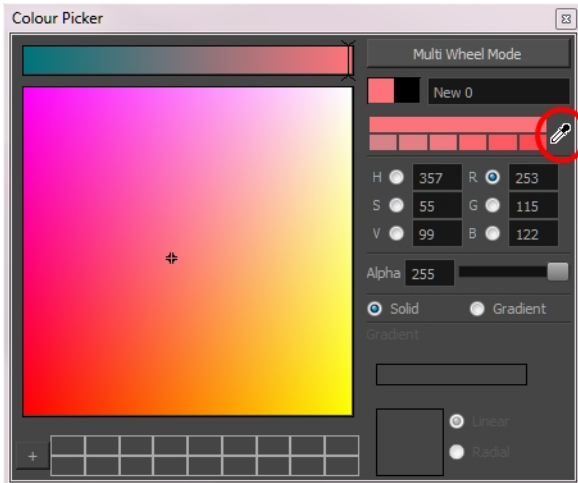
The Colour Picker window opens.



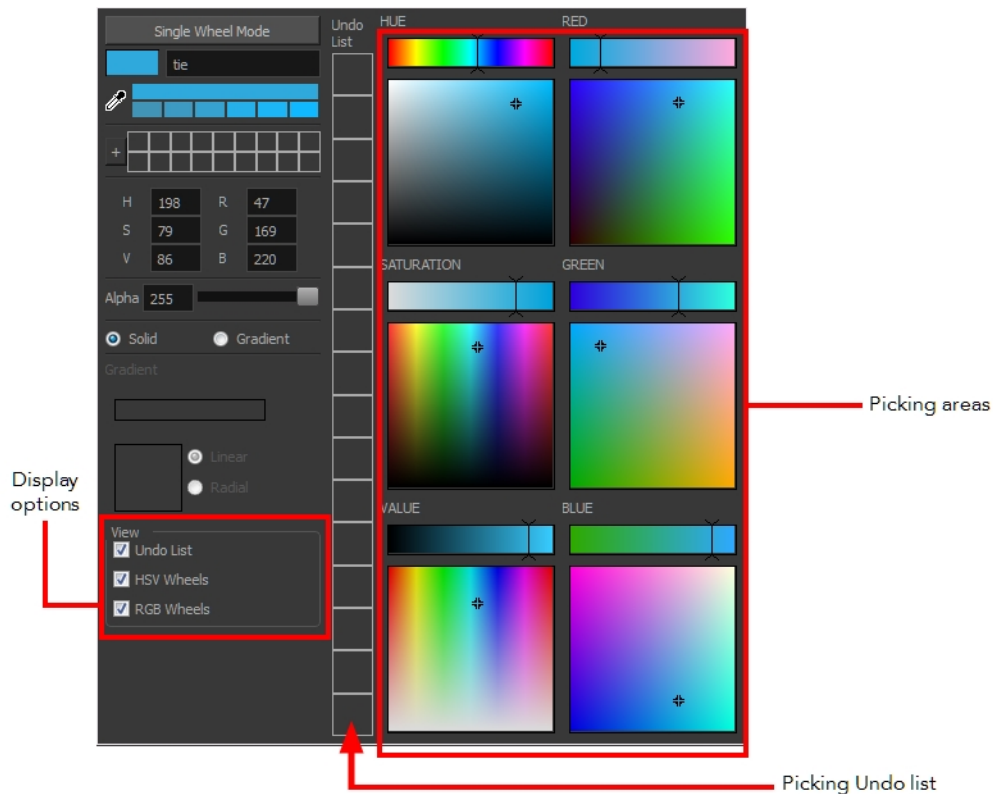
3. To set your colour, do one of the following:
  - ▶ In the colour wheel, select a colour.
  - ▶ Enter the HSV or RGB values in the corresponding fields. Select the **R,G,B,H,S** or **V** options to change the look of the colour picking area.



- ▶ Click the Dropper  button to select any colour on your screen. It can be from the Harmony interface, your operating system or any other open application.



You can also click **Multi Wheel Mode** to open the Multiwheel Colour window. This displays all the picking area styles together and also contains a picking undo list. To return to the regular Colour Picker window, click **Single Wheel Mode**.



4. Click on the Shade Scale swatches to modify the shade of the selected colour.



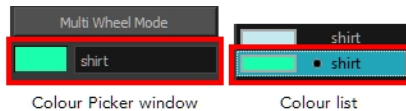
5. Adjust the transparency with the Alpha slider or type the value directly in the Alpha field.



- Click the **Add** button to add the current selected colour to the Colour Storage Library, so you can quickly access it later.



- Rename the colour swatch in the Colour Picker window or directly in the colour list by double-clicking on its name.



### How to change the default swatch colour for all your colour palettes

- From the top menu, select **Edit > Preferences** (Windows/Linux) or **Stage > Preferences** (Mac OS X).
- In the Preferences dialog box, select the **Drawing** tab.
- In the New Colour Pots section, select the **Create New Colour Pots Using the Default Colour** option. You can also click on the colour swatch beside the option to change the default colour.

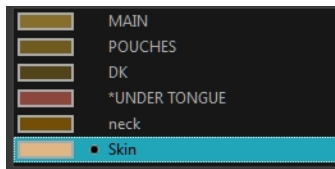
### How to add a new colour swatch using the default colour

- From the Colour View menu, select **Colours > New**.

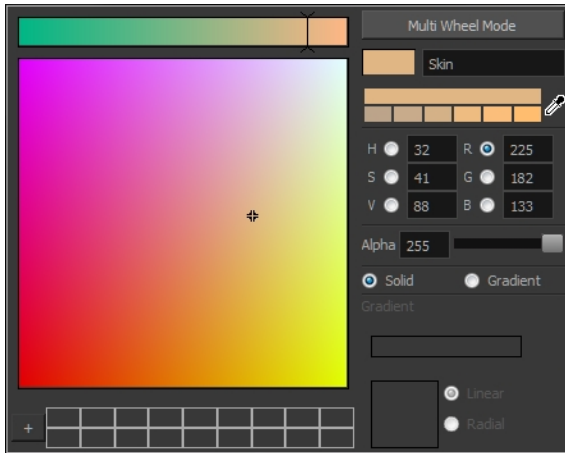
A new swatch is added to your palette using the default colour swatch colour. The new swatch created with the New command will be named **New 0**.

### How to create a gradient colour swatch

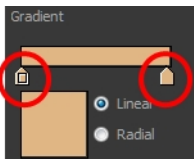
- In the Colour view, select a colour to modify .
- Do one of the following:
  - Click the new colour and from the Colour View menu, select **Colours > New**.
  - Double-click on the colour swatch.



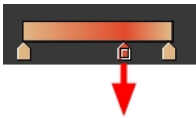
The Colour Picker window opens.



3. Select the **Gradient** option.
4. Select the **Linear** or **Radial** option.
5. Adjust the Gradient arrows to modify the colours.



- ▶ Add extra colours by clicking between the arrows below the gradient bar. Then click on the Colour Preview to select a colour.
- ▶ Pull down the arrows to remove them.




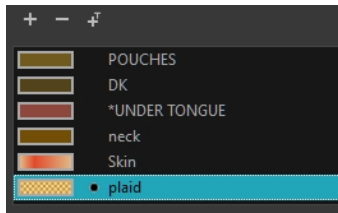
- ▶ Move the arrows left and right to modify the gradient distance.



**NOTE:** To learn how to reposition the gradient zones in your drawings, see [Editing Gradients and Textures](#) on page 240.

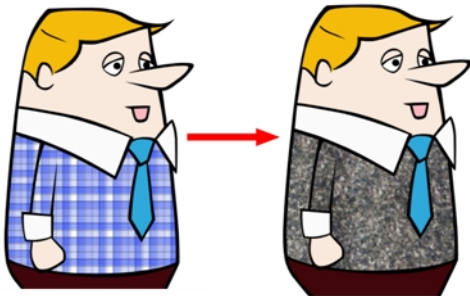
### How to create a texture colour

1. From the Colour menu, select **Colours > New Texture** or click the New Texture  button.  
The Browser window opens.
2. Browse for a PSD or TGA bitmap file created with a third party software and click **Open**.  
The texture is added to the colour list.

**NOTE:**

To learn how to reposition the textured zones in your drawings, see [Editing Gradients and Textures](#) on page 240.

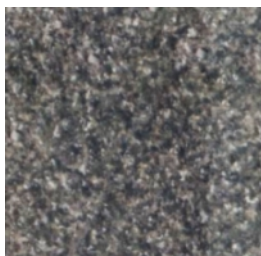
You can also replace a texture once it is painted. If you decide to make the character's shirt wool instead of plaid, just update the texture file in the swatch and the entire project updates. Any transformation previously applied to the texture's position in your drawings will be kept.

**How to replace a texture swatch**

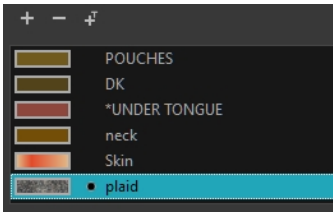
1. In the Colour view, select the texture swatch that contains the bitmap texture you want to replace.



2. From the Colour View menu, select **Colours > Edit Texture** or double-click on the swatch.  
The Browser window opens.
3. Browse for the new PSD or TGA bitmap file created in a third party software.

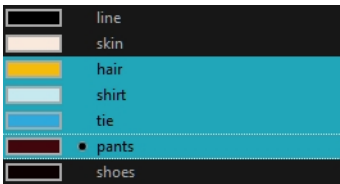



- Click **Open** to update the colour swatch.



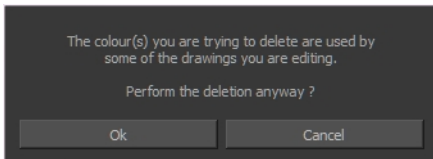
## How to delete a colour swatch

- In the Colour view, select the colour swatches to delete.



- Do one of the following:
  - From the Colour View menu, select **Colours > Delete**.
  - Click the Delete Colour  button.
  - Right-click and select **Delete**.
  - Press Delete.

If the colour swatch is used in a drawing, the Delete Colour dialog box opens.



- Click **OK** to delete the colours or click **Cancel** to abort the operation.
  - If you delete colour swatches already in use, the zones painted with them turn red so you can easily identify them.



## Editing Gradients and Textures




If you paint a zone with a gradient or texture colour, you can use the Edit Gradient/Texture tool to modify its position in the zone. You can move, scale, rotate and skew. If you want to match the colour to the animation, set the first texture position and copy the Edit Gradient/Texture position. When moving to the next drawing, you can select the next texture and paste the previous position to continue the modifications.

If you are painting a hand-drawn animation or if you want the Brush tool and Paint tool to use your gradient's position, angle and scale settings instead of the default ones, you can store your own settings and reuse them afterward.

This way of editing a texture using the Edit Gradient/Texture tool also works with pencil lines drawn with textured "brushes". If you then paint your textured pencil line with a gradient, you can do so and then edit both elements independently at the same time.

### How to use Edit Gradient/Texture tool

1. Do one of the following:
  - ▶ In the Tools toolbar, click the Edit Texture  tool.
  - ▶ From the Camera or Drawing View menu, select **Drawing Tools > Edit Gradient/Texture**.
  - ▶ Press Shift + F3.
2. Click the gradient or texture colour to modify.



Erik, Di-Gata Defenders © Nelvana Limited, Corus® Entertainment


A blue selection frame surrounds the selected gradient or texture.

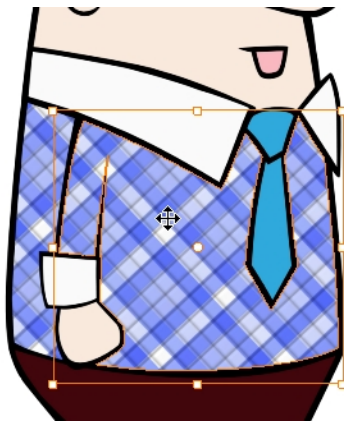





3. Edit the gradient or texture by adjusting the control handles around the selection frame.




### How to store gradient and texture settings

1. In the Tools toolbar, select the Select  tool or press Alt + S.
2. In the Camera or Drawing view, select the gradient or texture zone to store.




3. In the Tool Properties view, click the Store Colour Gradient  button.

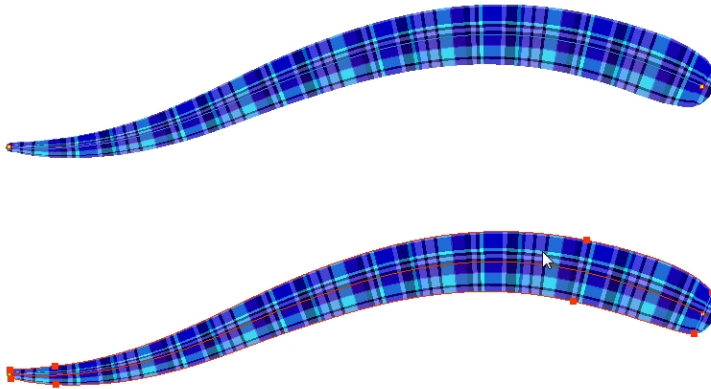
### How to use the stored gradient and texture settings

1. In the Tools toolbar, select the Brush  or Paint  tool.
2. In the Tool Properties view, click the Use Stored Colour Gradient  button.
3. In the Camera or Drawing view, draw and paint.

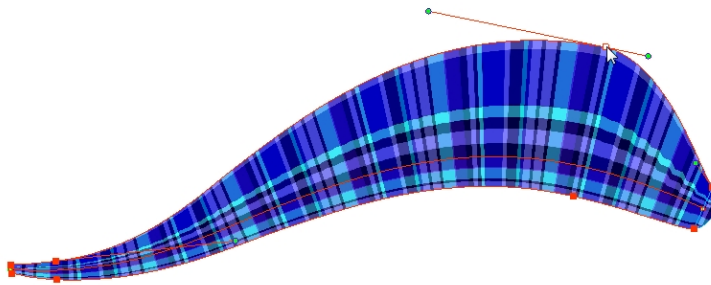
### How to use Pencil Editor tool to edit the texture or gradient on a pencil line

1. Do one of the following:
  - ▶ In the Tools toolbar, select the Pencil Editor  tool.
  - ▶ From the top menu, select **Drawing > Drawing Tools > Pencil Editor**.

- Press Alt + W.
2. Click on the pencil line to be modified to bring up its contour envelope.

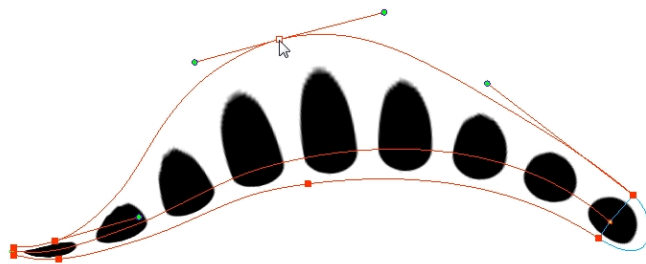


3. Select one of the contour points around the envelope and move its position to change the size of the tiled texture or gradient. You can also pull directly on the lines of the contour envelope or play with the Bezier handles of any given point in order to continue to modify the envelope form.




Expanding the width of the envelope parallel to the pencil line's central vector will cause the tiled texture to be stretched. Conversely, reducing the envelope's width will cause the tiled texture to look squashed.

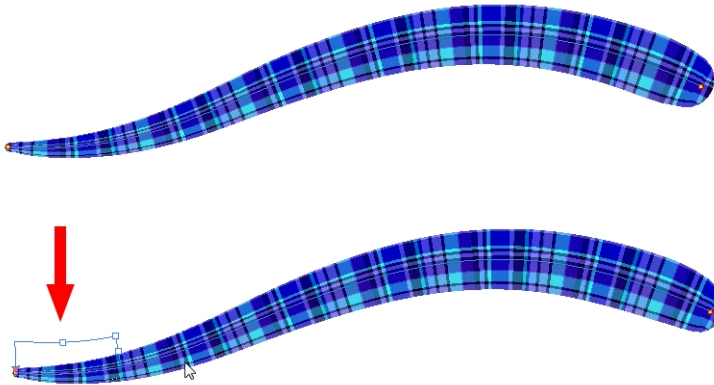
Reducing the contour's width perpendicular to the pencil line's central vector will reduce the number of tiles, while expanding it will increase the number of tiled images.



This editing technique does not just work on texture fills, but can also be applied to pencil lines drawn with a textured "brush".

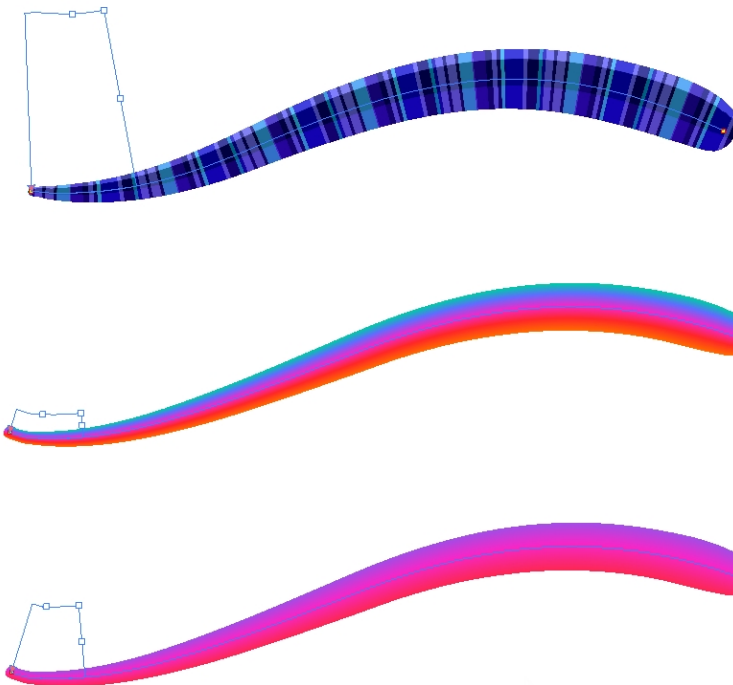
## How to use Edit Gradient/Texture tool to edit the texture or gradient on a pencil line

1. Do one of the following:
  - ▶ In the Tools toolbar, select the Edit Gradient/Texture  tool.
  - ▶ From the top menu, select **Drawing > Drawing Tools > Edit Gradient/Texture**.
  - ▶ Press Shift + F3.
2. Click on the pencil line to be modified to bring up the editor controls.

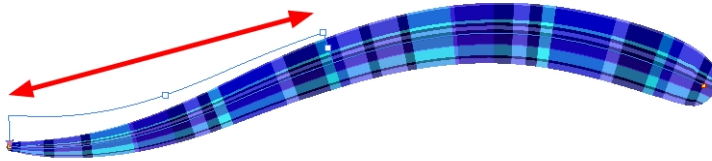


3. The editor controls delineate a single tile in the texture. For gradients, this is less applicable. Pull on the top of the editor controls to stretch the tiled texture throughout the length of the stroke.


As gradients are parallel to the stroke's central vector, this will stretch the way that the gradient is distributed in the pencil line's envelope. The envelope still acts as a boundary for the texture or gradient.

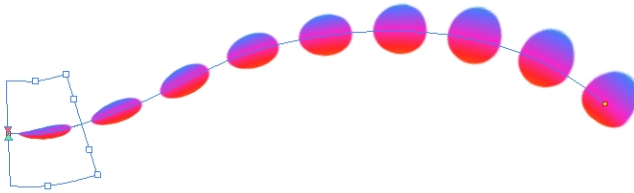


4. Drag the editor control perpendicular to the stroke. You will feel it glide along the stroke's central vector line. This is another way to resize the texture tile. Instead of stretching or shrinking it vertically, this motion stretches or shrinks it vertically. As gradients are parallel to the pencil line's central vector, stretching them vertically gives no visual result.

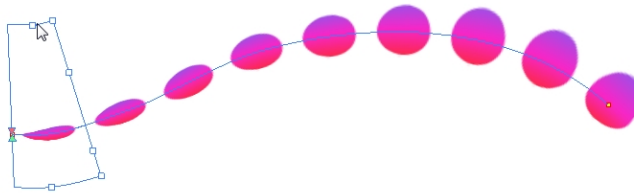


### How to use Edit Gradient/Texture tool to edit the texture and gradient of a pencil line

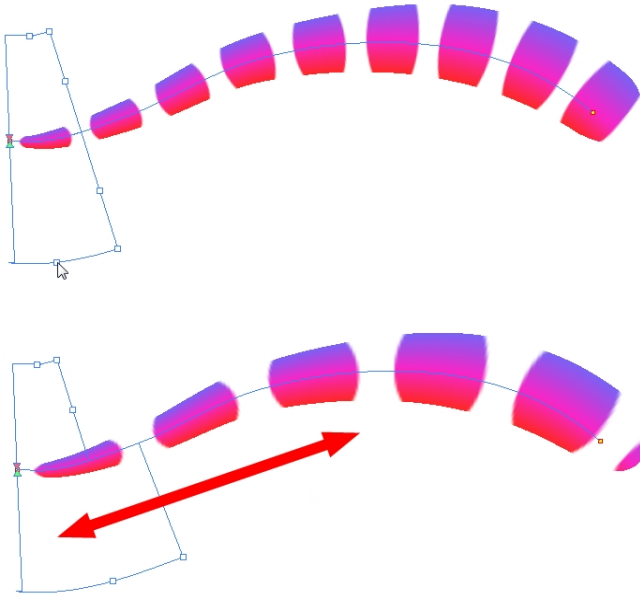
1. Do one of the following:
  - ▶ In the Tools toolbar, select the Edit Gradient/Texture  tool.
  - ▶ From the top menu, select **Drawing > Drawing Tools > Edit Gradient/Texture**.
  - ▶ Press Shift + F3.
2. Click on the pencil line to be modified to bring up the editor controls.



3. Use the top editor controls edit the gradient.



4. Use the bottom controls edit the "brush" texture.



## Colour Display Modes

The Colour view has two display modes:

- List
- Swatch

You can also display the RGB values and names of your solid colour swatches instead of only the name. This option is not available when displaying the colours in Swatch mode.

	• (000 000 000 255)	line
	(249 233 220 255)	skin
	(244 187 010 255)	hair
	(198 233 239 255)	shirt
	(047 169 220 255)	tie
	(065 006 012 255)	pants
	(012 000 000 255)	shoes
	(250 185 191 255)	mouth
	(251 249 250 255)	collar

### How to switch between the display modes

1. From the Colour View menu, and do one of the following:
  - Select **Colours > Swatch Mode** to display the swatches.
  - Deselect **Colours > Swatch Mode** to display the colour list.



## How to display the swatch colour values

- ▶ From the Colour View menu, select **Palettes > Display Colour Values**.

The solid colour swatches' RGB values are displayed between the colour swatch and its name. The gradient colour swatches will be identified as (gradient).

## Copying and Pasting Colours

When you're creating palettes, you may want to copy colour swatches or their values and paste them in other palettes to save time. You can also quickly copy a colour value from a palette in your scene to a selected colour swatch in a different palette.

You can copy a selected colour swatch and paste it as a clone. Since it produces a clone colour swatch, it is impossible to use the Paste as Clone command in the same palette as you copied the original colour swatch from.

If you would like to keep a reference file of some colour IDs or use them with custom plug-ins, you can copy the colour swatch IDs. Here is an example of colour ID: **075cf5b552401130**.

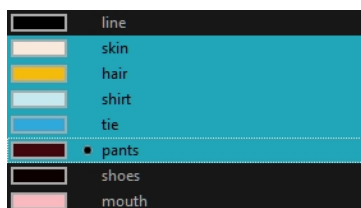
```
ToonBoomAnimationInc PaletteFile 2
Solid   Black           0x075cf5b15fe006a1  0  0  0  255
Solid   White          0x075cf5b15fe006a3  255 255 255 255
Solid   Red            0x075cf5b15fe006a5  255  0  0  255
Solid   Green          0x075cf5b15fe006a7  0  255  0  255
Solid   Blue           0x075cf5b15fe006a9  0  0  255  255
Solid   Custom|       0x075cf5b15fe006a8  0  0  150  255
Solid   "Vectorized Line" 0x0000000000000003  0  0  0  255
```

- ▶ In the Colour view, click the Edit Palette Mode  button to edit the colour list.

## How to copy and paste colours

1. In the Colour view, select one or more colours to copy.

- ▶ In the Colour view, click the Edit Palette Mode  button to edit the colour list.




- In the Colour View menu, select **Colours > Copy** or press Ctrl + C (Windows/Linux) or ⌘ + C (Mac OS X).
- In the Palette list, select the palette in which you want to paste the colours.



- From the Colour View menu, select **Colours > Paste as New Colours** or press Ctrl + V (Windows/Linux) or ⌘ + V (Mac OS X).
  - To paste the colour values of the copied swatch over an existing colour swatch, select **Colours > Paste Colour Values**.

### How to clone a colour swatch

- In the Colour view, select the colour swatch you want to clone.
  - In the Colour view, click the Edit Palette Mode  button to edit the colour list.
- From the Colour View menu, select **Colours > Copy** or press Ctrl + C (Windows/Linux) or ⌘ + C (Mac OS X).
- In the Colour view, select the colour palette you want to paste the clone into or create a new palette.
- From the Colour View menu, select **Colours > Paste as Clone**.  
The cloned colour swatch appears in the palette.

### How to copy a colour ID

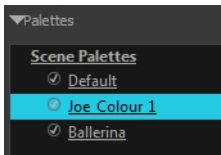
- In the Colour view, select the colour swatch you want to get the ID from.
  - In the Colour view, click the Edit Palette Mode  button to edit the colour list.
- From the Colour View menu, select **Colours > Copy Colour ID** or press Ctrl + C (Windows/Linux) or ⌘ + C (Mac OS X).
- Paste the copied value as plain text in the desired document.

## Mixing Colours

If you want to modify a series of colours to blend a tint in them or offset their RGBA values, you can use the Tint panel. You can also create palette styles, such as night and day styles.

### How to mix colours

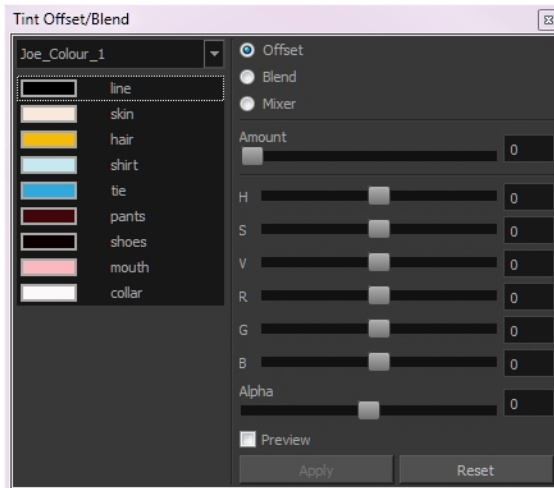
- In the Colour view, select the palette that contains the colours you want to offset or blend.



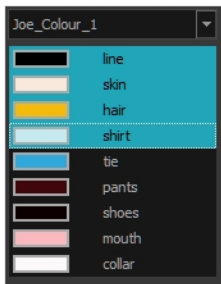
2. Do one of the following:

- From the Colour View menu, select **Palettes > Tint Panel**.
- Right-click and select **Tint Panel**.

The Tint Blend/Offset panel opens.

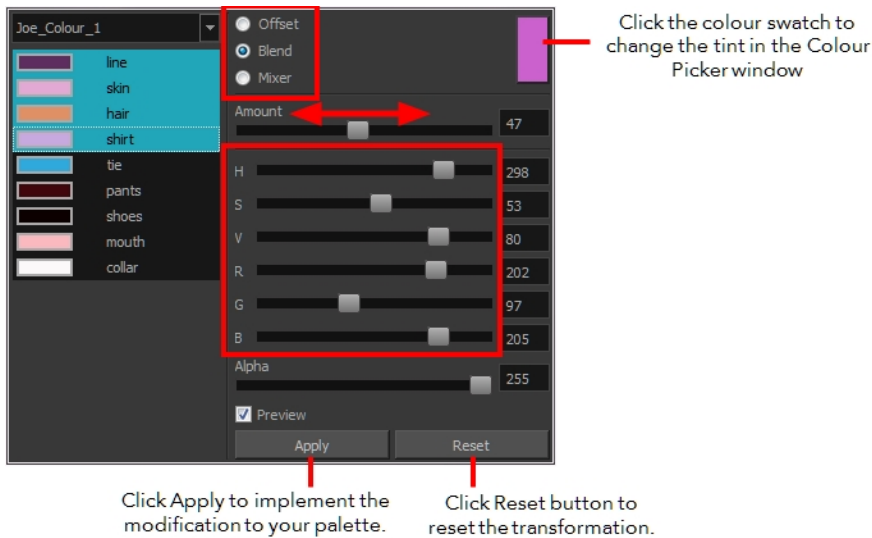


3. Select one or more colours to modify in the colour list. To select all the colours, press Ctrl + A (Windows/Linux) or ⌘ + A (Mac OS X).



4. Select **Preview** option.
5. Select the **Offset**, **Blend**, or **Mixer** option.





Parameter	Description
Offset	Offsets the selected colours by the adjustments made using the HSB and RGB sliders. Use the Amount slider to adjust the degree of offset. Use the Alpha slider to adjust the opacity of the selected colour.
Blend	Blends the selected colours with the colour swatch in the top-right corner. Use the Amount slider to adjust the degree of blend. A blend of 100% turns the selected colours into the same colour as the swatch. Adjusting the HSB and RGB sliders affect the swatch colour, which in turn affects the selected colours on the left. Use the Alpha slider to adjust the opacity of the swatch.
Mixer	Select a Base and Tint colour to form a third colour swatch. Use the slider just beneath to mix the Base and Tint colours by different amounts. This will affect the mixed swatch whether it is selected or not. Select either the Tint or Base swatch and use the HSB and RGB sliders to adjust its colour. This will affect the mixed swatch colour, which in turn affects the selected colours on the left.

6. Click **Apply**.

## Painting the Model

Now that you've created the colours and the palette, you're ready to paint your model.

The colour model needs to be painted in order to adjust the colours with the other elements in the production. You can paint your model regardless of the colour RGBA and adjust them later when all the elements are together.

Once your palette is created and your model is painted, you can import a key background and other characters using the Import Drawings option or the Library to compare and adjust the palettes—see [Sharing the Colour Model](#) on page 251 to learn how to import your background file.







Abigail Archer, Grossology © Nelvana Limited, Corus® Entertainment Inc.

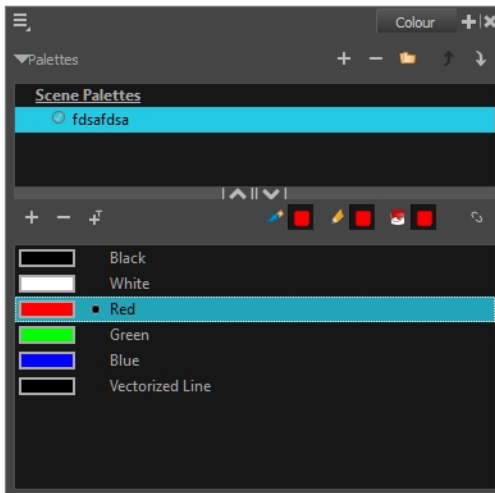
For paperless and cut-out animation, it's a good idea to provide a line-up template with the colour model to show the scale ratio between the characters, props and backgrounds.



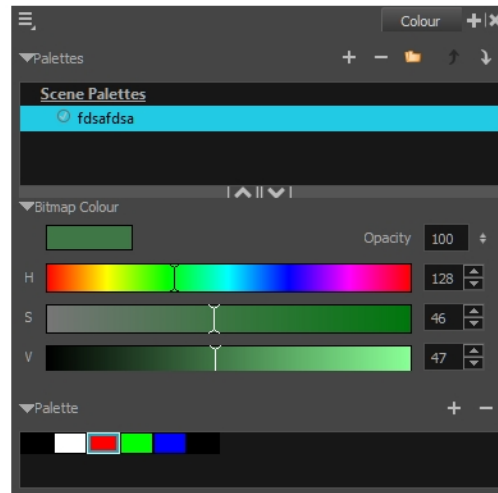
Once your colour model is completed, create a line-up template by pasting one of the production's main characters, or even just a hand, beside the colour model to show the relative size. This allows the animator, layout artist, or scene setup artist to retain the correct scaling throughout the entire project when setting the elements in the scene. You can store your template in the Library.

### How to paint a colour model

1. From the Drawing or Camera View menu, select **View > Switch to Colour Art/Switch to Line Art** or press L.
2. Create your master colour palette—see [Creating a Colour Palette](#) on page 215
3. Add new colours to the palette—see [Adding a Colour Swatch](#) on page 233.
4. Select your Paint Bucket    tool. We recommend the Paint Unpainted  tool.
5. In the Colour view, select a colour to paint your drawing.



Colour view when working with vector layers



Colour view when working with bitmap layers

- Paint the model by selecting colour swatches in the palette and clicking on your drawing. Note that only closed zones will be painted. If there's a gap in your artwork, you must close before you can paint it.



Abigail Archer, Grossology © Nelvana Limited, Corus © Entertainment Inc.

- To separate the lines and fill zones on separated art layers, see [Art Layers on page 357](#).
- Adjust the colours—see [Mixing Colours on page 247](#).

## Sharing the Colour Model

When your colour models are prepared and organized in a colour model scene, it's time to share them.

The Library is a central repository for all the data which will be reused throughout the production. It can be accessed from any Harmony scene; if multiple users are connected to the same network, all machines can access a central library. These models can be shared among all the users to ensure that everyone has the same set of colours and references.

A template is a set of elements created from a Harmony scene that can be imported into other scenes. It can contain drawings, palettes, and any other elements available in Harmony.

A colour model template is very simple to make. When a drawing is stored in the Library, the corresponding palette is attached to it. This means that whenever the colour model is imported from the Library into the scene,

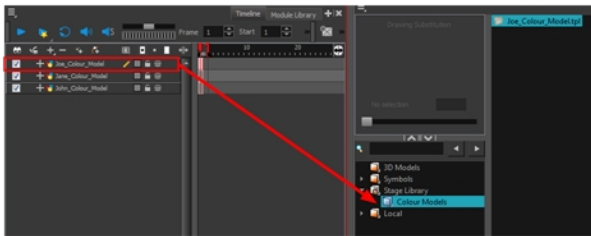
the palette is also imported. To learn more about libraries and templates—see the Harmony Cut-Out Animation Guide.

**NOTE:** It is recommended that you add a colour model subfolder to your library.

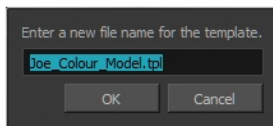
In the Timeline view, you can create a template by selecting the drawing element's node. This contains all drawings from the drawing element, palettes, and exposure. A template that was created by selecting the drawing exposure contains the selected drawings, their exposures, and the palettes.

### How to create a template from the Timeline view

1. In the Library, select a folder to store the template. Right-click and select **Right to Modify**.
2. From the Timeline view, select the drawings, pegs, effects, keyframes, sounds, exposures, and nodes, and drag them to the Library's folder. Anything that is available in the Timeline view can be stored as a template.



The Rename window opens.

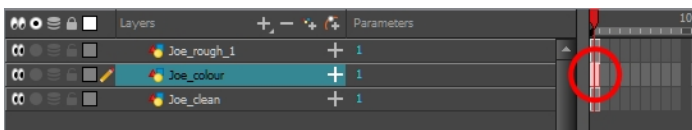


3. Type in a name for the template and click **OK**.

There is no need to save the library. Everything is automatically stored and saved as soon as it is pasted in the library.


### How to load a colour model from the Timeline or Xsheet view

1. In the Timeline or Xsheet view, select a drawing (\*.tvg).



2. Bring the model into the Model view by doing one of the following:
  - In the Timeline view, drag the selected drawing and drop it directly in the Model view.


- ▶ From the Model View menu, select **Use Current Drawing as Model**.

**NOTE:** The Use Current Drawing as Model button is not part of the default Model View toolbar. To add the Use Current Drawing as Model button to the Model toolbar, right-click in the Model view toolbar and select **Customize**. Drag the Use Current Drawing as Model  button from the Available Tools column and move it to the right (Toolbar) column. Click **OK**.

- ▶ In the Model View toolbar, click Current Drawing  button.


The model appears in the Model view.


### How to browse for a colour model drawing on your hard drive

1. Do one of the following:
  - ▶ In the Model View toolbar, click the Import Model  button.
  - ▶ From the Model View menu, select **Import Model**.
  - ▶ Select **File > Import > Colour Model**.
2. In the Browser window, browse for any \*.tvg drawing file on your hard drive or in the database.
3. Click **Open**.

The model appears in the Model view.

### How to load the default models

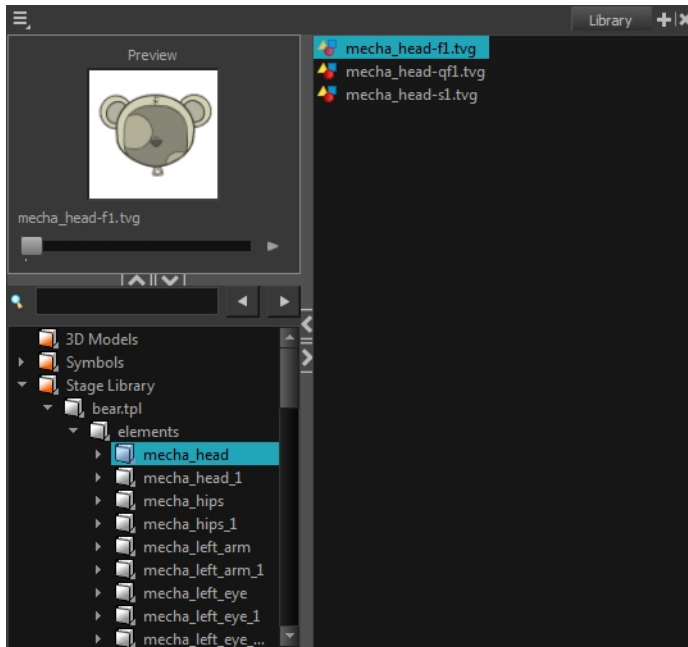
1. In your scene's folder, create a new folder and name it: **models**.
2. On your hard drive, copy the \*.tvg drawing file you want to use as colour models in your scene.
3. Do one of the following:
  - ▶ From the Model View menu, select **Load Default Models**.
  - ▶ In the Model View toolbar, click the Load Default Model  button.

**NOTE:** The Load Default Model button is not part of the default Model View toolbar. To add the Load Default Model button to the Model toolbar, right-click in the Model view toolbar and select **Customize**. Drag the Load Default Model  button from the Available Tools column and move it to the right (Toolbar) column. Click **OK**.

### How to load a single drawing from the Library view



1. In the Library view, click the template containing the drawing to import in the Model view.
2. Right-click on the template and select **Open As Folder**.

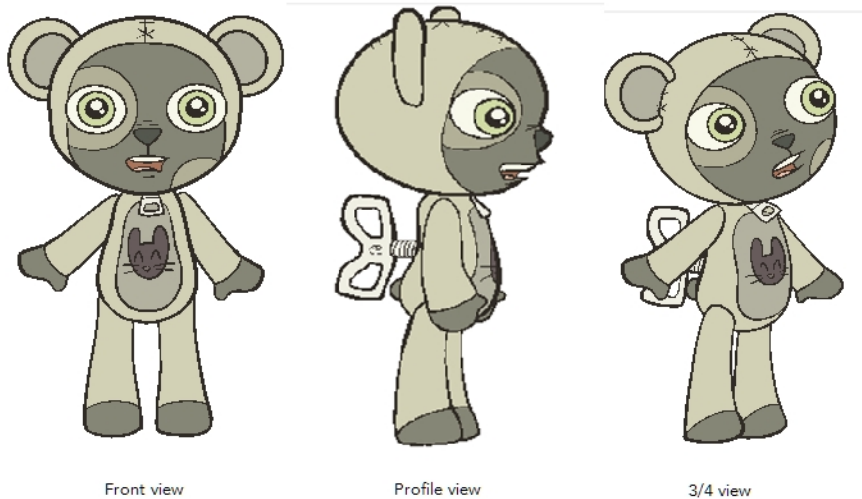
- In the Library view's left side, select the template's folder and continuing expanding its subfolders until \*.tvg files appear on the right side.



- In the Library view's right side, select the TVG drawing to import and drag it into the Model view.

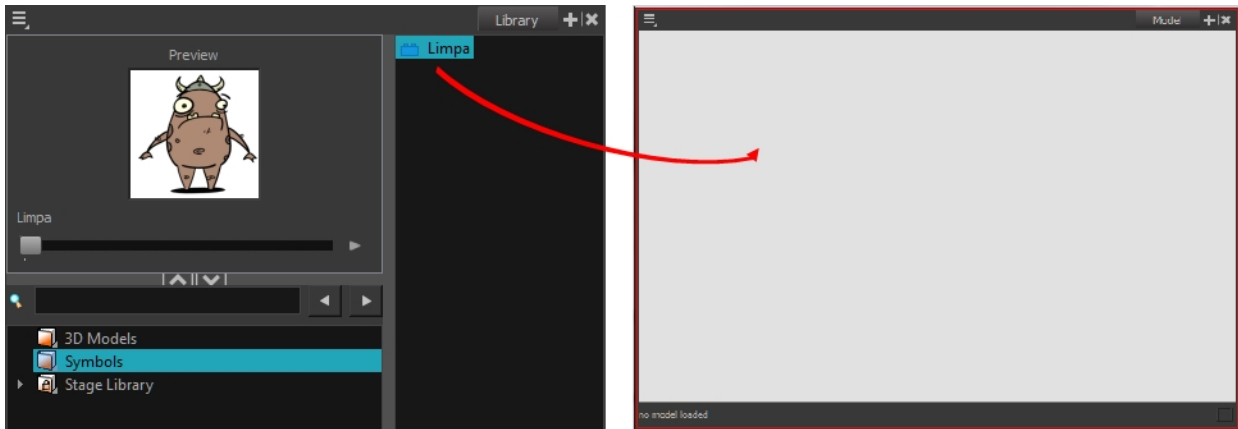
#### How to load a template with multiple drawings from the Library view



- In the Library view, find the template you want to import in the Model view.
- In the Library view's right side, drag the template (\*.tpl file) and drop it directly in the Model view.
- Use the Previous Model  and Next Model  buttons in the Model View toolbar to view all the drawings contained in the template. This can often be the front, profile, and 3/4 views of a character.



## How to load a symbol from the Library view

1. In the Library view's left side, select the **Symbols** folder.
2. In the Library view's right side, select the symbol you want to use as a model, and drag and drop it into the Model view.




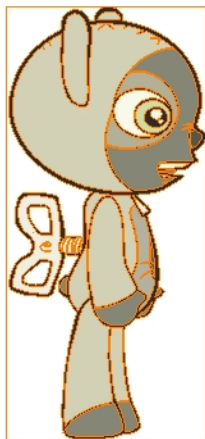
3. Use the Previous Model  and Next Model  buttons in the Model View toolbar to view all the drawings contained in the template. This can often be the front, profile, and 3/4 views of a character.

## How to clear a colour model

- In the Model View menu, select **Clear Model** or press Delete.

## How to copy the entire model from the Model view

1. In the Model View toolbar, select the Select  tool.
1. In the Model view, select your model.




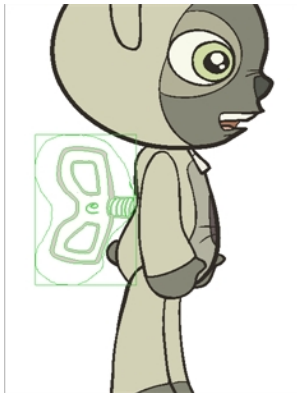
2. From the top menu, select **Edit > Copy Drawing Object** or press **Ctrl + C** (Windows/Linux) or **⌘ + C** (Mac OS X).

2. In the Timeline view, make sure you have the correct layer and frame selected.
3. Select the Drawing or Camera view, then go to the top menu and select **Edit > Paste Drawing Object**, or select the Timeline view and from the top menu, select **Edit > Paste cells in the Timeline** or press **Ctrl + V** (Windows/Linux) or **⌘ + V** (Mac OS X).

The model appears in the selected view.

### How to copy part of the model in the Model view

1. In the Model View toolbar, select the Cutter  tool or press **Alt + T**.
1. In the Model view, use the Cutter tool to create a selection around the part of your model that you want to copy.

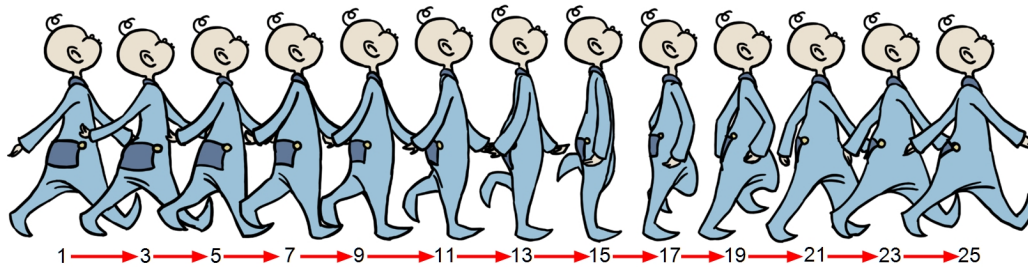


2. From the top menu, select **Edit > Copy Drawing Object** or press **Ctrl + C** (Windows/Linux) or **⌘ + C** (Mac OS X).
2. In the Timeline view, make sure you have the correct layer and frame selected.
3. Do one of the following:
  - Select the Drawing or Camera view and select **Edit > Paste Drawing Object**.
  - Select the Timeline view and select **Edit > Paste cells in the Timeline** or press **Ctrl + V** (Windows/Linux) or **⌘ + V** (Mac OS X).

The model appears in the selected view.



## Chapter 6: Timing



When you create hand-drawn animation traditionally or in a paperless environment, it's important to know how to set and modify the timing of your drawings.

In a traditional workflow, the person in charge of the digital exposure sheet reproduces the paper exposure sheet created by the animator. In a paperless workflow, the animator creates and manages their own exposure sheet directly in Harmony without the need for reproduction.

If you're more of a traditional animator, you will probably work with an exposure sheet. If you're a digital animator, you may prefer to work with a timeline to visualize your timing. Harmony offers both.

The Xsheet view displays the digital reproduction of a traditional paper exposure sheet used in hand-drawn animation. You can set the animation sequence's exposure and name the drawings.

The Timeline view is also used to visualize timing, and represents elements and groups of elements as layers.

You can adjust timing in both views; your choice depends on which technique you're accustomed to using. Depending on your working style, some actions may seem preferable to do in one view instead of another. Many of the actions you perform in the Xsheet can also be accomplished in the Timeline. This chapter will often show both techniques. You can choose which one you prefer.

In this chapter, you will learn how to work on your drawing's exposure and length. The exposure and animation paths for symbols are covered in separate chapters.

**NOTE:** The exposure sheet is not mandatory for cut-out animation. It can be useful for creating characters and parts, but is not really needed for animation and timing. If you plan to work with cut-out animation, you can still learn useful tips by reviewing the section on exposure sheets.

The basic digital exposure sheet process is divided into the following steps:

### Preparation

The digital exposure task is quite simple. There are very few things to prepare in order to get ready.

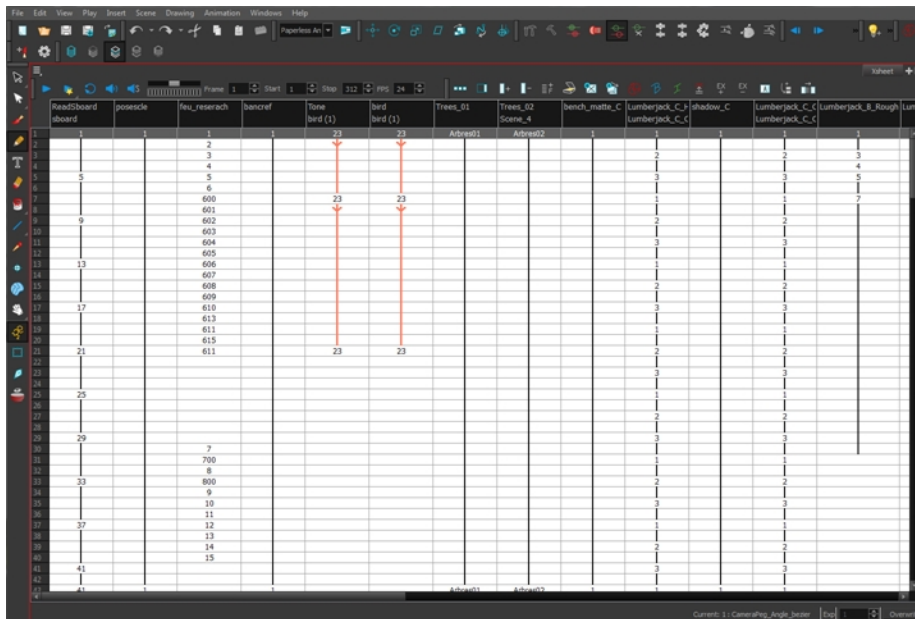
## Opening the Scene

The scene is generally created during a previous step, such as scanning (in a traditional animation workflow), scene set up, digital layout, or production organization.

## Using the Workspace

The person creating the exposure sheet will need only the Xsheet view to create the digital exposure sheet, although the Timeline view may also be helpful. If you're doing paperless animation, use the Camera or Drawing view if you want to sketch at the same time.

If you work with this layout often, you can use the Workspace Manager to save it as a workspace, and name it **Xsheet**, for example.



While drawing and animating paperless animation, you can use the Workspace Manager to save a frequently used layout and name it **Paperless Animation**, for example.

## Preparing References



To start an exposure sheet, you need to prepare your references. For traditional animation, you will need to reproduce the animator's paper exposure sheet. If you're working remotely, the studio can scan the paper exposure sheet using third-party software and send the digital files to be opened and viewed digitally.

In paperless animation, you will usually create an exposure sheet from the Xsheet view. The information from your layout and posing or storyboard will help you approximate how many elements are required in the scene.

## Frames

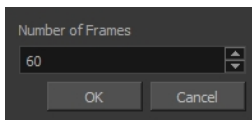
Once the references are ready, you need to set the scene length by adding the right number of frames to your scene. You can set the global scene length from the top menu.

In the Xsheet and Timeline view, you can add and remove frames from a scene to edit its length.

### How to set the scene length

1. From the top menu, select **Scene > Scene Length**.

The Set Scene Length dialog box opens.

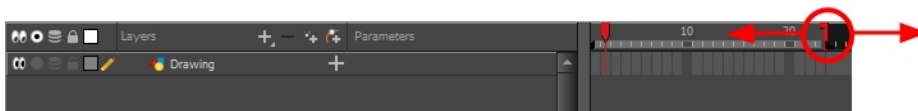


2. In the Number of Frames field, enter the number of frames needed.

### How to extend or reduce the scene length in the Timeline view

When you remove frames at the end of a scene to reduce the scene length in the Timeline view, the exposed drawings and symbols are not deleted. They're still available if you extend the scene afterward.

1. In the Timeline view, drag the scene length bracket:
  - ▶ **Right:** To add more frames to your scene.
  - ▶ **Left:** To reduce the number of frames in your scene.



### How to add frames in the middle of a scene

You can add frames anywhere in the middle of the scene—before or after a selection. If you select a frame row in the Xsheet view, Harmony will add the new frames before or after the selection, depending on your choice.


1. Do one of the following:
  - ▶ In the Xsheet view, select a frame row.

	Drawing_3	Drawing_2	Drawing_1	Drawing
1	13	15	1	1
2	14		2	
3	1		3	
4			4	
5		1	5	1
6		2	6	
7		3		
8	2	4		

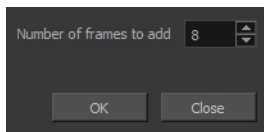
- ▶ In the Timeline view, select the frame to which you want to add frames before or after.



2. Do one of the following:

- ▶ From the top menu, select **Scene > Frame > Add Frames Before Selection** or **Add Frames After Selection**.
- ▶ In the Xsheet view, right-click and select **Frames > Add Frames Before Selection** or **Add Frames After Selection**.
- ▶ In the Xsheet toolbar, click the Add Frames  button to add frame after your selection.
- ▶ Press Ctrl + G and Ctrl + H (Windows/Linux) or ⌘ + G and Ctrl + H (Mac OS X).

The Add Frames dialog box opens.



3. In the Number of Frames to Add field, enter the number of frames needed in the scene.
4. Click OK.

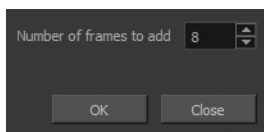


Two frames were added  
before selected frame

### How to add frames at the start or end of a scene

1. In the top menu, select **Scene > Frames > Add Frames at Start** or **Add Frames at End**.

The Add Frames dialog box opens.



2. In the Number of Frames to Add field, enter the number of frames needed in the scene.


3. Click OK.

### How to remove a frame or a range of frames to reduce the scene length in the Xsheet view

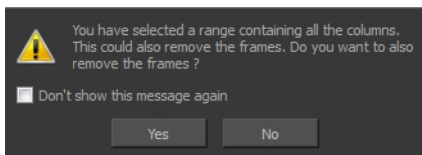
In the Xsheet view, you can remove any selected frame range, such as the last frame.

1. In the Xsheet view, do one of the following:
  - ▶ Select a frame in a given column.
  - ▶ Select a frame range by clicking the first frame's number and then dragging the selection highlight down to the last frame to delete.

	Drawing_3	Drawing_2	Drawing_1	Drawing
1	13	15	1	1
2	14		2	
3	1		3	
4			4	
5		1	5	
6		2	6	
7		3		
8	2	4		
9	3	5		2
10	4	6		3
11	5	7		4
12	6	8		
13	6	9		
14	7	10		5
15	8	11		6
16	9	12	7	7
17	10	13		8
18	11	14		
19	12			
20				
21				

2. To delete the selected frames, do one of the following:
  - ▶ From the top menu, select **Scene > Frame > Remove Selected Frames**.
  - ▶ Press Delete to delete the selection.
  - ▶ Click the Remove Frames  button. To remove several frame selections, click the button repeatedly.

If you selected a range of frames, the Warning dialog box may open.



3. To complete the operation:
  - ▶ Click **Yes** to delete the selection.
  - ▶ Click **No** to delete only the exposure in the cell and not the frames.
  - ▶ Select the **Don't Show This Message Again** option to prevent the warning message from being displayed each time you delete a frame range.

## Creating Drawings

Before filling any value or setting any timing or exposure, you need to add different drawing elements.

Each drawing element is represented as a vertical element column in the Xsheet view and a horizontal element layer in the Timeline view.

In Harmony, whether you work in the Timeline or Xsheet view, any modification you do to one view will be applied to both. You can also see your layers displayed in the Node view as nodes.

To start an exposure sheet, you will use drawing elements. Drawing elements are drawing containers. Any image file, either bitmap or vector, will use a drawing element.

When you add a drawing element to your scene, a folder is added to the scene directory. This folder is named the same way as the drawing element. Its purpose is to contain all the drawings related to this element. For example, in cut-out animation, a character can have many heads available. All of the head drawings will be contained in this folder, even if they are not exposed in the Timeline or the Xsheet view. There is always a drawing container connected to a drawing element (layer, column).

**NOTE:** There are different element types available, such as sound and expression. A sound element contains sound files. Expressions, Bezier, eases, 3D path, Quadmaps and Pegs are for motion purposes during the compositing step. It's not necessary to create these types to create your exposure sheet.

You can add drawing elements from the Timeline view, Xsheet view, and the Scene menu.

This section is divided as follows:

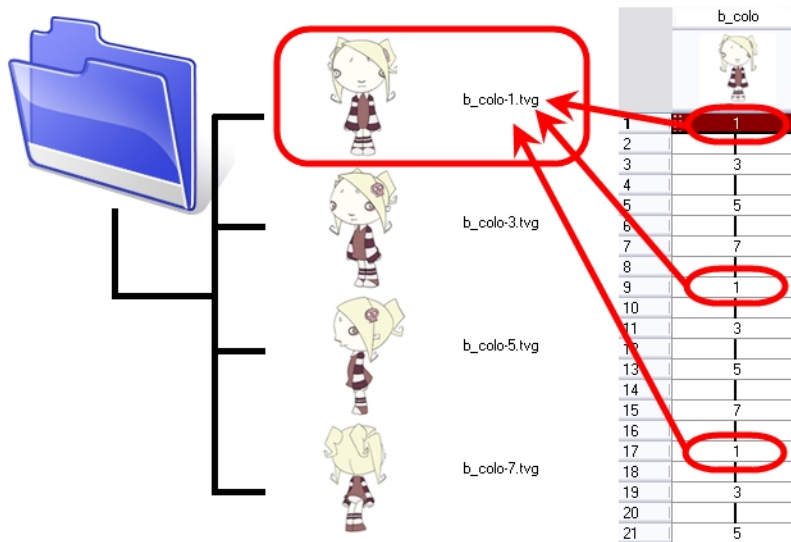
- [Layer and Column Concepts on page 262](#)
- [Layer and Column Types on page 263](#)
- [Adding New Drawing Elements on page 266](#)
- [Deleting Layers and Columns on page 269](#)
- [Layer and Column Properties on page 270](#)
- [Modifying Layers and Columns on page 273](#)
- [Duplicating Layers and Columns on page 276](#)
- [Cloning Layers and Columns on page 276](#)
- [Adding an Annotation Column on page 277](#)
- [Linking External Files with Timing Columns on page 282](#)

## Layer and Column Concepts

A layer is linked to a directory, the location where all its drawings are saved. This directory has the same name as the layer. When a name is typed in a cell, Harmony searches the layer's directory for the corresponding drawing to display. If there is no corresponding drawing, a new one is created.

Drawings are exposed in cells and linked to the drawings saved in the layer's directory. When you remove a drawing from a cell, it is not displayed and still exists in the directory.

A drawing that is exposed multiple times (for example, in a walk-cycle) would be linked to the same original drawing in the layer's directory. If you modify, repaint, or correct the drawing, all exposed drawings with the same name are updated simultaneously. You must duplicate or create a new drawing to modify a single exposure and retain the others.



When you create a drawing cycle, all of the repeated drawings are linked to the original files. This means that when you modify, repaint, or correct a drawing named "1," all drawings named "1" are updated simultaneously. In order to modify a drawing independently from its other exposures, you must duplicate the drawing.

## Layer and Column Types

A column is also known as a layer. There are several types of layers that you can add in the Xsheet and Timeline view. Each layer is indicated by an icon to help you differentiate them. Some layers are represented differently in the Xsheet view.

### Drawing Layer



The most common layer type is the drawing layer. Any time you need to create a vector drawing or import a symbol or image, you can use a drawing layer. You can also create bitmap artwork on a drawing layer.

**NOTE:** Bitmap images are contained in bitmap layers.

### Bitmap Layer



If you import a bitmap images (as original bitmap) in your project, they are inserted in a Bitmap layer. If you choose to vectorize your image when you import, the vectorized object will be placed on a Drawing layer.

When importing a bitmap image, you have the option of encapsulating the image in a symbol. If you place a bitmap into a symbol, you will be able to mix vector drawings with it on the same layer.

## Camera Layer



You can only have one Camera layer at a time in the Timeline view. By default, there is no Camera layer when you create a scene. You need to add a Camera layer when you want to create a camera motion.

The Camera layer is not visible in the Xsheet view.

**NOTE:** If you want to have several cameras with different settings, you can keep adding Camera layers in your Timeline view (however, only one will ever be visible at a time as you can only have one camera at a time in your timeline). To switch to a different camera, select **Scene > Camera** and select another camera layer.

## Effect Layer



To enhance the look of your scene, you can add effect layers and attach your drawings to them.

In Harmony, there is a series of effect nodes in the Node Library view.

When you select the Effect layer in the Timeline view, the effect's parameter columns are displayed in the Functions section of the Xsheet view.

## Colour-Card Layer



The Colour-Card layer is used to add a plain colour background to a scene. By default, your scene has no background colour and if you render it as a QuickTime movie or image sequence, it will have a black background.

This layer is not visible in the Xsheet view.

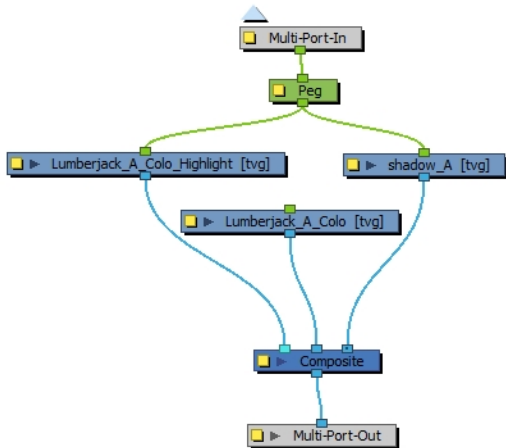
## Group Layer



A Group layer can be used to organize both the Timeline and Node views. You can drag and drop other layers onto a Group layer and then collapse the Group layer to hide these other layers from view.

If you create the Group layer in the Timeline view, a corresponding node will appear in the Node view. Any layers that you connect to the Group layer will appear in the Group node connected to an Input and Output port.





## Peg Layer



A Peg layer is a trajectory or motion path layer that does not contain drawings. It can be attached to any drawing layer, cut-out puppet, or other peg layers; they will all follow the trajectory you set in the Peg layer.

When you select the Peg layer in the Timeline view, the peg's function columns are displayed in the Functions section of the Xsheet view.

## Quadmap Layer



A Quadmap layer can be described as a deformation transformation layer that does not contain drawings. This can be attached to any drawing layer, cut-out puppet, or even other Peg layers. They will all follow the deformation you set in the Quadmap layer.

When you select the Quadmap layer in the Timeline view, the Quadmap's function columns are displayed in the Functions section of the Xsheet view.

## Sound Layer



You can import sound files to add dialog and sound effects to your project. The sound layer will be added to your Timeline and Xsheet view when you import a sound file in your scene.

In the Xsheet view, the Sound layer is a dark grey colour.

## Advanced Column Types

In the Xsheet view, you can add several advanced column types to create particular animation paths. When you create these columns, they are not linked automatically to any particular drawing layer. You can create a motion path using these columns and then link or unlink several drawing or peg layers to it.

Advanced column types include:

- Timing
- 3D Path
- 3D Rotation
- Bezier Curve
- Ease Curve
- Expression
- Annotation

## Adding New Drawing Elements

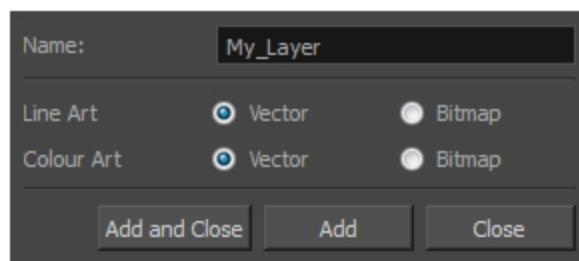
There are different ways to add a drawing layer to your project. By default, when you create a new scene there is one Drawing column in the Xsheet view and one corresponding Drawing layer in the Timeline view.

You can add an element for each drawing and it will appear as a column in the Xsheet view, a layer in the Timeline view, and a node in the Node view.

### How to add a drawing element from the Timeline view

1. In the Timeline view, click the Add Drawing Layer  button or press Ctrl + R (Windows/Linux) or ⌘ + R (Mac OS X).

The Add Drawing Layer window opens.



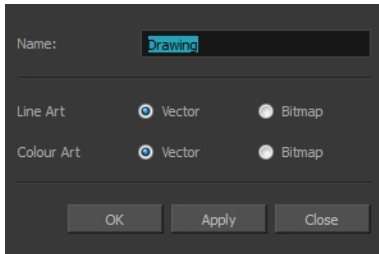
2. In the Name field, name your new layer.
3. Set the Line Art and Colour Art options to **Vector** to get a vector layer or to **Bitmap** to have a bitmap layer.
4. Do one of the following:
  - Click **Add** to add a first layer and keep the window open to add more layers.
  - Click **Add and Close** to add a new layer and close the window.

A new drawing layer is added to the Timeline view.

### How to add a drawing element from the top menu

1. From the top menu, select **Insert > Drawing**.


The Add Drawing Layer dialog box opens.



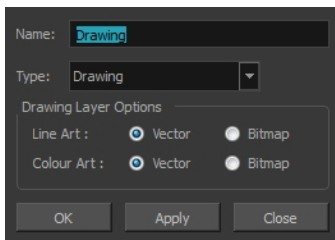
2. In the Name field, type a relevant element name and click **OK**.

The new drawing element appears in your scene.

### How to add a drawing element from the Xsheet view

1. Do one of the following:
  - ▶ In the Xsheet menu, select **Columns > Add Columns**.
  - ▶ Click the Add Columns  button.
  - ▶ Press Shift + C.

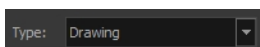
The Add Column dialog box opens.



2. In the Name field, type a relevant element name.



3. In the Type field, select **Drawing**.



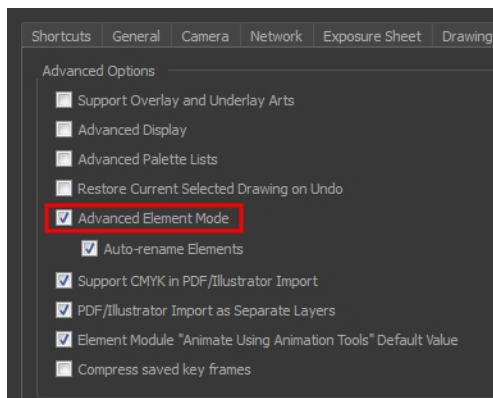
4. To complete the operation:
  - ▶ Click **OK** to add your new layers and close the dialog box.
  - ▶ Click **Apply** to add your new layers and keep the dialog box open to add column.
  - ▶ Click **Close** to cancel the operation.

The new drawing element appears in the Timeline, Xsheet and Node views—see [Layer and Column Types](#) on page 263.

### How to create a column using the advanced Add Column dialog box

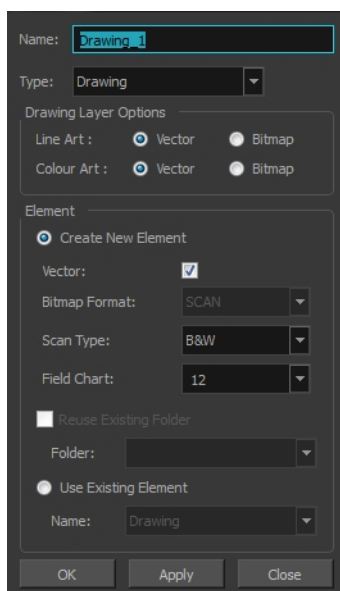
You can use the advanced Add Column dialog box to make more file format and field size options available when you insert a column.

1. From the top menu, select **Edit > Preferences** (Windows/Linux) or **Stage > Preferences (Mac OS X)** and select the **Advanced** tab.
2. In the Advanced Options section, select the **Advanced Element Mode** option to access the advanced Add Column dialog box.



3. Click **OK**.
4. In the Xsheet menu, select **Columns > Add Column** or press Shift + C.

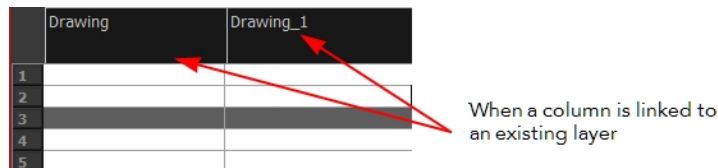
The Add Column dialog box opens.



5. In the Name field, type the new column's name.

6. In the Type menu, select the Drawing type.
7. In the Element section, select one of the following:
  - ▶ **Create New Element:** Creates an independent column with its own drawing folder.
  - ▶ **Reuse Existing Folder:** Links your column to an existing folder within the Element folder of your scene. If you select this option, in the Folder menu, select the folder to which you want to link your new column.
  - ▶ **Use Existing Element:** Uses drawings from an existing column in the new column. Both columns will be attached to the same set of drawings, but their timing will remain independent from one another. If you modify one of the drawings, it will be modified in both columns. This is the same principle as the Clone column.

In the Name menu, select the column to which you want to link your new column.



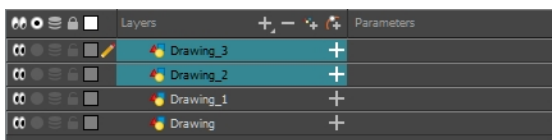
8. If you selected the Create New Element option:
  - ▶ Deselect the **Vector** option if you want your layer to contain bitmap images or enable it if you want the layer to contain vector drawings. Most of the time, the Vector option will be enabled.
  - ▶ If you deselected the **Vector** option, from the **Bitmap Format** list, select which type of bitmap image you want to insert in the column. Select the **SCAN** type if you are planning to scan drawings using the Toon Boom Harmony Scan module.
  - ▶ If you deselected the **Vector** option and you chose the **SCAN** type, from the Scan Type menu, select what kind of scanning you want to achieve.
  - ▶ In the **Field Chart** field, when importing traditional animation, indicate the size of paper on which the animation or background was drawn. If you are not using perforated animation paper, leave the 12 field default value as is.
9. Do one of the following:
  - ▶ Click **OK** button to create the new column and close the dialog box.
  - ▶ Click **Apply** to create the new column but keep the dialog box opened to create other new columns.


## Deleting Layers and Columns

You can delete an element in the Timeline view or Xsheet view.

### How to delete layers in the Timeline view

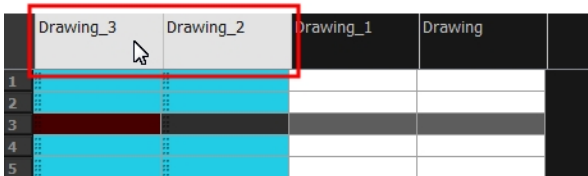
1. In the Timeline view, select the layers to delete.




2. Do one of the following:
  - In the Timeline's Layer toolbar, click the Delete Layers  button.
  - Right-click on the selection and select **Delete**.

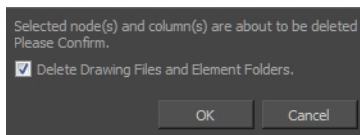
### How to delete columns in the Xsheet view

1. In the Xsheet view, select the columns to be deleted by clicking on their header.



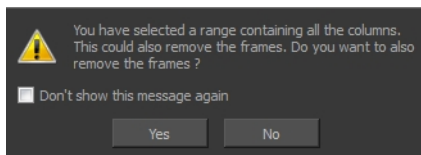
2. Do one of the following
  - Right-click on the selection and select **Delete Columns**.
  - In the Xsheet toolbar, click the Delete Columns  button.
  - Press Delete.

The Confirm Delete dialog box opens.



- Select the **Delete Drawing Files and Element Folder** option if you want to delete the drawings and folders linked to the selected column.
3. To complete the operation:
    - Click **OK** to delete the selected layers.
    - Click **Cancel** to cancel the operation.

The Warning dialog box may open.



4. Do one of the following:
  - Click **Yes** to delete all the frames from your scene.
  - Click **No** to keep the frames in your scene.
  - Select the **Don't Show This Message Again** option if you do not want the dialog box to display again in the future.

## Layer and Column Properties

Each element has its own set of properties that you can modify, including effect and peg layers.

If you want to modify an element's properties, you can display the properties of a selected layer in the Timeline view or selected node in the Node view. If you're working with the Xsheet, you can display its properties as well. You can display a layer's properties as a window or as a view of its own.

The Layer Properties editor allows you to:

- Rename the layer
- Enable or disable the layer
- Lock the layer
- Change the track colour
- Activate the onion skin preview
- Adjust the positioning and animation parameters
- Adjust many other advanced parameters

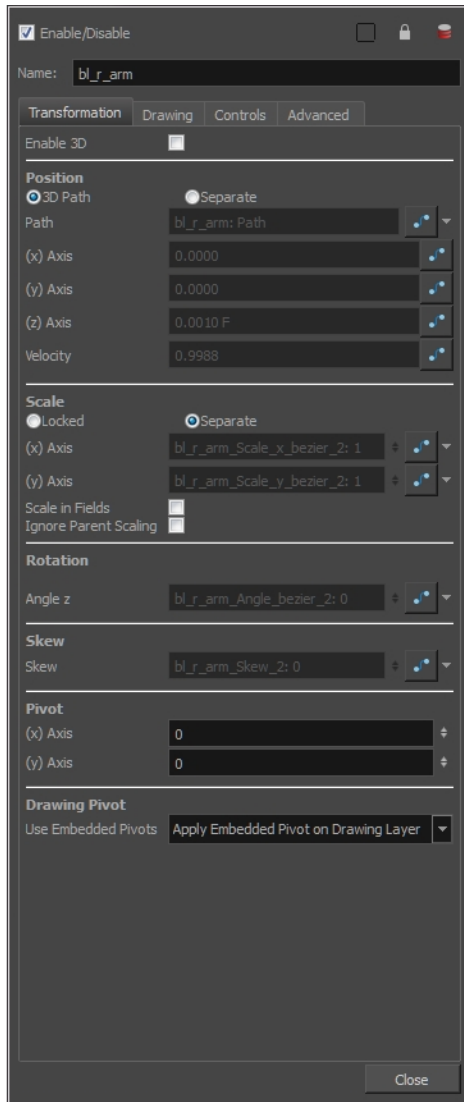
The Column Properties editor allows you to:

- Rename the layer
- Enable or disable the layer

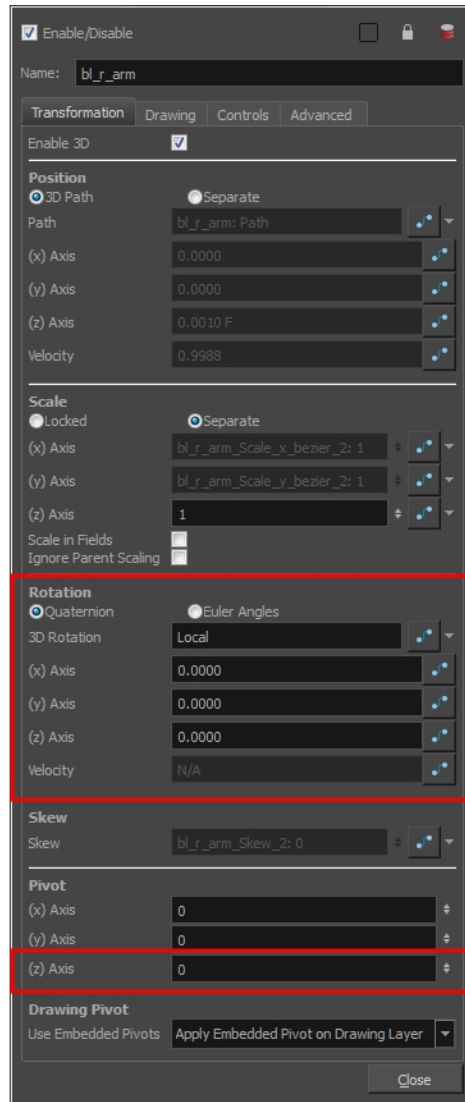
### How to display a layer's properties

1. Do one of the following:
  - In the Layer Properties view is not part of your workspace, from the top menu, select **Windows > Layer Properties**. In the Timeline view, select a layer
  - In the Timeline view, double-click on a layer.
  - Press Shift + E.
  - In the Node view, click on a node's yellow properties button.

The properties display.



Transformation tab with the Enable 3D option deselected

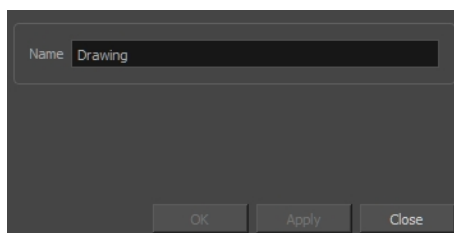


Transformation tab with the Enable 3D option selected

## How to display a column's properties in the Xsheet view

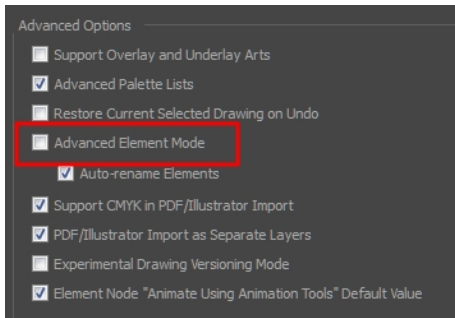
- In the Xsheet view, do one of the following:
  - ▶ Double-click on a column header.
  - ▶ Right-click on a column header and select **Column Editor**.

The properties for the column are displayed.

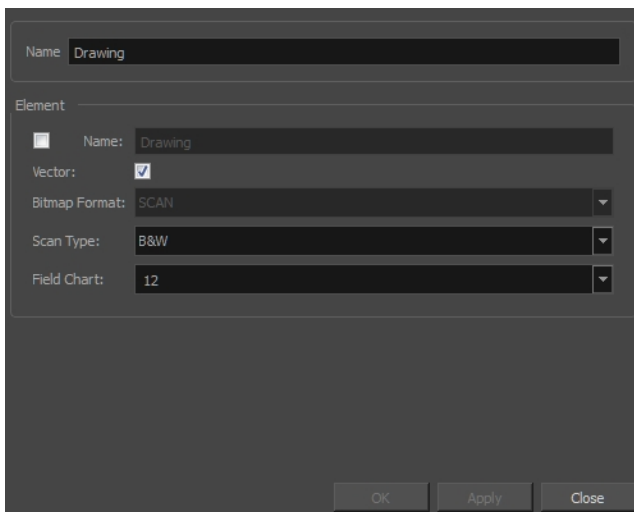




- (Optional) To view additional properties, select **Edit > Preferences** from the top menu.
- In the Preferences dialog box, select the **Advanced** tab, then select the **Advanced Element Mode** option.



- In the Xsheet view, double-click on a column header. Additional properties for the column are displayed.



## Modifying Layers and Columns

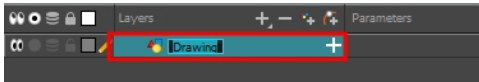
Once you add layers and columns to your project, you can modify their properties, names, or ordering.

You can change the order of your elements in the Timeline view and Xsheet view. When you change the order of your elements in one view, the other one is updated.

The Element Manager window lets you add, delete or modify elements (drawing folders) in your scene. If you have drawing folders that are not linked to a column in your scene, use the Element Manager to delete them if needed.

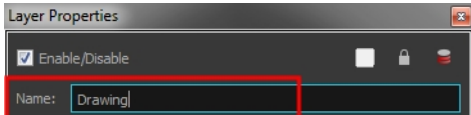
### How to rename a layer in the Timeline view

- In the Timeline view, double-click on the name of the layer to rename.
- In the Name field, rename the layer and press Enter/Return.



### How to rename a layer in the Layer Properties editor

1. In the Timeline view, double-click anywhere on the layer except the layer name to rename. The Layer Properties editor opens.
2. In the Name field, rename the layer.

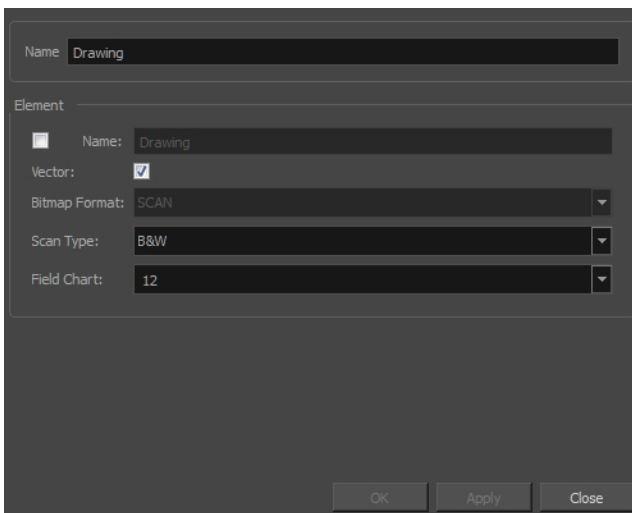


3. Click **Close**.

### How to rename a column

1. In the Xsheet view, double-click on a column name. Do not click on the drawing folder name that the column is linked to (this also appears in the column header just below the column name).

The Drawing dialog box opens.



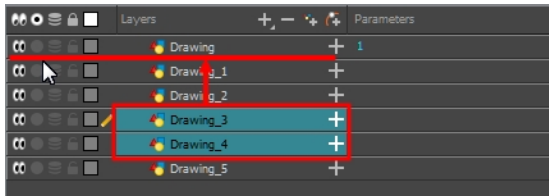
2. In the Name field, rename the column.
3. Click **OK**.

### How to reorder layers in the Timeline view

1. In the Timeline view, select the layers to move.
2. Drag the selection to the new location.

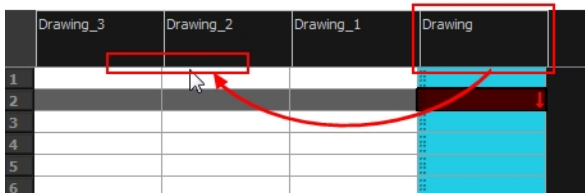
3. Do one of the following:

- ▶ Drop the selection on an existing layer to make it a child of another element layer.
- ▶ Drop it between the existing layers. Timeline layers that are located above the selection are displayed in front it. Layers located under it in the Timeline View are displayed behind it.



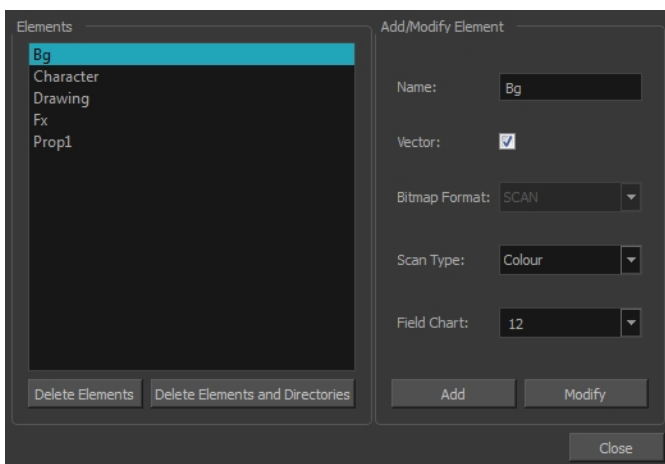
### How to reorder columns in the Xsheet view

1. In the Xsheet view, click on the column's header with the middle mouse button.
2. Drag the column to its new position.



### How to use the Element Manager dialog box

- ▶ From the top menu, select **Scene > Element Manager**.



Interface Element	Action
<b>Elements</b>	Displays a list of the elements in the scene.
<b>Delete Elements</b>	Deletes the selected elements.
<b>Delete Elements and Directories</b>	Deletes the selected layer and its directories (drawing folder).

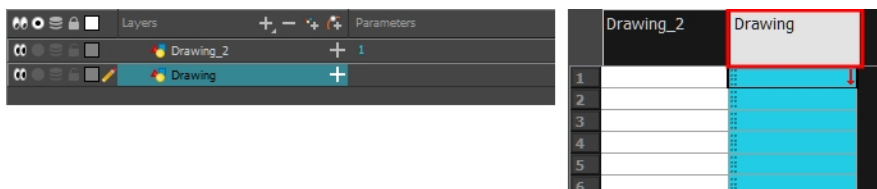
Interface Element	Action
<b>Add/Modify Element</b>	Use this area to add or modify an element.
<b>Name</b>	Type in a new name in this field to create an element or to rename the selected element.
<b>Vector</b>	Select this option if the new element is a vector drawing or if you want to enable the parameters on the selected element in the Elements list.
<b>Bitmap Format</b>	Lets you select the file format of the bitmap layer.
<b>Scan Type</b>	If you're planning to scan elements with the Toon Boom Harmony Scan module, select the scan type from the list.
<b>Field Chart</b>	If you're importing traditional animation, select the size of the paper on which the animation was drawn.
<b>Add</b>	Creates a new element with the current parameters entered in the <b>Add/Modify Element</b> section.
<b>Modify</b>	Applies the parameter changes made to the selected element.

## Duplicating Layers and Columns

Duplicating an element provides you with a copy of the drawings and their exposure. You can modify anything you want in the duplicated element without affecting the original one.

### How to duplicate an element

1. In the Timeline or Xsheet view, click the layer or column you want to duplicate.



1. In the Timeline or Xsheet menu, select **Drawings > Duplicate Drawings** or press Alt + Shift + D.

The new duplicated layer or column appears.

## Cloning Layers and Columns

Cloning a layer or column provides you with a copy of the selected element that uses the same drawings as the original. For example, if you modify a drawing in the cloned or original column, it is updated in both columns.

You can choose whether or not to copy the column timing to the cloned columns.

- You can modify the column timing independently from each other, but the drawings remain linked.

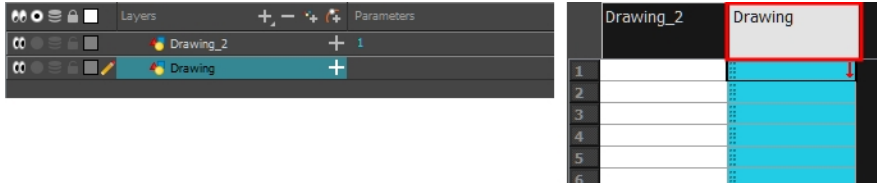
- You can copy the columns timing, so drawings and timings remain linked.

You can clone selected nodes from the Node view in the same way.

This is useful when you want to reuse a hand-drawn animation but have different timings.

## How to clone an element

1. In the Timeline or Xsheet view, select the layer or column you want to clone.



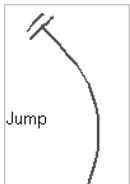
1. Do one of the following:
  - From the top menu, select **Edit > Clone: Drawings Only** to clone only the layer or column drawings.
  - From the Timeline menu, select **Layers > Clone Selected Layers: Drawings Only**.
  - In the Xsheet menu, select **Columns: Clone Selected Columns: Drawings Only**.

The new cloned layer or column appears.

## Adding an Annotation Column

The annotation columns are useful for marking actions, corrections or other information related to your animation that you want to draw or write. This way, you can print your Xsheet, take it back to your animation table and work with the annotations.

Before you can draw in the Annotation column, you must first activate the Enable Drawing option to activate the Drawing mode. Pen tablet pressure sensitivity is not supported in the annotation column.



In the annotation column, you can type in your notes and relevant information, as well as draw sketches and ideas that will be useful in producing your animation.

Typing in an annotation column is independent from the Drawing mode. You can be in either mode and the typing will work. To learn about typing values in the Xsheet view, see [Typing Exposure on page 285](#).

You can erase part or all of the annotation column's text and drawn annotations. Annotations that you type in cannot be erased using this method.

You can change the pen size and colour when you draw in the annotation column.

When working with the annotation columns, it is useful to display tick marks on odd-numbered frames.

shadow_d Lumberjack_D_Colo	Lumberjack_D_Colo Lumberjack_D_Colo	bench_matte_D_1	Annotation
1	1	1	
2	2		
3	3		
1	1		
2	2		
3	3		
1	1		
2	2		
3	3		
1	1		
2	2		
3	3		
1	1		
2	2		


Tick marks in Annotation column

To display the tick marks, you must run a short script.

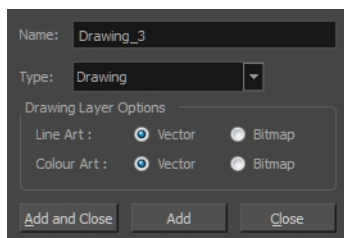
If you scanned your paper exposure sheet's annotations or if you need to place some pictures or drawings in the Annotation columns, you can easily import them.

### How to add an annotation column

1. Do one of the following:

- ▶ In the Xsheet menu, select **Columns > Add Columns**.
- ▶ In the Xsheet toolbar, click the **Add Columns**  button.
- ▶ Press Shift + C.

The Add Column dialog box opens.




2. In the Name field, type in an appropriate name.
3. From the Type list, select **Annotation** and click OK.

The new column appears.

### How to draw in the annotation column

1. Do one of the following:

- ▶ In the Xsheet menu, select **Annotation > Enable Drawing**.

- ▶ In the Annotation column header, click the icon in the upper-right corner to cycle through the icons until the Brush  icon is displayed.

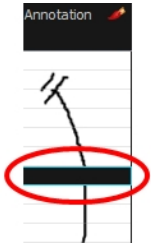
The Drawing mode is enabled.

2. To draw in an Annotation column, simply use your mouse or pen tablet.

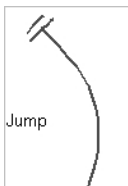


### How to type in an annotation column


1. Do one of the following:
  - ▶ In the selected cell, press Ctrl (Windows/Linux) or ⌘ (Mac OS X).
  - ▶ In the selected cell, hold down Ctrl + Shift + click (Windows/Linux) or ⌘ + Shift + click (Mac OS X).

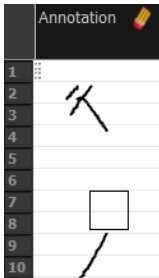


2. In the selected cell, type the desired text.



### How to erase part of a drawn annotation using Erasing mode

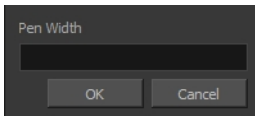
1. In the annotation column header, click the icon in the upper-right corner to cycle through the icons until the Eraser  icon is displayed.
2. In the column, click and drag the cursor on top of the drawn annotation to erase parts of it.



**NOTE:** When using a pen on a tablet, you MUST flip your pen to the eraser side for the eraser to work.

### How to change the pen width

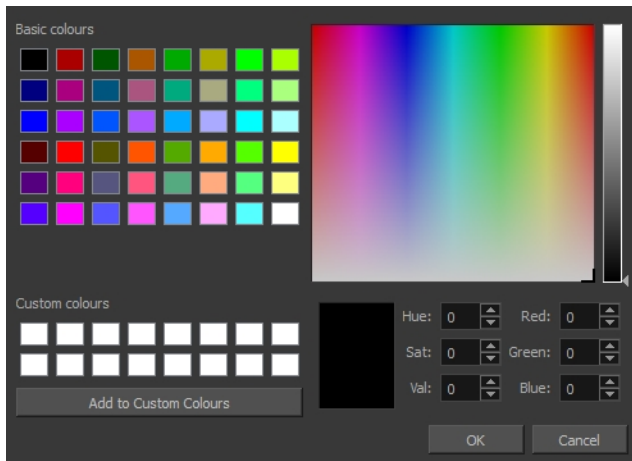
1. In the Xsheet menu, select **Annotation > Pen Width** and do one of the following:
  - Select a pen width preset.
  - Select **Change Current** to display the Pen Width dialog box. In the Pen Width field, type the number of pixels for the pen size and click **OK**.



### How to change the pen colour

1. In the Xsheet menu, select **Annotation > Change Pen Colour**.  
The Select Colour dialog box opens.





2. Choose a new colour.
3. Click **OK**.

### How to display tick marks

1. From the top menu, select **Windows > Script Editor**.
2. From the Script Editor menu, select **File > New Script**.
3. Type in a name for your script and click **OK**.
4. In the File list, select the script you created.
5. On the right side of the view, type the following script:

```
function display_tick_marks()
{
  preferences.SetBool("XSHEET_ANNOTATION_FRAME_MARKER", true);
  MessageLog.trace(preferences.getBool("XSHEET_ANNOTATION_FRAME_MARKER", false));
}
```

6. Click **Verify**.  
The script is verified.
7. From the Script Editor menu, select **Play/Debug > Run**.  
A dialog box opens with your script selected in the Files column.
8. In the Functions column, select **display\_tick\_marks** and click **OK**.

Tick marks appear on odd frames in the Annotation column. If you do not see tick marks, close and restart Harmony.

### How to turn off the display of tick marks

1. Follow steps 1 to 5 of *How to display tick marks* and use the following script:

```
{
  preferences.SetBool("XSHEET_ANNOTATION_FRAME_MARKER", false);
  MessageLog.trace(preferences.getBool("XSHEET_ANNOTATION_FRAME_MARKER", false));
}
```

2. Follow steps 6 to 8.

All tick marks are removed from the Annotation column.

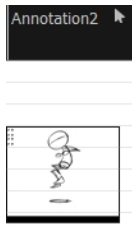
### How to import annotation files

1. In the Xsheet view, select the first cell in the Annotation column where you want the imported image to start.



2. Do one of the following:
  - ▶ Right-click on the cell and select **Annotation > Import File**.
  - ▶ From the Xsheet menu, select **Annotation > Import File**.
3. Browse for the bitmap image to import.
4. Click **Open**.

The image appears in the Annotation column.




## Linking External Files with Timing Columns

Timing columns are unique in that they can reference a source folder outside of the project folder to bring images into the project. For example, you may have background scenes created in a third party software that you might need to update in the future. By using Timing columns, you can dynamically link your backgrounds, expose different backgrounds at different times, and have live, automatic updating capabilities.

**IMPORTANT:** If the project file is moved, or if the folder that the column is linked to is moved, then dynamic linking is broken and the images that were in that folder will disappear in Toon Boom Harmony.

## How to use a Timing column

1. In the Xsheet view, click the Add Columns  button.
1. In the Add Column dialog box, type in the name of the new column, then from the Type menu, select **Timing**.
1. Do one of the following:
  - Click **OK** if you are finished.
  - Click **Apply** if you want to continue adding more columns and column types.

A peach coloured column appears in the Xsheet with the name you typed in, and for the header, <unused>.

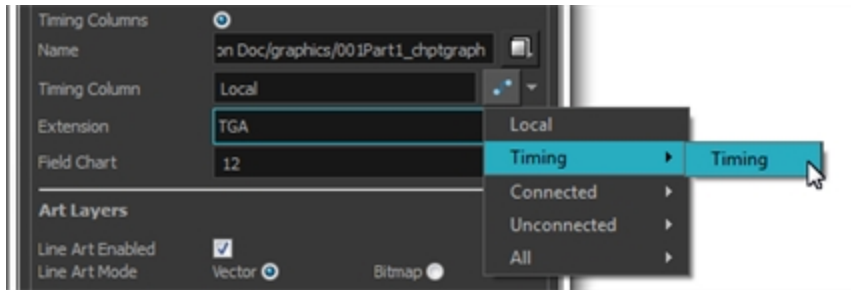
	Drawing	<unused> Timing
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

1. In the Node view, add a new node.
1. Open the **Layer Properties** editor by clicking the yellow square of the node.
1. In the Drawing tab, select the **Timing Columns** option.
1. In the Name field, enter the path of the folder you want to access. If you use the Browse button to locate a folder, you must select a file in the folder you want and then delete the dash and the suffix (for example, **background-01** should be renamed to **background**) from the file name in the field. If you leave the full file name selected, Harmony will display that file for the entire duration of the scene, regardless of the contents of the Timing Column field.

**NOTE:** This means that all the images in the folder that you are linking to are named using the naming convention described above. If for some reason you are unable to access a certain directory, type the directory extension directly in the path extension field at the top of the browser window.

1. In the Timing Column field, click the **Arrow** button to create a new timing column, or select the name of the column from the list. If you have an element directory selected in the Name field, the Timing Column will indicate which files are called from that element directory. Remember that the file displayed at each frame is based on the element name, cell label, and extension. If the element is **to to**, the timing column is

labeled 1, 2, and 3, and the extension is TVG, Harmony will display drawings `totobody-1.tvg`, `totobody-2.tvg`, and `totobody-3.tvg` at the selected frames.



In the Xsheet, the <unused> header changes to the name of the node in the Node view.

1. From the Extension list, select the file format of the files you want to display.
1. Click **OK**.
1. In the Xsheet view, in the Timing column, type the number that corresponds to the suffix of the drawing file that you want to expose to make it appear in the Camera view.

## Filling Exposure

Harmony provides different tools to fill in exposures and values, create cycles, and set increments.

This section is divided as follows:

- [Filling Exposure Mode on page 285](#)
- [Typing Exposure on page 285](#)
- [Holding Exposure on page 287](#)
- [Extending a Single Exposure on page 288](#)
- [Extending an Exposure Sequence on page 289](#)
- [Extending the Exposure of Previous Drawings on page 290](#)
- [Dragging Cells on page 291](#)
- [Increasing and Decreasing Exposure on page 294](#)
- [Inserting Blank Cells on page 297](#)
- [Setting the Exposure on page 298](#)
- [Filling a Selection with a Single Exposure on page 299](#)
- [Filling a Selection with a Sequence on page 300](#)
- [Filling a Selection Randomly on page 302](#)
- [Filling Empty Cells on page 303](#)
- [Deleting Exposure on page 296](#)
- [Creating Cycles on page 304](#)
- [Managing Key Exposures on page 308](#)

## Filling Exposure Mode

In the Xsheet view, you can fill columns using two different filling modes: Overwrite or Insert. These modes control the filling behaviour. The Timeline view only uses the Overwrite mode.

By default, the Xsheet view is set to Overwrite mode. Adding a new value or a new value sequence overwrites existing ones. The existing timing sequence remains in the same place and is not pushed down the column.

	Drawing	Drawing
1	1	1
2	2	2
3	3	3
4	4	4
5	5	7
6	6	8
7	7	9
8	8	10
9	9	11
10	10	12
11		
12		

The Insert mode is the opposite of the Overwrite mode. When you add a new value or a new value sequence over existing ones, the new values are inserted between the old ones. The existing timing sequence is pushed down the column.

	Drawing	Drawing
1	1	1
2	2	2
3	3	3
4	4	100
5	5	
6	6	
7	7	
8	8	100
9	9	4
10	10	5
11		6
12		7
13		8
14		9
15		10

### How to switch between Overwrite and Insert modes

- Do one of the following:
  - In the bottom-right corner of the Xsheet view, click **Overwrite/Insert**.
  - Press **I**.



## Typing Exposure

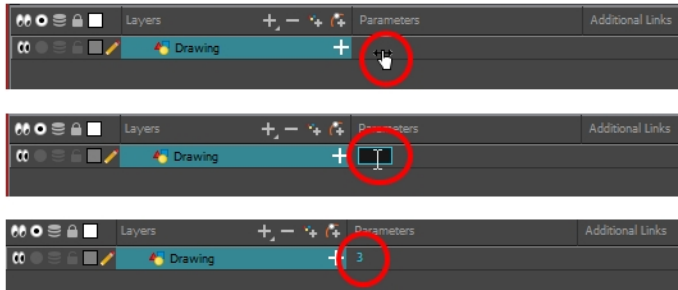
To fill in your exposure, you can type the values directly in the Xsheet view.

If you want to type an exact drawing name or value in the Timeline view, you must use the Parameters section of the Timeline.

**NOTE:** You can only use alphanumeric values. (0-9, a-z, underscore (\_) and dash (-)).

### How to type a value in the Timeline view

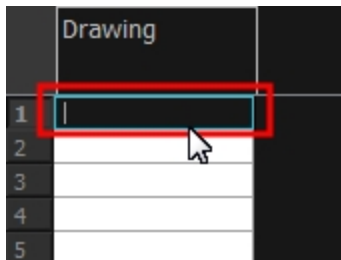
1. In the Drawing Substitution field, double-click to edit the field and type the name of the drawing you want to create.



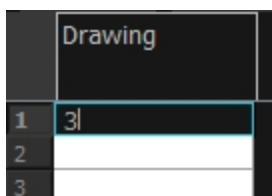
2. Press Enter/Return to validate the value.

### How to type values in the Xsheet view

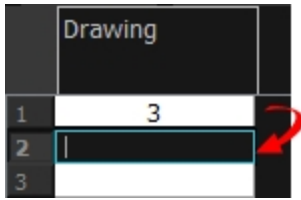
1. In an Xsheet column, double-click on a cell.



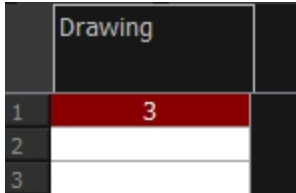
2. Type a value or drawing name in the cell.



3. Press Enter/Return to move to the next cell.



- Press Esc to exit the typing mode and return to normal mode.

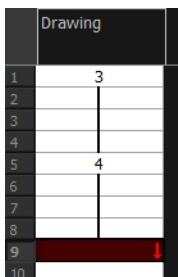


## Holding Exposure

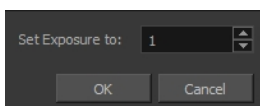
Drawings in an animation project are often exposed for more than one frame. The most common exposure of a drawing is two frames. In the industry, this type of exposure is known as *animation in double frames* or *animation on twos*. A drawing can also be exposed for three, four, or five cells and so on. To prevent mistakes and save time, you can hold cells automatically as you type in the Xsheet view.

### How to hold exposure

- Do one of the following:
  - In the Xsheet menu, select **Exposure > Hold Exposure > Hold 2 Cells**.
  - In the Xsheet view, right-click and select **Exposure > Set Exposure To > Set Exposure to 1, 2,3, or Set Exposure**. The settings you select will be kept from session to session. You do need to set them every time you use Harmony.
  - From the top menu, select **Animation > Cell > Hold Exposure > the desired option**.
- Type a value or drawing name in the cell.
  - Press Enter/Return to move on to the next cell.
  - Press Esc to quit the typing mode.





- If you selected Set Exposure, the Set Exposure dialog box opens. You can hold as many cells as needed.

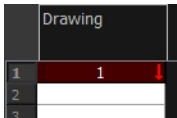


## Extending a Single Exposure

Extending the exposure lets you select a cell that contains a value and pull it down to the desired frame.

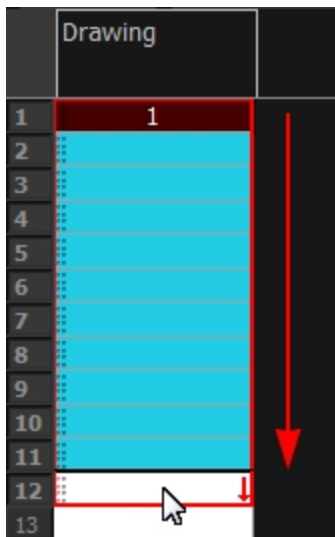
### How to extend a cell exposure gesturally

1. In the Xsheet view, select the red arrow  in the cell's right side. Make sure you see the drag down  cursor.



2. Pull down the selected cell to the desired frame.

**NOTE:** The red selection box must be visible when releasing the cursor. If not, the action is considered cancelled.



### How to extend a sequence from the top menu



1. Do one of the following:
  - From the top menu, select **Animation > Cell > Extend Exposure**.
  - Press F5.
 The Extend Exposure dialog box opens.
2. Enter the frame number you want to extend the cell to.

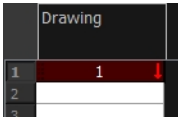


## Extending an Exposure Sequence

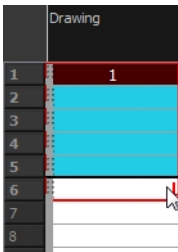
When working with a sequence that contains only numbers, you can extend an exposure sequence in a similar manner to extending a single exposure.

### How to extend an exposure to create a sequence

1. In the Xsheet view, select a cell containing a number.
2. In the selected cell, click the red arrow  on the cell's right side. Make sure to see the drag down  cursor.

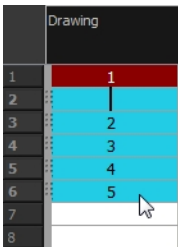


3. Hold down the Shift key. Make sure a plus sign (+) appears.
4. Pull down the selection box to the desired frame.



**NOTE:** The red selection box must be visible when releasing the cursor. If not, the action is considered cancelled.

5. First release the Shift key, then release the mouse button.

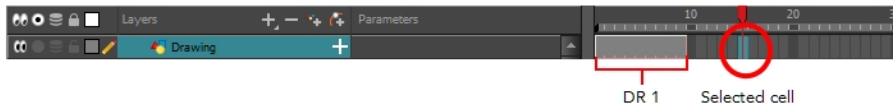


## Extending the Exposure of Previous Drawings

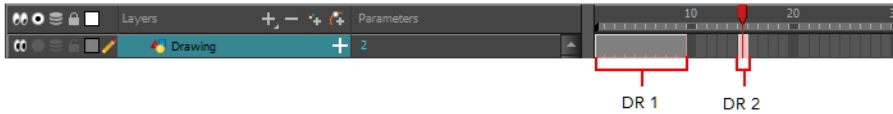
When drawing on a blank frame you can automatically create a new drawing and extend the timing from the previous exposed drawing.

In the following example, a cell is selected on the timeline for creating a new drawing in image A. In image B, the previous exposure does not extend to the new drawing, while in image C, it does.

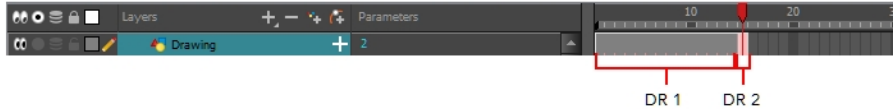
A: A cell is selected for a new drawing.



B: The previous exposure is not extended to the beginning of the new drawing.



C: The previous exposure extends to the beginning of the new drawing.

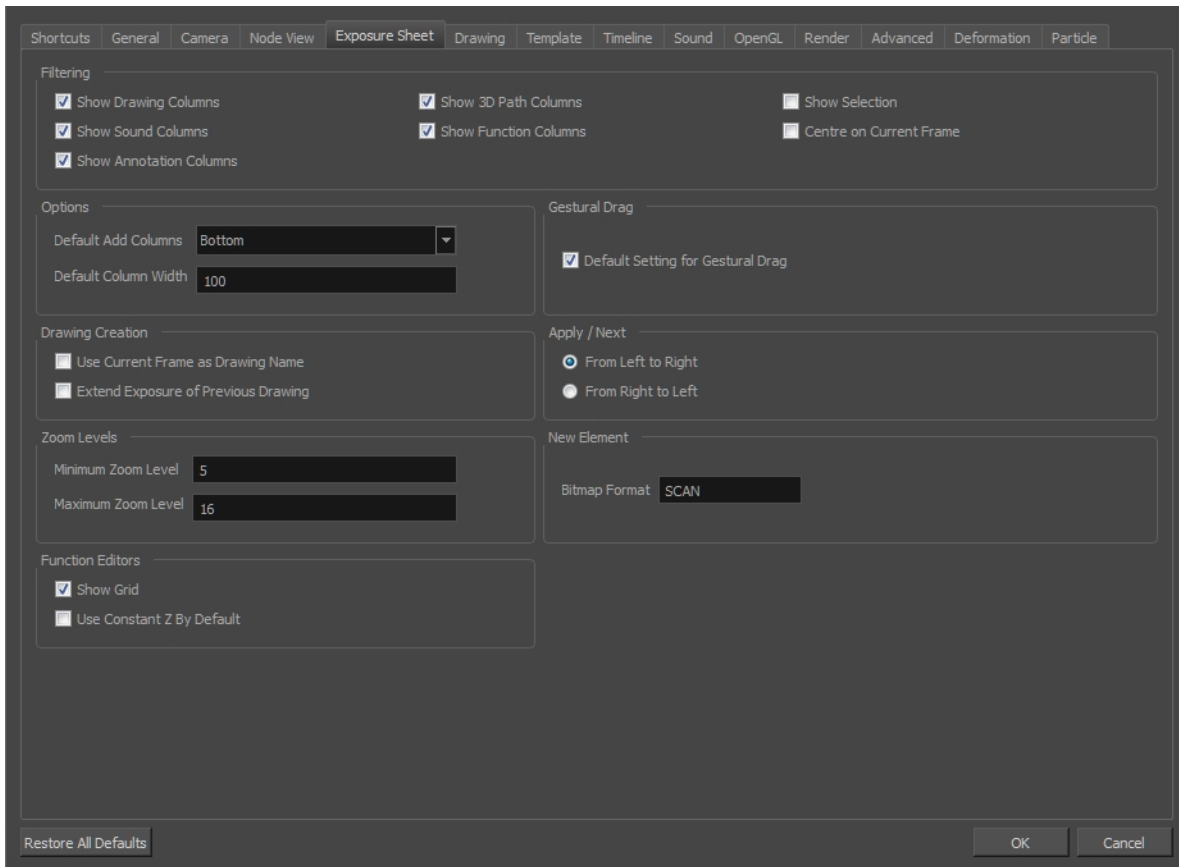


### How to extend the exposure of previous drawings

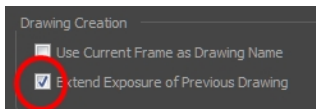
1. Open the Preferences dialog box by doing one of the following:
  - From the top menu, select Edit > Preferences.
  - Press Ctrl + U (Windows/Linux) or ⌘ + U (Mac OS X).

The Preferences dialog box opens.

2. Select the **Exposure Sheet** tab.



3. In the Drawing Creation section, select the **Extend Exposure of Previous Drawing** option.



4. On the left side of the Timeline view, select a cell and create a new drawing.

The previous exposure automatically extends to the beginning of the new drawing.

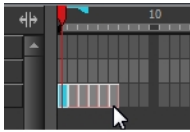
## Dragging Cells

To readjust your timing, you can drag one or more cells to a new location. You can drag a cell to any other frame in the same column or into another column.

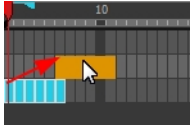
You can turn off the Gestural Drag mode for the Xsheet view to prevent drawings from being dragged from one location to another. This feature does not apply to Annotation columns.

### How to drag a cell to another location in the Timeline view

1. In the Timeline view, select one or more cells to move.

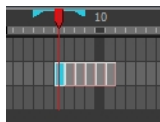


2. Drag the cells to the new location.

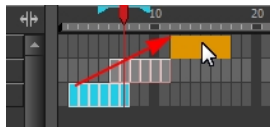


3. Drop the selection by doing one of the following:

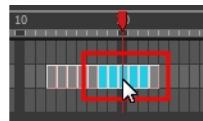
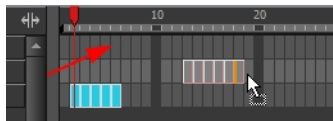
- ▶ Drop by simply releasing the mouse or pen.



- ▶ Hold Ctrl (Windows/Linux) or ⌘ (Mac OS X) while dropping the selection to copy the cells. The original cells will not be moved.

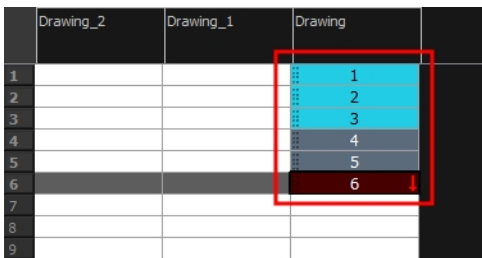



- ▶ Press Shift while dropping the selection to insert them between existing frames.

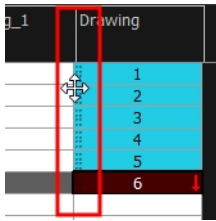


### How to drag a cell to another location in the Xsheet view

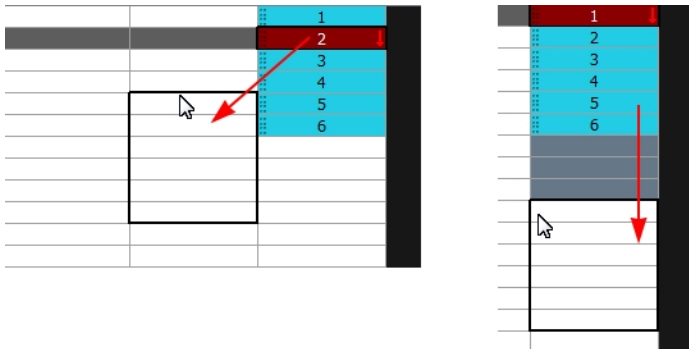
1. In the Xsheet view, select one or more cells.



2. In the Xsheet view, position the pointer over the small dotted area  on the left side of the selected cells.



3. Drag the selection to any other cell in the same column or in another column.



4. Do one of the following:

- ▶ Drop the selection to overwrite the existing cells.

	Drawing_2	Drawing_1	Drawing
1		1	
2		2	
3		3	
4		4	
5		1	
6		2	
7		3	
8		4	
9		5	
10		6	
11		11	
12		12	
13		13	
14			

- ▶ Hold down Ctrl (Windows/Linux) or ⌘ (Mac OS X) while dropping the selection to copy the cells. The original selection will not be moved.

		1
		2
		3
		4
		5
		6
	1	
	2	
	3	
	4	
	5	
	6	

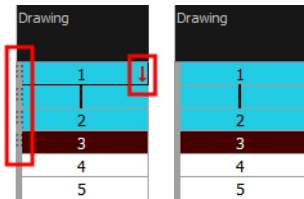
- ▶ Press Shift while dropping the selection to insert it between existing frames.

	Drawing_2	Drawing_1	Drawing
1		1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		1	
9		2	
10		3	
11		4	
12		5	
13		6	
14		8	
15		9	
16		10	
17		11	
18		12	
19		13	

### How to turn off the Gestural Drag mode

1. Do one of the following:

- ▶ In the Xsheet view, right-click and deselect the **Gestural Drag Mode** option.
- ▶ In the Xsheet toolbar, click the Toggle Gestural Drag Mode button (you may have to customize the toolbar to display it).



The dragging pad disappears on selected cells when the Gestural Drag mode is off.

## Increasing and Decreasing Exposure

Once a value is entered in the Timeline or Xsheet view, you can increase and decrease its exposure.

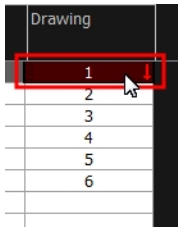
Increasing the exposure adds one more exposure to a selected cell; repeating this action adds an extra cell each time. This is an efficient way to extend a drawing's exposure and is always set in Insert mode. Increasing an exposure pushes the existing exposure forward.

Decreasing the exposure removes one exposure from a selected cell and pulls any cells following it to the beginning of selection.


### How to increase exposure

1. In the Timeline or Xsheet view, select a cell.





2. Do one of the following:

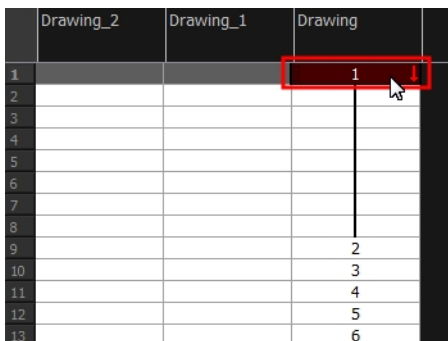
- ▶ From the top menu, select **Animation > Cell > Increase Exposure**.
- ▶ In the Xsheet toolbar, click the Increase Exposure  button.
- ▶ At the bottom-right corner of the Xsheet view, set the number of cells over which the drawing will be exposed.




- ▶ Right-click and select **Exposure > Increase Exposure**.
- ▶ Press +.

## How to decrease exposure

1. In the Timeline or Xsheet view, select a cell.



2. Do one of the following:

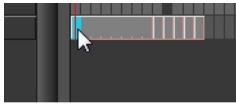
- ▶ From the top menu, select **Animation > Cell > Decrease Exposure**.
- ▶ In the Xsheet toolbar, click the Decrease Exposure  button.
- ▶ At the bottom-right corner of the Xsheet view, set the number of cells over which the drawing will be exposed.



- ▶ Right-click and select **Exposure > Decrease Exposure**.
- ▶ Press -.


### How to use the Clear Exposure and Pull feature

1. In the Timeline or Xsheet view, select a range of cells.



	Drawing_2	Drawing_1	Drawing
1			1
2			
3			
4			
5			
6			
7			
8			
9			2
10			3
11			4
12			5
13			6

2. Do one of the following:

- ▶ From the top menu, select **Animation > Cell > Clear Exposure and Pull**.
- ▶ Right-click and select **Exposure > Clear Exposure and Pull**.
- ▶ In the Xsheet toolbar, click the Clear Exposure and Pull  button.

The exposure is reduced by the selected number of cells.

## Deleting Exposure

You can delete a drawing's exposure in several ways. When you delete a drawing's exposure from the Timeline or Xsheet view, you are not deleting the actual drawing file. You can always retrieve it by typing its name again in a cell.

You can delete the exposure in a selected cell range or delete the entire exposure of a drawing exposed over several cells. Note that you can also delete the exposure for drawings inside a collapsed group.

### How to delete selected exposures


1. In the Timeline or Xsheet view, select the exposure you want to delete.
2. Do one of the following:
  - ▶ Right-click and select **Delete**.
  - ▶ Press Delete.

### How to clear the entire exposure of a drawing

1. In the Timeline or Xsheet view, select a cell of a drawing exposed over several cells.



2. Do one of the following:

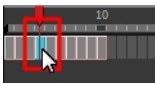
- ▶ From the top menu, select **Animation > Cell > Clear Exposure**.
- ▶ In the Timeline view, right-click and select **Exposure > Clear Exposure**.
- ▶ In the Xsheet toolbar, click the Clear Exposure  button (you may have to customize the toolbar to display it).

## Inserting Blank Cells

You can place an empty cell between other cells.


### How to insert blank cells

1. In the Timeline or Xsheet view, select the cell in which you want to insert a blank cell.



Drawing	
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10

2. Do one of the following:

- ▶ In the top menu, select **Animation > Cell > Insert Blank Cell**.
- ▶ Right-click on the selected cell and select **Exposure > Insert Blank Cell**.
- ▶ In the Timeline or Xsheet toolbar, click the Insert Blank Cell  button (you may have to customize the toolbar to display it).
- ▶ Press Shift + J.

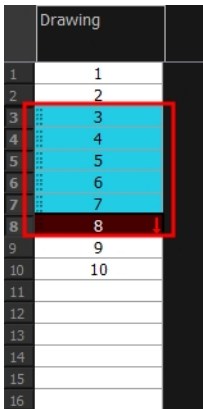
A blank cell is inserted.



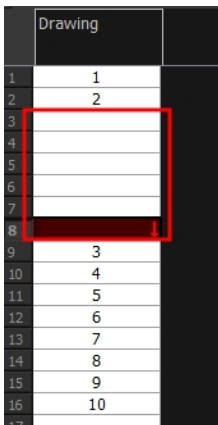
Drawing	
1	1
2	2
3	3
4	
5	4
6	5
7	6
8	7
9	8
10	9
11	10
12	

### How to clear a selected cell range without changing the exposure and timing

1. In the Xsheet view, select a frame range to clear.



2. Right-click and select **Clear**.

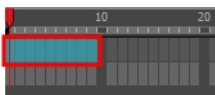


## Setting the Exposure





You can easily increase or decrease the exposure for a selected cell range.

### How to set the exposure

1. In the Timeline or Xsheet view, select the cell range on which you want to set the exposure.



	Drawing
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	

- Do one of the following:
  - From the top menu, select **Animation > Cell > Set Exposure to > Set Exposure to 1, 2, 3, or Set Exposure**.
  - In the Timeline toolbar, click one of the Set Exposure     buttons (you may have to customize the toolbar to display them).
  - In the Xsheet view, right-click and select **Exposure > Set Exposure to > Set Exposure to 1, 2, or 3, or Set Exposure**.
- If you chose the Set Exposure option, the Set Exposure dialog box opens. Enter the number of frames you want the drawings to display and click **OK**.

Set Exposure to: 
▲  
▼

OK Cancel

The new timing is displayed in the Xsheet view.

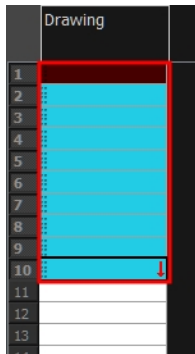
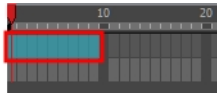
	Drawing
1	1
2	2
3	
4	
5	3
6	
7	3
8	4
9	
10	
11	5
12	
13	
14	6
15	
16	
17	7
18	
19	
20	8
21	9
22	10

## Filling a Selection with a Single Exposure


You can fill the same value over an entire selection. The selection can be over one cell, a cell range in one column, a cell range over many columns, an entire column, or many columns. You can use numbers, words, letters, or any alphanumeric value.

## How to fill a selection with a single exposure

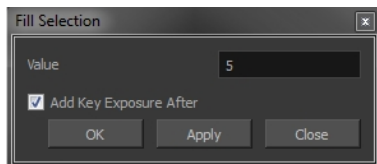
1. In the Timeline or Xsheet view, select a cell range.



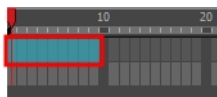
2. Do one of the following:

- ▶ From the top menu, select **Animation > Cell > Fill Selection**.
- ▶ In the Xsheet toolbar, click the Fill Selection  button (you may have to customize the toolbar to display it).
- ▶ Press Ctrl + T (Windows/Linux) or ⌘ + T (Mac OS X).

The Fill Selection dialog box opens.



3. In the Value field, type the desired value.
4. To insert a key exposure in the frame following the last cell in the selection, select the **Add Key Exposure After** option. Otherwise, leave it deselected.
5. Click **OK**.

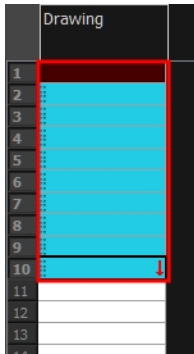
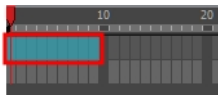


## Filling a Selection with a Sequence


You can create a numbered sequence over a selection. The sequence can be forward, backward, single, double or higher increment, as a cycle, and so on. The selection can be over one cell or a cell range in one column or more or an entire column or many entire columns.

## How to fill a selection with a sequence

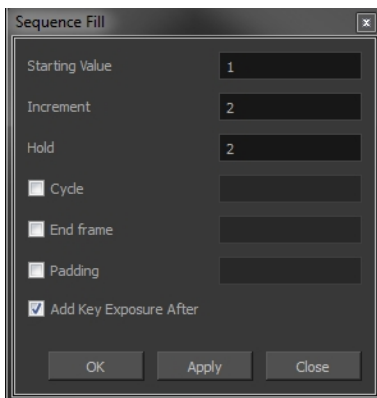
1. In the Timeline or Xsheet view, select a cell range.



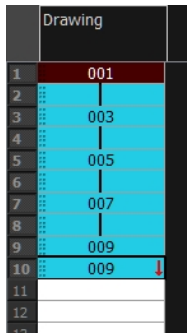
2. Do one of the following:

- ▶ From the top menu, select **Animation > Cell > Sequence Fill**.
- ▶ In the Timeline view, right-click and select **Exposure > Sequence Fill**.
- ▶ In the Xsheet toolbar, click the Sequence Fill  button (you may have to customize the toolbar to display it).
- ▶ Press **Ctrl + M** (Windows/Linux) or **⌘ + M** (Mac OS X).

The Sequence Fill dialog box opens.



3. In the Starting Value field, type the first number in the sequence.
4. In the Increment field, type the number by which the drawing number will increase from frame to frame. For example, an increment of 1 gives you: 1-2-3-4; an increment of 2 gives you: 1-3-5-7; and -2 gives you this: 8-6-4-2.

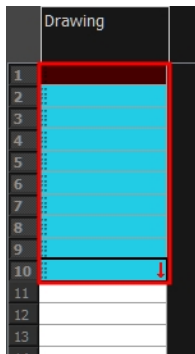
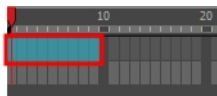


## Filling a Selection Randomly


You can fill in random values over a selection. You can give a maximum and a minimum value and create a range for Harmony to choose the random values from. The selection can be over one cell or a cell range in one column or more or an entire column or many entire columns.

### How to fill cells randomly

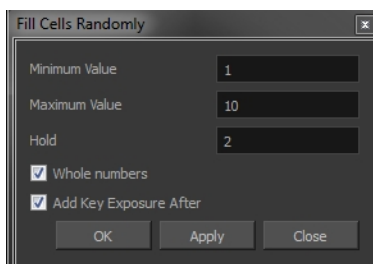
1. In the Timeline or Xsheet view, select a cell range.



2. Do one of the following:

- ▶ Select **Animation > Cell > Fill Cells Randomly**.
- ▶ In the Xsheet view, click the Fill Cells Randomly  button (you may have to customize the toolbar to display it).

The Fill Cells Randomly dialog box opens.



3. In the Minimum Value field, enter the lowest acceptable value.
4. In the Maximum Value field, enter the highest acceptable value.
5. In the Hold field, choose an exposure holding value.
6. If you are applying this option to a drawing column, select the **Whole Numbers** option to avoid decimal points.
7. Click **OK**.

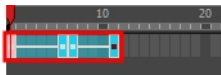
	Drawing
1	5
2	
3	3
4	
5	9
6	
7	2
8	
9	
10	
11	

## Filling Empty Cells


You can fill empty cells to extend the exposure of single frame drawings to fill the range of empty cells after each one. When creating drawings on cells that are not side-by-side, the exposure of the first drawing no longer fills automatically. You must select the frame range where you want your drawings to hold their exposure up to the next drawing and use the Fill Empty Cells command.

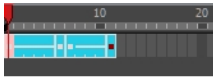
### How to fill empty cells

1. In the Timeline or Xsheet view, select a cell range.



	Drawing
1	1
2	
3	
4	
5	
6	2
7	3
8	
9	
10	
11	4
12	
13	

2. Do one of the following:
  - ▶ Right-click and select **Exposure > Fill Empty Cells**.
  - ▶ From the top menu, select **Animation > Cell > Fill Empty Cells**.
  - ▶ In the Timeline toolbar, click the Fill Empty Cells  button.



Each drawing in the selection is exposed in the range of empty cells that follow it.

## Creating Cycles

Once you have entered a series of drawings and exposures, you can create cycles out of them in several ways.

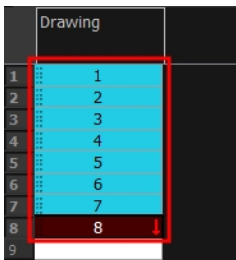
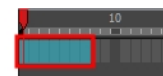
You can loop your drawings using the following commands:


- Create Cycle
- Paste Cycle
- Paste Reverse

When you create a drawing cycle, all of the repeated drawings are linked to the same original files. This means that when you modify, repaint, or correct a drawing named "1" for example, all drawings named "1" are updated simultaneously. In order to modify a drawing independently from its other exposures, you must duplicate the drawing.

### How to create a cycle

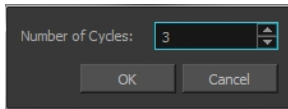
1. In the Timeline or Xsheet view, select the cell range to loop.



2. Right-click on the selection and select **Create Cycle** or in the Timeline toolbar, click the Create Cycle  button (you may have to customize the toolbar to display it).

The Create Cycle dialog box opens.





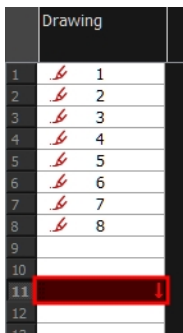
3. Enter the number of cycles you want, including the current selection.

## How to paste a cycle

1. In the Timeline or Xsheet view, select the cell range to loop.

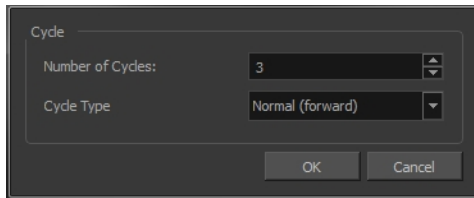


1. From the top menu, select **Edit > Copy Cell from Timeline** or **Xsheet** or press **Ctrl + C** (Windows/Linux) or **⌘ + C** (Mac OS X).
2. In the Timeline or Xsheet view, select the cell where you want your cycles to start.



3. Do one of the following:
  - ▶ From the top menu, select **Edit > Paste Cycle**.
  - ▶ Right-click and select **Paste Cycle**.
  - ▶ Press **Ctrl + /** (Windows/Linux) or **⌘ + /** (Mac OS X).

The Paste Cycle dialog box opens.



4. Do one of the following:
  - ▶ In the Number of Cycles field, enter the number of cycles you want to paste.
  - ▶ Increase or decrease the number of cycles you want to paste.
5. In the Cycle Type menu, select the type of cycle you want to paste.

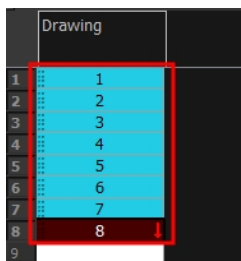


- ▶ **Normal (forward):** Pastes cycles as for all cycles, starting with the first cell of your selection and ending with the last.
  - ▶ **Reverse:** Pastes cycles in the reverse order of the original selection, starting with the last cell of your selection and ending with the first one.
  - ▶ **Forward > Reverse:** Pastes the first cycle in your selection as is, then the following one in reverse order. This repeated until all cycles are pasted.
  - ▶ **Reverse > Forward:** Pastes the first cycle in your selection in reverse order, then the following one as is. This repeated until all cycles are pasted.
6. Click **OK**.

**NOTE:** You can perform the same operation using the Paste Special dialog box. To open the Paste Special dialog box, select **Edit > Paste Special** or press **Ctrl + B** (Windows/Linux) or **⌘ + B** (Mac OS X).

### How to paste a reversed cycle

1. In the Timeline or Xsheet view, select the cell range to paste in reverse order.



- From the top menu, select **Edit > Copy Cell from Timeline** or **Xsheet** or press **Ctrl + C** (Windows/Linux) or **⌘ + C** (Mac OS X).
- In the Timeline or Xsheet view, select the cell where you want your cycles to start.



	Drawing
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	
10	

- Do one of the following:
  - From the top menu, select **Edit > Paste Reverse**.
  - Right-click and select **Paste Reverse**.
  - Press **Ctrl + .** (Windows/Linux) or **⌘ + .** (Mac OS X).

	Drawing
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	8
10	7
11	6
12	5
13	4
14	3
15	2
16	1
17	

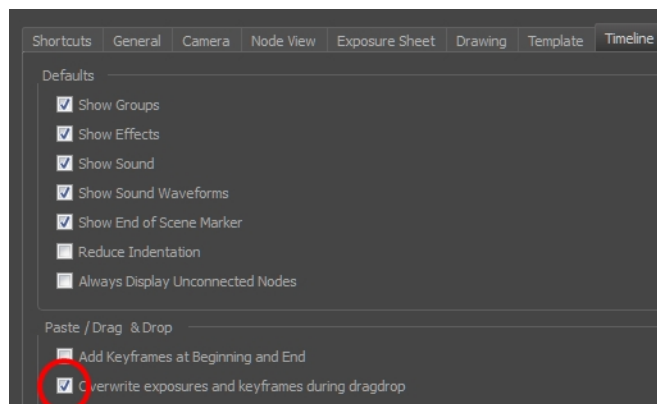
## Overwriting Exposures and Keyframes

If the area on which you are dropping a selection contains exposures and/or keyframes, they are overwritten by the content you are selected by dragging. You can set this mode in two places: the Timeline toolbar and the Preferences dialog box.

### How to override exposure and keyframes

- In the Timeline or Xsheet view, drag to select the drawings you want to move.
- Do one of the following:
  - In the Timeline toolbar, click the **Toggle Override Exposure and Keyframe During Drag and Drop** button (you may have to customize the toolbar to display it).

- ▶ From the top menu, select **Edit > Preferences** or press Ctrl + U (Windows/Linux) or ⌘ + U (Mac OS X). Select the **Timeline** tab, then select the **Override Exposure and Keyframe During Drag and Drop** option.



3. Drop your selection at the desired location.

## Managing Key Exposures

Before working with key exposures, it's important to understand how keyframes, exposure and key exposure work in Harmony:

- **Keyframe:** A keyframe is a point in time where a change to the properties of the object or character occurs. In Harmony, keyframes consist of the coordinates that determine how an entire layer and its contents are moved. Keyframes include these parameters: XYZ position, skew, scale, angle and pivot.
- **Exposure:** Exposure is a property; it is the length of time that a drawing is visible over a series of frames. In Harmony, exposure is independent of keyframes. That is, keyframes are not linked to drawings. Keyframes can be moved independently from the drawing exposure.
- **Key Exposure:** A key exposure in Harmony is a type of exposure that forces a drawing to remain exposed on a specific frame. If a drawing is exposed before a key exposure and you swap out that drawing for another one, then the original drawing is retained. This preserves the key drawing. Note that Harmony automatically sets a key exposure when you perform a drawing swap.

## Adding Key Exposures

Key exposures are mainly used for swapping drawings in cut-out animation where you will have numerous drawings for the various positions of the mouth or eyes of a character for example.

If there is a particular drawing you want to keep on a specific frame, you can set it as a key exposure. This prevents it from being overwritten by a drawing swap on a preceding frame. A key exposure is simply a property of an exposure that forces it to be exposed on a certain frame regardless of whether the previous exposure is the same drawing or not.

**NOTE:** Keep in mind that if you modify the artwork in a drawing, all instances of that drawing will be automatically updated even if set as a key exposure. This keeps your existing animation key poses intact. It is frequently used on a mouth or eyes layer.

**Example:** Swapping a drawing with no key exposure

In the following example, drawing 3 (DR 3) is selected on the timeline and it contains no key exposure.



When it is swapped for drawing 4 (DR 4), the entire duration of drawing 3 substituted for drawing 4.



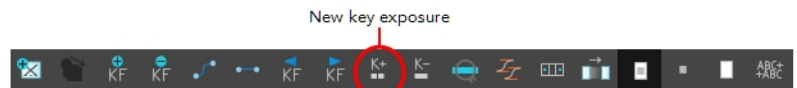
### Example: Swapping a drawing with a key exposure

Here's what happens when swapping a drawing with a key exposure. In the following example, the playhead is positioned in the middle of drawing 5 (DR 5) to set the position for the new key exposure. When the new key exposure is added, drawing 5 is split in two; both halves contain drawing 5. Now if you swap the first drawing 5 for drawing 1, the second drawing 5 retains its exposure.

A location is selected for a new key exposure.



A key exposure is added at the location of the playhead.



One drawing is swapped for drawing 1 (DR 1). The second drawing retains its exposure.



## How to add a key exposure

1. In the Timeline view, select the drawing cell to set as the key exposure.
2. Do one of the following:
  - In the Timeline toolbar, click the Add Key Exposure **K+** button.
  - In the Timeline menu, select **Exposure > Add Key Exposure**.
  - Right-click and select **Exposure > Add Key Exposure**.

A new key exposure is added.

If you added a key exposure at the beginning of the drawing, the entire exposure is filled with that same drawing. If you added a key exposure anywhere other than the beginning of the drawing, then the drawing is split in two and both parts contain the same drawing.

## Removing Key Exposures

When you no longer need a key exposure, you can remove it. When you do this, the existing key exposure is replaced by the preceding exposure. In the following example, a key exposure is set to drawing 1 (DR 1). When the key exposure is removed, the exposure is replaced by the preceding exposure, drawing 4 (DR 4).


Before: Key exposure is set to drawing 1.



After: Key exposure is removed. The preceding exposure, drawing 4, replaces the exposure.



### How to remove a key exposure

1. In the Timeline view, select a key exposure to remove.
2. Do one of the following:
  - In the Timeline toolbar, click the Remove Key Exposure  button.
  - In the Timeline menu, select **Exposure > Remove Key Exposure**.
  - Right-click and select **Exposure > Remove Key Exposure**.

The key exposure is removed and replaced by the preceding exposure.

## Removing Duplicate Key Exposures

When working with drawings to adjust the timing of a mouth in a lipsync, for example, and forcing the use of specific key exposures, unnecessary key exposures will be created. You can delete these duplicates without affecting the rest of the drawing. The first drawing of the selection will be used for the range.

**NOTE:** Duplicate key exposures may occur when pasting with the Enforce Key Exposure option selected.

### How to remove duplicate key exposures

1. In the Timeline view, select the layer that contains duplicate key exposures.

2. In the Timeline toolbar, click the Remove Duplicate Key Exposure  button (you may have to customize the toolbar to display it).

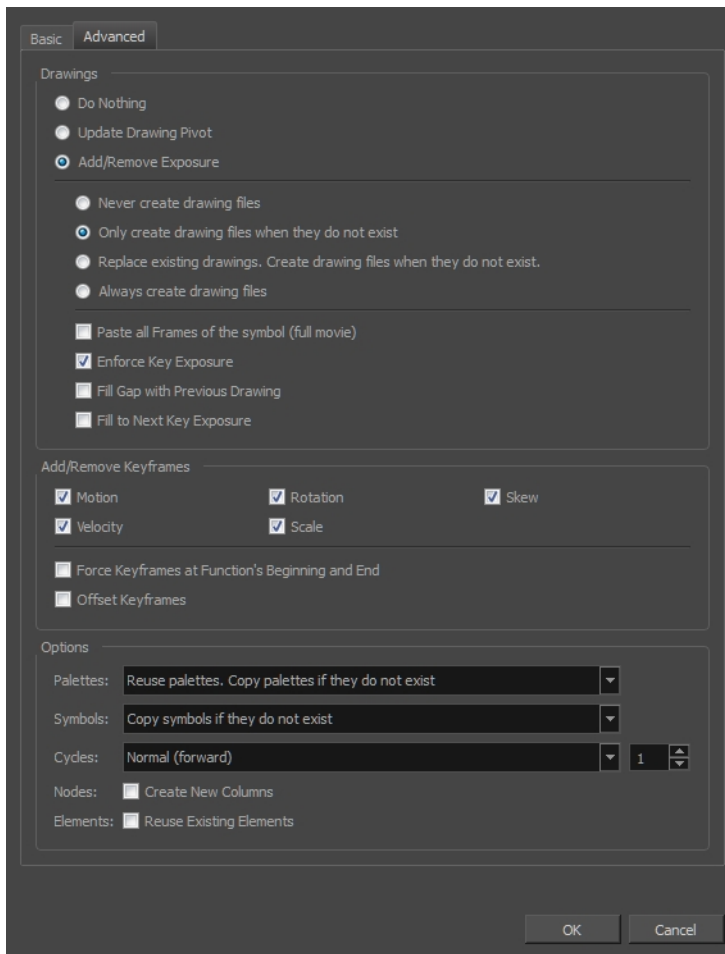
## Pasting Key Exposures Using Different Modes

As you animate, you will find that you reuse key exposures. There are different options to paste your selected drawings when they contain key exposures:

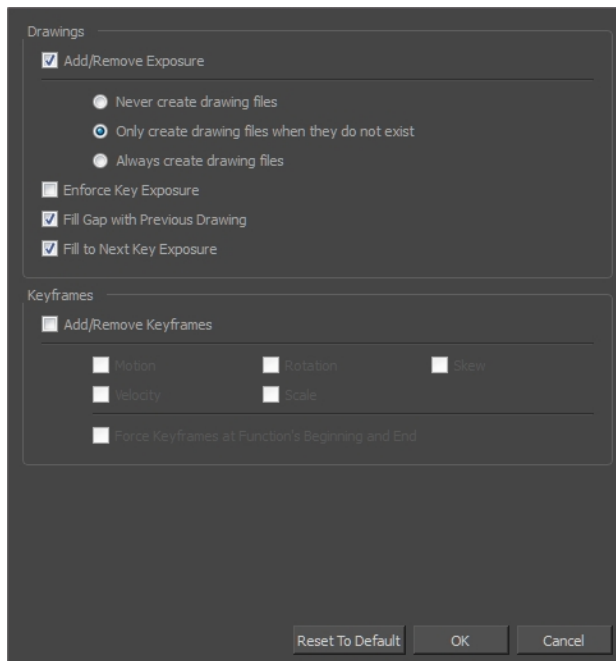
- **Enforce Key Exposure:** If there are key exposures that exist on copied drawings, they are preserved when pasting. No key exposures are added. This is the default behavior when pasting.
- **Fill Gap with Previous Drawing:** Fills selected area in the Xsheet or Timeline view with the previous drawing.
- **Fill to Next Key Exposure:** Fills selected area till the next key exposure.

### How to paste using different modes

1. In the Timeline or Xsheet view, select the drawings you want to copy and press Ctrl + C (Windows/Linux) or ⌘ + C (Mac OS X).
2. In the Timeline or Xsheet view, select the cell where you want your pasted selection to start.
3. Do one of the following:
  - Press Ctrl + B (Windows/Linux) or ⌘ + B (Mac OS X).  
The Paste Special dialog box opens.



- ▶ From the Timeline menu, select **Edit > Modify Paste Presets > Exposure**. The Edit Exposure Paste Preset dialog box opens.





4. Select the **Enforce Key Exposure** or **Fill to Next Key Exposure** option. In the Paste Special dialog box, these options are on the Basic tab.
5. Click **OK**.
6. Press **Ctrl + V** (Windows/Linux) or **⌘ + V** (Mac OS X) to paste your selection.

## Navigating between Frames and Columns

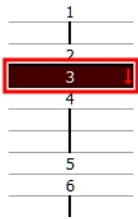
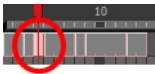
Once a cell is selected in the Timeline or Xsheet view, you can navigate between the drawings, frames, and layers using keyboard shortcuts that work in the Camera, Drawing, Xsheet and Timeline views.

You can navigate through:

- Drawings
- Frames
- Columns

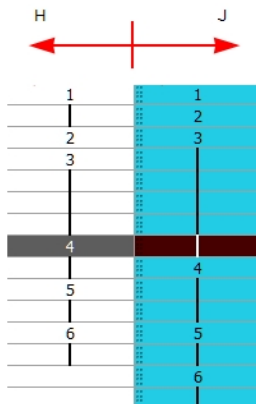
### How to navigate through drawings, frames and columns

1. In the Timeline or Xsheet view, select a cell.

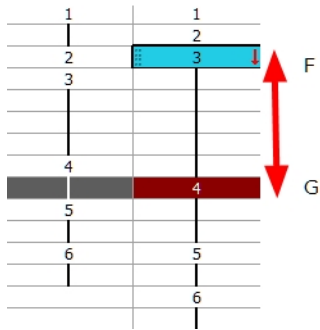


2. Once the cell is selected, you can navigate between:

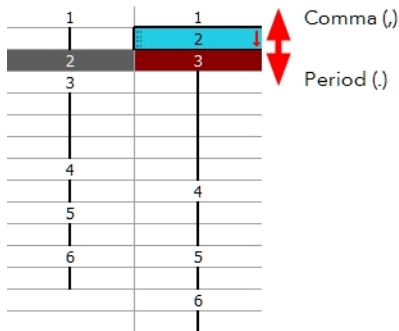
- **Previous and next layers:** From the top menu, select **Drawing > Previous Layer** and **Next Layer** or press **H** and **J**.



- **Previous and next drawings:** From the top menu, select **Drawing > Previous Drawing** and **Next Drawing** or press **F** and **G**.



- ▶ **Previous and next frames:** From the top menu, select **Play > Previous Frame** and **Next Frame** or press comma (,) and period (.).



## Managing Drawings

Drawings that are created in Toon Boom Harmony are not stored in their cells. They are actual files stored in the project's folder. If you want to rename a drawing or delete a drawing from your project, you need to edit the file and not the cells.

This section is divided as follows:

- [Renaming a Drawing on page 314](#)
- [Deleting a Drawing on page 316](#)
- [Duplicating a Drawing on page 317](#)
- [Copying and Pasting Drawings on page 317](#)
- [Merging Drawings on page 319](#)

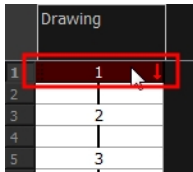
## Renaming a Drawing

To rename a drawing, you need to select the drawing cell and use the Rename Drawing command.


### How to rename a drawing

1. In the Timeline or Xsheet view, select the drawing to rename.

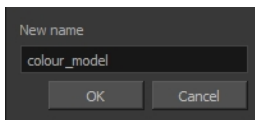




2. Do one of the following:

- ▶ Right-click and select **Drawings > Rename Drawing**.
- ▶ In the Timeline toolbar, click the Rename Drawing  button (you may have to customize the toolbar to display it).
- ▶ Press Ctrl + D (Windows/Linux) or ⌘ + D (Mac OS X).

The Rename Drawing dialog box opens.



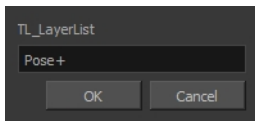
3. In the New Name field, type in the new drawing name.

### How to rename a drawing sequence with a prefix

You can rename a drawing sequence with a prefix, which can be quite useful for cut-out puppet breakdown and deformation animation.

1. In the Timeline or Xsheet view, select a drawing sequence. Note that you can only select a drawing range in one column or layer at a time.
2. Right-click and select **Drawings > Rename Drawing with Prefix**.

The Rename Drawing with Prefix dialog box opens.

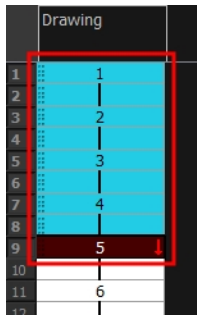


3. In the Prefix to Add field, type the prefix to add before the drawing name.

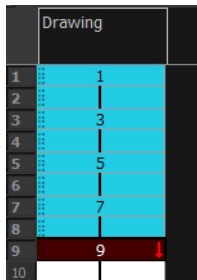
### How to rename drawings by their frame position

You can rename a series of drawings relative to their frame position. This is useful in hand-drawn animation.

1. In the Timeline or Xsheet view, select the drawing sequence to rename.



- From the top menu, select **Drawing > Rename by Frame**.



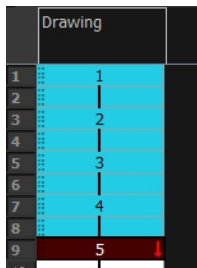
## Deleting a Drawing

You can permanently delete a drawing file from a project's folder.

**NOTE:** Deleting a drawing file is an operation that cannot be undone.

### How to delete a drawing

- In the Timeline or Xsheet view, select the drawings to delete.



- Do one of the following:
  - From the top menu, select **Drawing > Delete Selected Drawings**.
  - Right-click and select **Drawings > Delete Selected Drawings**.

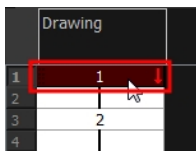
## Duplicating a Drawing


If you want to modify a drawing that already exists, but keep the original drawing intact, you can duplicate the drawing and work on the copy. When duplicating a drawing, the selected cell is replaced with the new drawing. The exposure of the original drawing that was on the current cell is removed. The original drawing is not deleted from the project folder or other cells in which it is exposed.

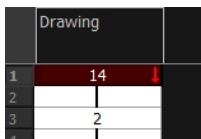
With Toon Boom Harmony, you can create a keyframe at the same time as you duplicate your drawing. This way, you can modify and reposition drawings without affecting the original drawing.

### How to duplicate a drawing

1. In the Timeline or Xsheet view, select the drawing to duplicate.



2. Do one of the following:
  - ▶ From the top menu, select **Drawing > Duplicate Drawings**.
  - ▶ Right-click and select **Drawings > Duplicate Drawings**.
  - ▶ In the Xsheet toolbar, click the Duplicate Drawing  button.
  - ▶ Press Alt + Shift + D.



## Copying and Pasting Drawings

When you copy and paste a selection in the Timeline or Xsheet view, you are not copying and pasting the actual drawings, you are pasting the exposure. Exposure is a property; it is the length of time that a drawing is visible over a series of frames. In Harmony, exposure is independent of keyframes. That is, keyframes are not linked to drawings. Keyframes can be moved independently from the drawing exposure.

If you want to copy and paste selected drawings into a different layer or paste the selection in the same layer to duplicate the drawings, you must use the Paste Special feature.

There are four different ways to paste your selected drawings with the Paste Special dialog box:

**Never create drawing files:** When adding exposures to a drawing layer, drawing files will not be created.

**Only create drawing files when they do not exist:** When adding exposures to a drawing layer, new drawings will be created only when drawings with the same name do not already exist in the destination.

**Replace existing drawings. Create drawing files when they do not exist:** Replace drawings with the same names to update a scene with new modified drawings and preserve the animation.

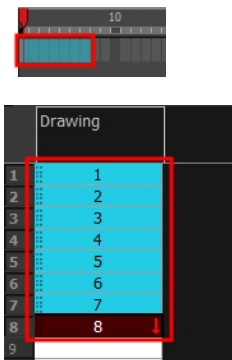
**Tip:** If you don't want to lose the existing animation when pasting a template, such as when placing new drawings after the animation, then delete the template's animation. It will still have updated the drawings but not override the existing animation.

**Always create drawing files:** When adding exposures to a drawing layer, new drawings will always be created. If drawing files with the same name already exist, Harmony will create a new name for the drawing.

If you want to perform another Paste Special operation using the same settings you used previously, you can use the Paste Special Again command instead. You can paste your selection using the same settings as in the most recent Paste Special operation, without opening the Paste Special dialog box.


### How to paste drawings with the Paste Special command

1. In the Timeline or Xsheet view, select the drawings to copy and press Ctrl + C (Windows/Linux) or ⌘ + C (Mac OS X).

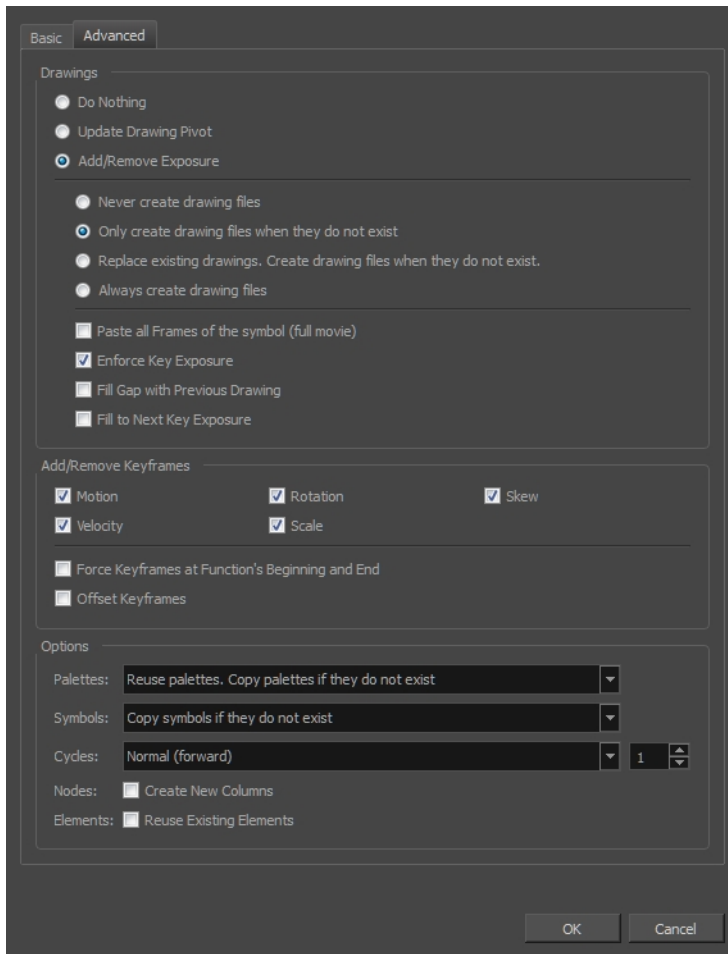


2. In the Timeline or Xsheet view, select the cell where you want your pasted selection to start.




3. Do one of the following:
  - ▶ Right-click and select **Paste Special**.
  - ▶ From the top menu, select **Edit > Paste Special**.
  - ▶ In the Xsheet or Timeline toolbar, click the Paste Special  button (you may need to customize the toolbar to display it).
  - ▶ Press Ctrl + B (Windows/Linux) or ⌘ + B (Mac OS X).

The Paste Special dialog box opens.



4. Select the **Basic** tab.
5. In the Drawings section, select the **Always Create Drawings** or **Only Create Drawings When They Do Not Exist** option.

### How to paste new drawings with the previous Paste Special settings

1. Do one of the following:
  - ▶ From the top menu, select **Edit > Paste Special Again**.
  - ▶ Right-click and select **Paste Special Again**
  - ▶ In the Timeline or Xsheet toolbar, click the Paste Special Again  button (you may have to customize the toolbar to display it).
  - ▶ Press **Ctrl + Shift + B** (Windows/Linux) or **⌘ + Shift + B** (Mac OS X).

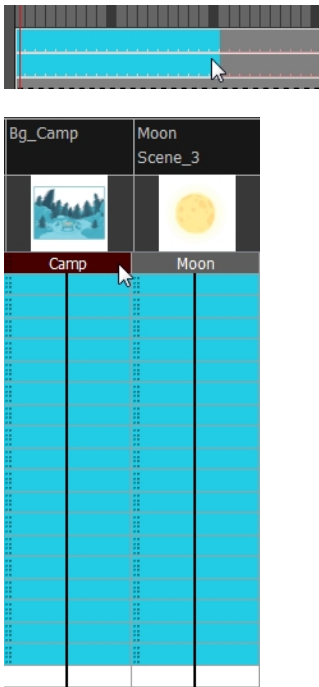
## Merging Drawings

There are two methods of merging drawings.

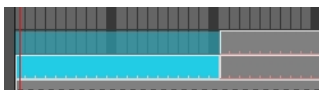
- You can merge selected drawings in adjacent elements. The columns and layers will be left intact, and each new merged drawing will reside in the frames of the left-most column or lower layer.
- You can merge elements. All drawings will be merged. Unused columns and layers will be deleted, but the original drawing files are still accessible.

### How to merge selected drawings

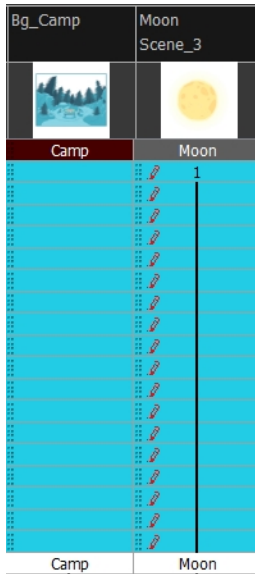
1. In the Xsheet view, select the drawings to merge.



2. Do one of the following:
  - In the Xsheet menu, select **Columns > Merge Selected Drawings**.
  - In the Timeline menu, select **Layers > Merge Selected Drawings**.







3. Do one of the following:

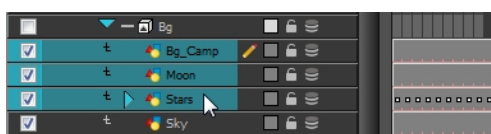
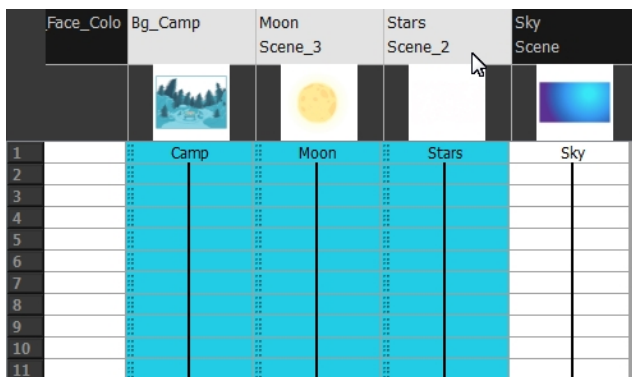
- In the Xsheet menu, select **Columns > Merge Selected Columns**.
- In the Timeline menu, select **Layers > Merge Selected Layers**.

In the Xsheet view, the right-most column will contain the merged drawings and the remaining columns will be left blank at the corresponding frames. In the Timeline view, the bottom timeline layer will contain the merged drawings from all layers and the other layers will be left blank at the corresponding frames. Drawings are not deleted and are still accessible.

### How to merge drawings in entire layers or columns

1. Do one of the following:

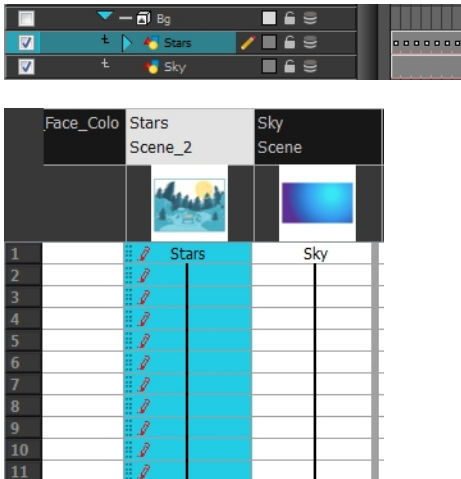
- In the Timeline view, select the layers you want to merge.
- In the Xsheet view, Shift-click the headers of the columns you want to merge.



2. Do one of the following:

- In the top menu, select **Edit > Merge**.

- ▶ In the Xsheet menu, select **Columns > Merge Selected Columns.**
- ▶ In the Timeline menu, select **Layers > Merge Selected Layers.**



In the Xsheet view, the right-most column will contain the merged drawings and the other columns will be deleted. In the Timeline view, the bottom timeline layer will contain the merged drawings from all layers and the other layers will be deleted. Drawings are not deleted and are still accessible.

## Modifying the Layer and Column Display

You can change the way a column in the Xsheet view displays. You can change the way a layer in the Timeline view or a column in the Xsheet view displays. You can stay organized without changing the content of elements or your animation output.

This section is divided as follows:



- [Expanding and Collapsing Layers and Columns](#) on page 322
- [Showing or Hiding Layers](#) on page 323
- [Showing and Hiding Columns](#) on page 325
- [Modifying the Look of the Column](#) on page 328
- [Xsheet Thumbnails](#) on page 333
- [Changing the Colour of a Layer or Column](#) on page 334
- [Setting Scene Markers](#) on page 335
- [Setting Tempo Markers](#) on page 338

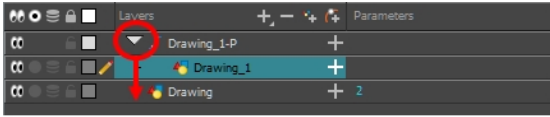
## Expanding and Collapsing Layers and Columns

To simplify the look of the Timeline or Xsheet view, you can expand and collapse the layers and columns. If some layers are parented to other ones, you can collapse the parent layer to hide its children.



### How to collapse or expand selected layers in the Timeline view

1. In the Timeline view, select the layer(s) to collapse or expand.
2. Do one of the following:




- ▶ Right-click on the selection and select **Collapse/Expand > Collapse/Expand**.
- ▶ Click the Expand Children Arrow  button on the parent layer.
- ▶ Click the Collapse/Expand  button (you may have to customize the toolbar to display it).
- ▶ Press Ctrl + I (Windows/Linux) or ⌘ + I (Mac OS X).



### How to collapse or expand all layers in the Timeline view



1. Do one of the following:
  - ▶ Right-click on the layers and select **Collapse/Expand > Expand All** or **Collapse All**.
  - ▶ In the Timeline toolbar, click the Collapse All  or Expand All  buttons (you may have to customize the toolbar to display them).
  - ▶ Press 0 and 9.

### How to collapse and expand 3D path or rotation columns in the Xsheet view

1. In the Xsheet toolbar, click the Show Column List  button to display the Functions list.
2. In the Xsheet view, select the column header of the 3D path or 3D rotation column to collapse or expand.
3. Do one of the following:
  - ▶ Right-click on the column's header and select **Expand/Collapse > Collapse Selection** or **Expand Selection**.
  - ▶ In the Xsheet toolbar, click the Collapse Selection  or Expand Selection  buttons (you may have to customize the toolbar to display it).

### How to collapse or expand all 3D path and 3D rotation columns in the Xsheet view

Do one of the following:

- ▶ Right-click on any column's header and select **Expand/Collapse > Expand All** or **Collapse All**.
- ▶ Press 0 and 9.
- ▶ In the Xsheet toolbar, click the Collapse All  or Expand All  buttons (you may have to customize the toolbar to display it).

## Showing or Hiding Layers

As you work in the Drawing or Camera view, some layers may be in the way or are used as references. You can hide these layers to make your work area less cluttered and easier to navigate. You can show and hide layers in the Timeline view in several different ways.

When using the Solo mode to show or hide layers, here's how it works:

- If you have anything selected, it is not affected.

- When multiple layers are selected and you enable/disable the Solo mode on any of those layers, it is applied to all the selected layers.
- When multiple layers are selected and you enable/disable the Solo mode on layers that are not part of the selection, it is applied only to those particular layers.

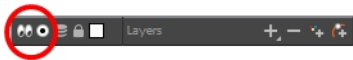
When exporting or rendering a scene, the Solo mode setting of layers is ignored.



**NOTE:**

When a layer is affected by an inverted cutter, enabling the Solo mode for this layer will not show it unless the mask is also enabled.



### How to show or hide all layers

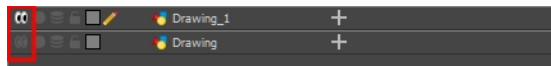
1. Click one of the following in the Layers toolbar:




- ▶ Enable/Disable All  button to show or hide all layers.  
Any hidden layers are unhidden, so you can view all layers.
- ▶ Solo Mode  button to view disable your current Solo mode selection. Any soloed drawing or sound layers are disabled, so you can view all layers. When you click again on the Solo Mode button, you last Solo selection is displayed.

### How to show or hide individual layers

1. Do one of the following:
  - ▶ In the Layer toolbar, click the Solo Mode  button.
  - ▶ Click the layer's Enable/Disable All  button to show or hide that layer.



- ▶ Press A to show a layer or D to hide selected layers.
- ▶ In the Timeline toolbar, click the Enable/Disable  button (you may have to customize the toolbar to display it).

When you deselect a layer in the Timeline view, the corresponding column is hidden in the Xsheet view.

### How to enable the selected layer and disable all others

1. Do one of the following:
  - ▶ Hold down Alt and click the Solo Mode  button of the layer you want to solo and hide all other layers.

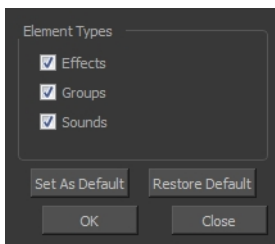
- ▶ In the Timeline toolbar, click the Disable All Others  button (you may have to customize the toolbar to display it).

In the Timeline view, you can hide or show certain types of layers such as Group and Effect.

### How to show and hide layer types in the Timeline view

1. Do one of the following:
  - ▶ From the Timeline menu, select **View > Show > Show Manager**.
  - ▶ You can also select **View > Show > Show Sounds**, **Show Effects** or **Show Groups** to immediately show or hide the selected type. This option will remain only for the current session. When you close and reopen Harmony, the default settings will return.

The Show Manager dialog box opens.



2. Select the types of layers you want to display and deselect the ones you want to turn off.
3. Click **Set As Default** to make these new settings the default ones that will be used each time to start the application. Click **Restore Default** to restore the settings used when installing the application.

In the Xsheet view, you have the choice of hiding or showing certain types of columns such as Annotation and Functions.




## Showing and Hiding Columns

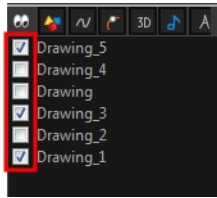
The Xsheet view has a Column List section that displays all the columns contained in the exposure sheet. It can be used to hide individual columns.

If you need to see a column after it has been hidden, you can display it directly from the Xsheet view without using the Column List section.

You can also hide a column type, such as Drawing or Sound. When you do this, its corresponding layer is disabled in the Timeline view.

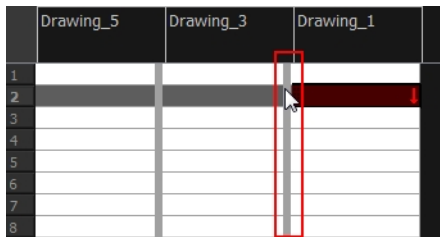
### How to show or hide columns in the Xsheet view

1. In the Xsheet toolbar, click the Show Column List  button.
2. On the right side of the Functions section, click the Expand  button to display the Column List section.
3. Do one of the following:
  - ▶ In the Column List section, select the columns to display and deselect the columns to hide.
  - ▶ In the Xsheet toolbar, click the Hide Selected Column  button (you may have to customize the toolbar to display it).

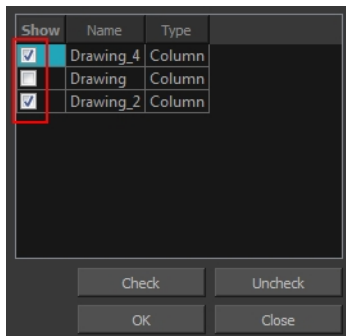


### How to show a hidden column in the Xsheet view

1. In the Xsheet menu, click on the thick grey line that represents a hidden column. You can also right-click on the column header and select **Show Hidden Columns**.



The Show Hidden Columns dialog box opens.



2. In the Show column, select the hidden columns you want to display in the Xsheet view.
  - ▶ Click **Check** to select all the selected columns.
  - ▶ Click **Uncheck** to deselect all selected columns.

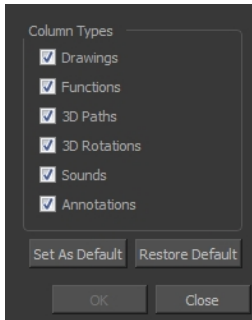
### How to show all columns

- ▶ In the Xsheet menu, select **View > Unhide All Columns**.

### How to show and hide column types



1. In the Xsheet view, select **View > Column Types Manager**.

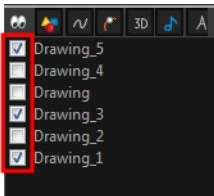
The Column Types dialog box opens.



2. Select the types of columns you want to display and disable the ones you want to hide.
3. Click **Set As Default** if you want to make these new settings the default ones that will be used each time to start the application.
4. Click **Restore Default** if you want to restore the settings used when installing the application.

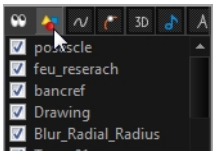
### How to show or hide Xsheet columns using the Column List





1. In the Xsheet toolbar, click the Show Column List  button.
2. On the right side of the Functions section, click the Expand  button to display the Column List section.
3. In the Column List section, select the columns to display and deselect the columns to hide.



### How to show or hide an Xsheet column type using the Column List

1. In the Column List section, click the button corresponding to the column type you want to show or hide.



Column Type	Action
	Show/Hide All Columns
	Show/Hide Drawing Columns
	Show/Hide Function Columns
	Show/Hide 3D Path Columns

3D	Show/Hide 3D Rotation Columns
🎵	Show/Hide Sound Columns
A	Show/Hide Annotation Columns

### How to show or hide function columns on the left side of the Xsheet view

1. Right-click on a column and select **Tag > Function Columns Visible** or **Function Columns Invisible**.

## Modifying the Look of the Column

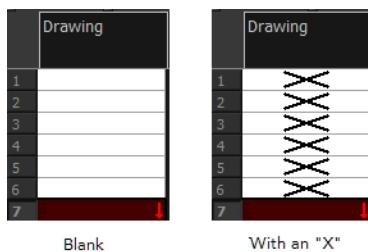
In Harmony, you can modify the way the column displays drawings, empty cells and the column width.

You can modify the following elements:

- Empty cells
- Row units
- Held exposure
- Column width

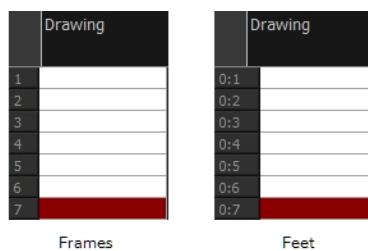
### How to modify the look of empty cell

1. From the Xsheet menu, select **View > Empty Cells > With an "X"** or **Blank**.



### How to modify row units

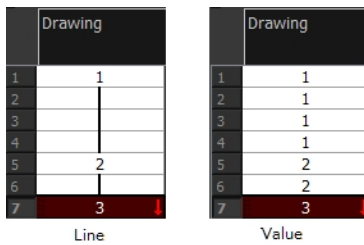
1. From the Xsheet menu, select **View > Row Units > Frames** or **Feet**.





## How to modify the look of a held exposure

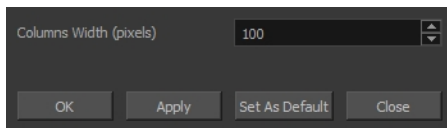
1. In the Xsheet menu, select **View > Held Exposures > Line** or **Value**.



## How to modify column width

1. In the Xsheet view, select any column to modify the width.
2. From the Xsheet menu, select **View > Set Columns Width**.

The Xsheet Column Width dialog box opens.



3. In the Column Width field, enter the desired width in pixels.
4. Do one of the following:
  - ▶ Click **OK** to validate and close the dialog box.
  - ▶ Click **Apply** to validate the operation and keep the dialog box opened to adjust the next column's width.
  - ▶ Click **Set As Default** to create all the new columns to this width.
  - ▶ Click **Close** to cancel the operation.
5. To restore all columns to the default value, in the Xsheet menu, select **View > All Columns to Default Width**.

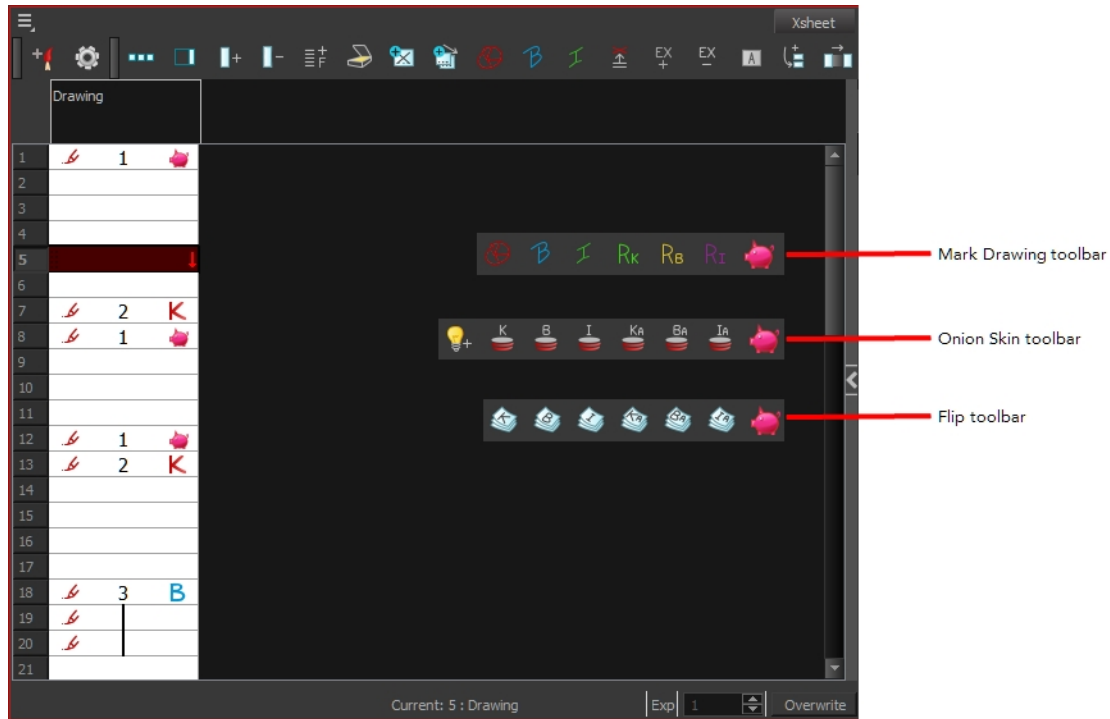
## Drawing Identification

In the Xsheet view, you can identify drawings as Key, Breakdown or In-between. This helps to keep the Xsheet well organized while animating.

When working with several animators, directors or even other studios, the necessity for retakes will often arise. Harmony gives you the possibility to mark new drawings as either Retake Key, Retake Breakdown, or Retake In-betweens.

If your production requires you to mark drawings with a custom marker, you also have the option to create your own.

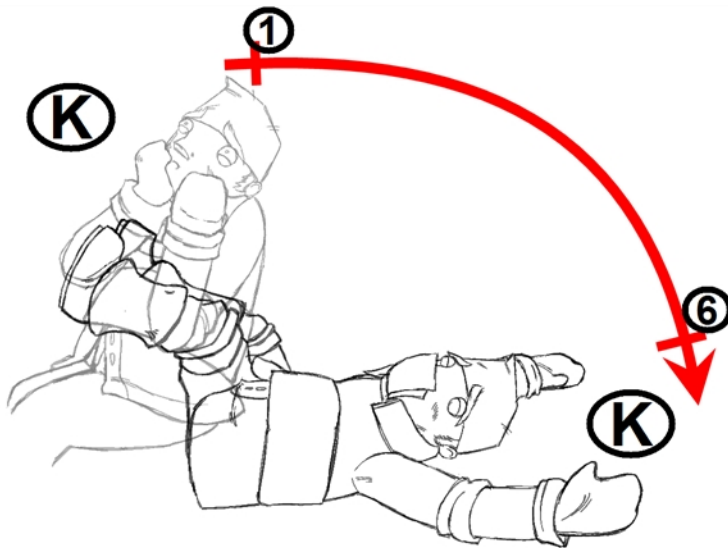
Make custom marks for the Xsheet by creating your own icons, then cutting, pasting and changing a bit of code. Not only is it possible to have your custom mark appear in the Xsheet and Mark Drawing toolbars, but also in the Onion Skin and Flip toolbars.



**NOTE:** You can create custom shortcuts for the Drawing Identification options in the Preferences dialog box.

## Key Drawing

A key drawing is a visually significant pose in a movement, often an extreme position. For example, if a character that is sitting down falls on his back, the key poses would be the character sitting and the character on his back. Of course, it may vary from one animation to another.



## Breakdown Drawing

A breakdown drawing is a pose somewhere between two key poses that better shows the movement. Most animation moves are arcs, such as an arm waving, somebody bending, or a leg walking. All of these movements are rotations. The breakdown pose is used to describe this curve better.

The breakdown drawing is then used to indicate secondary poses, also called the *follow-through*. These actions can be a big stomach jiggle as somebody jumps, a cloak floating behind somebody that is running, or arms moving after the main body action. These moves will generally have a different timing than the primary action. They will mainly start later and finish later. So, the breakdown drawings are used to complete the key drawings.




Note that a breakdown drawing is not always placed exactly in the middle of two keys. It will often be closer to one or the other depending on the timing and the action. Also, you can have more than one breakdown pose between two keys.

### How to mark a drawing as Key, Breakdown or In-between

1. From the top menu, select **Windows > Toolbars > Mark Drawing**.

The Mark Drawing toolbar displays.



2. In the Xsheet view, select the cell you want to identify. This option is not available in the Timeline view.
3. In the Mark Drawing toolbar, click one of these buttons: Mark as Key Drawing , Mark as Breakdown Drawing  or Mark as In-between Drawing . In the Xsheet menu, you can also select **Drawing > Mark Drawing As > Key Drawing, Breakdown Drawing, In-between Drawing, Retake Key, Retake BD and Retake IB**.
  - ▶ If you selected Mark as Key Drawing, a **K** icon appears in the cell.
  - ▶ If you selected Mark as Breakdown Drawing, a **B** icon appears in the cell.
  - ▶ If you selected Mark as In-Between Drawing, there is no icon displayed in the cell since it is used to remove a Key or Breakdown marker.

Drawing_1	
1	1 K
2	
3	
4	
5	
6	
7	2 R <sub>o</sub>
8	
9	
10	
11	
12	
13	3 B
14	
15	
16	
17	4 R <sub>k</sub>
18	
19	
20	5
21	
22	6 R <sub>t</sub>
23	
24	
25	
26	7 K
27	
28	
29	
30	
31	8

### How to create custom markers

1. With a bitmap editing software, create the following icons in PNG format:
  - ▶ Mark Drawing Toolbar icon (24 x 24 pixel)
  - ▶ Onion Skin Toolbar icon (24 x 24 pixel)
  - ▶ Flip Toolbar icon (24 x 24 pixel)
  - ▶ Xsheet Column icon (16 x 16 pixel)
2. Close Harmony.
3. When your icons are ready, open the Toon Boom Harmony **drawingTypes.d** folder.

In Harmony Server, the path is global for all users so you must create the folder and place in /USA\_DB.

- ▶ /USA\_DB/drawingTypes.d

#### NOTE:

If the **drawingTypes.d** folder does not exist, you must create it. To do so, copy the **resources** folder from the following location.

- Windows: **Start > Programs > Harmony 12.1 Premium**


- Mac OS X: **Applications > Toon Boom Harmony 12.1Premium > resources > drawingTypes.d**
- Linux: `/usr/local/ToonBoomAnimation/harmony_12/lnx86_64/bin/Stage/resources/drawingTypes.d`

4. Paste your icons in the `drawingTypes.d` directory.
5. In the same directory, open the `drawingTypes.xml` file in a text editor.
6. For each custom icon you want to create, add the following line. Make sure to place it before this closing tag: `</DrawingTypes>`.
  - `<DrawingType text="NewButtonName" pixmapFile="XsheetIcon.png" commandIcon="MarkDrawingIcon.png" flipIcon="FlipIcon.png" onionIcon="OnionIcon.png" />`
7. In that line, replace the following information with your new icon information:
  - `NewButtonName`: Write the name of your new marker. This name will appear in the button tooltip.
  - `XsheetIcon.png`: Write the name of the icon that you created to appear in the Xsheet column. Include the file extension.
  - `MarkDrawingIcon.png`: Write the name of the icon that you created to appear in the Mark Drawing toolbar. Include the file extension.
  - `FlipIcon.png`: Write the name of the icon that you created to appear in the Flip toolbar. Include the file extension.
  - `OnionIcon.png`: Write the name of the icon that you created to appear in the Onion Skin toolbar. Include the file extension.
8. Save the file and close it.
9. Start Harmony.





## Xsheet Thumbnails

When there are a large number of columns in the exposure sheet, it's not easy to quickly identify a particular column. Displaying the column thumbnails makes this easier. This option displays a small thumbnail picture of the current frame below the column header.

### How to display the thumbnails

1. Do one of the following:
  - In the Xsheet toolbar, click the Show Thumbnails  button.
  - In the Xsheet menu, select **View > Show Thumbnails**.

The thumbnails appear.

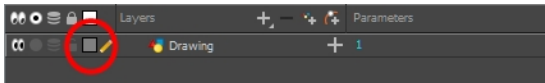
	Bg_Camp	Moon Scene_3	Stars Scene_2	Sky Scene	Fire_Colo	Lumberjack_D_H Lumberjack_D_C
1						
2	Camp	Moon	Stars	Sky	1	1
3					2	2

## Changing the Colour of a Layer or Column

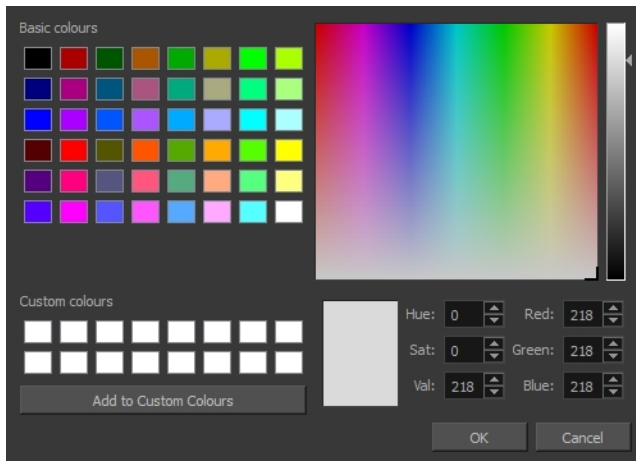
To easily identify elements in the Timeline or Xsheet view, you can change the colour of layers and columns. The colours you choose will be reflected in the Node view.

### How to change the layer's colour in the Timeline view

1. In the Timeline view, click the Change Track Colour  button of the layer you want to modify.



2. In the Select Colour dialog box, select a new colour for your layer.



3. Click **OK**.

The layer's background colour is updated. In a Drawing layer, exposed cells are the brighter, selected colour for easy identification. The corresponding column colour is also updated in the Xsheet.

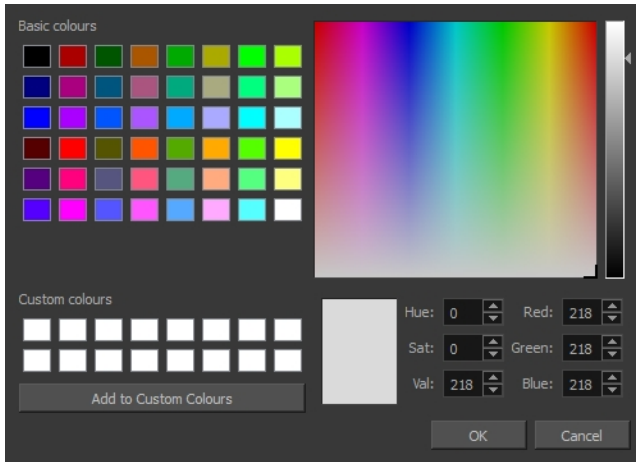


### How to reset a layer's colour in the Timeline view

1. In the Timeline view, select the layers to reset.
2. In the Timeline toolbar, click the Default Track Colour  button (you may have to customize the toolbar to display it).

### How to change a column's colour in the Xsheet view

1. In the Xsheet view, select one or more columns to modify.
2. Right-click on the column's header and select **Colour > Change Columns Colour**.
3. In the Select Colour dialog box, select a new colour for your columns.



4. Click **OK**.

The column's colour is updated. The corresponding column colour is also updated.

	Plant_000	Tower_000	Tower2_000	Moon
1	1	1	1	1
2				
3				
4				
5				
6				
7				
8				
9				

### How to reset the column's colour in the Xsheet view

1. In the Xsheet view, select the columns to reset.
2. Right-click on the column's header and select **Colour > Default Columns Colour**.

## Setting Scene Markers

Scene markers are visual indicators displayed at the top of the Timeline view in the frame counter area. You can use it to denote anything relevant to your work. You can indicate the frames you want to clean up, a change in action, an impact, or where you intend to apply an effect. You can also add a note to a scene marker, which is displayed when you hover over the scene marker.

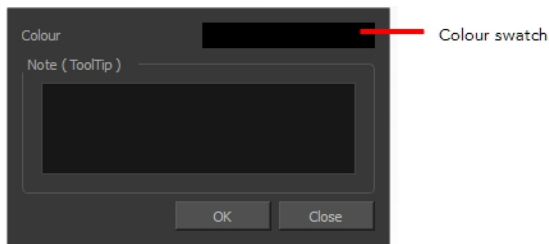
There are two ways to add a scene marker. You can mark the current frame or make a frame range selection and mark the whole section.

## How to mark the current frame

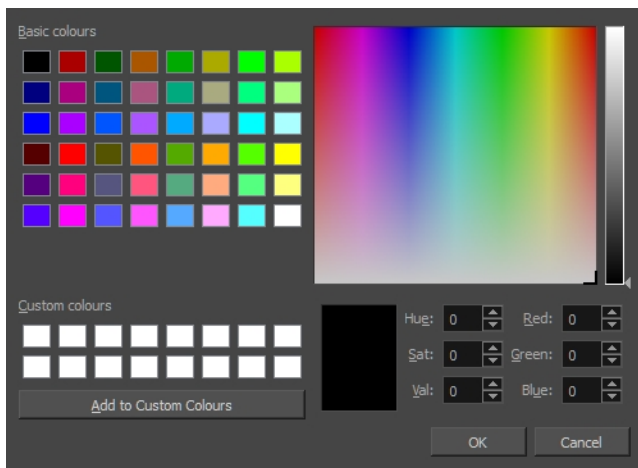
1. In the Timeline view, make sure the red playhead is set on the frame you want to mark. Even if you right-click on a different frame, the scene marker will be created on the current frame on which the playhead is positioned.
2. Right-click in the frame counter area and select **Scene Markers > Mark Current Frame**.



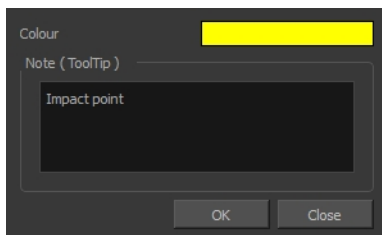
The Timeline Scene Marker dialog box opens. The Colour box displays a black colour swatch, or the colour of the last scene marker you created.



3. Click the Colour swatch to open the Mark Colour dialog box and select a colour for the scene marker. Click **OK**.



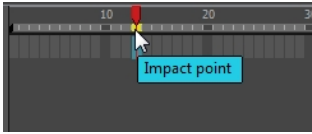
4. In the Note field, enter text to display as the tooltip and click **OK**.



In the Timeline view, the scene marker is displayed at the current frame.



5. Hover over the scene marker to display its tooltip.

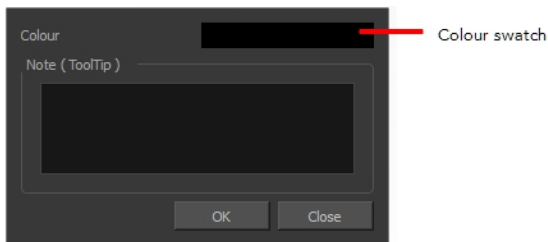


## How to create a scene marker on a frame range

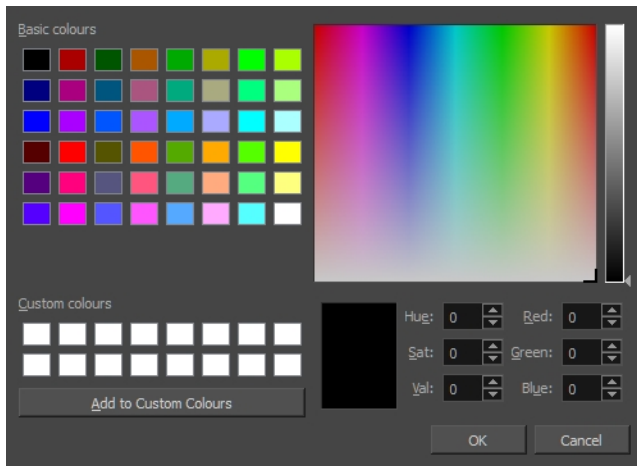
1. In the frame counter area of the Timeline view, select the frame range you want to mark.



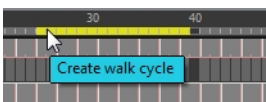
The Timeline Scene Marker dialog box opens. The Colour box displays a black colour swatch, or the colour of the last scene marker you created.



2. Click the Colour swatch to open the Mark Colour dialog box and select a colour for the scene marker. Click **OK**.



3. In the Note field, enter text to display as the tooltip and click **OK**.  
In the Timeline view, the scene marker is displayed over the selected frame counters.
4. Hover over the scene marker to display its tooltip.



## How to edit a scene marker

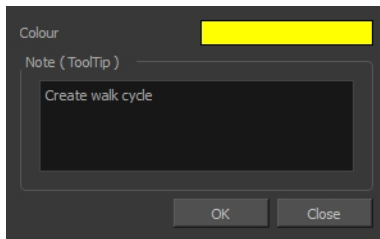
**NOTE:** If you select only a part of a scene marker, you will not open the scene marker for editing. You will only be able to create a new scene marker to overwrite it.

1. In the Timeline view frame counter, select the entire scene marker.



2. Right-click the selection and select **Scene Markers > Edit Scene Marker**.

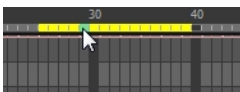
The Timeline Scene Marker dialog box opens.



3. Make your changes.
4. Click **OK**.

## How to delete a scene marker

1. In the Timeline view frame counter, at least one frame counter in the scene marker you want to delete.



2. Right-click the selection and select **Scene Markers > Delete Scene Marker**.

## Setting Tempo Markers

Tempo markers are used to synchronize your animation with a musical score. This lets you reproduce the FPB (Frames Per Beat) and use the tempo signature as tempo markers. The Xsheet view allows you to pace your animation according to the tempo or beat of the soundtrack music or to any rhythmic sound, such as the ticking of a clock or water leaking from a spout.

	Drawing	Limpa_Colour	Kalimba 100%
1	1	1	
2		2	
3		3	
4		4	
5		5	
6		6	
7		7	
8		8	
9		9	
10		10	
11		11	
12		12	
13		13	
14		14	
15		15	
16		16	
17	2	17	
18	3	18	
19	4	19	
20	5	20	
21	7	21	
22	8	22	
23	9	23	
24	10	24	
25	11	25	

### How to set the tempo markers

1. In the Xsheet menu, select **View > Set Tempo Marker**.

The Tempo Marker dialog box opens.

2. Reproduce the tempo and beat value of your music or sound for the Xsheet view marker display.
  - ▶ **Starting Frame:** Enter the number of the frame where you want the tempo markers to begin.
  - ▶ **Frames/Beat:** Set the frames per beat value. This will determine the frequency (in frames) in which a beat marker will appear. Keep in mind that, by default, 24 frames represent 1 second.
  - ▶ **Beat/Bar:** Set the tempo of your music or sound. This will determine the frequency (in beats) in which a tempo marker will appear in the Xsheet view.
3. Click **OK**.

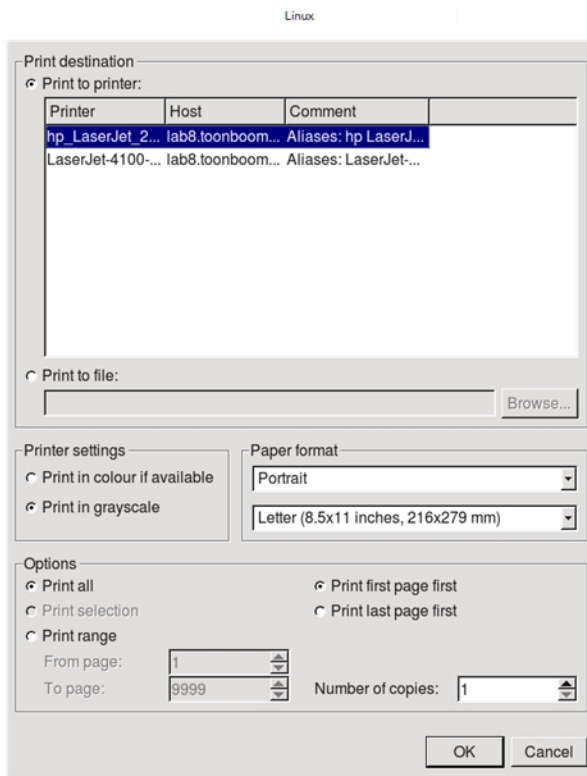
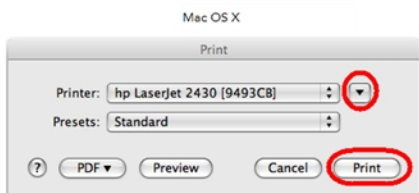
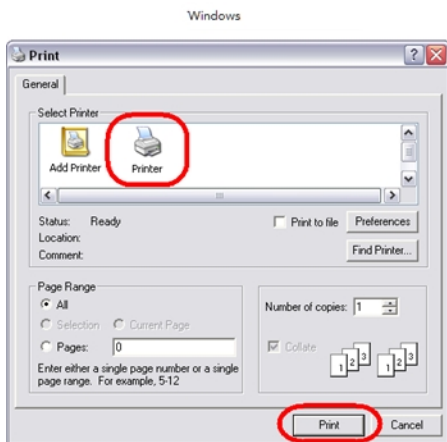
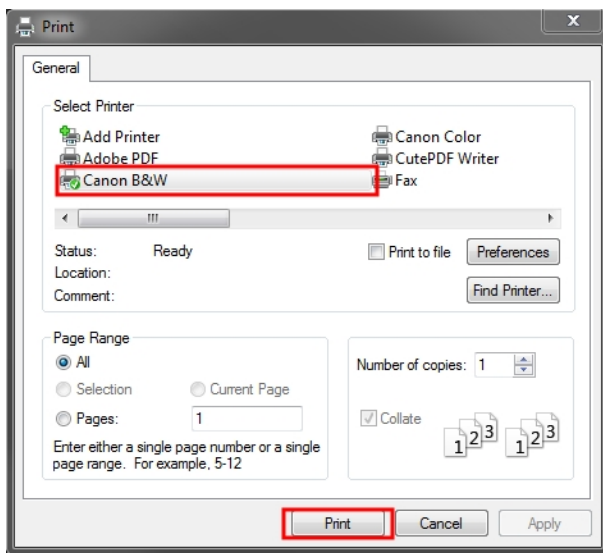
## Printing the Xsheet

Once you have marked all the information, corrections, and timing you want in the Xsheet view, you can print your exposure sheet. Printing the Xsheet allows you to take it with you to your animation table or give a copy to the animator. You can also use it to create your Xsheet skeleton directly in Harmony.

## How to print your exposure sheet


1. Select **File > Print > Xsheet**.

The Print dialog box opens.



2. To set up your print:

- **Windows:** In the Select Printer section, select your printer and adjust the rest of the printing settings.


- ▶ **Linux:** In the Print Destination section, select your printer and adjust the rest of the printing settings.
- ▶ **Mac OS X:** In the Printer section, select your printer and adjust the rest of the settings by clicking on the Parameters  button. You can also click **PDF** and select an option from the menu if you want to save a PDF version of your exposure sheet.

**NOTE:** Refer to your printer user guide to learn more about its options.

3. Do one of the following:

- ▶ **Windows and Mac OS X:** Click **Print**.
- ▶ **Linux:** Click **OK**.

	A	B	C	D	Annotation
1	1	001	6	1	
2	2	001	6	1	
3	3	001	9	1	
4	4	001	9	1	
5	5	001	9	1	
6	6	001	9	1	
7	7	001	1	1	
8	8	001	1	1	
9	9	001	3	1	
10	10	001	3	1	
11	11	001	1	1	
12	12	001	1	1	
13	13	001	5	1	
14	14	001	5	1	
15	15	001	2	1	
16	16	001	2	1	
17	17	001	7	1	
18	18	001	7	1	
19	19	001	2	1	
20	20	001	2	1	
21	21	001	7	2	
22	22	001	7	3	
23	23	001	4	4	
24	24	001	4	5	
25	25	001	9	6	
26	26	001	9	7	
27	27	001	2	8	
28	28	001	2	9	
29	29	001	4	10	



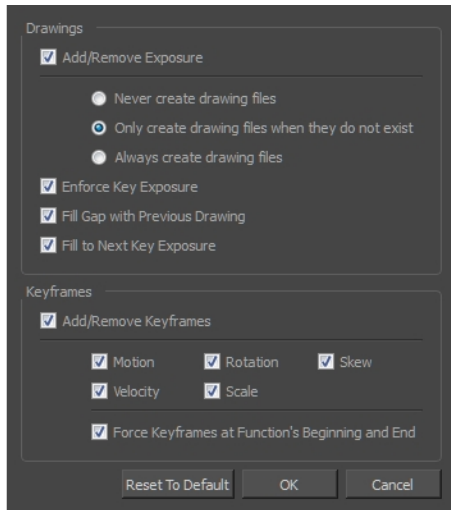
## Modifying Paste Presets

When pasting key frames and exposures, you can modify the existing presets to your liking. There are three presets you can modify: the default presets for both key frames and exposures, key frames only and exposures only.

### How to modify paste presets

1. From the Timeline view menu, select **Edit > Modify Paste Presets** and one of the following options:
  - ▶ **All** to edit the default paste preset settings.
  - ▶ **Key Frame** to edit the preset settings for pasting key frames.
  - ▶ **Exposure** to edit the preset settings for pasting exposures.

The Edit Paste Presets dialog box opens.



2. Refer to the following table and edit the presets as desired.

**Edit Paste Preset Dialog Box Parameters**

Parameter	Description
Drawings	
Add/Remove Exposure	<b>Never create drawing files:</b> Never create drawing files: When adding exposures to a drawing layer, drawing files will not be created.
	<b>Only create drawing files when they do not exist:</b> When adding exposures to a drawing layer, new drawings will be created only when drawings with the same name do not already exist in the destination.
	<b>Always create drawing files:</b> When adding exposures to a drawing layer, new drawings will always be created. If drawing files with the same name already exist, Harmony will create a new name for the drawing.
Enforce Key Exposure	If there are key exposures that exist on copied drawings, they are preserved when pasting. No key exposures are added. This is the default behavior when pasting.
Fill Gap with Previous Drawing	Fills selected area in the Xsheet or Timeline view with the previous drawing.
Fill to Next Key Exposure	Fills selected area till the next key exposure.
Keyframes	
Add/Remove Keyframes	<b>Motion:</b> Copies the properties of the selected motion keyframe to the new frame.
	<b>Velocity:</b> Copies the properties of the selected velocity keyframe to the new frame.
	<b>Rotation:</b> Copies the properties of the selected rotation keyframe to the new frame.

	<b>Scale:</b> Copies the properties of the selected scale keyframe to the new frame.
	<b>Skew:</b> Copies the properties of the selected skew keyframe to the new frame.
	<b>Force Keyframes at Function's Beginning and End:</b> Adds a keyframe to the beginning and end of the pasted function, reproducing the source function.





# Chapter 7: Character Building



Harmony is a great tool for building characters. You can use different techniques and features to break down your puppets.

This chapter will guide you through all the steps to create a complete simple rig. Harmony allows you to create very advanced puppets using deformations, hierarchies and z ordering. As you practice and get familiar with those concepts, you will be able to develop more complex rigs and combine various advanced features.

This chapter contains the following topics:

- [About the Model](#) on page 346
- [Relative Sizes](#) on page 347
- [Studying the Model](#) on page 350
- [Setting the Default Separate Position Preferences](#) on page 353
- [Naming Conventions](#) on page 353
- [Disabling the Animation on Drawing Layers](#) on page 355
- [Art Layers](#) on page 357
- [Breaking Down the Character](#) on page 364
- [Ordering the Layers](#) on page 374
- [Rigging](#) on page 378
- [Adding Extra Drawings](#) on page 395
- [Setting the Pivots](#) on page 397
- [Skeleton Optimization](#) on page 399
- [Storing the Character in the Library](#) on page 404
- [Appendix](#) on page 408

## About the Model

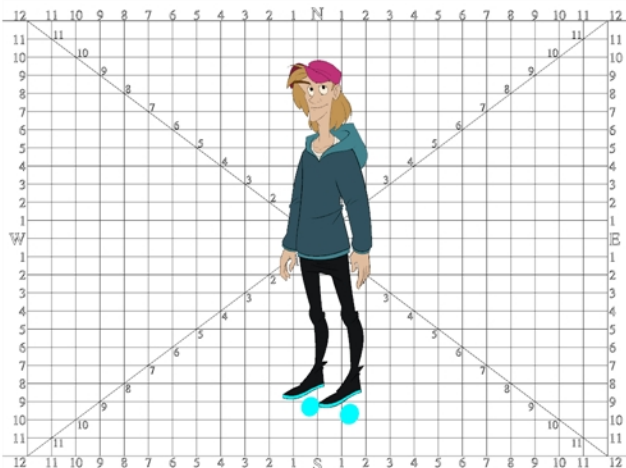


To begin breaking down your puppet, you must first import your character into a new project. You can also draw your character directly in the scene.

You can import your character in several different formats:

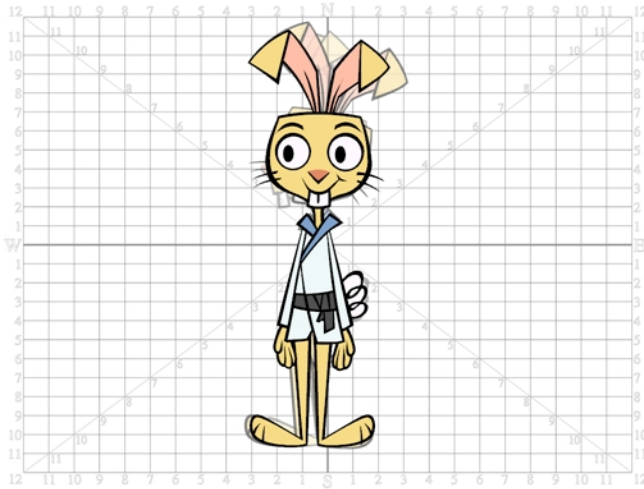
- Library template—see [Library on page 459](#)
- Bitmap image or picture—see [Compositing Guide > Import chapter > Import Bitmap Images topic](#)
- External vector format—see [Compositing Guide > Import chapter > Import AI and PDF Files topic](#)

## Model Alignment



When setting the character model in your scene, we recommend that you to center it in the Camera view and scale it to fit inside the safe area frame—see [Field Chart on page 349](#).

If you have several views of your character, place each view in a separate cell and center them one on top of another. This will facilitate the break down process and ensure that all of your puppets are aligned and the same size.

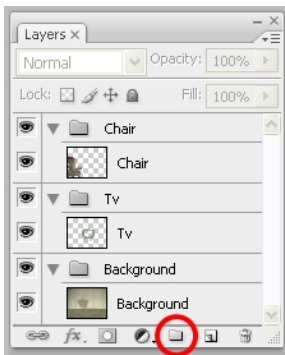


## Photo Puppets

If you are creating a cut-out puppet out of photos, break down the different parts in a bitmap editing software. Then, import your parts and vectorize them as textured images.

A good way to set and import your bitmap parts is to organize them in a multilayered PSD file.

In Adobe Photoshop, organize your file so that all your layers are “grouped” into individual folders, or that all the elements you want to import as a single layer in Harmony are grouped together in their own folder. Any layer that is not in a folder group, by itself or otherwise, will not be imported.



## Relative Sizes

Understanding the relative size of every character and prop is important for maintaining consistency and structure throughout your project.

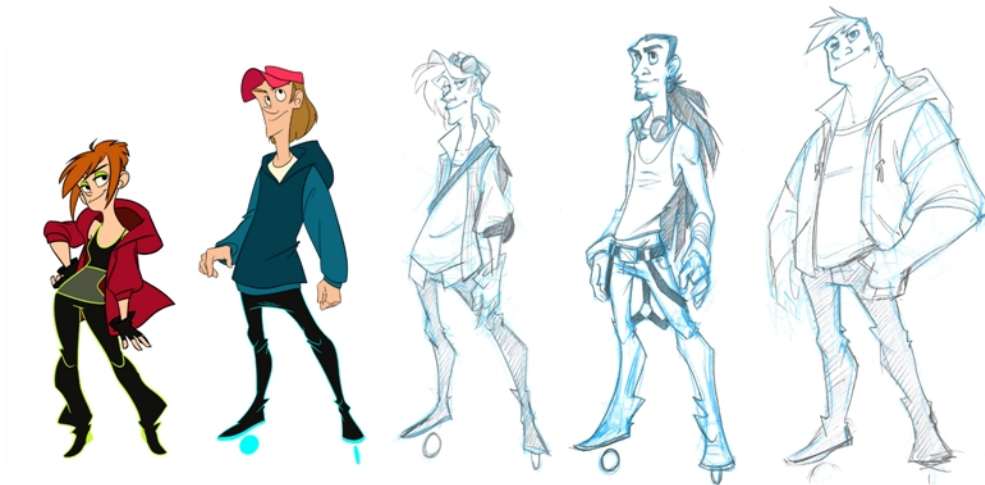
A production may contain many characters and props. It is not unusual for these to have been created by different people. If there is no size control implemented, the characters and elements created by different artists can vary greatly in size. When this occurs, the characters that are put together in a scene will be out of proportion. The animator or person doing the scene setup will then have to scale them to the correct size.

When a character or a prop is scaled down, the outline will get increasingly thinner. By the time the element is scaled to its proper size, the outline may be so thin that the difference between one character's outline and another's will not look very good.

These tips will help you to create and determine the correct relative sizes for each puppet:

- [Line Up](#) on page 348
- [Field Chart](#) on page 349
- [Brush Size](#) on page 349

## Line Up

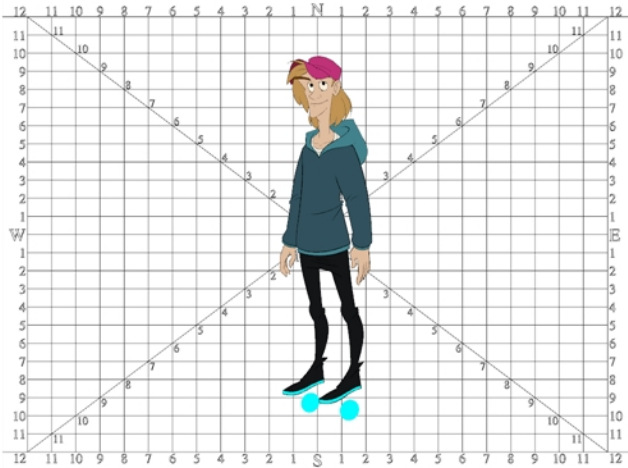


A line up consists of copying and pasting all of your character designs into the same drawing and then scaling them so they are in proportion with each other. This line up is very important and should be handed to any animator, layout and posing artist, or scene setup person working on the project.

For the prop design, it is recommended that you paste one of the main character's hands or even the full body beside the prop. This enables the animator to know what size to draw or set the prop.


In your character design scene, it is a good idea to create a layer for the character line up. The line up is usually done during the character design step. When the character builder imports the model to the break down scene, the size relation should be correct.

## Field Chart



The field chart in Harmony is a tool that is very useful when setting the height of characters and props. You can display the field chart using the Show Grid option in the Camera and Drawing views.

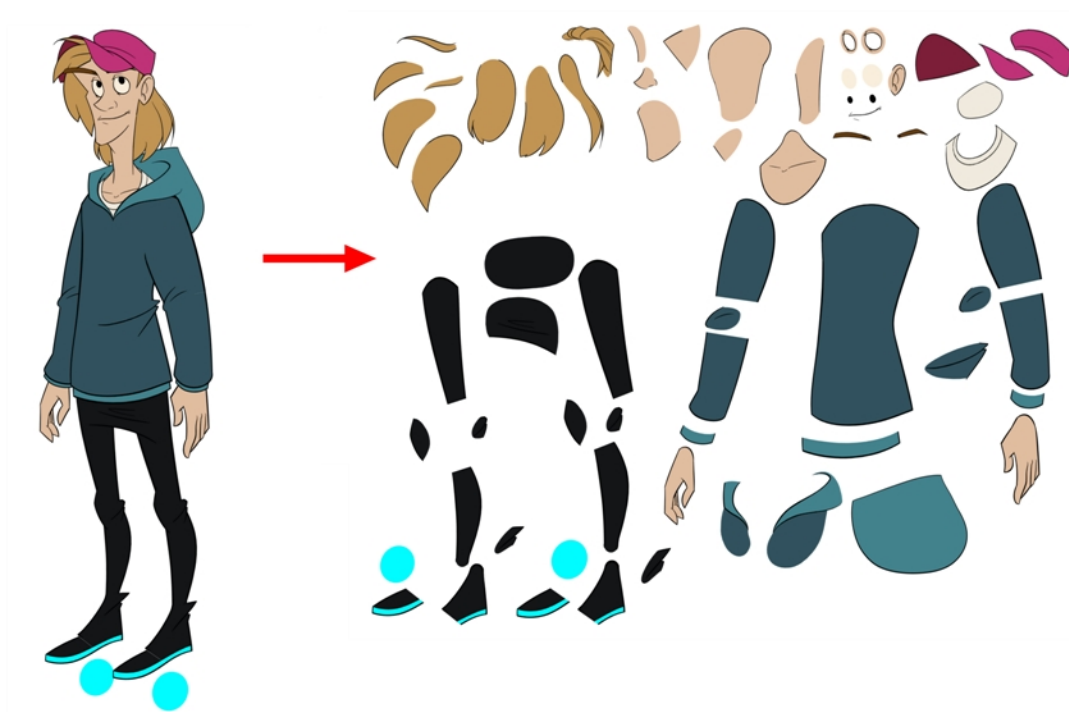
### How to display the field chart

1. Do one of the following:
  - ▶ From the top menu, select **View > Grid > Show Grid**.
  - ▶ Press Ctrl + ' (Windows/Linux) or ⌘ + ' (Mac OS X).
  - ▶ Click the Show Grid  button in the Camera View and Drawing View toolbars.

## Brush Size

There are a variety of pens and brushes in Harmony and you can also create and save your own. It is a good idea to create and save pens with precise sizes and parameters to trace and design your models and break downs—see [Drawing with the Brush Tool on page 61](#).

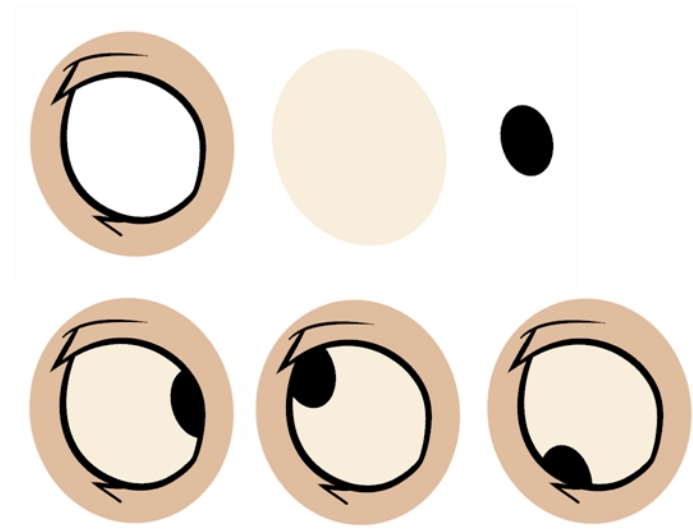
## Studying the Model



Now that you have imported or designed your model, the next step is to analyze it. This is to determine what parts will be broken apart and how they will be divided. Will the hair be separated into one, two or three sections? Will the hand be separated from the sleeve? To determine what is best for your character, observe the model in the Camera or Drawing view.

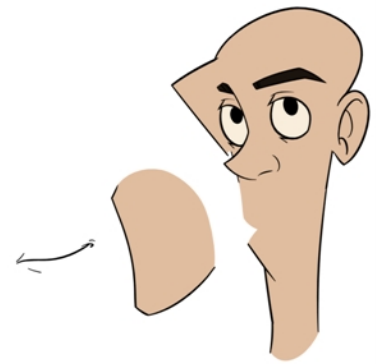
- [Eyelids and Pupils](#) on page 351
- [Separating the Mouth Elements and Jaw](#) on page 351
- [Keeping Fingers Attached to the Hand](#) on page 351
- [Flipping Logos](#) on page 352
- [Complete and Overlapping Pieces](#) on page 352

## Eyelids and Pupils



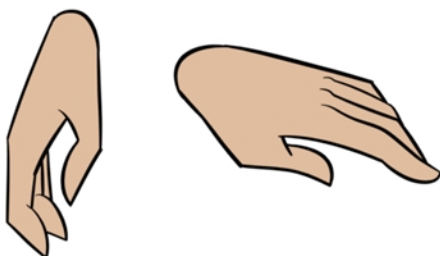
For increased flexibility when animating the eyes, you can split them into three layers: the eyeball, the pupil and the eyelid. The eyelid layer is used for the blink and to cut the pupil when it gets too close to the side of the eyeball. For a more advanced break down, the two eyes are separated on their own individual three-layer sets.

## Separating the Mouth Elements and Jaw



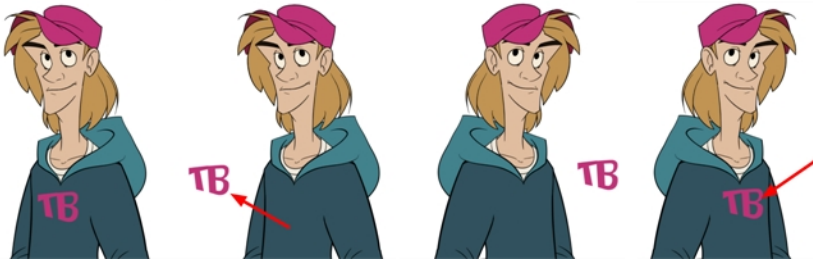
To get a greater level of flexibility, you can separate the jaw from the head. You can also separate the mouth shape, teeth, tongue and interior one from another.

## Keeping Fingers Attached to the Hand



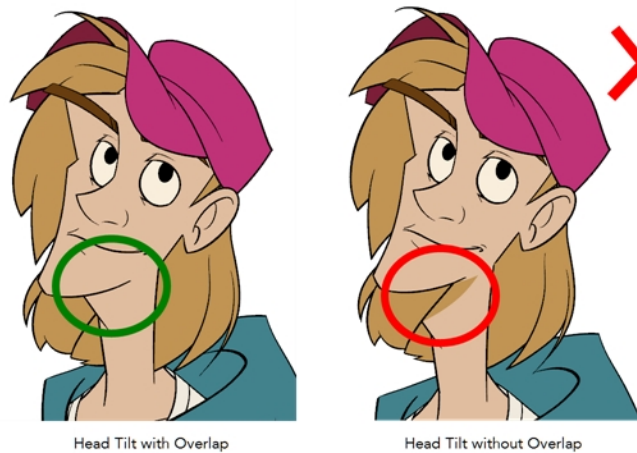
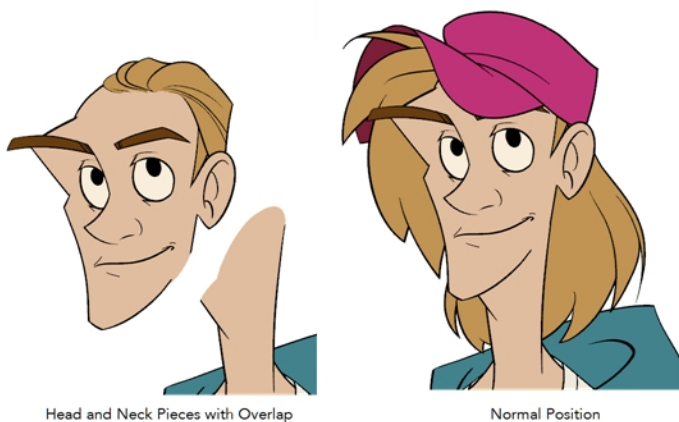
To avoid needlessly complicating the break down, the fingers are not usually separated from the hand. The full hand is a single layer with a bank of different hands stored inside. This technique is easy to work with and produces a less mechanical effect.

## Flipping Logos



You can separate logos and letters that appear on a character or a prop. This allows you to flip and reuse a character's puppet.

## Complete and Overlapping Pieces



For a better result with animated parts, it is important to understand that they must be properly overlapping and complete. A common mistake is to trace the part just as it appears on the model.



## Setting the Default Separate Position Preferences

Before you adding layers to your puppets, make sure the Default Separate Position for Elements and the Default Separate Position for Pegs preferences are enabled.

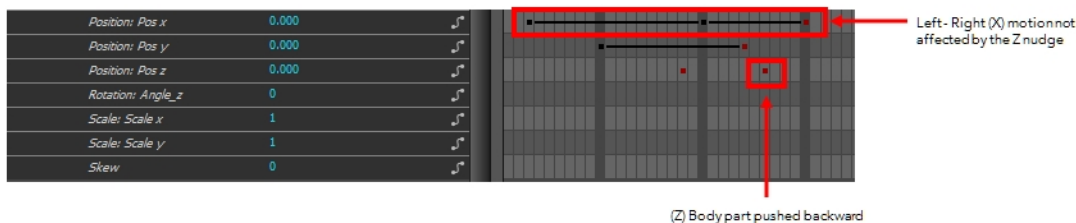
With the Default Separate Position preferences selected, when you create new layers, their X, Y and Z axes are independent from each other.

By default, the Default Separate Position for Elements preference is enabled. For cut-out animation, you want to have three independent axes so you can control them individually.

When you lock the three positions together, each time you add a keyframe, it is added on all three positions at the same time.



When you separate the three positions and add a keyframe on one axis, it is not added on the other two. This gives you more freedom when animating with motion keyframes and nudging parts forward and backward over time.



### How to set the Default Separate Position options

- Do one of the following:
  - Windows/Linux: Select **Edit > Preferences**.
  - Mac OS X: Select **Stage > Preferences**.
  - Press **Ctrl + U** (Windows/Linux) or **⌘ + U** (Mac OS X).
- In the Preferences dialog box, select the **General** tab.
- In the Settings section, select the **Default Separate Position for Elements** and the **Default Separate Position for Pegs** options.
- Click **OK**.

## Naming Conventions

When working on a production, it is critical to keep work well organized with a naming convention chart before starting the project. It is crucial that everyone follows the criteria laid out in the naming convention chart. When dealing with thousands of characters, pieces and puppets, it is easy to get lost.

## Adding a Prefix or Suffix to a Layer


It is highly recommended that you incorporate a naming convention for the layers. This will be very convenient in later steps. We suggest that you add one or two letters for the character/prop name before the part name and an "R" or "L" for right and left to identify the corresponding character/prop:

- Character Abby's right arm = ab\_r\_arm.

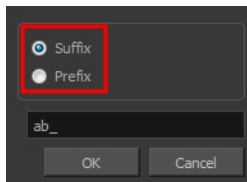
If you plan to work with different angles for your characters (front, side, three-quarter, back), you can add one or two letters to identify the angle:

- Character Abby's right arm, front view = ab\_r\_arm\_f.

### How to add a prefix to a series of layers

1. In the Network or Timeline view, select all the nodes or layers to rename or press Ctrl + A (Windows/Linux) or ⌘ + A (Mac OS X).
2. In the Scripting toolbar, click the Add Prefix or Suffix Script  button. If the Scripting toolbar is not visible, you can display it by selecting **Windows > Toolbars** from the top menu. If the script is not available in your Scripting toolbar, refer to Fundamentals Guide > Interface chapter > Managing Toolbars topic to learn how to add it.

The Add Prefix or Suffix dialog box opens.



3. Select the **Prefix** or **Suffix** option depending on what you want to add to the layer's name.
4. Type the prefix or suffix information to be added to the layer's name.
5. Click **OK**.

## Naming the Drawings

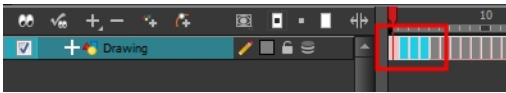
We recommend that you use a naming convention for your drawings. If you combine all the angles of a character in the same breakdown scene, it is a good idea to identify each angle used.

	ab_arm_l	ab_hand_l	ab_head	
1	f1	f1	f1	Front angle drawings
2	f2	f2	f2	
3	f3	f3	f3	
4	f4	f4	f4	
5	q1	q1	q1	Side angle drawings
6	q2	q2	q2	
7	q3	q3	q3	
8	q4	q4	q4	
9	s1	s1	s1	Side angle drawings
10	s2	s2	s2	
11	qb1	qb1	qb1	Back angle drawings
12	qb2	qb2	qb2	
13	b1	b1	b1	Back angle drawings
14	b2	b2	b2	
15				
16				

Before breaking down the characters for your production, we recommend that you create a drawing name convention that represents the angle used. For example, use "f" for front, "s" for side, "q" for three-quarter so that the drawing name looks like this: f1, f2, f3, s1, s2, etc. This will be quite useful during animation and drawing substitution. Since drawings are displayed in alphabetical and numerical order, all the drawings for the front view will be together, then all the drawings for the three quarter view, and so on.

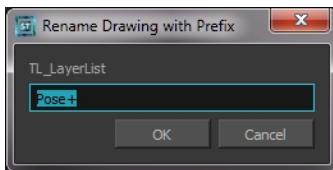
### How to add a prefix to one or more drawings

1. In the Timeline view, select the drawing range to rename.

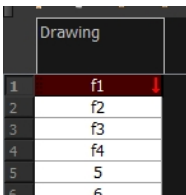


2. Do one of the following:
  - ▶ Right-click on the selection and select **Drawings > Rename Drawing with Prefix**.
  - ▶ From the top menu, select **Drawing > Rename Drawing with Prefix**.

The Rename Drawing with Prefix dialog box opens.



3. Type the characters you want to add before the current drawing name.
4. Click **OK**.



**NOTE:** To rename a drawing, select the drawing and use the Rename Drawing option. **Do not double-click on the frame** and write a new name, as this will create a new drawing and hide your actual one. Note that the hidden drawing has not been deleted and is still located within the element folder. Simply retype the name and it will reappear.

## Disabling the Animation on Drawing Layers

By default, a drawing layer can be animated, but Harmony lets you disable this feature. Being able to switch your drawings so they can no longer be animated without a peg has certain advantages. It means that you can access the drawing substitution feature for this drawing layer, while being able to create keyframes on its parent peg. This feature is also available for backward compatibility when bringing in templates created in older versions of Harmony, so as not to lose their offset keyframes or drawing substitution keyframes.

When selecting the element in the Camera view, the actual drawing layer is selected, but the motion you will create will automatically be transposed to the peg layer. You cannot animate (add keyframes) directly onto the

drawing layer if the option is disabled. You will still be able to perform certain offset movements in the Transformation tab of the Layer Properties, but not using any of the animation tools in the Tools toolbar.

There are two ways to disable animation on drawing layers, via the Layer Properties window and the Preferences dialog box. When you disable animation in the Layer Properties window, it affects only the selected layer and not any others.

If you prefer this style of animation and want every drawing element that you create to not be animated, you can disable the Element Node "Animate Using Animation Tools" Default Value preference. This will disable the Animate Using Animation Tools option on all the new layers you will create from that point on so you don't have to do this through the Layers Properties window for every layer. It is recommended to disable this preference before starting a new character rig.

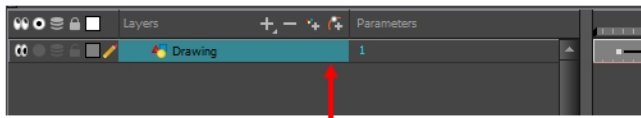
### How to disable animation in the Layer Properties view

1. In the Timeline view, double-click on a layer.

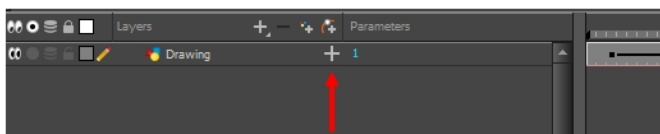
The Layer Properties window opens.

2. In the Controls tab, disable the **Animate Using Animation Tools** option.

Notice that the layer functions are no longer available in the Timeline view.



Layer without functions



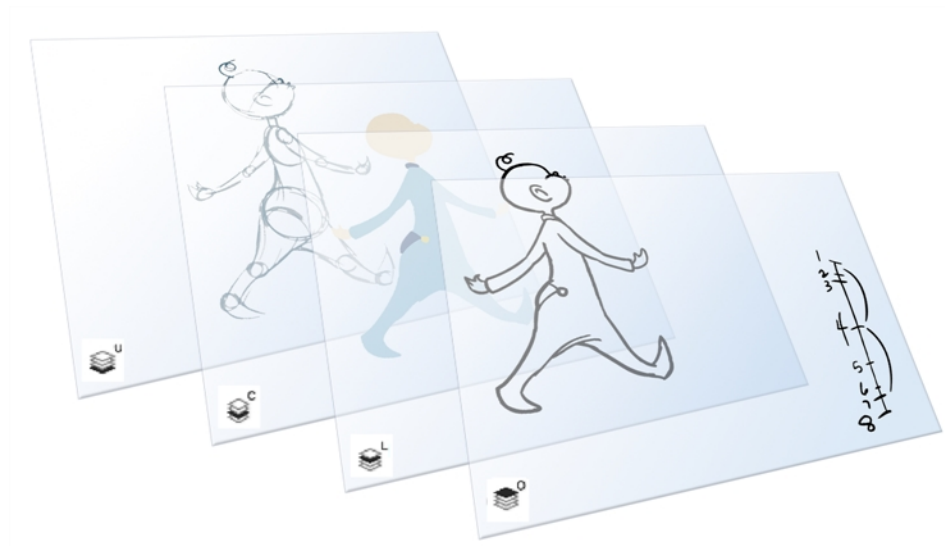
Layer with functions available

3. Click **Close**.

### How to disable the option in the Preferences dialog box

1. Do one of the following:
  - ▶ Windows/Linux: Select **Edit > Preferences**.
  - ▶ Mac OS X: Select **Stage > Preferences**.
  - ▶ The keyboard shortcut is Ctrl + U (Windows/Linux) or ⌘ + U (Mac OS X).
2. Select the **Advanced** tab.
3. In the Advanced Options section, deselect the **Element Node "Animate Using Animation Tools" Default Value** option.

## Art Layers

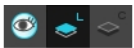


Art layers give you the possibility to divide the artwork in your drawing on different layers. For example, you can separate the outline and colour fill on two art layers, similar to 1950s traditional cell animation. These art layers are contained within a single drawing as opposed to the layers in the Timeline view or Xsheet columns where individual drawings with individual timing are stacked one on top of the other—see [Creating Strokes on page 362](#).

Toon Boom Harmony drawings include four art layers.

-  [Overlay on page 358](#)
-  [Line Art on page 359](#)
-  [Colour Art on page 359](#)
-  [Underlay on page 360](#)

You can access the art layers through the Art Layer toolbar. By default, only the Line Art and Colour Art are displayed. You need to enable the Support Overlay and Underlay Arts option in the Preferences dialog box.



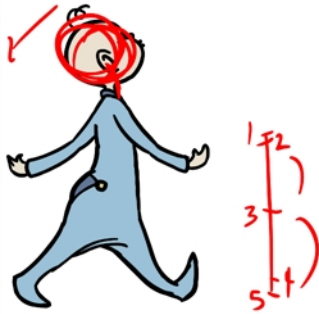
Each layer can be used for separate hand-drawn animation tasks, letting you organize your work and facilitate creation and revision.

## Overlay



The Overlay layer can serve multiple purposes:

- Highlights and tones
- Annotations and corrections



- Sketching

You can also draw in the Overlay layer as it's a regular layer.



## Line Art

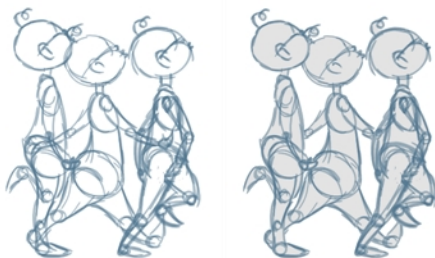


In hand-drawn animation, the Line Art layer is mainly used to trace and clean up animation. The outline is drawn in the Line Art layer and colour is painted in the Colour Art layer.

## Colour Art



In hand-drawn animation, you use the Colour Art layer to paint your animation. The outline is drawn in the Line Art layer and colour is painted in the Colour Art layer. Strokes (invisible lines) are generated from Line Art to contain the painted area.



When you are doing rough animation, you may want to send a clip for feedback or approval before carrying on with your work. If you have several characters in your project that are overlapping, it may be difficult to understand what is going on as you can see through the characters. Toon Boom Harmony can generate a matte automatically in the Underlay, or even in the Colour Art layer, and fill all the zones inside your characters to make them opaque. This process is fast and easy, and allows you to send easy-to-understand movies.

## Underlay





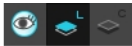
The Underlay layer can serve multiple purposes. It is frequently used by animators to sketch rough animation or generate a matte colour when doing line testing.



### How to enable the Support Overlay and Underlay Arts option

1. From the top menu, select **Edit > Preferences** ( Windows/Linux ) or **Stage > Preferences** ( Mac OS X ).
2. In the Preferences dialog box, select the **Advanced** tab.
3. In the Advanced Options section, select the **Support Overlay and Underlay Arts** option.
4. Click **OK**.


### How to switch between drawing layers

1. In the Art Layer toolbar, click the Line Art  or Colour Art  buttons. When switching art layers, you can edit the select layer without affecting the other one.







2. Click the Preview All Enabled Art Layers  button to display both layers together. Even when the Preview mode is enabled, you will only be able to edit the select art layer. The other ones are only displayed as a reference. By default, the Preview mode is always enabled in the Camera view. You will only be able to see the select art layer by itself if you enable the Current Drawing on Top  option located in the Camera bottom toolbar.

#### NOTE:

To edit both Line Art and Colour Art at the same time, you must enable the Apply to Line Art and Colour Art  button in the Tool Properties of the tools supporting the operation.



### How to switch between the drawing layers in Advanced Art mode

1. In the Art Layer toolbar, click the Overlay Art , Line Art , Colour Art  or Underlay Art  buttons to display the appropriate layer—see [How to enable the Support Overlay and Underlay Arts option on page 360](#). When switching art layers, you can edit the selected layer without affecting the




other one.



2. Click the Preview All Enabled Art Layers  button to display all the layers together. The other ones are only displayed as a reference. By default, the Preview mode is always enabled in the Camera view. You can view only the selected art layer if you select the Current Drawing on Top  option in the Camera bottom toolbar.

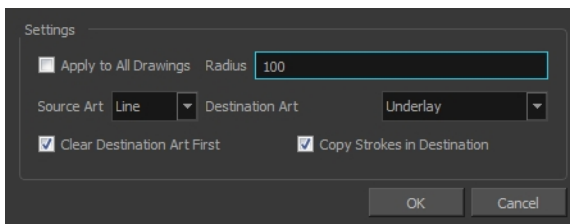
## How to generate a matte

1. Do one of the following:
  - ▶ In the Tools toolbar, select the Select  tool.
  - ▶ Press Alt + S.
2. In the Camera or Drawing view, select the drawing you want to create a matte for.

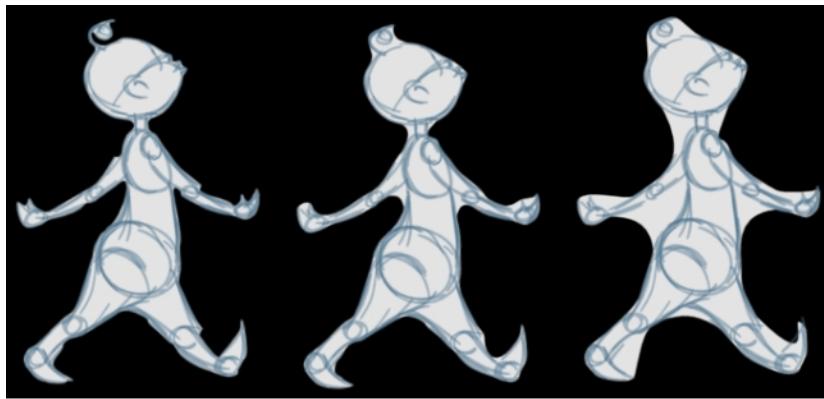
**NOTE:** You can also apply the operation to all the drawings in the layer at the same time.

3. Do one of the following:
  - ▶ From the top menu, select **Drawing > Generate Auto-Matte**.
  - ▶ In the Camera or Drawing menu, select **Drawing > Generate Auto-Matte**.

The Auto-Matte dialog box opens.



4. If you want to create a matte for all the drawings included in your layer, select the **Apply to Multiple Drawings** option.
5. Depending on how precise or rough your line is, increase or decrease the radius value. The lower the value, the closer to your lines' contours the matte will be shaped. The higher the value, the looser the matte will be shaped.



Radius: 20

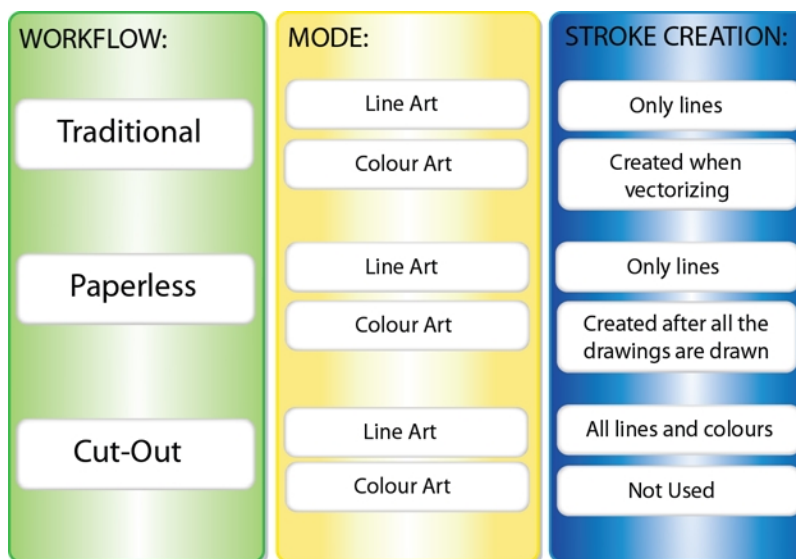
Radius: 100

Radius: 300

6. In the Source Art menu, select the layer from which you want the matte created: **Line Art, Colour Art, Underlay** or **Overlay**.
7. In the Destination Art menu, select the layer on which you want the matte to be created: **Line Art, Colour Art, Underlay** or **Overlay**.
8. If you already have artwork on the destination layer and you want the content to be deleted before the matte is added into it, select the **Clear Destination Art First** option.
9. If you want the contour of your lines to be copied as invisible lines in your matte drawing (in case you ever need to keep them for later), select the **Copy Stroke in Destination** option.
10. Click **OK**.

## Creating Strokes

A drawing is composed of Line and Colour filling layers. Lines and colours can be separated or kept together, depending on which animation process you use. The following diagram presents Line Art and Colour Art recommendations based on the selected animation workflow.



When a traditional drawing is scanned, strokes are automatically created in the Colour Art from the Line Art when drawings are vectorized unless you specified otherwise.

When working with Cut-out animation, we recommend that you do all of the work in the Line Art.




Once the drawing sequence is completed for paperless drawings, you can proceed with creating Colour Art strokes if you plan to paint the animation in the Colour Art. Use the Create Colour Art from Line Art option to create strokes from your lines.

You can create strokes in the Colour Art during the following stages:



- After the full drawing is completed in Line Art
- While drawing in Line Art

You may have some traditional drawings that need to be fixed; for example, needing extra lines to patch gaps. Use the Auto-Create Colour Art from Brush option to create the strokes at the same time as the lines are drawn. This creates strokes from the lines and brush strokes created in the Line Art while you draw and is useful for fixing drawings. However, if you are drawing a new sketch, it is better to create the strokes afterward using the Create Colour Art from Line Art option.

### How to create Colour Art zones out of the Line Art content

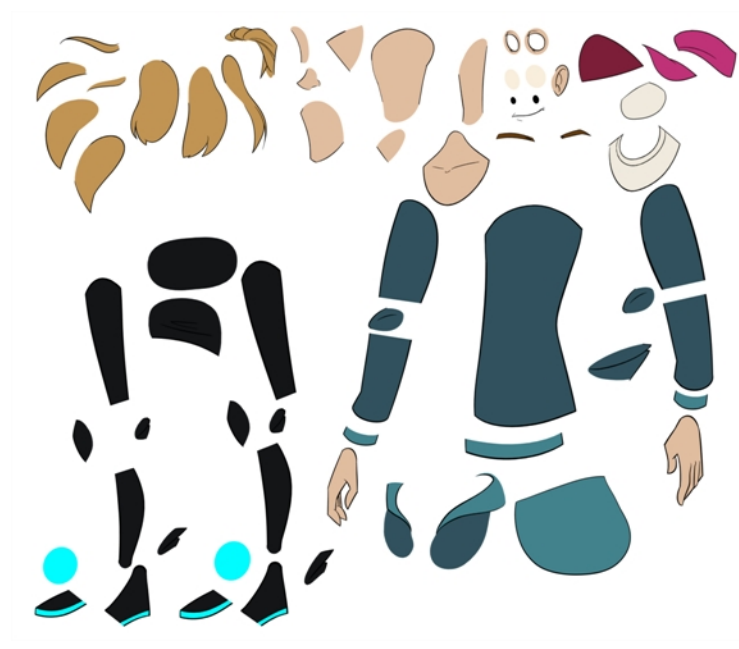
1. In the Tools toolbar, select the Select  tool or press Alt + S.
2. In the Tool Properties view, click the Permanent Selection  button if you want to apply the operation on all drawings in the layer.
3. In the Camera or Drawing view, select the artwork to transfer to the Colour Art. Create a selection around the entire animation sequence if you want to apply the operation to all your drawings.
1. In the Drawing View toolbar, click the Create Colour Art from Line Art  button or press \*.

### How to create strokes with the Create Colour Art Automatically option

1. In the Tools toolbar, select the Brush tool.
2. In the Tool Properties view, enable the Create Colour Art Automatically  option.
3. Draw the required lines.
4. Once you're done, deselect the Create Colour Art Automatically  option.

You are now ready to paint your model.

## Breaking Down the Character



There are many techniques you can use to break down a puppet. In this section, you will learn about one of the most common and simplest methods. For your first character **breakdown**<sup>1</sup>, follow these instructions to get an idea of the way Harmony works. Once you understand Harmony's basic functions and commands, you will be able to create your own techniques to satisfy the needs of your production.

Refer to the [Appendix on page 408](#) at the end of the chapter for alternate tips.

This section is divided as follows:

- [Tracing the Model on page 364](#)
- [Articulations on page 367](#)

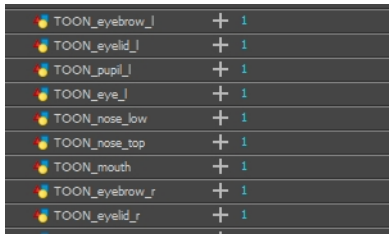
### Tracing the Model

The main breakdown technique shown here is to trace your model—see the [Appendix on page 408](#) to learn about more techniques.

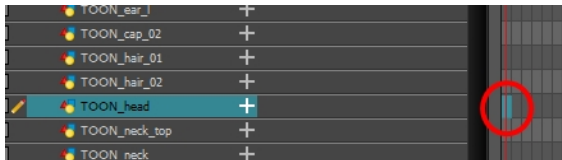
#### How to break down a character


1. In the Timeline view, add a new drawing layer for each body part to separate. You can press Ctrl + R (Windows/Linux) or ⌘ + R (Mac OS X)—see [Naming Conventions on page 353](#).

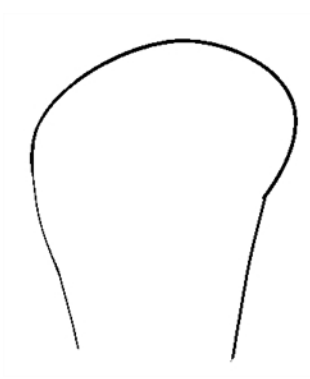
<sup>1</sup>In cut-out animation, the breakdown is the action of breaking a character into pieces to create a puppet with articulations. To breakdown a character, the artist will cut parts, such as hands and arms, from the character's model and paste them in separate layers. Next, the joints will be fixed and the pivots set. In additional animation, a breakdown is an animation pose generally found between two key poses. The key poses are the main poses in an animation and the breakdowns are secondary poses, ones that help to describe the motion and the rotation curve.




- In the Timeline view, select the layer's first cell in which you want to draw the part.

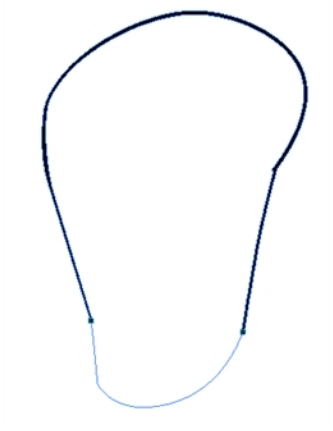




- In the Tools toolbar, select a drawing tool.
- In the Colour view, select a colour swatch. If you haven't created a palette for your character yet, see [Colour Styling and Colour Models on page 203](#).
- In the Camera or Drawing view, draw the new part with as with as few points as possible so the pieces are easy to manipulation, modify or redraw. Using the Polyline  tool would make it easy to do this.

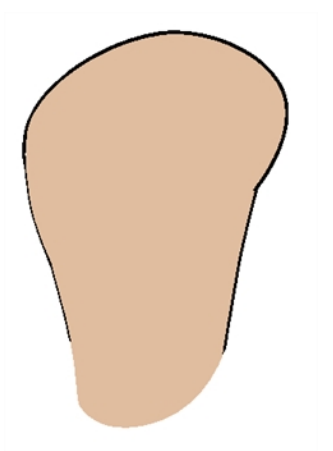





If you are working in the Drawing view, click the Light Table  button in the Drawing View toolbar to display the other layers as washed out colours. You can also press Shift + L.

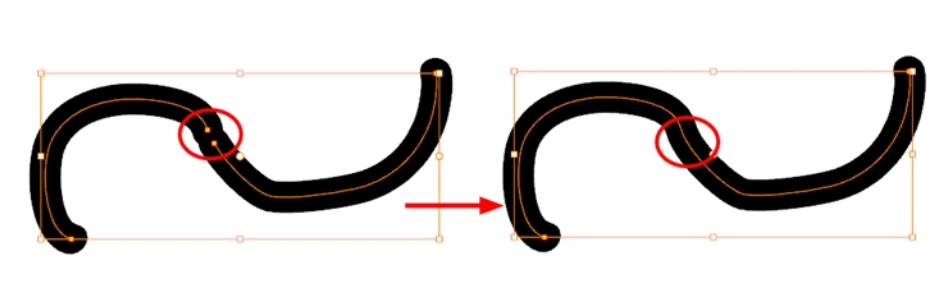
- You can use the Stroke tool in the Tools toolbar to create an invisible hairline if you want to close a shape without drawing an actual stroke.
  - Select **View > Show > Show Strokes** or press K to display the invisible lines.



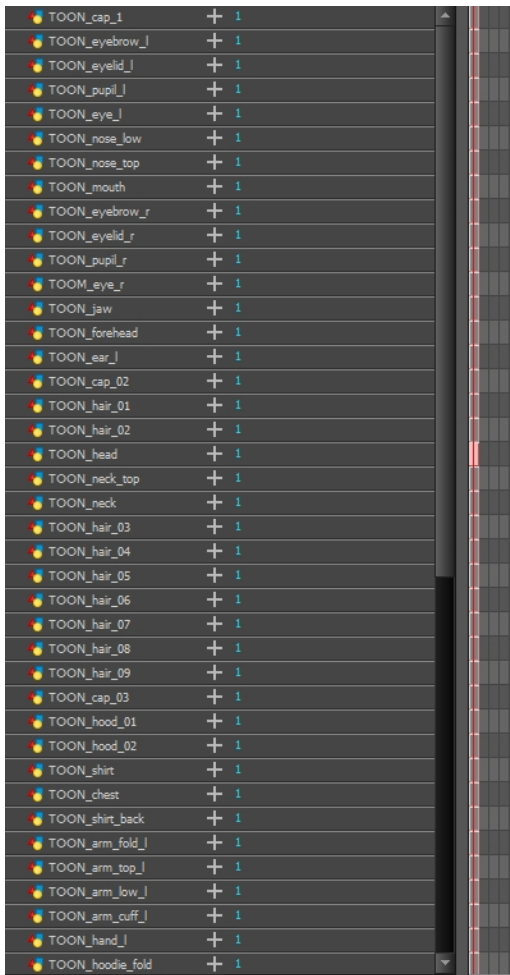
7. In the Tools toolbar, select the Paint  or Paint Unpainted  tool to colour your drawing.
8. In the Colour view, select the corresponding colour.
9. In the Camera or Drawing view, paint your drawing.



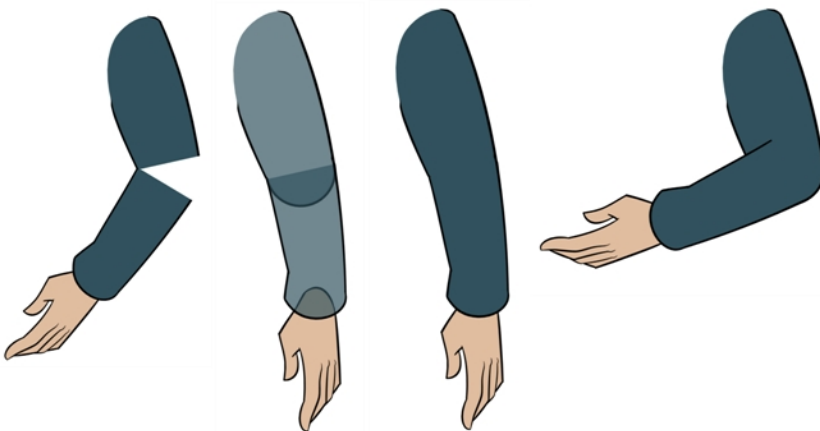
10. In the Tools toolbar, select the Select  tool. Select your drawing and flatten the lines by clicking the Flatten  button in the Tool Properties view.
11. If your lines are composed of several pencil strokes, you might want to combine them into one single smooth pencil line. Using the Select tool, select the pencil lines to be merged and in the Tool Properties view, click the Merge Pencil Lines  button.



12. Repeat the entire process until the break down is completed.



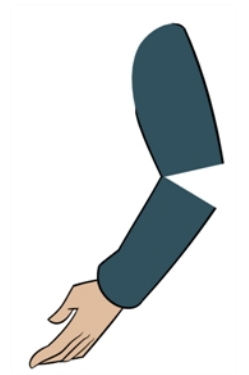
## Articulations



Once your pieces are traced, you can go ahead and complete the articulations.

Articulations are an important aspect of any cut-out break down because without them, a puppet cannot move properly and will not look good.

If you are using deformations to animate the limbs, your articulations don't need to overlap. The deformer effect will create the joint for you.



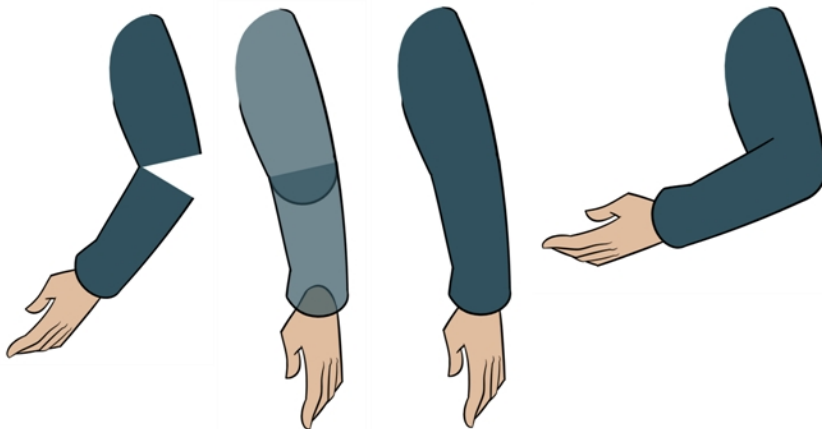
This topic is divided as follows:

- [Classical Articulation](#) on page 368
- [Auto-patch Articulations](#) on page 370

## Classical Articulation

Classical articulation is the most popular technique for basic characters. It is quite simple and produces excellent results, but it's not the most efficient method. In many instances, it causes limitations and extra drawing corrections. For example, there may be a gap in the articulation if the part is bent too far. Joint design is usually a circle; the overlapping part cannot be sent behind without showing the joint.

For a more advanced articulation, see [Patch Articulation](#) on page 424 in the Appendix section.

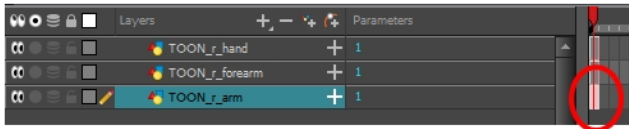







Classical articulation is done by erasing a part of the line from the overlay layer, leaving the colour overlapping the bottom layer. You can use this technique for all the articulations on your puppet.

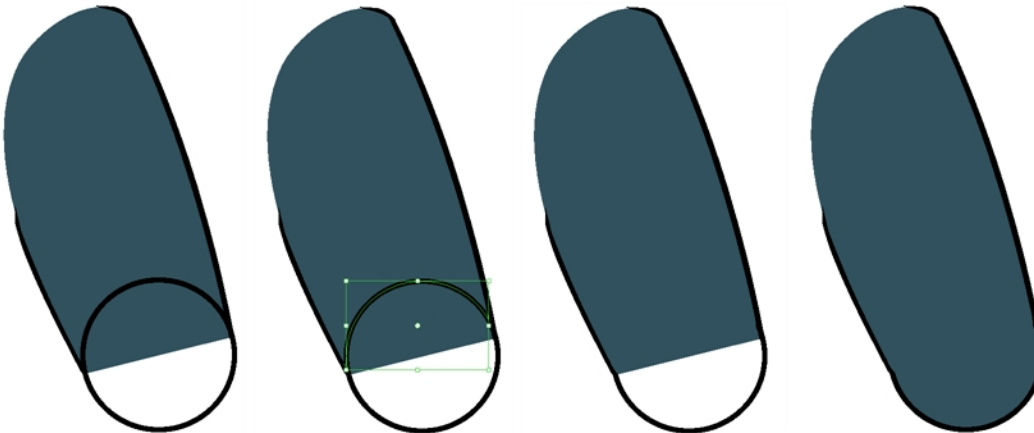
### How to create a classical articulation

1. In the Timeline view, select the cell containing the part to modify (piece located behind), such as the upper arm.




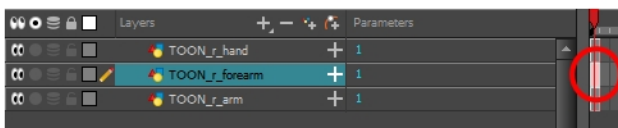


2. In the Tools toolbar, select the Pencil , Polyline , Ellipse , Cutter , or Contour Editor  tool.
3. In the Colour view, select an outline colour.
4. In the Drawing or Camera view, use your drawing tool to make sure the joint overlaps the other part in a half-circle shape.



If you are working in the Drawing view, click the Light Table  button in the Drawing toolbar or press Shift + L.

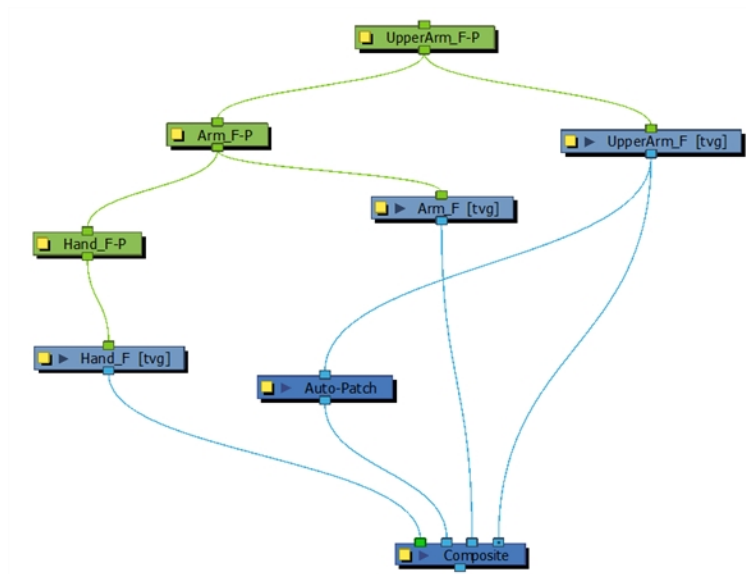
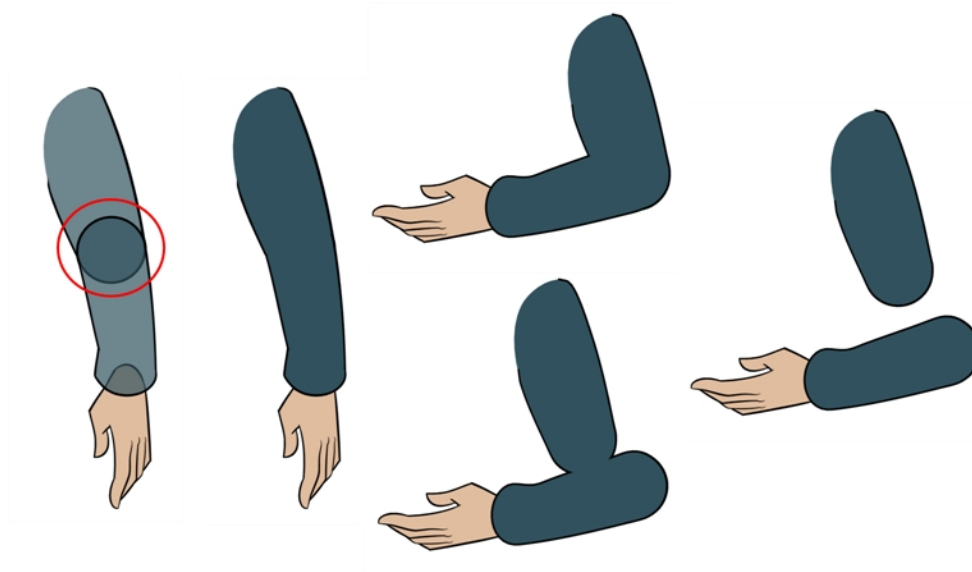
5. From the top menu, select **View > Show > Show Strokes** or press K to display the invisible lines that may be present in your drawing.
6. In the Drawing or Camera view, select all the strokes in your drawing.
7. In the Tools Properties view, click the Flatten  button.
8. In the Drawing or Camera view, select all the strokes in your drawing.
9. In the top menu, select **Drawing > Optimize > Remove Extra Strokes** to remove any unnecessary, invisible lines in your drawing.
10. Repeat the previous steps for the other articulations.
11. In the Timeline view, select the cell of the part that will be on top of the joint.



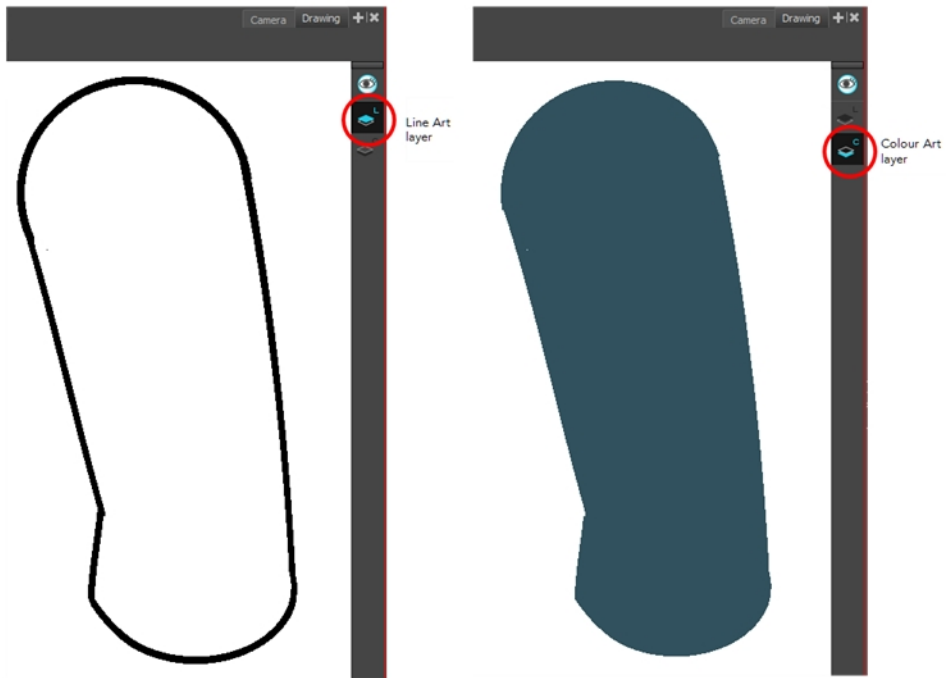
**NOTE:** When placing rotation pivots later on, make sure they are positioned at the centre of the articulation.

### Auto-patch Articulations

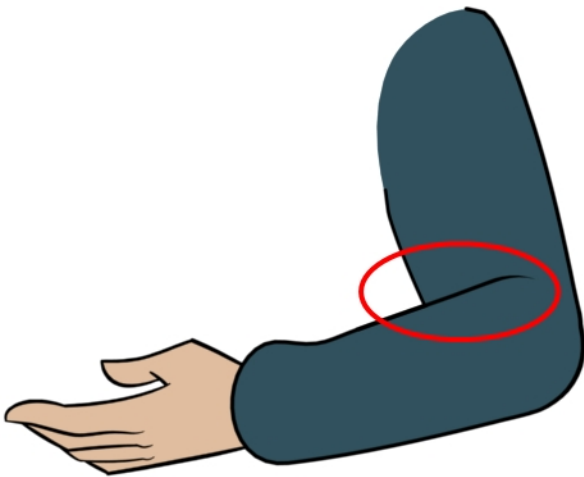
Harmony has a very efficient node to automatically patch an articulation without you having to do any line adjustment or colour overlapping. You can draw your two pieces with their complete lines overlapping each other in semicircles and the Auto-patch node will create a perfect articulation from it.

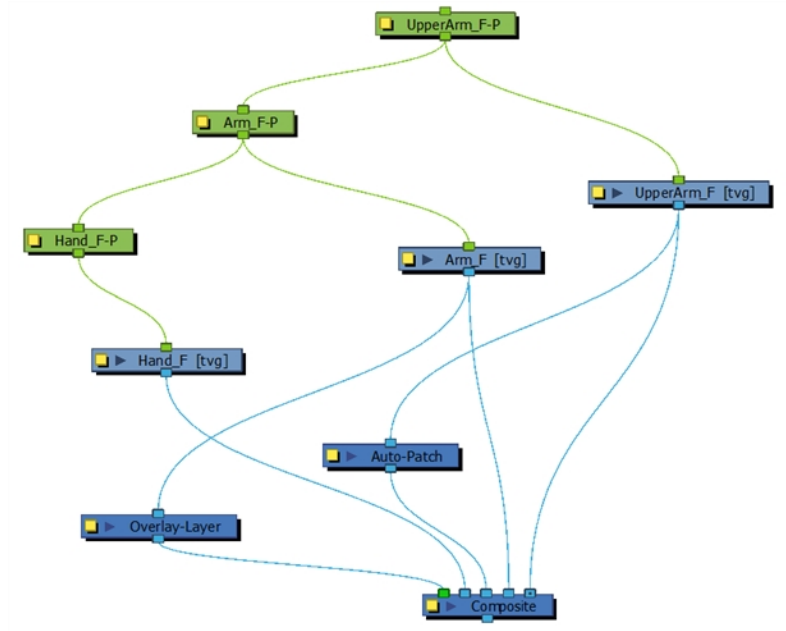


In order for the Auto-patch to work on your puppet, you must draw the outline with the Pencil tool (pencil lines) on the Line Art layer of your drawing, and then paint the colour on the Colour Art layer.

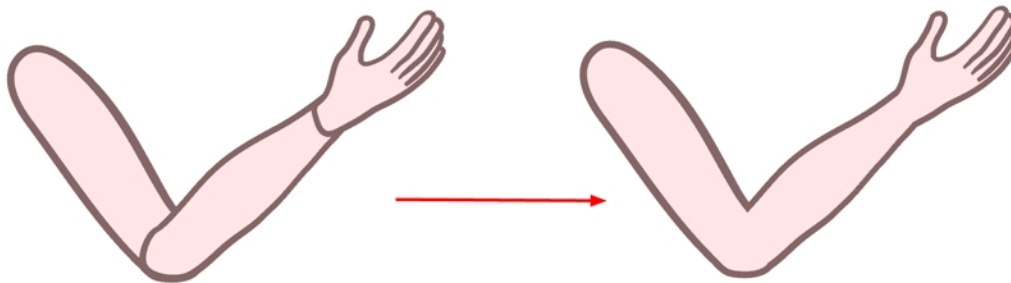


You can use this technique in even more efficiently by adding extra lines in the Overlay layer of your drawing to create a fold illusion for a bent elbow.





### About the Auto Patch Node

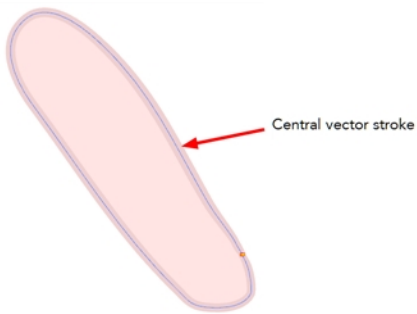


The Auto Patch node is used mainly when creating joint patches for cut-out puppets drawn with pencil lines and painted in the Colour Art layer. Instead of removing a portion of the outline to attempt to create a seamless joint, you can draw complete pieces, and with the Auto Patch node, automatically create a perfect articulation.

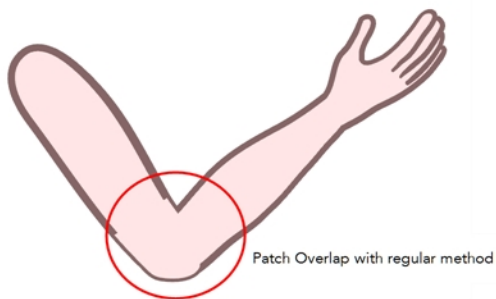
The requirements for this effect to work are:

- Drawing outlines must be drawn in pencil lines
- Drawing outlines must be drawn in the Line Art layer
- Drawing fill colours must be painted in the Colour Art layer

Pencil lines are central vector lines. The vector is located along the centre of the line. This means that when you paint a zone delimited by a pencil line, the colour fill will expand to the centre of the pencil line.

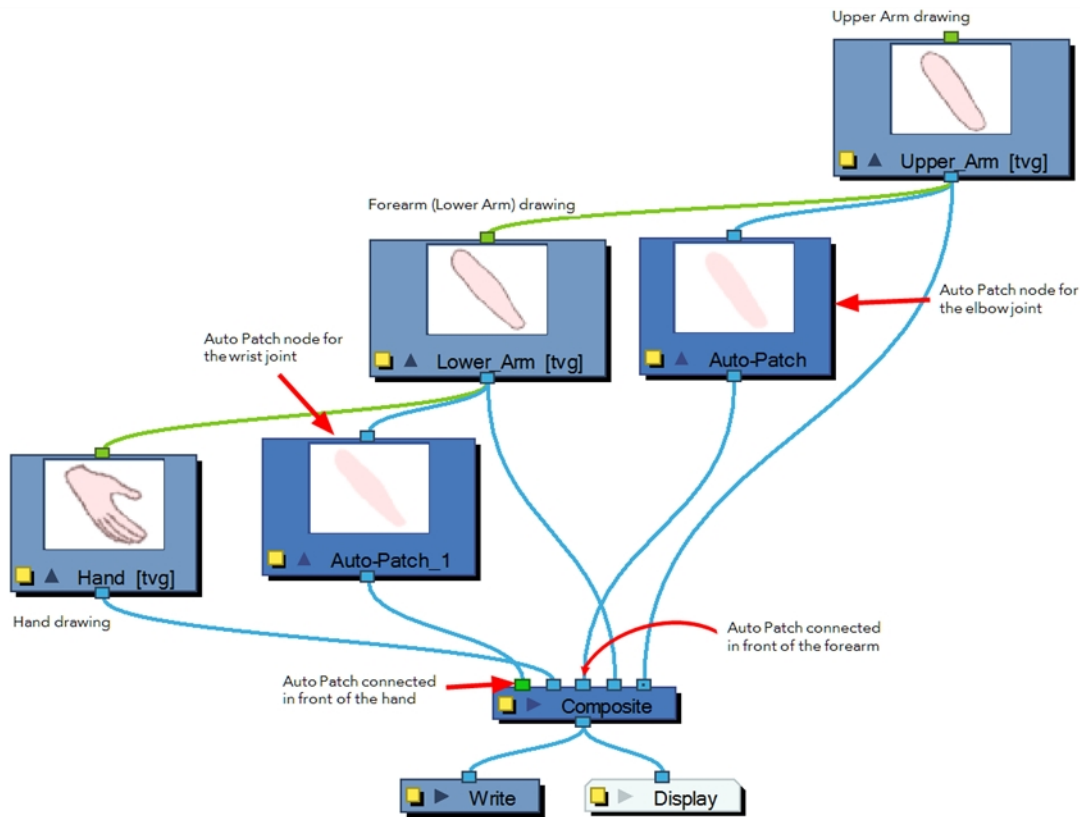


When using the regular patch technique, recommended for the brush line, the result with pencil lines is very odd looking because the colour fill zone is bigger than the pencil line inner contour.

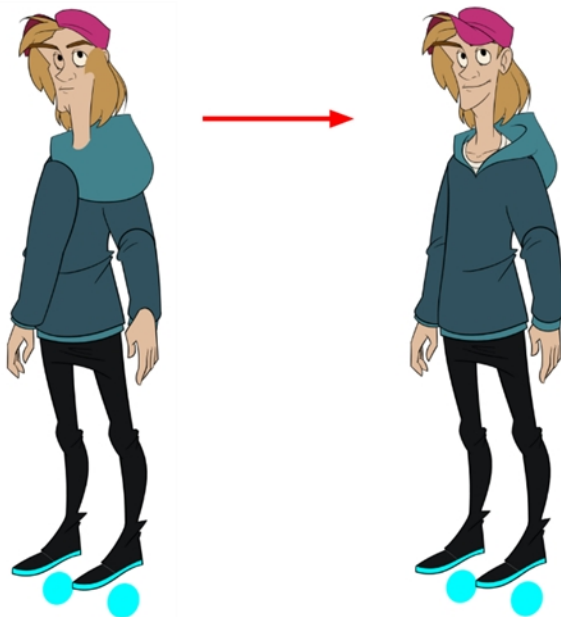


Instead of using the regular patch method, you can use the Auto Patch node. It will automatically extract the Colour Art and clip it to the right size. Then, you can connect it in front of the piece to be covered.

The node connection for the Auto Patch is quite simple. Once your basic character rigging is done, add the Auto Patch node to the joints you want to cover. There is no need to set any parameters.



## Ordering the Layers



At this point, it is possible that your character's pieces may show up in the wrong order.

There are several ways to fix this. First, you can reorder your layers by dragging them to a higher or lower level in the Timeline view. The top layer is displayed in front of the others and the bottom one is displayed behind.

Second, you can use the Z-axis nudging (forward and backward) if you have extra views included in the same layers (front, three-quarter, back, etc.).

This topic is divided as follows:

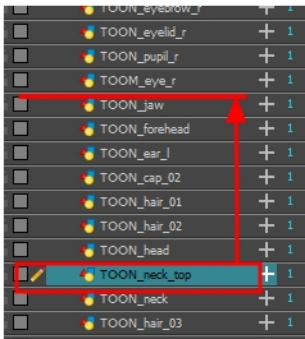
- [Ordering the Timeline Layers on page 375](#)
- [Ordering Layers in the Network View on page 375](#)
- [Nudging Parts Backwards and Forwards on page 376](#)

## Ordering the Timeline Layers

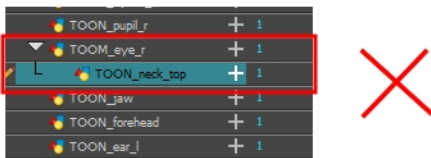
In the Timeline view, the layer positioned at the top will be displayed in front and the ones below will be displayed behind. If you have multiple views, you should order your layers based on the most common view, which is generally the three-quarter front.

### How to order the layers

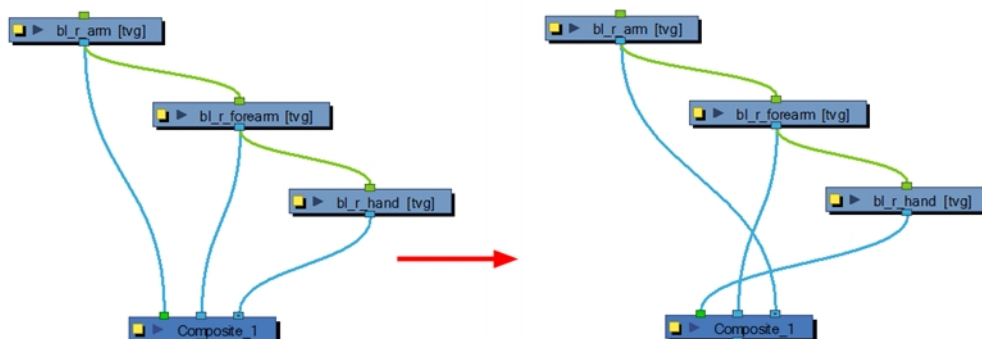
- ▶ In the Timeline view, drag a layer to reorder it and drop it between other layers.



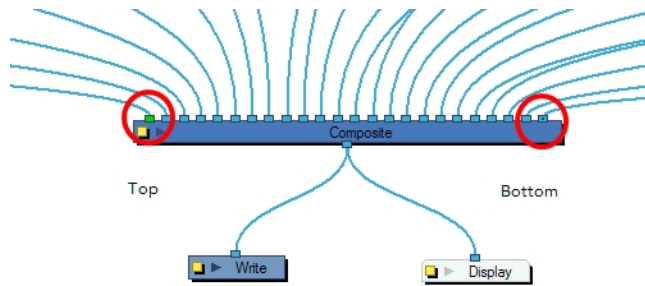
If you drop it on a layer, it will create a parent hierarchy, so make sure to drop it between layers.



## Ordering Layers in the Network View



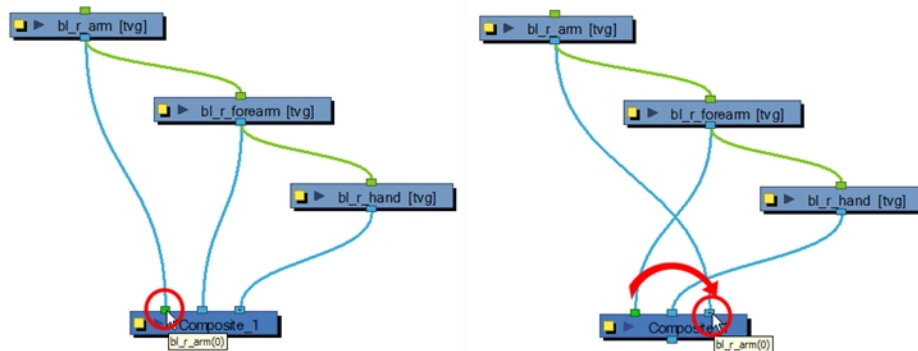
The Node view allows you to reorder layers without breaking any hierarchy. For example, if you want the Head layer to appear behind all the facial features, in the Timeline view, you cannot simply move the layer down because you will break the parenting between the head layers. In the Node view, since you have a set of flexible connections, you can change the Composite node ordering without breaking the parenting between the nodes.



The Composite node ordering corresponds to your timeline ordering unless the Node view's organization is too complex for the Timeline view to display. The element connected in the left-most port of the Composite node is displayed in front in the Camera view and the one connected in the right-most port is displayed behind.

### How to order layers in the Node view

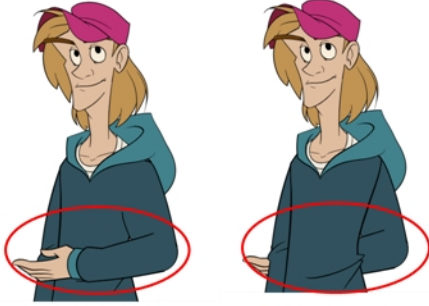
- ▶ In the Node view, select the node's output cable connected to the Composite node and drag it to its new position.



### Nudging Parts Backwards and Forwards

If you created a hierarchy on your arms, legs or other body parts, it is possible that you will want a part, such as the hand, to appear in front of its parent. Yet, if you move the hand layer above the arm layer, you will break the hierarchy. To reorder a layer rigged in a hierarchy, nudge it backwards or forwards on the z-axis.





**NOTE:** You will do the same for the layers that are not in the right order on the extra views. Do not place the drawing on another layer. You want to keep all your drawings of the body parts in the same layers like a box containing all of the hands or all of the shoes.



Harmony allows you to move your elements in three dimensions:

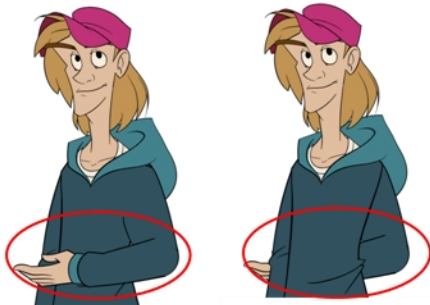
- Up and down (Y-axis)
- Left and right (X-axis)
- Backwards and forwards (Z-axis)

In the same way you create multiplane backgrounds (depth), you can perform a micro nudge of the part to be reordered and see it in front of the other elements, even if its layer is actually behind the other ones in the Timeline view. The forward-backward position can also be animated over time.

Repeat the following instructions for all the views.

### How to nudge your parts backward and forward

1. In the Tools toolbar, select the Transform  tool. Make sure to enable the Animate  mode.
2. In the Camera view, select the element you want to reorder. Make sure the focus (red outline) is around the Camera view before selecting the element.
3. To move the element forward, press Alt + Down Arrow and to move the element backward, press Alt + Up Arrow.



## Rigging



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The rigging process is where building a puppet can take several different directions.

In this section, you will learn how to create a simple rig. Afterwards, you will learn how to add pegs and create a hierarchy. You can also see more advanced tricks in the [Appendix on page 408](#).

- [About Rigging on page 378](#)
- [Adding Pegs on page 382](#)
- [Rigging the Head on page 383](#)
- [Rigging the Body on page 385](#)
- [Creating a Hierarchy on page 387](#)
- [Ordering the Layers on page 374](#)
- [Adding the Master Peg on page 389](#)
- [Creating the Keyframes on page 390](#)
- [Setting Properties for Many Layers on page 391](#)
- [Masking on page 393](#)

### About Rigging

There are some basic concepts to know when rigging and layer parenting:

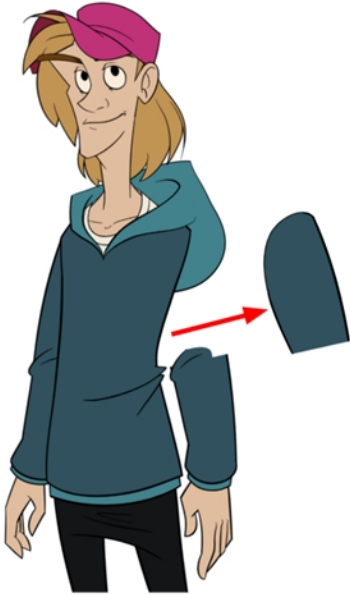
- [Simple Rigging on page 379](#)
- [Parenting Layers on page 380](#)
- [Rigging Using Pegs on page 381](#)

## Simple Rigging

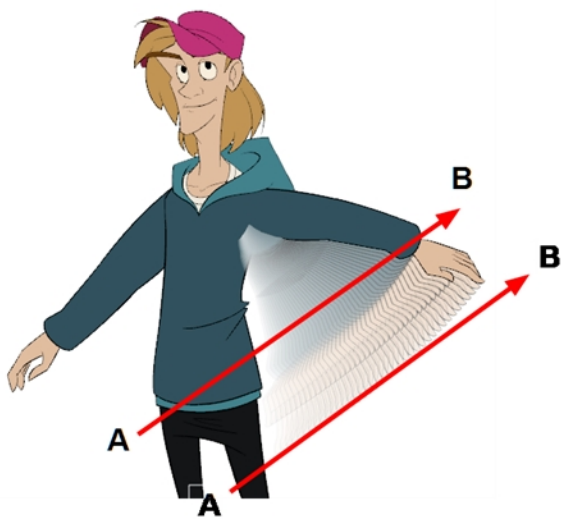
Simple rigging is very fast and easy to do. It is built as follows:

- All the body parts are independent
- All the timeline layers are attached to a master peg layer (trajectory layer)

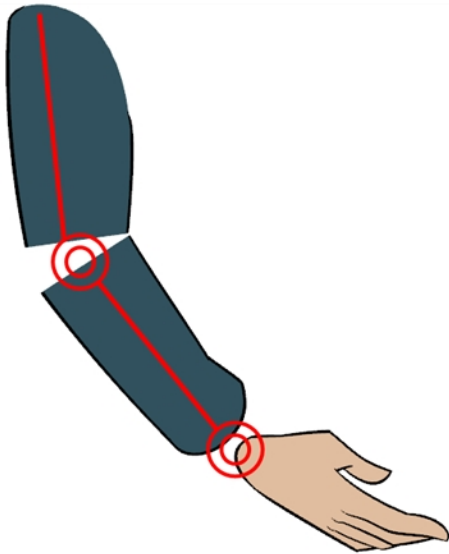
The advantage of using this technique is that you are free to move any part around without being influenced by a parent layer.



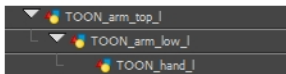
However, since the parts are not parented to each other, the parts will move from point A to point B along a straight trajectory. The hand will not follow the arm's rotation. You will have to set more keyframes for the hand to move along a curved path.



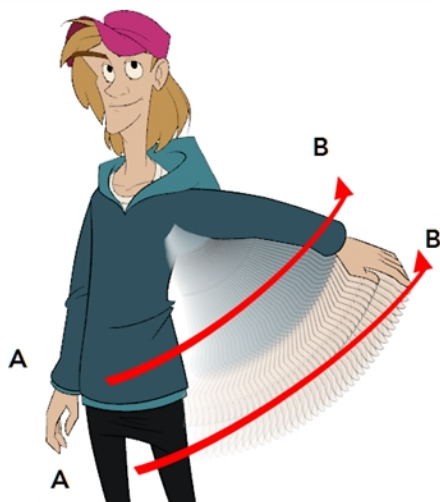
## Parenting Layers



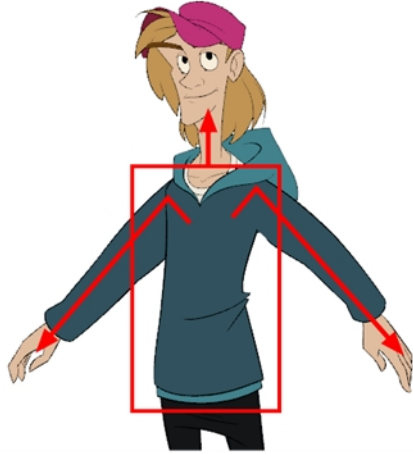
When you want one part to follow another part, such as the forearm following the arm, you can attach the layers one to the other. For example, you can attach the forearm layer to the arm layer without having to encapsulate the forearm into the arm layer. They will still be parented, but you can access the forearm directly without having to enter the arm layer.



The advantage of parenting layers is that the child layers will follow the parent smoothly without having to select them or create a series of keyframes.



The disadvantage of parenting layers is that you are not able to move the parent independently of its children, since the child layers receive all the transformation information from their parent.



Parenting layers, such as the arms and legs, and allowing the torso and hips to be independent from them is often a good solution.

**NOTE:**

To attach one layer to another, you must drag the desired layer onto the other one in the Timeline view.

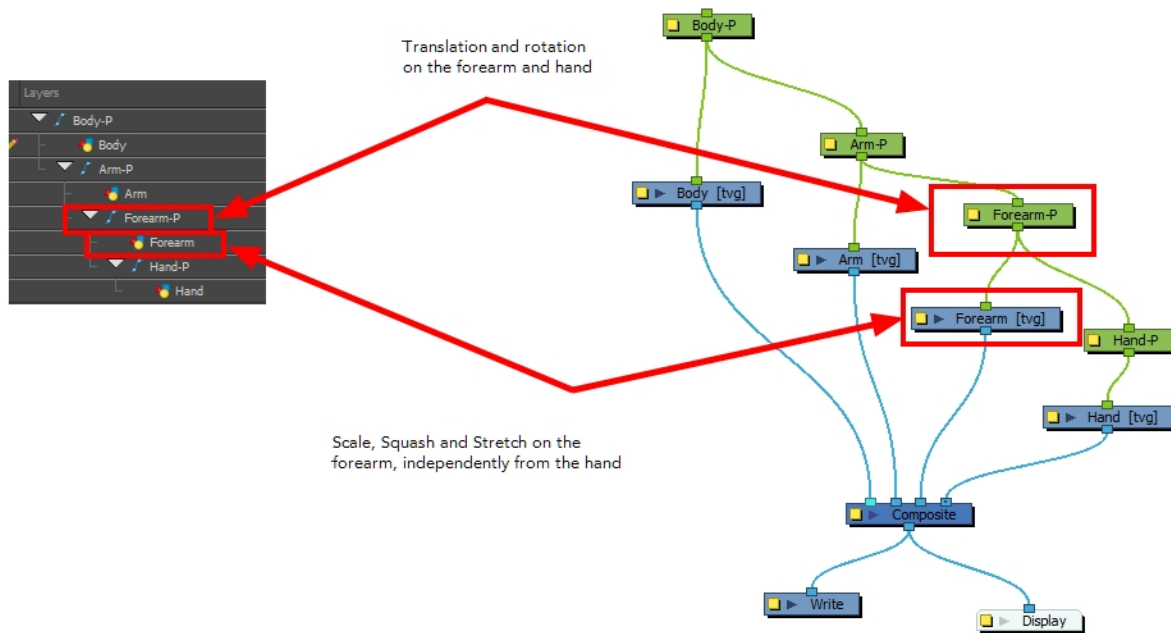
Harmony offers powerful techniques to create hierarchies between your layers without having to encapsulate layers into each other. These techniques are a great improvement over the less efficient and time consuming method of creating parenting between your layers by inserting symbols into other symbols. Therefore, rigging with symbols inside symbols is **NOT** recommended.

## Rigging Using Pegs

Peg layers are useful when you are doing more advanced puppet rigging. Peg layers are trajectory layers that do not contain drawings. They are motion paths that you can use to control your entire puppet or advanced hierarchies.

Parenting a drawing layer to a peg layer allows you to divide your motions on two separate levels. You can scale a body part up the chain of pegs directly on the drawing layer. This way, you do not affect any child layers that could be attached to that part.

Then, you can perform your translation and rotation on the peg layer so all the parts attached to that peg layer follow the same trajectory.

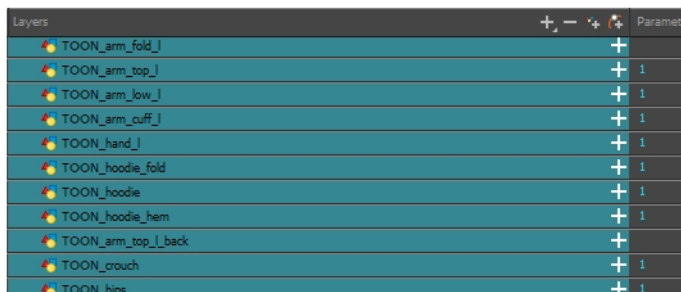



## Adding Pegs

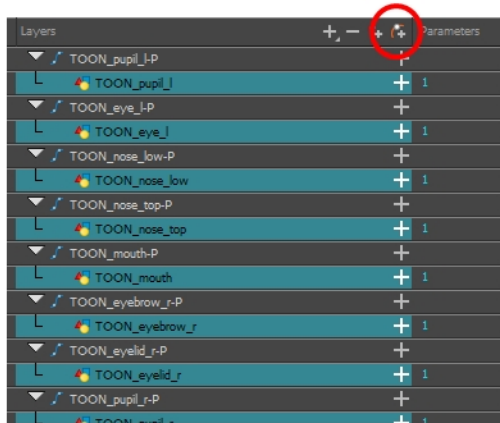
It is recommended to add parent pegs to your drawing layers which are path layers that let you add keyframes to modify the positions of pieces over time. It is not mandatory, but it is helpful to have your drawings and keyframes separated—see [Disabling the Animation on Drawing Layers on page 355](#).

### How to parent drawing layers to pegs

1. In the Timeline view, select all the layers.




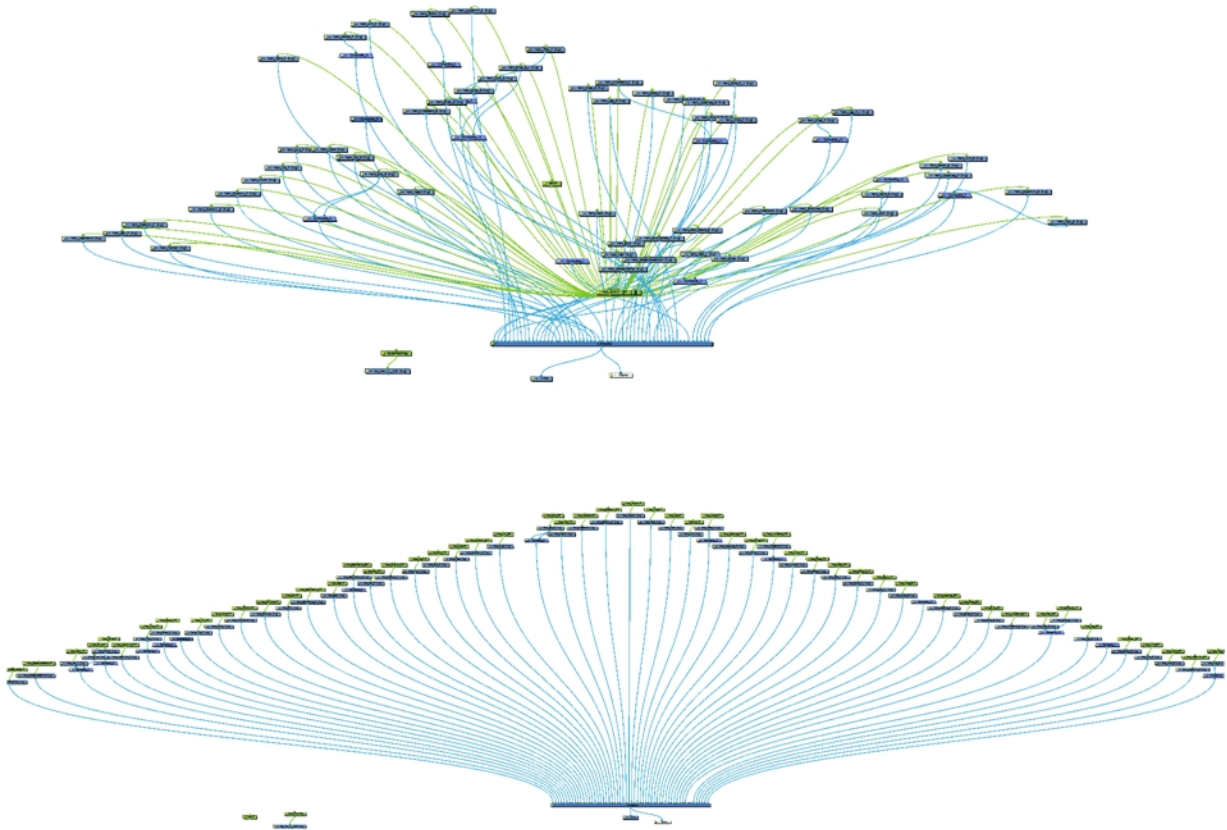
2. In the Timeline Layer toolbar, click the Add Parent Peg  button to add a parent peg to all selected layers.



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At this point, in the Node view, the layers look tangled.

3. In the Node view, select all the nodes and, in the Network View toolbar, click the Order Network Down  button.

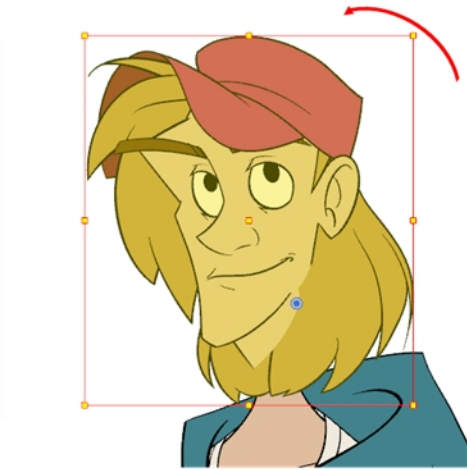


## Rigging the Head

You will start by attaching the facial features to the head.

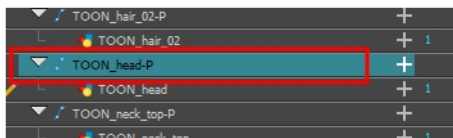
The advantage of parenting the head and the facial features to the same peg is that you can easily animate each facial feature, and they will all follow the head motion.


You can also use additional pegs to control smaller groups of pieces such as the facial features or all the left eye pieces. You can parent as many pegs as you want to obtain a maximum of control on your rig.

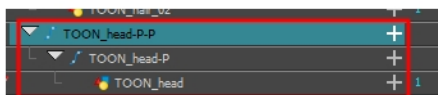


### How to parent the facial features to the head

1. In the Timeline view, deselect any selected layers.
2. Select the head peg layer.



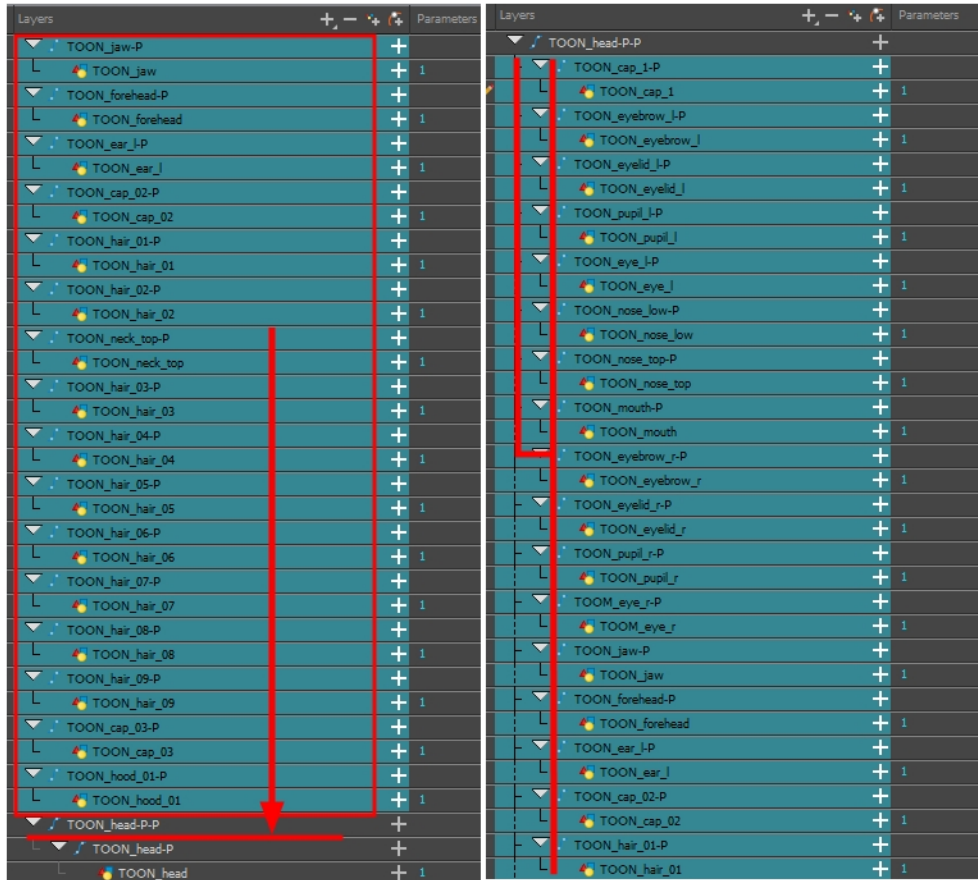
3. In the Timeline View Layer toolbar, click the Add Parent Peg  button to add a new peg layer to your timeline. You can rename the peg to keep your work organized.



A new peg is added and parented to the head peg layer.



1. Select all the remaining head and facial feature layers and drag them **ONTO** the peg layer or **BETWEEN** the head peg layer and the new head peg to parent them.



## Rigging the Body

When the character's head is ready, you can move on to rigging the body. You can do a simple rigging where all the body parts are independent of each other, or create parenting between some of the layers. Refer to [Creating a Hierarchy on page 387](#) to learn how to parent your layers.

Simple rigging consists of leaving the layers in the Timeline view without doing any kind of parenting. Later on, you will attach those layers to a master peg and organize them in the correct order—see [Adding the Master Peg on page 389](#) and [Ordering the Layers on page 374](#).

Your drawings must be connected to a Composite node. A Composite node takes all the drawing layers connected in it and flattens them into a single image which allows you to organize your network and manipulate your puppet easily. It also allows you to apply effects on your complete character. The Composite node is useful when you are working with many nodes in the Node view.

If you create your layers in the Timeline view, they will automatically be connected to the Composite node in the Node view, as long as you are not using the Display All mode in the Display toolbar.

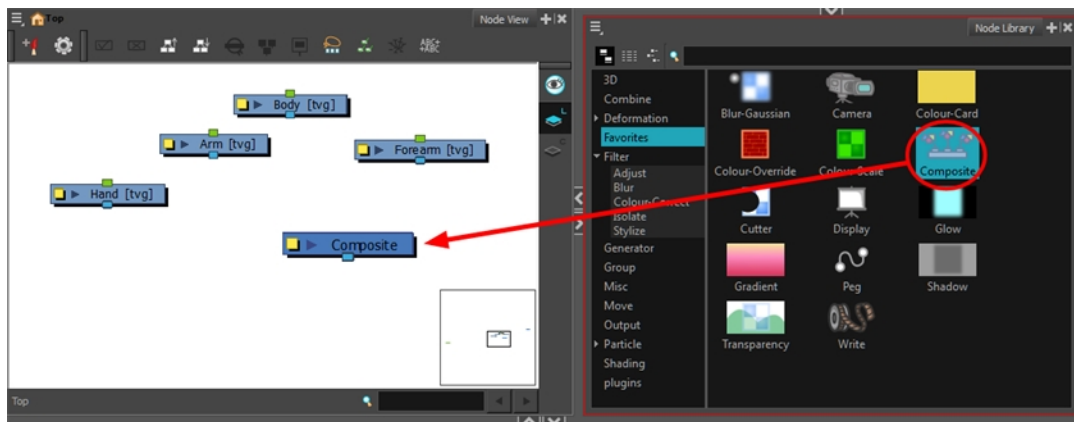


## Connecting Nodes to a Composite Node

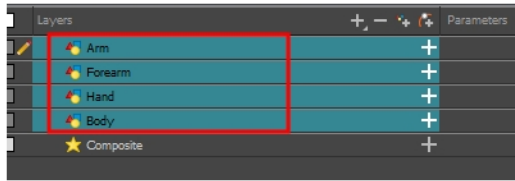
In Harmony, if your nodes are not connected to a Composite node in the Node view, you can connect them all at once following the Timeline order.

### How to connect your nodes to a Composite node

1. If you do not have a Composite node, open a Node Library view. From the top menu, select **Window > Node Library**.
2. Select the Favorites tab and select the **Composite** node.
3. Drag the Composite node to the Node view or press Ctrl + H.

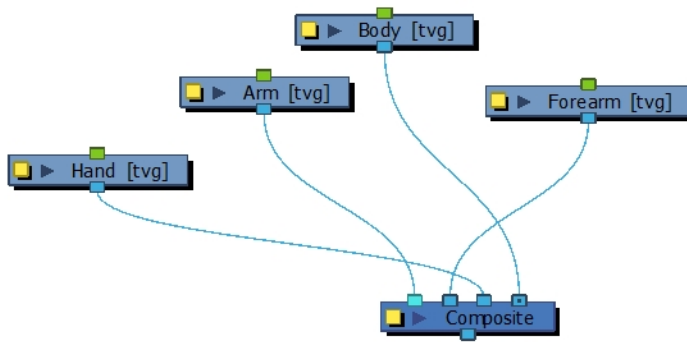


4. In the Timeline view, select all the nodes you can to connect to your Composite node.



5. Right-click on the selection and select **Connect To Composite** > **select the desired Composite node**.

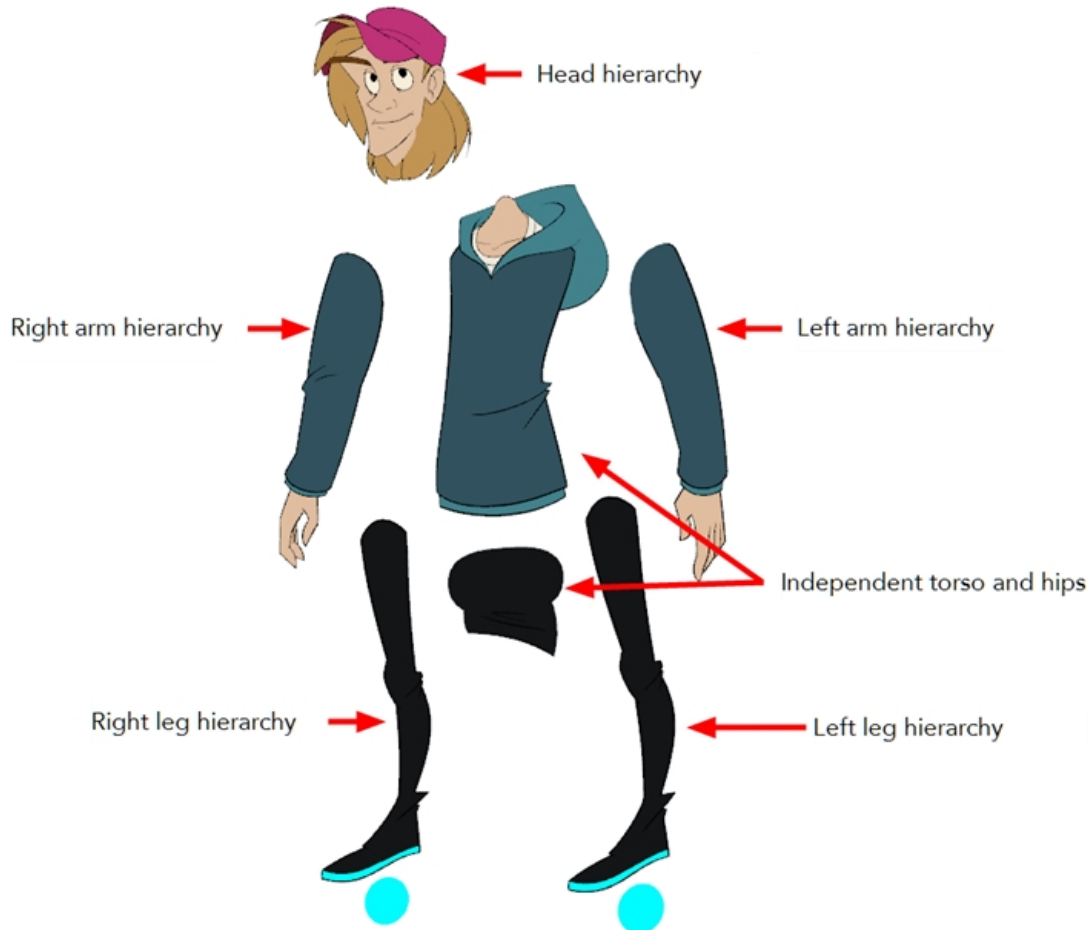
Your nodes are now connected to the Composite node in the same order as the Timeline view.



## Creating a Hierarchy

Harmony lets you extend your rigging techniques beyond normal boundaries and sets new standards. You can create hierarchies without encapsulating pieces inside each other by creating a linked structure between layers.

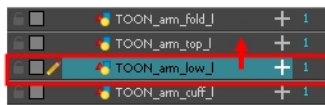
You should create a hierarchy on the arms and legs, and keep them separated from the body. This gives you more animation freedom, and when you need to scale or skew the torso, it will not affect the entire body.



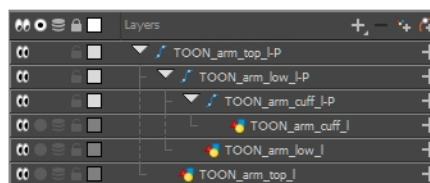
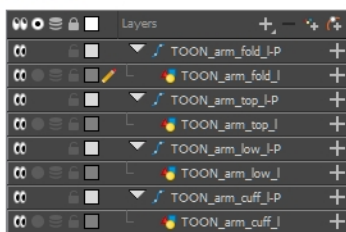
### How to create a hierarchy in the Timeline view

1. Drag the child piece (hand) and drop it ON the parent piece (forearm). Then, you can drag the parent (forearm) piece onto another parent piece (upper arm).

Without pegs



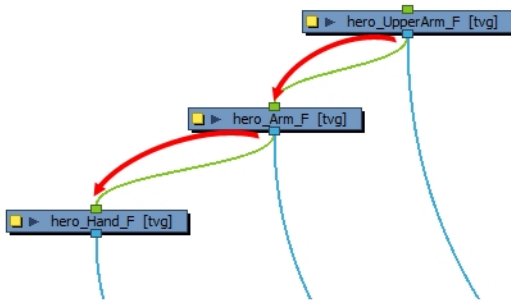
With pegs



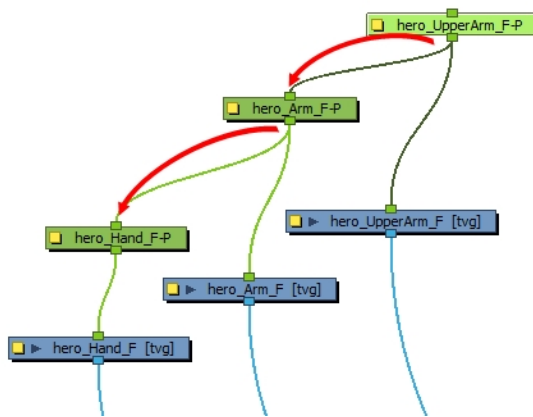
- You can unparent layers by holding down Shift and dragging the selected parents away from the child layer. Drop your selected between other layers.

## How to create a hierarchy in the Node view

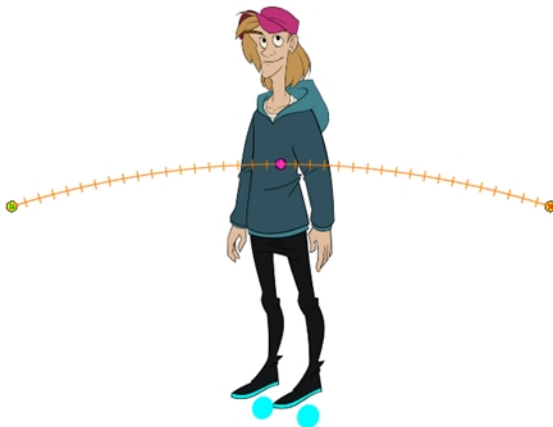
- ▶ **Without Pegs:** From the parent part, drag a new cable connection out of the node's output port (bottom) and connect it to the child part node's input port (top).



- ▶ **With Pegs:** From the parent part's peg, drag a new cable connection out of the node's output port (bottom) and connect it to the child part's peg input port (top).



## Adding the Master Peg




When you animate your character, you will probably need to resize and reposition it to fit your scene. When you need to scale down or move your character, it is a good idea to hook (attach) the whole puppet to a trajectory.

Attaching your puppet to a **peg**<sup>1</sup> will allow you to scale it and reposition it without having to do this to the different parts and pieces. Only one layer will contain the position information, which makes your animation easier to modify and control.

### How to add a master peg

1. In the Timeline view, select the top layer to parent a peg to it. You need to select a layer to be able to add a peg to your scene. Unless you use the Display All mode from the Display toolbar, you will get an error message if you try to add a peg without any selection.

2. In the Timeline view, click on the Add Peg  button.

A new peg is added to the timeline as a parent of the selected layer.

1. Name the new peg **Master** plus the character's name.
3. In the Timeline view, select all the layers you want to attach to your new peg. Remember that one item is already parented to that peg.
2. Drag your selection **ON** to the peg layer to parent all your character's pieces to the peg. If your layers are added above the already parented layers, move that parented layer back on top of the layer stack.




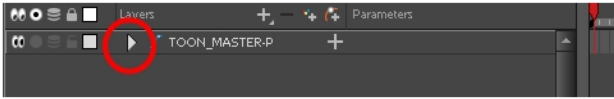
## Creating the Keyframes

Once all your drawings are ordered and your master peg is added, you need to insert keyframes on each cell to create all of the function curves and block your pose in place.

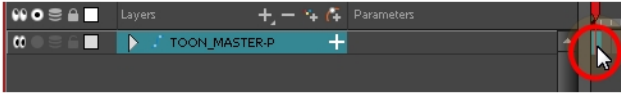
<sup>1</sup>In traditional animation, a tool used to ensure accurate registration of action as cel layers move. In digital animation, in which you are doing a more advanced puppet rigging, you can use peg layers. Peg layers are trajectory layers that do not contain drawings. They are motion paths that you can use to add path articulations. For the latter, you can also use the Inverse Kinematics tool.


## How to create the keyframes

1. In the Timeline view, collapse the master peg by clicking the Expand  arrow.



2. In the Timeline view, select the first cell.



3. Do one of the following:
  - ▶ From the top menu, select **Insert > Keyframe**.
  - ▶ In the Timeline View toolbar, click the Add Keyframe  button.
  - ▶ Press F6.

**NOTE:** If you use the F6 shortcut when working Flash keyboard shortcuts flavour, this not only creates a keyframe but also duplicates a drawing.

## Setting Properties for Many Layers

When working with several nodes, you may frequently want to modify a series of settings. Instead of opening the properties for each individual layer, you can set the properties for many layers so you can change a common setting in a single click.

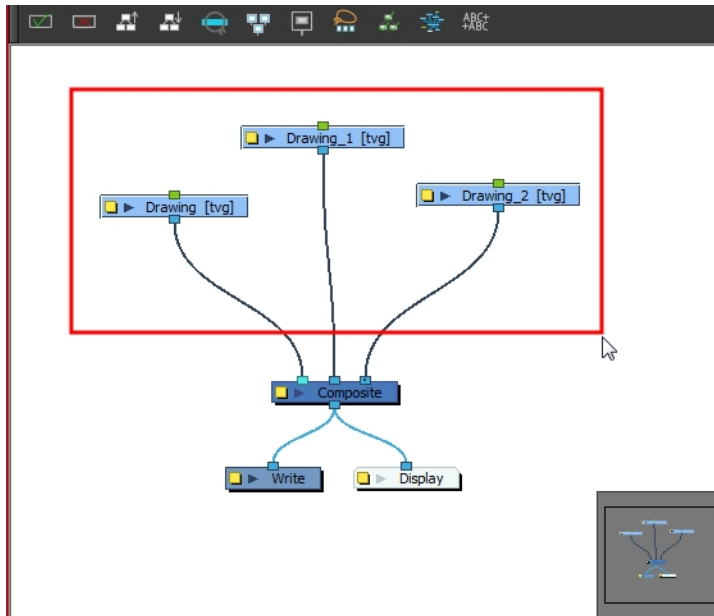
This allows you to modify the following settings:


- 3D Path or Separate mode
- Use Embedded Pivot
- Overlay
- Line Art
- Colour Art
- Underlay
- Animate Using Animation Tools

**NOTE:** You can access this function in the Node View toolbar. You can add the button to the Timeline View toolbar through the Toolbar Manager. In the Toolbar Manager, you will find the feature in the script section under the name Script: TB\_Set\_Properties\_on\_manu\_layers in TB\_Set\_Properties\_on\_many\_layers.js.

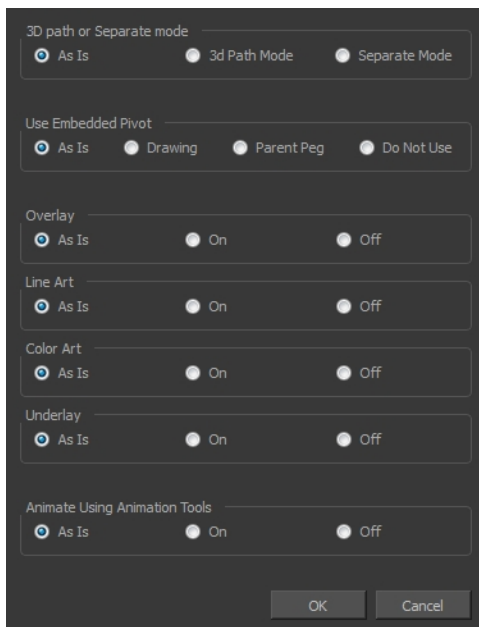
## How to set properties for many layers

1. In the Node or Timeline view, select all the layers you want to modify at the same time.



2. In the Node or Timeline View toolbar, click the Set Properties for Many Layers  button. This option is not available by default in the Timeline View toolbar. You must add it through the Customize option. Right-click on the toolbar and select Customize. In the Available Tools list, select Script: TB\_Set\_Properties\_on\_many\_layers and move it to the Toolbar list.

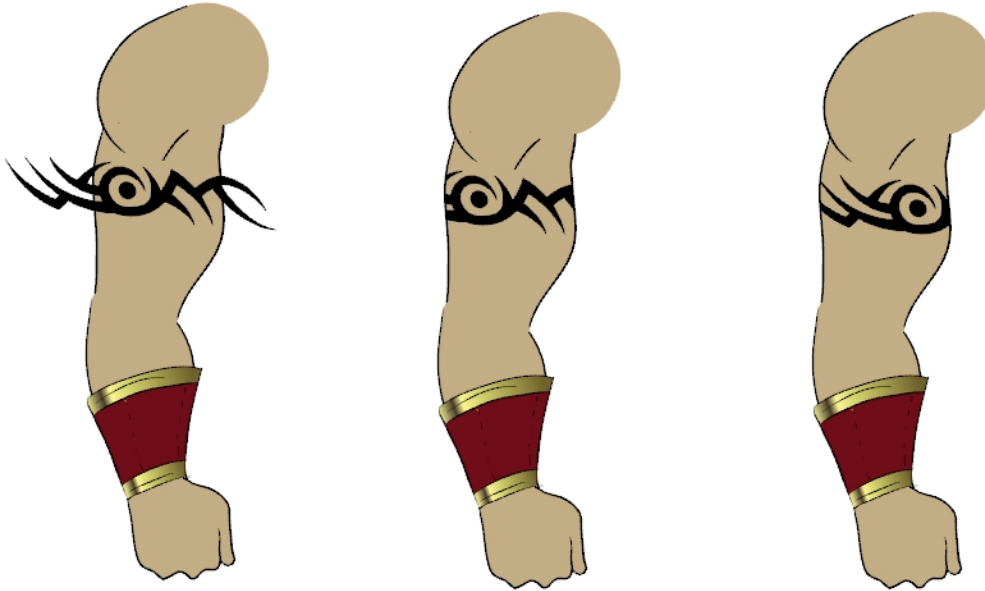
The Set Properties for Many Layers dialog box opens.





3. Modify the properties. If your nodes have different parameters enabled for a certain setting, leave the **As Is** option selected to avoid modifying it. Each node will keep its original setting. Select any other options for all nodes to change to this parameter regardless of their original setting.
4. Click **OK**.

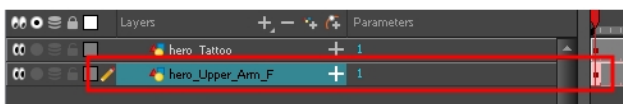
## Masking



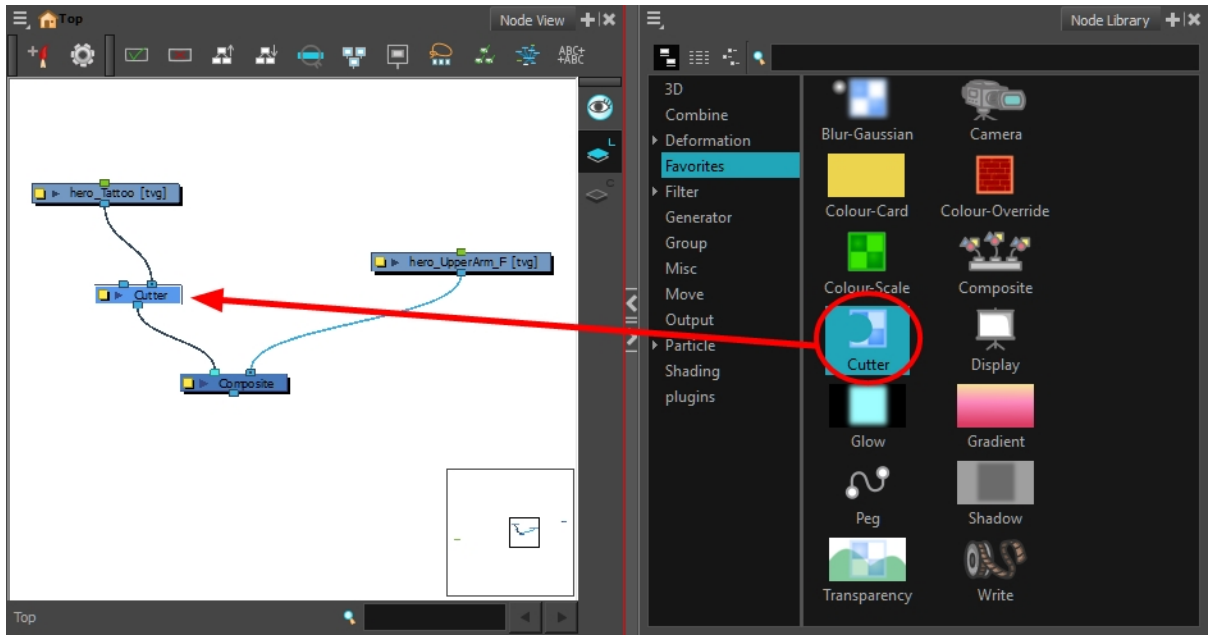
When rigging a character, there may be instances when you want to have the ability to move a particular piece to give the illusion of a rotation or move the pupil within the white of an eye without having the extra bit of the drawing sticking out of the character or eyeball. To do so, you can use masks to cut anything you don't want to be visible.

### How to mask an object in the Node view

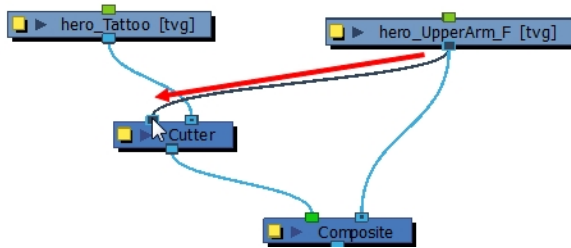
1. In the Timeline view, make sure the keyframe is added on the object that will be masking the piece to cut.



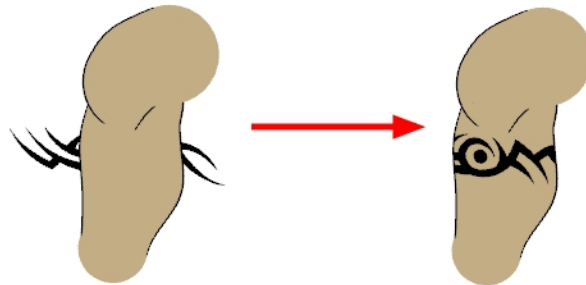
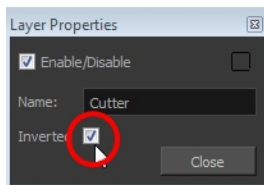
2. From the Node Library view, select the Favorites category and then select the **Cutter** node.
3. Drag the Cutter node to the Node view.
4. Connect the object you want to cut to the Cutter node's right port and connect the Cutter to the Composite node.




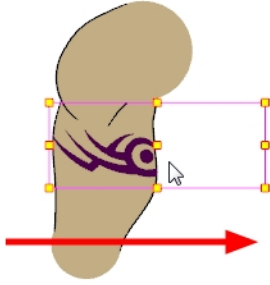
5. Pull out a cable from the masking object and connect it to the Cutter node's left port.



6. Your masking effect is most likely inverted and what you want to cut is probably showing. Click the Mask node's yellow button to open the Layer Properties window. In the Layer Properties window, enable the **Inverted** option.



7. From the Tools toolbar, select the Transform  tool and move the cut object within the masking zone.



## Adding Extra Drawings



Your break down is now complete. You can move on to adding the extra drawings your character needs, such as principal hand positions and mouth shapes. If you ever forget to add extra drawings in your main character's template, you can easily add them later.

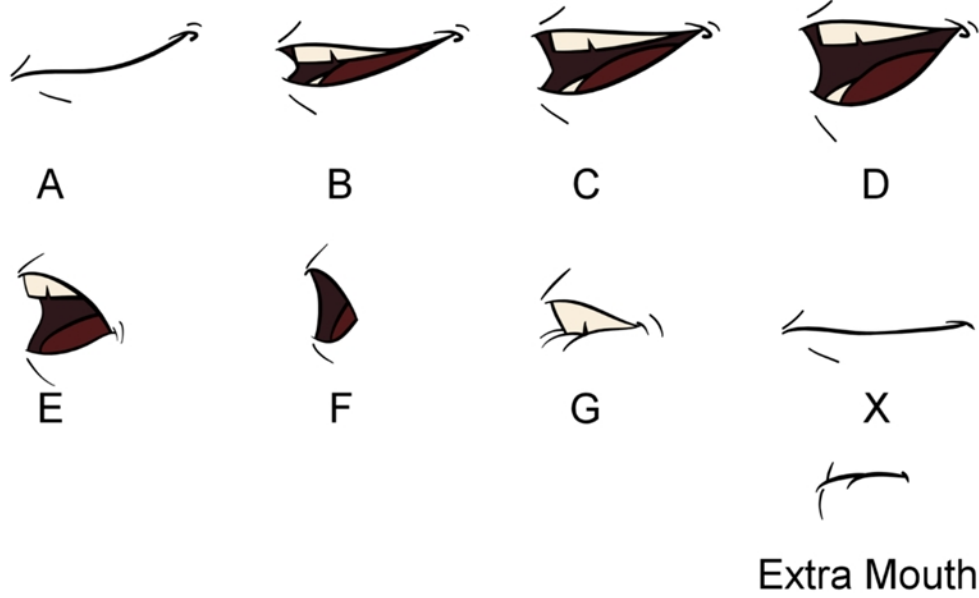
**NOTE:** Add your extra drawings in the layer corresponding to the part you are drawing. You should see the layers as containers for the different pieces. Each body part has its own container in which you can add more drawings of the same part.

If you want to use the auto lip-sync detection feature to animate your dialog, you should create the following mouths for your puppet.

The mouth shapes used by Harmony are based on the conventional mouth chart used in the animation industry.

**NOTE:** The letters used to represent the shapes do **NOT** correspond to an actual sound.

**NOTE:** If you are doing cut-out animation, refer to the Cut-out Animation Guide, Character Building chapter, "Adding Extra Drawings" topic to learn how to add extra drawings to your character.



Here is an approximation of the sound each mouth shape can produce:

- **A:** m, b, p, h
- **B:** s, d, j, i, k, t
- **C:** e, a
- **D:** A, E
- **E:** o
- **F:** u, oo
- **G:** f, ph
- **X:** Silence, undetermined sound

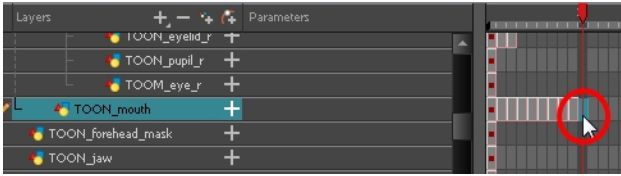
You can lip-sync the traditional way or let the system automatically create the basic detection.

You can refer to the mouth chart positions as you draw the shape of the character's mouth.

### How to add extra drawings



1. In the Timeline view, select the cell where you want to add a new drawing. If you want to duplicate the current drawing and work from it, you can select **Drawing > Duplicate Drawings** or press Alt + Shift + D.

A new drawing is created in the selected cell and automatically extended to the next one. The new drawing is a duplicate of the one that was selected so it contains a duplicate of the art. You can modify it to create your new drawing or delete its contents in the Camera or Drawing view and start from scratch.



1. In the Tools toolbar, select a drawing tool for drawing your extra part.
2. In the Camera or Drawing view, draw your new drawing.



2. Using the Select  tool, select your drawing and flatten the lines by clicking the Flatten  button in the Tool Properties view.

## Setting the Pivots



One of the last steps before storing the character in the library is to set the pivots for the different parts.

Harmony has three types of pivots:

- **Permanent Pivot**

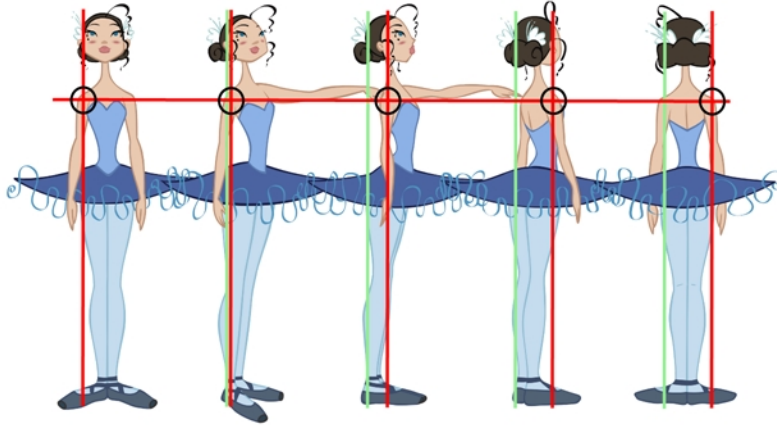
This is a permanent pivot, sometime referred to as peg pivot, that is applied to the entire drawing or peg layer. If you modify its position, it will be changed for the entire layer, modifying the animation, scale and rotation interpolation. The permanent pivot is set using the Rotate, Translate or Scale tool. The Transform tool will only move that pivot temporarily for positioning purposes, but the animation interpolation will be done from the original permanent pivot's position. The Transform tool is designed to move the pivot temporarily during the animation process. It also permits you to select multiple pegs and apply a common temporary pivot.


To permanently move a peg pivot, use the Rotate or Scale tool. You can also directly type the values in the Layer Properties window in the Pivot section's (x) Axis and (y) Axis fields.

In the Layer Properties window, in the Drawing Pivot section, select the **Don't Use Embedded Pivot** option to use the permanent pivot.

- **Drawing Pivot**

The Drawing pivot is contained within each drawing. In one layer, each drawing can have its own pivot. If you have many different views of a character within one layer, the pivot can be different and the animation will adjust to the pivot. The Drawing pivot can also be referred to as *embedded pivot*. If you are not mixing different views within the same layers or are using pegs to animate your layers, it is recommended to use the permanent pivot.




You can set a different pivot for each one of your drawings. For example, if you have a series of drawings from different views, they are not likely to rotate from the same location. In that case, you can set a different pivot for these drawings by using the Drawing Pivot  tool.

In the Layer Properties window, in the Drawing Pivot section, select the **Apply Embedded Pivot on Drawing Layer** option to use the drawing pivot directly on the drawing layer. If you want to apply the drawing pivot to a parent peg to force the peg to follow the drawing pivot variations, enable the **Apply Embedded Pivot on Parent Peg** option.

- **Symbol Pivot**

The Symbol pivot is similar to the Drawing pivot. Each symbol cell can have its own pivot and act the same as the Drawing pivot. The Symbol pivot can also be referred to as *embedded pivot*. Inside a symbol, each drawing can have its own pivot. If you are not mixing different views within the same layers or are using pegs to animate your layers, it is recommended to use the Peg pivot.

For a simple character rig, it is recommended to set the Peg pivot (even on drawing layers) using the Rotate  tool.

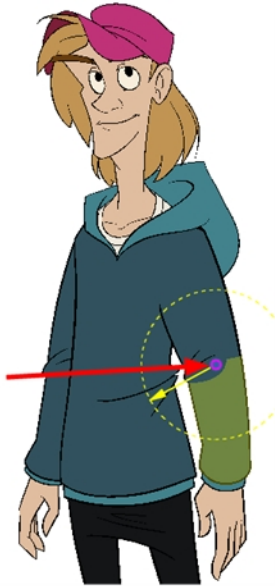
If you want the puppet's pieces to rotate correctly, you must set the pivot points right in the middle of an articulation, such as an elbow or a knee.

By default, your master peg pivot is placed at the centre of the Camera view, which generally equates to your character's hips. A good way to set your peg's pivot is to move it between the character's feet.

### How to set the pivots with the Rotate tool

1. In the Advanced Animation toolbar, select the Rotate  tool.

2. In the Camera or Timeline view, select the layer whose pivot you want to set. In the Camera view, you can also hold down Ctrl (Windows/Linux) or ⌘ (Mac OS X) and click on the piece whose pivot you want to set.
3. In the Camera view, drag the blue pivot to reposition it.



4. Repeat the previous steps for all the pieces, including the eyes, nose and mouth. If you are unsure as where to place the pivot, put it in the center of the selected piece or group of pieces.

**NOTE:** If you added other pegs to your rig, you must set their pivot using the same method.

## Skeleton Optimization

In the Node view, you can add extra nodes, such as a Display, and group all the nodes to keep your work organized.

There are four steps to make sure your puppet can be reused efficiently:

- [Deleting the Write Node on page 399](#)
- [Renaming the Display Node on page 400](#)
- [Changing the Composite Type on page 401](#)
- [Grouping Nodes on page 402](#)

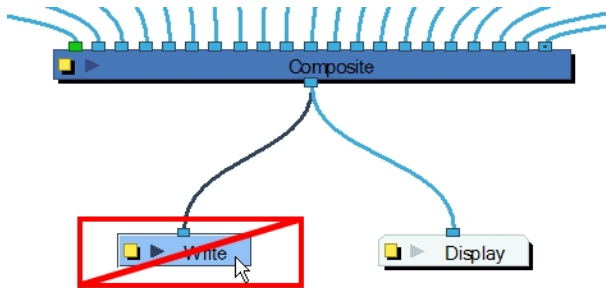
## Deleting the Write Node

The first step in optimizing your network is to delete the Write node, which used for rendering certain portions of the Node view.

When you render a scene that contains three or four characters and they each have a Write node in their skeleton, a render is created for each one and they overwrite each other.

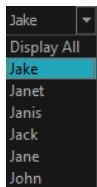
### How to delete the Write node

1. In the Node view, select the Write node.



2. From the top menu, select **Edit > Delete** or press Delete.

### Renaming the Display Node

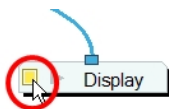


The Display node lets you see a section of the network in the Camera view. By renaming the Display node with your character's name, you can quickly identify it in the Global Display toolbar and isolate your character to see it better while working on it.

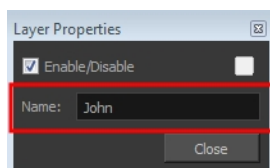
If you do not have a Display node in your network, you can add one by selecting one from the Node Library view and dragging it into the Node view.

### How to rename your Display node

1. In the Node view, click on the Display node's Properties button to open the editor.



2. In the Layer Properties window, rename the Display node with your character's name.

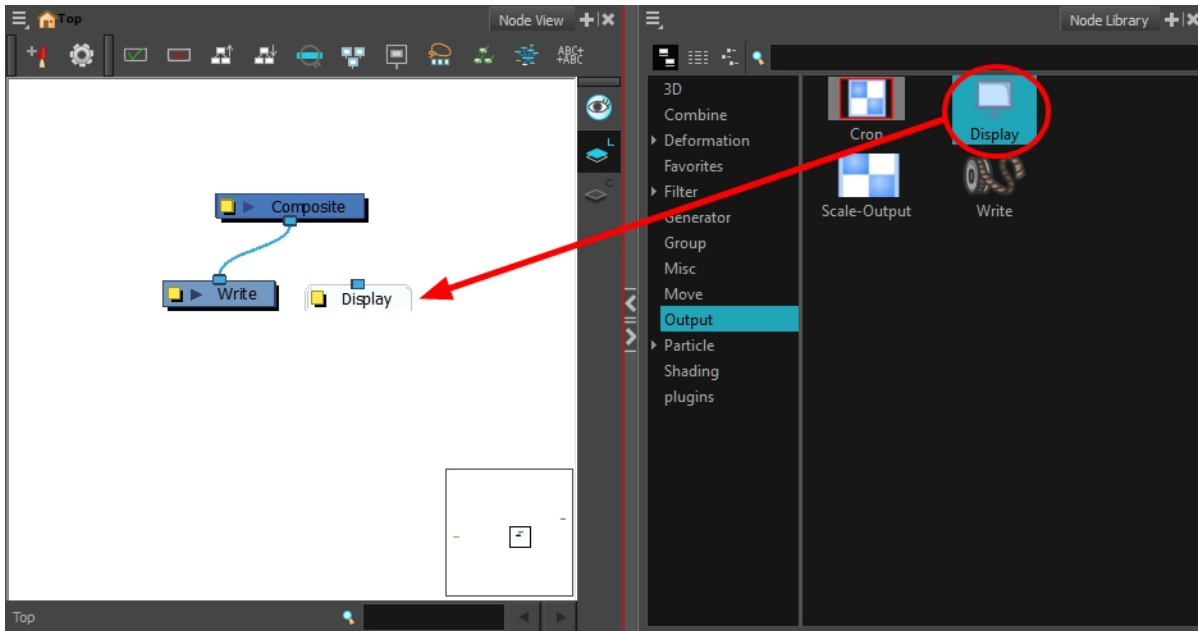


3. Click **Close**.

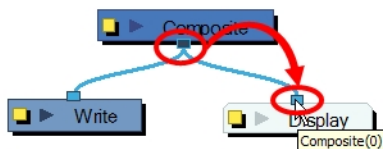


## How to add a Display node

1. In the Node Library view, select the **IO** tab and select the **Display** node.
2. Drag the node to the Node view.



3. Connect the Composite node's output port into the Display node's input port.



## Changing the Composite Type

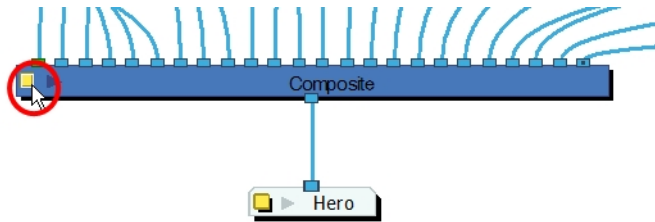
When you create a character with Harmony, you have to connect all your nodes in the Composite node. The Composite node takes all the different images coming out of your drawing nodes and flattens them into one single image.

This is useful when it is time to apply an effect to your entire character or group your layers for a more organized network.

The regular Composite node will flatten all the pieces into one image preventing interaction with props or characters connected to a different Composite node. That is why you have to change the Composite node's type to a special one that will still output one single image but will not flatten the drawings together. This will allow you to nudge your drawings on the Z-axis so that parts of you characters can pass in front and behind other characters and objects. This Composite type is called Pass Through.

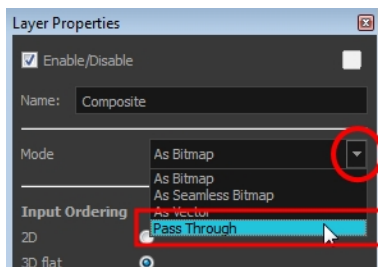
## How to change your Composite node to a Pass Through type

1. In the Node view, click on the Composite node's Properties button.

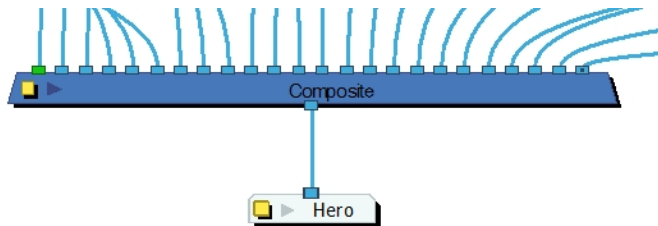


The Layer Properties dialog box opens.

2. From the Mode menu, select **Pass Through**.

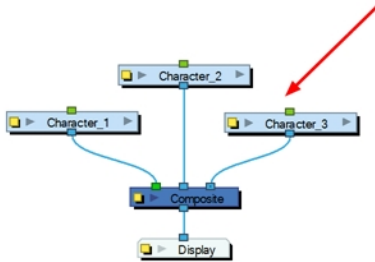
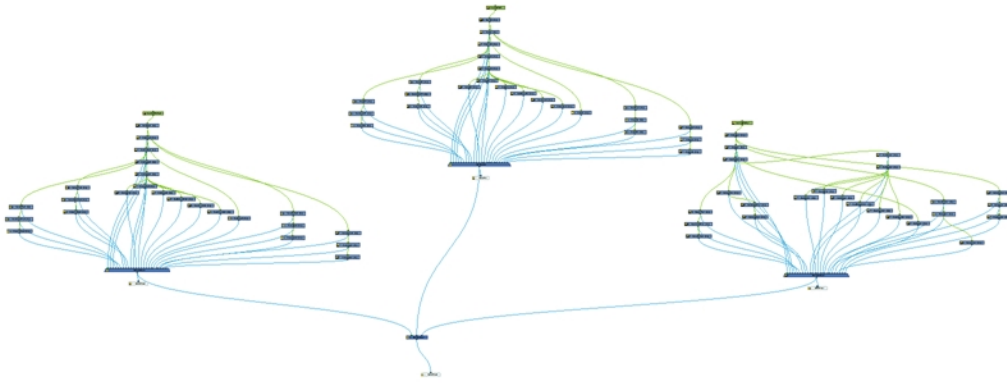


3. Click **Close**.



## Grouping Nodes

Once your rigging is completed, you must group the puppet's skeleton to help organize the often large and complex networks. This way, once you have imported two or three characters into the scene, three Group nodes will be displayed instead of all the rigging connections of three puppets.

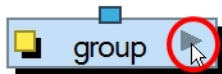


## How to group nodes

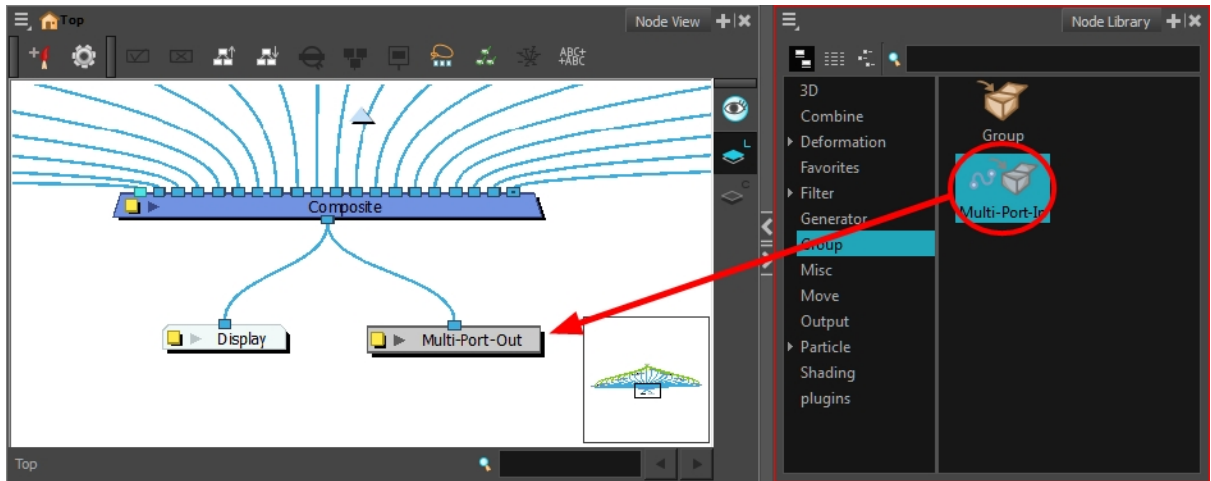
1. In the Node view, select all your nodes.
2. In the top menu, select **Edit > Group > Group Selected Layers** or press Ctrl + G (Windows/Linux) or ⌘ + G (Mac OS X).

Your nodes are grouped.

3. Click on the Group node's right arrow to enter the group.



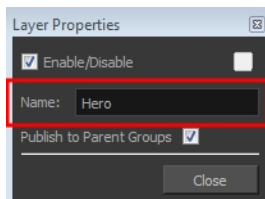
4. If you do not have a Multi-Port Out node inside your group, in the Node Library view, select the **Group** category and select a **Multi-Port Out** node.



5. Drag the Multi-Port-Out node to the Node view.
6. Connect the Composite node's output port into the Multi-Port Out node.  
An output port is created on your Group node.
7. In the bottom-left corner of the Node view, click **Top** to return to the network's root. You should now see an output port on your Group node.



8. Click on the Group's Properties button to open the Layer Properties window.



9. In the Layer Properties window, rename the Group node with your character's name.
10. Click **Close**.



## Storing the Character in the Library

For maximum efficiency and reuse of your character in different scenes, you must store a template in the Library view. You can create different kinds of templates, such as templates that include all the layers, a template for a body, key pose or even some containing only the head.

Harmony has a Timeline and a Node view. The Timeline view represents the layers in a linear and simple way. The Node view lets you create all sorts of complex connections that the Timeline view cannot display. This means that:

- Any template created from the Timeline view must be imported in the Timeline view.
- Any template created from the Node view must be imported in the Node view. These templates are also referred to as *master templates*.

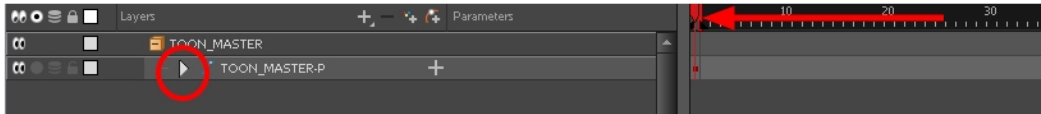
**NOTE:** It is highly recommended that you create a cut-out puppet's main template (master template) from the Node view since it contains advanced connections, Display nodes and Composite nodes.

When you create a template from the Timeline view's right side, you must first import your master template in order for everything to work properly when you reimport it into a scene. Once the master template is imported, you can import the key pose (action) template's content into the right side of the Timeline view.

When you create a template from a keyframe in the Timeline view's right side, it only copies the drawings and keyframes. It does not copy all of the node system's advanced connections and composites. If you import a template that was created in the Timeline view into the Node view or in the Timeline view's left side, the layers will be in the wrong order and will not be connected to a composite.

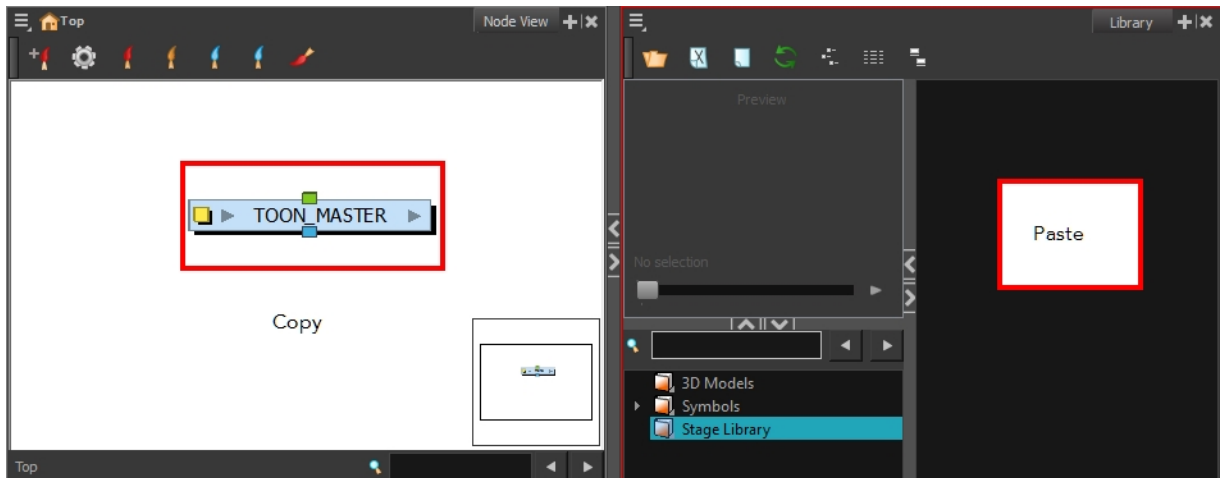
### How to create a template from the Node view

1. In the Library view, right-click on the desired library folder and select **Right To Modify**.
2. In the Timeline view, collapse the master peg layer.

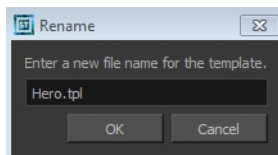


1. If your scene has a series of blank cells, they must also be included in the template if you drag the layer to the Library view. Reduce the scene length so there are no empty cells before creating your template.
2. Add a keyframe on the collapsed character.

3. In the Node view, select your character's group and in the top menu, select **Edit > Copy**. In the Library view, select the folder in which you want to store the template and in the top menu, select **Edit > Paste**.



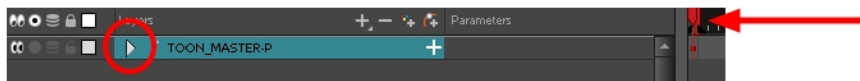
The Rename dialog box opens.



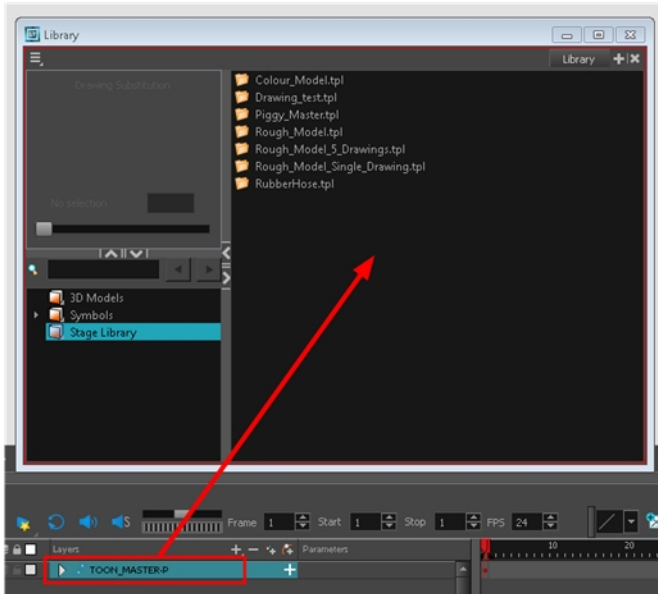
3. In the Name field, type in a name for the template.
4. Click **OK**.

### How to create a template from the Timeline view

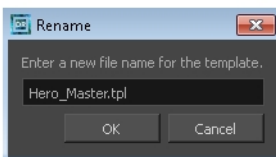
1. In the Library view, right-click on the desired library folder and select **Right To Modify**.
2. In the Timeline view, collapse the master peg layer.



3. If your scene has a series of blank cells, they will also be included in the template if you drag the layer to the Library view. Reduce the scene length to have no empty cells before creating your template.
4. In the Timeline view, select your master peg and drag it to the Library view.



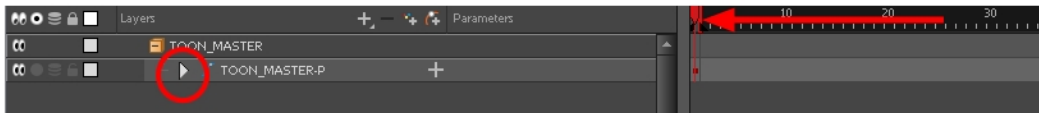
The Rename dialog box opens.



5. In the Name field, name the new template.
6. Click **OK**.

### How to create a key pose (action template)

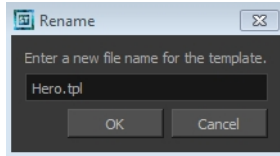
1. In the Library view, right-click on the desired library folder and select **Right To Modify**.
2. In the Timeline view, collapse the master peg layer.



3. Select the cell containing the desired view and drag it into the desired library folder.

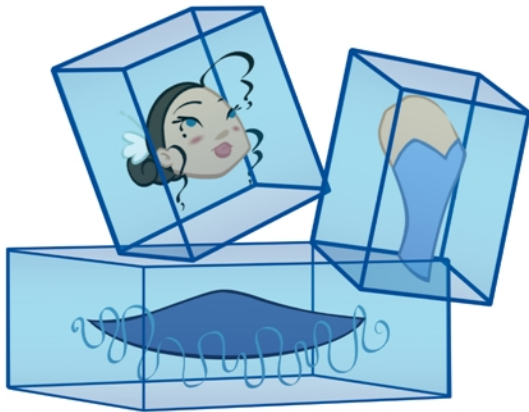


The Rename dialog box opens.



4. In the Name field, type in a name for the template.
5. Click OK.

## Appendix



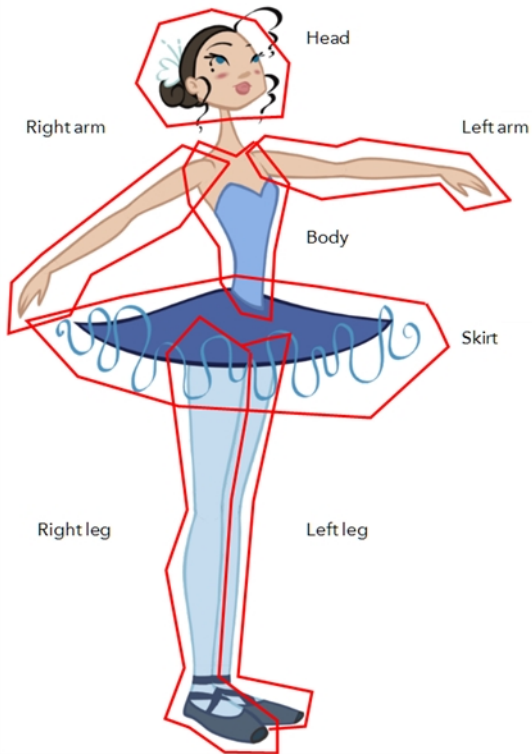
The many options and animation techniques available for building a puppet make it impossible to determine only one method to break down a character. Here are some advanced tips on breaking down puppets. As you become more familiar with the software, you will find more ways to improve the construction of your puppet.

This section is divided as follows:

- [\*Break Down: Cutting the Character in Pieces\*](#) on page 409
- [\*Break Down: Distribute to Layers\*](#) on page 420
- [\*Converting the Layers into Symbols\*](#) on page 421
- [\*Patch Articulation\*](#) on page 424
- [\*Setting Different Pivots for a Puppet Using Symbols\*](#) on page 429
- [\*Setting Pivots on a Frame Range\*](#) on page 431
- [\*Adding New Drawings to an Existing Template\*](#)



## Break Down: Cutting the Character in Pieces



If you do not want to redraw all the artwork for your character, you can use the cut away technique where, with the Cutter tool, you select and send pieces of the model on a new layer.

The first step in breaking down your character is to do a rough cut down of the main parts, such as the body, arms, legs and head. Using the Create Drawing from Drawing Selection feature lets you automatically create layers and copy your selection in it.

This section is divided as follows:

- [Breaking Down the Main Parts on page 409](#)
- [Breaking Down the Secondary Parts on page 412](#)
- [Selecting and Incorporating to an Existing Layer](#)
- [Breaking Down the Extra View Main Parts on page 415](#)
- [Breaking Down Secondary Parts in the Extra Views on page 416](#)

### Breaking Down the Main Parts

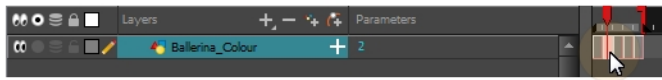
To break down the main body parts, you will use the Create Drawing From Drawing Selection feature. There is no need to create any layers prior to this process. Make sure your model is well centered and sized in the Camera view.




You do not need to make clean cuts around your parts; a rough one is sufficient as long as it includes all the artwork of the part you want to break down. You will clean the extra bits and pieces later.

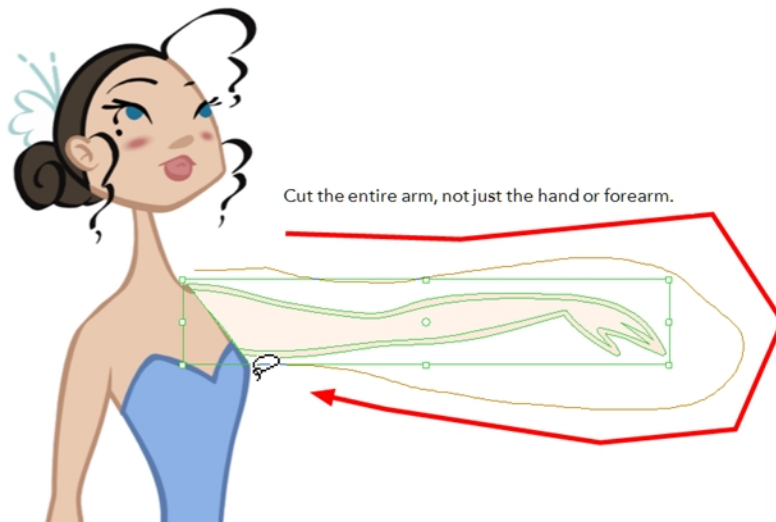
Using the Cutter tool, you will roughly cut the main sections, and then use the Select tool to select precise lines and colour zones.

## How to break down the main parts

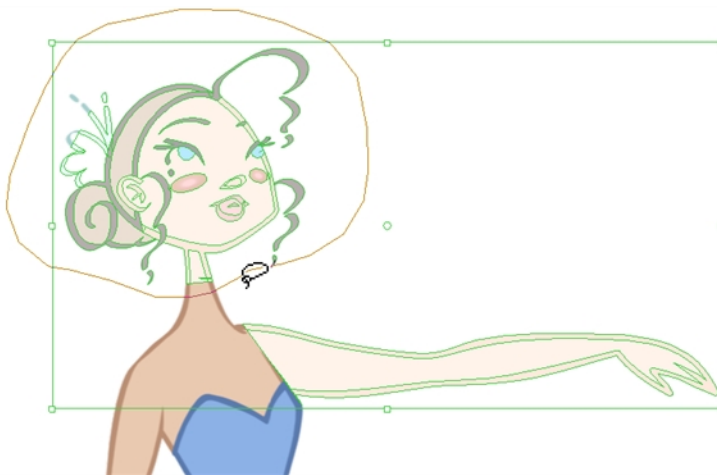
1. In the Timeline view, select the model's cell that corresponds to the first view to break down.



2. In the Tools toolbar, select the Cutter  tool.
  - ▶ If you prefer to use the Select tool, choose the Select  tool from the Tools toolbar or press Alt + S.
  - ▶ In the Tool Properties view, you can switch to the Lasso  selection mode.
3. In the Camera view, create a selection around the first part to break down. If you click on a zone, the Cutter tool will select the zone. It will end the selection at the first point of intersection that it meets.

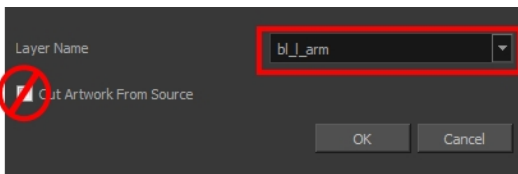


- ▶ Hold down Shift to create a new lasso selection around another zone and add it to your previous selection.



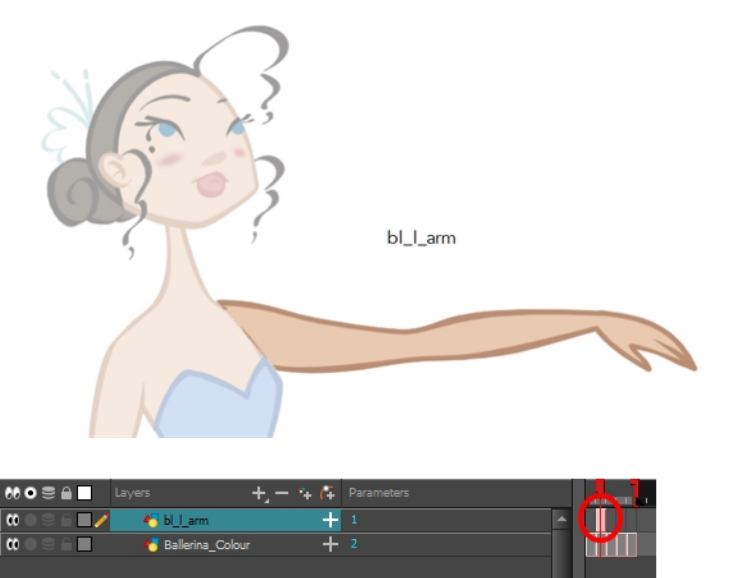
- From the top menu, select **Edit > Create Drawing From Drawing Selection** or press F9 (Windows/Linux) or  $\text{⌘} + \text{F9}$  (Mac OS X).

The Create Drawing From Drawing Selection dialog box opens.

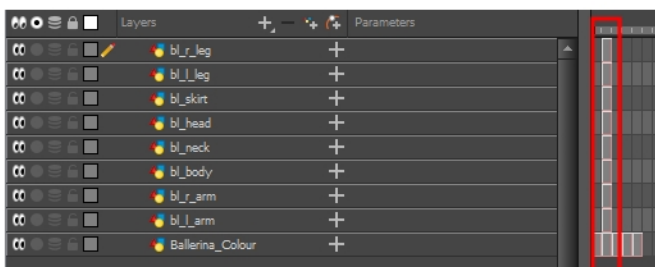


- In the Layer Name field, type the name of the layer you want to create following the naming convention you established previously.
- Deselect the **Cut Artwork From Source** option to keep the selected artwork on your original drawing. You do not want to cut the artwork from the colour model.
- Click **OK**.

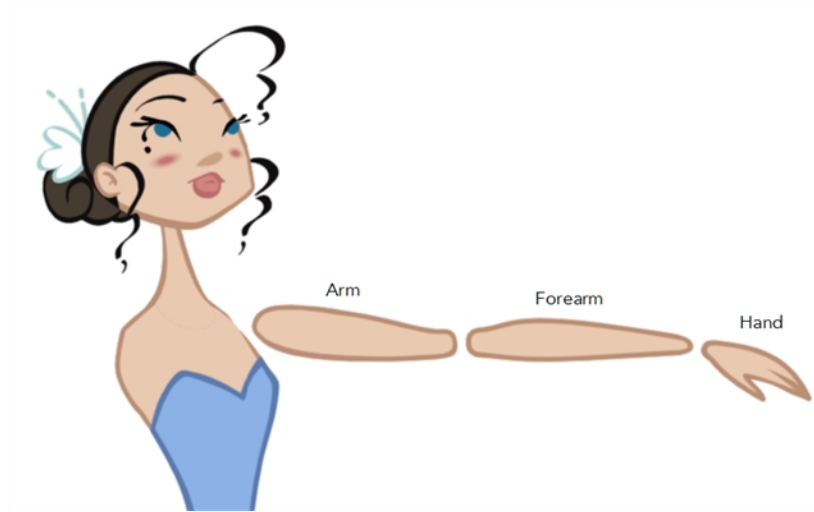
The new layer is created and your selection is copied in it. The drawing is created in the same frame number as the cell it was taken from.



- Repeat the previous steps for each main body part.



## Breaking Down the Secondary Parts

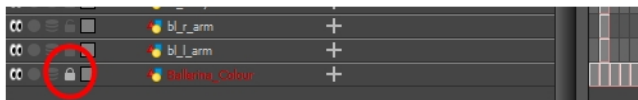


You should now have a layer for each main part of the character for the first view to break down. You are now ready to break down those main pieces into smaller ones.

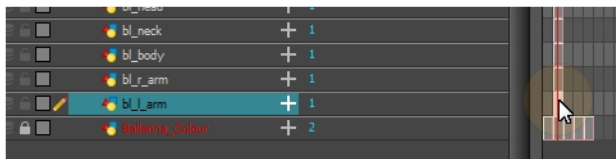
Breaking down the secondary parts is similar to the main part break down process except that this time you will cut away the artwork from the layer it has been selected from.



### How to break down the secondary parts

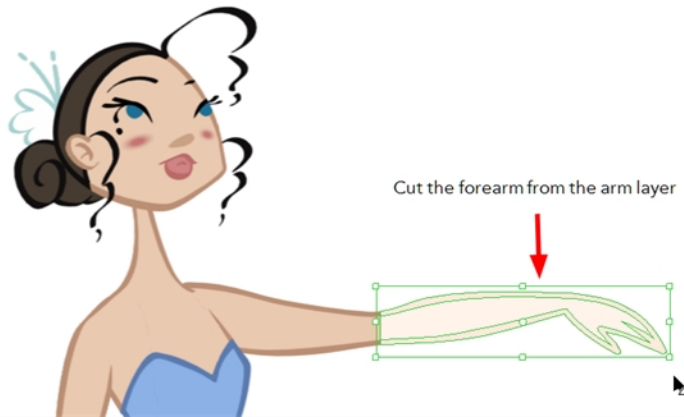
1. In the Timeline view, lock your model layer by clicking its Lock  button.




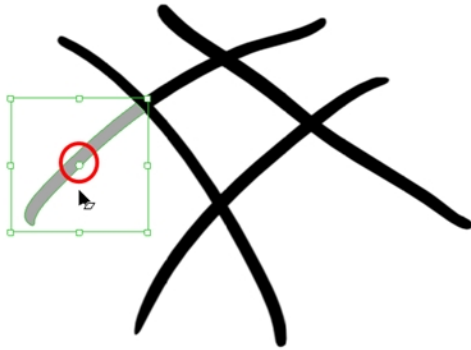
2. In the Timeline view, select the cell that corresponds to the main part you want to break down.



3. In the Tools toolbar, select the Cutter  tool.
  - If you prefer to use the Select tool, choose the Select  tool from the Tools toolbar or press Alt + S.
4. In the Camera view, create a selection around the part to break down.

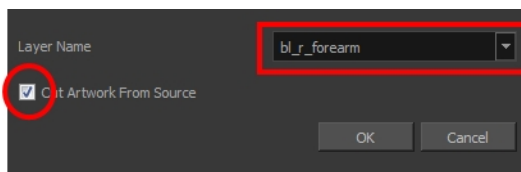


- ▶ If you click on a zone, the Cutter  tool will select the zone and end the selection at the first point of intersection that it meets. Click on the line with the Cutter tool to select it up to the next intersection.



5. From the top menu, select **Edit > Create Drawing From Drawing Selection** or press F9 (Windows/Linux) or  $\text{⌘} + \text{F9}$  (Mac OS X).

The Create Drawing From Drawing Selection dialog box opens.

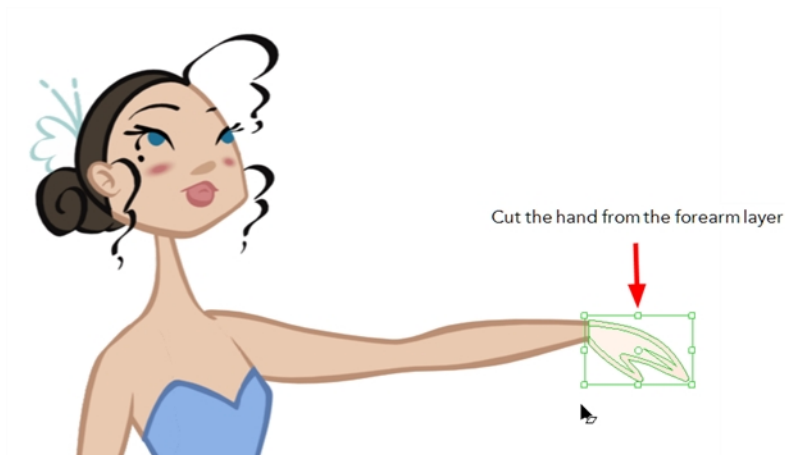


6. In the Layer Name field, type the name of the layer you want to create following the naming convention you established previously.
7. Select the **Cut Artwork From Source** option to remove the selected artwork from your original drawing. In this case, you want to cut the artwork from the colour model.
8. Click **OK**.

The new layer is created and your selection is copied in it. The drawing is created in the same frame number as the cell it was taken from.



9. Repeat the previous steps for each body part.



**NOTE:**

If you forgot to add some artwork to a layer you previously created, you can always add it later.

In the Camera view, select the artwork to send to the existing layer. Open the Create Drawing from Drawing Selection dialog box by pressing F9 (Windows/Linux) or  $\text{⌘} + \text{F9}$  (Mac OS X). In the dialog box, select an existing layer from the list instead of typing a new name. Click **OK** to add the artwork to the existing drawing in the layer you selected.



## Selecting and Incorporating to an Existing Layer

Your first view should now be completely broken down. If your articulations are still rough and bits and pieces are missing you will fix those in the next step.

If your character model has more than one view, now is the time to break them down.

The process is very similar to breaking down the first view. You have two choices:

- Breaking down the new view in a net set of layers
- Braking down the new views in the same existing layers  
If your layers are not in the correct order, you can reorder them later. Simply add the part that you are breaking down to the layer you previously created for the same body part.

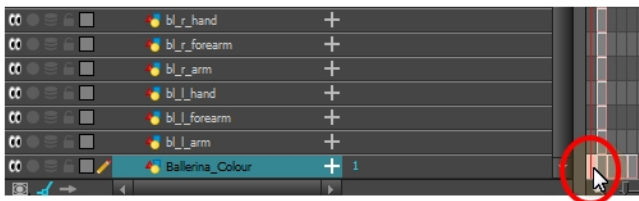
Start by breaking down the main pieces, as you did before. The secondary parts will be broken down later on.



## Breaking Down the Extra View Main Parts

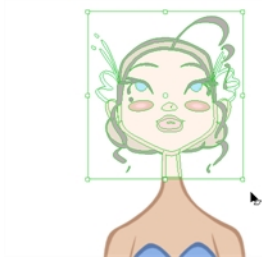
Repeat the following steps for each extra view you need to break down.

### How to break down the other views

1. In the Timeline view, selected the model's cell corresponding to the view to break down. Don't forget to unlock the layer.

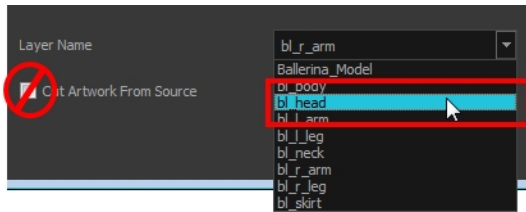


2. In the Tools toolbar, select the Cutter  tool.
  - If you prefer to use the Select tool, in the Tools toolbar select the Select  tool or press Alt + S.
3. In the Camera view, create a selection around the first part to break down.



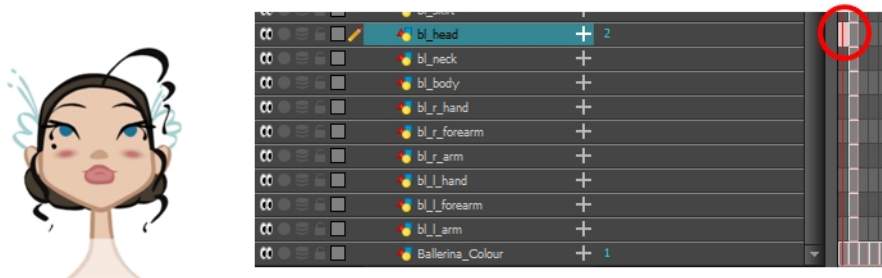
- From the top menu, select **Edit > Create Drawing From Drawing Selection** or press F9 (Windows/Linux) or ⌘ + F9 (Mac OS X).

The Create Drawing From Drawing Selection dialog box opens.



- In the Layer Name field, select the corresponding layer from the list if you want to use the same layers or type a new name if you want to create a new layer.
- Deselect the **Cut Artwork From Source** option to keep the selected artwork on your original drawing. You do not want to cut the artwork from the colour model.
- Click **OK**.

The artwork is inserted into the existing layer. The drawing is created in the same frame number as the cell it was taken from. It is not incorporated in the other view's drawings.



- Repeat step 1 to 7 for each main body part.

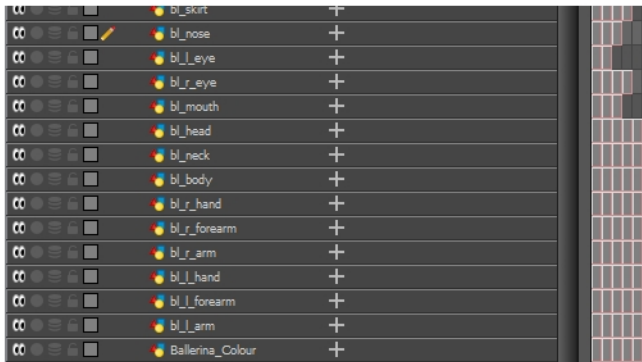
### Breaking Down Secondary Parts in the Extra Views

To break down the secondary parts for your extra views, follow the exact same process as you did for the first view you broke down, but you will incorporate the new parts in the existing layers—see [Breaking Down the Secondary Parts](#) on page 412.

Each view can have its own set of layers in the Timeline view, therefore each view does not necessarily need to have the same layer structure.

Here is an example of how your timeline should look at this stage:












## Completing the Parts and Articulation



Now that all the layers are created and the parts are basically broken down, it is time to clean up the parts and complete the articulation.

### Cleaning the Parts




You will need to use a series of drawing tools to clean the parts:

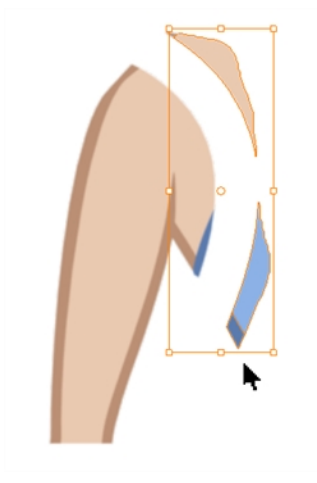
-  Brush tool
-  Eraser tool
-  Select tool
-  Cutter tool
-  Contour Editor tool
-  Paint tool
-  Close Gap tool



## How to clean your drawings

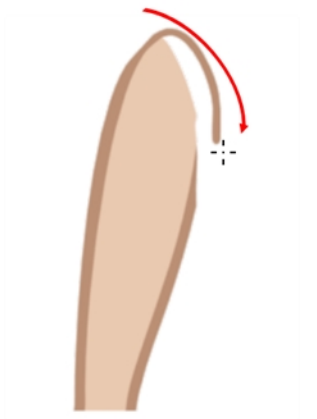
1. In the Tools toolbar, select the drawing tool you need to fix your drawings.





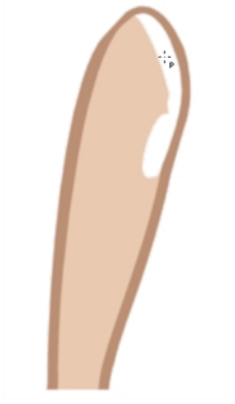
2. In the Timeline view, select the cell containing the drawing to fix.
3. In the Camera view, delete the extra bits using the Select  or Cutter  tool. You can also use the Eraser  tool.



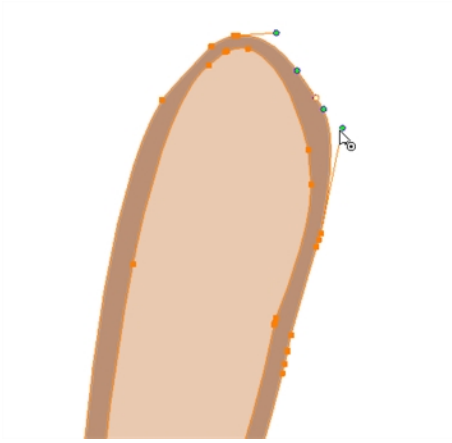
4. Draw the missing lines using the Brush  tool. If you use the Brush tool, it is recommended that you enable the Auto-Flatten  option in the Tool Properties view.





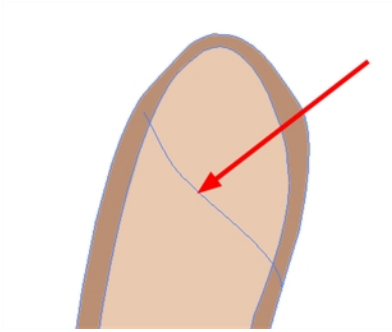
5. Using the Paint  tool, paint the gaps. You can close some gaps with invisible lines using the Close Gap  tool or press Alt + C.



6. Reshape your lines using the Contour Editor  tool or press Alt + Q.



7. Using the Select  tool, select the entire drawing and click the Flatten  button in the Tool Properties view to flatten your drawings.
8. From the top menu, select **View > Show > Show Strokes** to display the invisible lines that could be present in your drawing or press K.



9. From the top menu, select **Drawing > Optimize > Remove Extra Strokes** to remove any unnecessary invisible lines in the drawing.
10. Repeat this entire process for each drawing to fix.

## Break Down: Distribute to Layers


When breaking down a character, you can distribute each selected art stroke to a new layer.

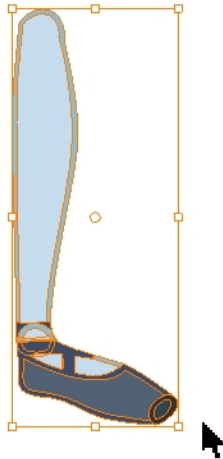
Each stroke you select in the Camera view is automatically placed on a new layer. One layer per stroke.

If one part of your puppet is composed of several strokes, you must group them before distributing them onto new layers.

**NOTE:** You cannot distribute layers in the Drawing view; it must be done in the Camera view.

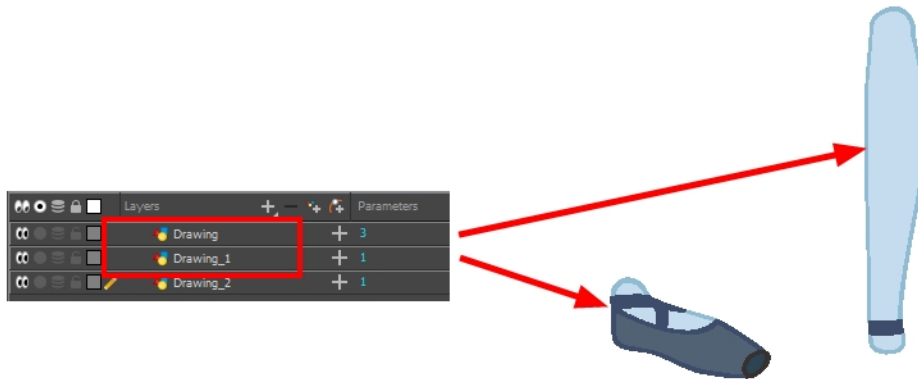
### How to distribute to layers

1. In the Tools toolbar, click the Select  tool.
2. In the Camera view, select the art strokes you want to distribute to different layers.

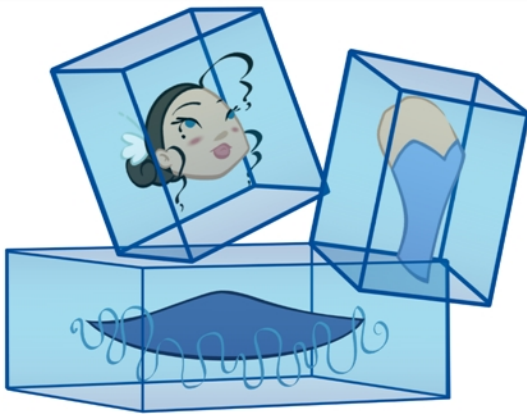


3. From the top menu, select **Drawing > Distribute to Layers** or click the Distribute to Layers  button in the Tool Properties view.

Drawing layers are created in the Timeline view, each corresponding to the different strokes or groups of strokes selected. Each stroke or group of strokes is distributed into each new Drawing layer. The selected strokes in the original drawing layer are removed.



## Converting the Layers into Symbols



**NOTE:** Converting your layers into symbols is optional. When animating, you will need to enter the symbol to create a new drawing. If you want to use morphing when animating, keep your layers as drawings. Do NOT use symbols.

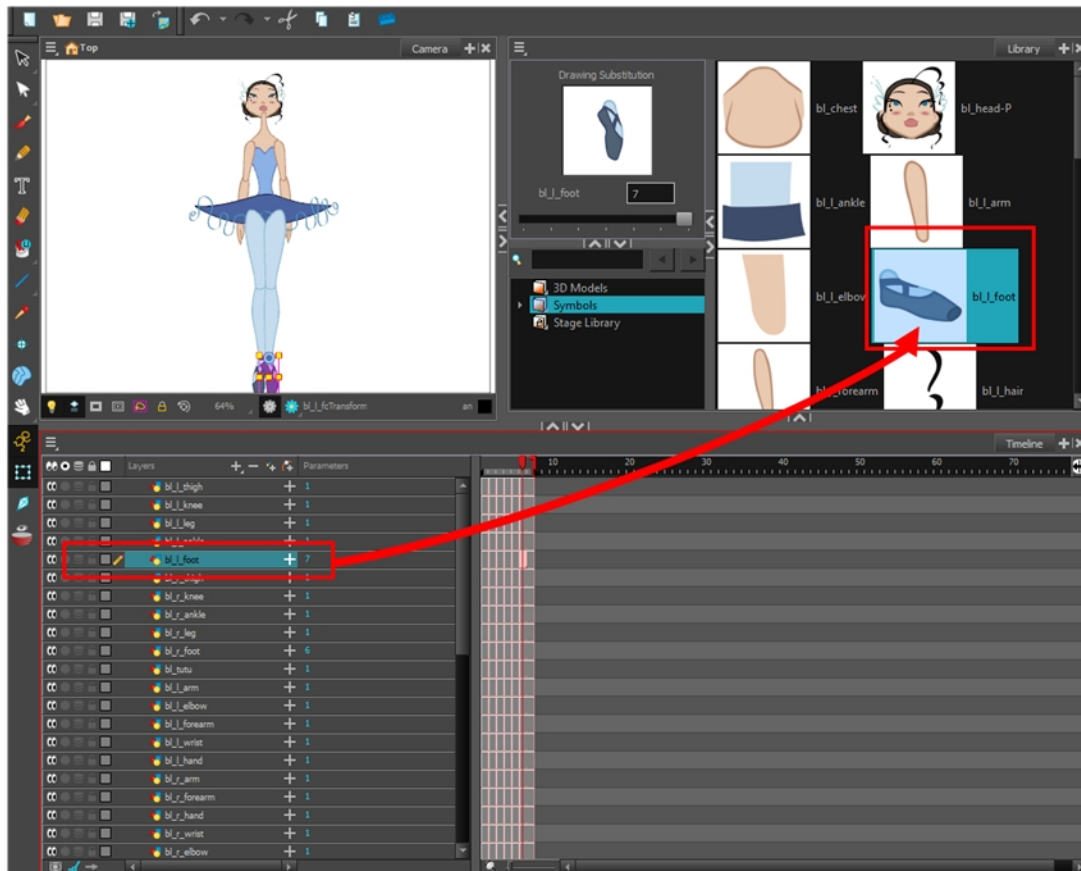
Once the breakdown is completed, you can create symbols out of each drawing. The symbol will encapsulate each drawing of the layer. Later on, even if you only expose the first frame, such as the front head, you will still have access to all of the head drawings you placed in the symbol. This will also allow you to add more drawings, as your characters' master templates will evolve throughout the production of your movie or series.


All your layers should be stored in the library as symbols. Before building your puppet, remove all the current layers in your scene. All of your work is saved in the library.

If you are not sure that you put everything in your library, you can always perform a Save As on your scene and work on a new version.

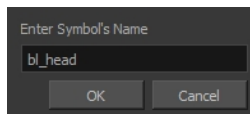
## How to create a symbol

1. Create a symbol by doing one of the following:
  - ▶ From the Timeline view, drag the layer to the Symbols library folder.



- ▶ In the Timeline view, select the layer to convert to a symbol. From the top menu, select **Edit > Create Symbol** or press F8. You can also click on the Create Symbol  button available in the Edit toolbar.

The Create Symbol dialog box opens.




2. In the Enter Symbol's Name field, type the new symbol's name. It is recommended that you keep your original layer's name.
3. Click **OK**.
4. Repeat this process for each layer in the Timeline view.

**NOTE:** Make sure all your layers are stored in the symbol library.

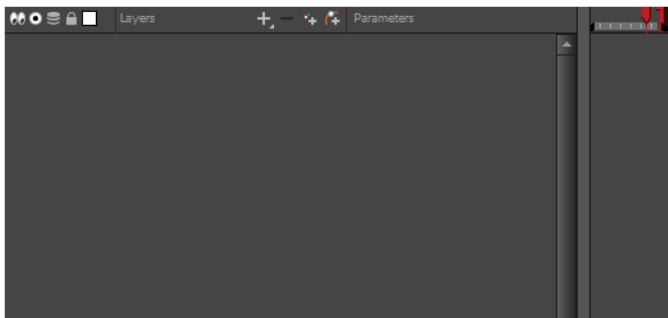
## How to clean the Timeline view

1. In the Timeline view, select all of your layers.

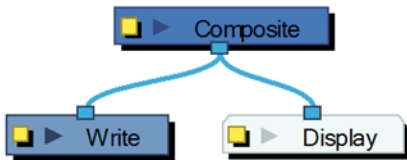


2. In the Timeline's Layer toolbar, click the Delete Layers  button.
3. In the Confirm Delete dialog box, click **OK**.

Your timeline is now ready to receive the body part symbols for the rigging process.



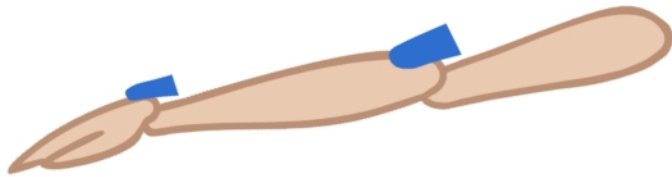
Your Node view should look like this:



## Patch Articulation





The Harmony advanced rigging can use an articulation fixing technique called *Patch Articulation*. This technique is a colour fill patch that is drawn on a third layer and is used to cover the joint lines. It is a simple, yet powerful method.



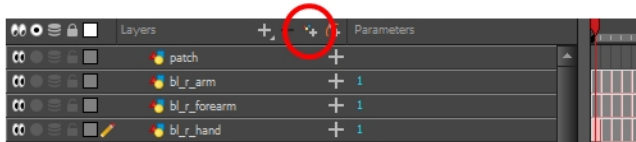
With this technique, you avoid having to create a correction layer at the end of the animation to fill the gaps in the joints. You do not need to worry about the articulations at all. Once a patch is set, the articulation is fixed for the entire length of the animation.

To make this technique even more efficient, Harmony lets you draw the patch inside the same drawing, but on a separate contained layer. The Line Art and Colour Art layers are not only useful in traditional ink and paint, but also in advanced cut-out breakdown. You can draw the patch in the Colour Art layer and extract it in the Node view. The advantage of doing it this way is that when animating and using the drawing substitution, the patch drawing will change at the same time as the main drawing.

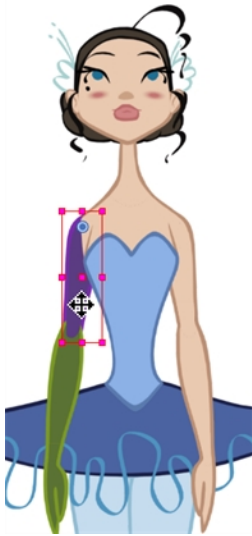
### How to create a patch articulation


1. In the Tools toolbar, select the Transform  tool or press Shift + T.
2. If you plan to create your patch on an independent layer, do the following. If not, go the next step.
  - In the Timeline view, add a new drawing layer by clicking the Add Drawing Layer  button or press Ctrl + R (Windows/Linux) or ⌘ + R (Mac OS X).

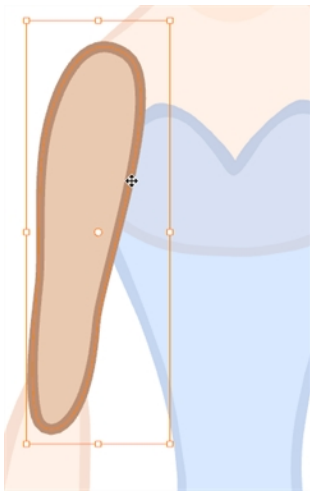




3. In the Camera view, select the part for which you want to create a patch. For example, if you are fixing the elbow articulation, select the arm or forearm drawing to edit it.

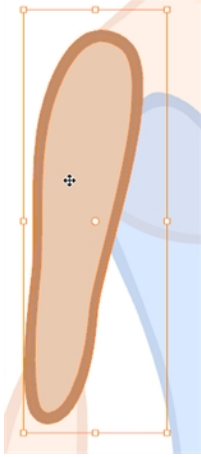


4. In the Tools toolbar, select the Select  tool or press Alt + S.
5. If you drew your lines with pencil lines, it is recommended to convert them to brush lines (fill shapes):
  - ▶ In the Camera view, select the pencil lines.

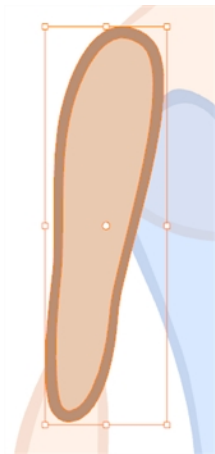


- ▶ In the Tools Properties view, click the Convert Brush Strokes to Pencil Lines  button.

- ▶ In the Camera view, select the piece's outline and fill.

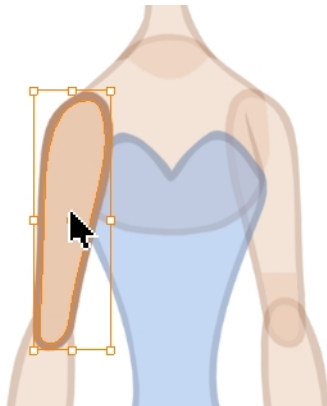


- ▶ In the Tool Properties view, click the Flatten  button to remove the excess colour fill located under the contour stroke.




**NOTE:** If you want to keep your lines as pencil and create a patch joint, you will need to use the [Auto-patch Articulations on page 370](#) node.

6. In the Camera view, select the fill zone of the part's drawing.



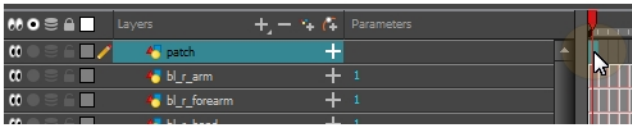
7. In the Camera view, right-click and select **Copy**.

8. To paste the selection:


- ▶ If you are using the recommended method, which is to paste your selection in the Colour Art, in the Art Layer toolbar, click the Colour Art  button.

OR

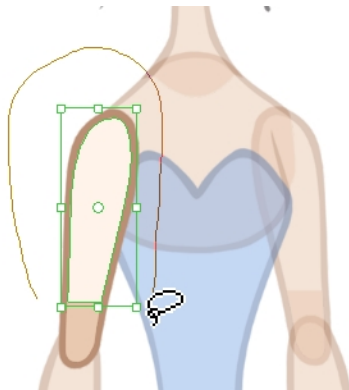
- ▶ If you are using an independent layer, in the Timeline view, select the cell in which you want to create the patch.



9. In the Camera view, right-click and select **Paste**.

10. In the Tools toolbar, select the Cutter  tool.

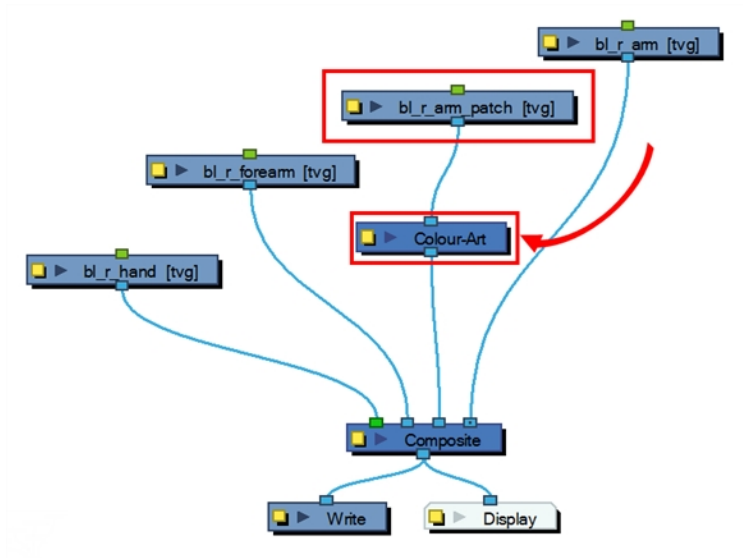
11. In the Camera view, make a selection around the pasted zone to cut everything out but a small overlapping zone to cover the articulation.



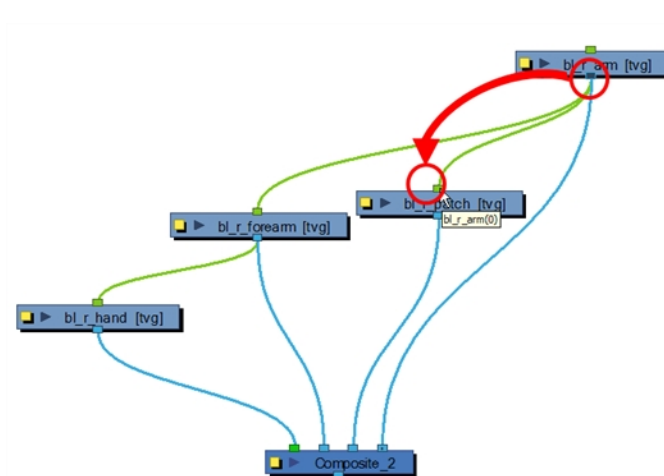
12. To extract the patch from the Colour Art layer:

- ▶ In the Node view, select the node containing the drawing with the patch.
- ▶ Copy and paste the selected node. Note that when you copy and paste from the Node view, by default it creates a clone, so any changes that are made to one affect the other.
- ▶ Click on the node's yellow button to open the Layer Properties window.
- ▶ In the Name field, add the word **patch** to the node's name.
- ▶ Close the Layer Properties window.

13. In the Node Library, select the **All Node** tab. Drag a Colour Art node and connect it below the Patch node.

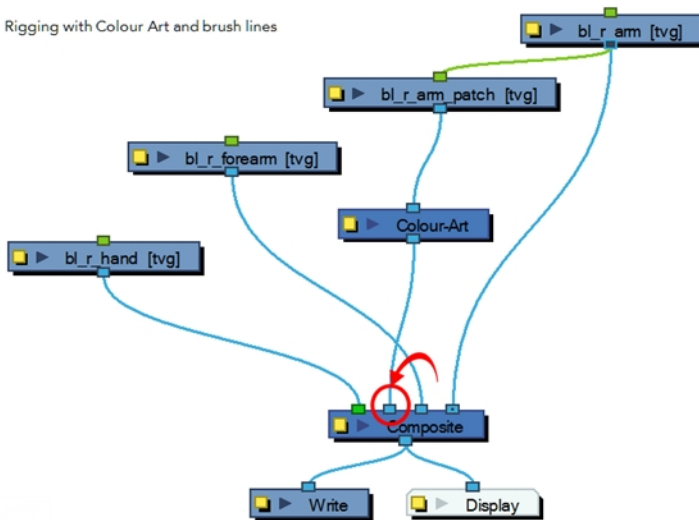


14. In the Node view, connect the main part you create the patch from and parent it to the patch node.

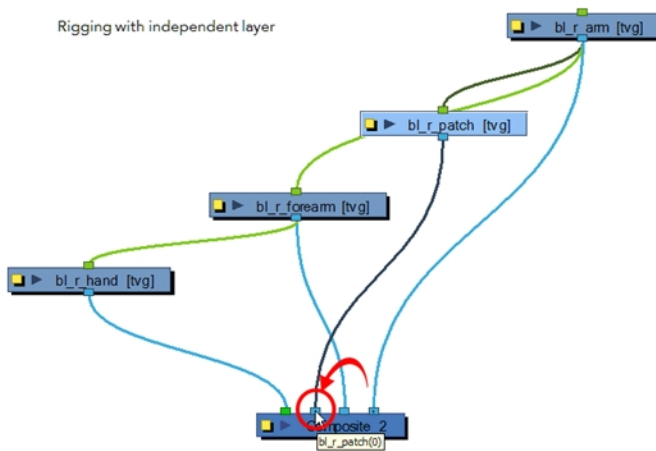


15. Select the patch node's connection to the Composite node and drag it in front of the piece to be covered. In this case, the elbow patch is parented to the arm and connected in front of the forearm.

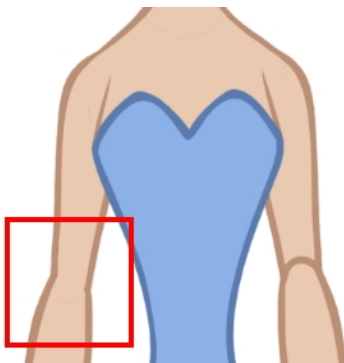
Rigging with Colour Art and brush lines



Rigging with independent layer



1. Repeat the process for each articulation which requires fixing.



## Setting Different Pivots for a Puppet Using Symbols


If you want the puppet's pieces to rotate correctly, you must set the pivot points onto the articulations. You can set the pivots using the Rotate tool which sets it for the entire layer or you can set the pivots directly on your symbol and have a different pivot for each symbol cell. By default, when you create symbols, the symbol pivot is located at the centre of your drawing. You will need to move it onto the shoulder or elbow.

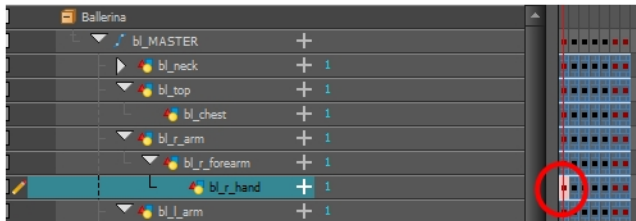
You will set the pivot on the symbol's cells, not directly on the drawings. To set your pivots, you must be at the top level of your character building scene and not inside the symbols.


By default, when you set the pivot onto a symbol, all the cells use the same pivot. If you need different pivots for different cells, refer to the following procedure.

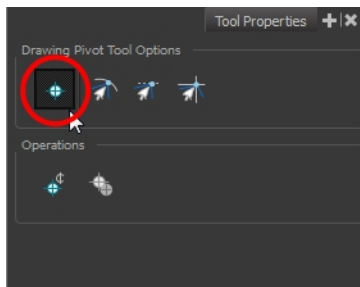
Do the following steps for each layer in the Timeline view.

### How to set the pivots for the body parts

1. In the Tools toolbar, select the Drawing Pivot  tool or select **Drawing > Tools > Drawing Pivot**.
2. In the Camera or Timeline view, select the symbol on which you want to set a pivot.

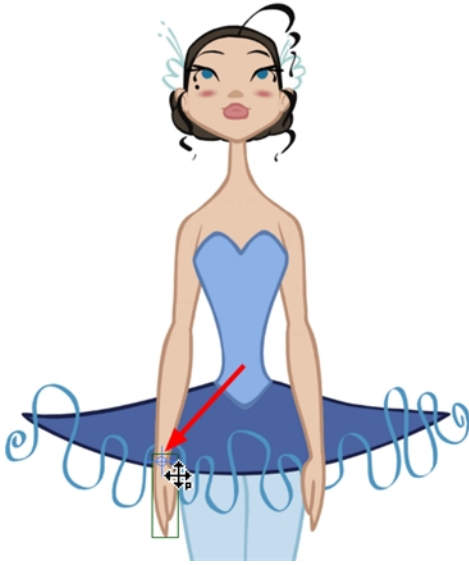


3. If you only want to set one pivot for your symbol, in the Tool Properties view, select the Set the Pivot for Symbol on All Frames  button.



- Deselect this button if you want to set a series of different pivots for your symbol's cells.

4. In the Camera view, click where you want the pivot to be. You can also drag the pivot marker to the desired location.



5. If you want to set a different pivot for another drawing or symbol cell, select the drawing or cell and in the Camera view, set the new pivot.  
Make sure the Set the Pivot for Symbol on All Frames button is deselected.

## Setting Pivots on a Frame Range

If you are using the drawing pivots rather than the Rotate tool pivot and if some elements need the same drawing pivot, such as all of the three-quarter hands, you can select all of these hands cells and set the pivot all at once. If your pivot is already correctly set on your first drawing, copy and paste that pivot onto the other drawings in the Timeline or Xsheet view.



You must have the same drawing pivots on the extra parts from the same angle. If you substitute a drawing while the part is rotating, the animation risks popping out of place if the pivot is uneven.

### How set the drawing pivot of a frame range

1. In the Drawing or Camera view, set the first drawing pivot of the series. For example, set it on hand-1.



- In the Timeline view, select the cell that contains the correct pivot.

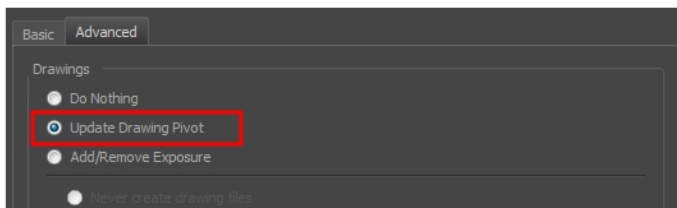


- From the top menu, select **Edit > Copy**.
- In the Timeline view, select the cell range that requires the same pivot.



- From the top menu, select **Edit > Paste Special** or press Ctrl + B (Windows/Linux) or ⌘ + B (Mac OS X).

The Paste Special dialog box opens.



- In the Paste Special dialog box, select the Advanced tab.
- In the Drawings section, select the **Update Drawing Pivot** option.



8. Click **OK**.

**NOTE:** You can also copy and paste the pivot from one drawing to another using the keyboard shortcuts Ctrl + C and Ctrl + V (Windows/Linux) or ⌘ + C and ⌘ + V (Mac OS X) when the drawing pivot tool is active and the focus is around the Camera view.

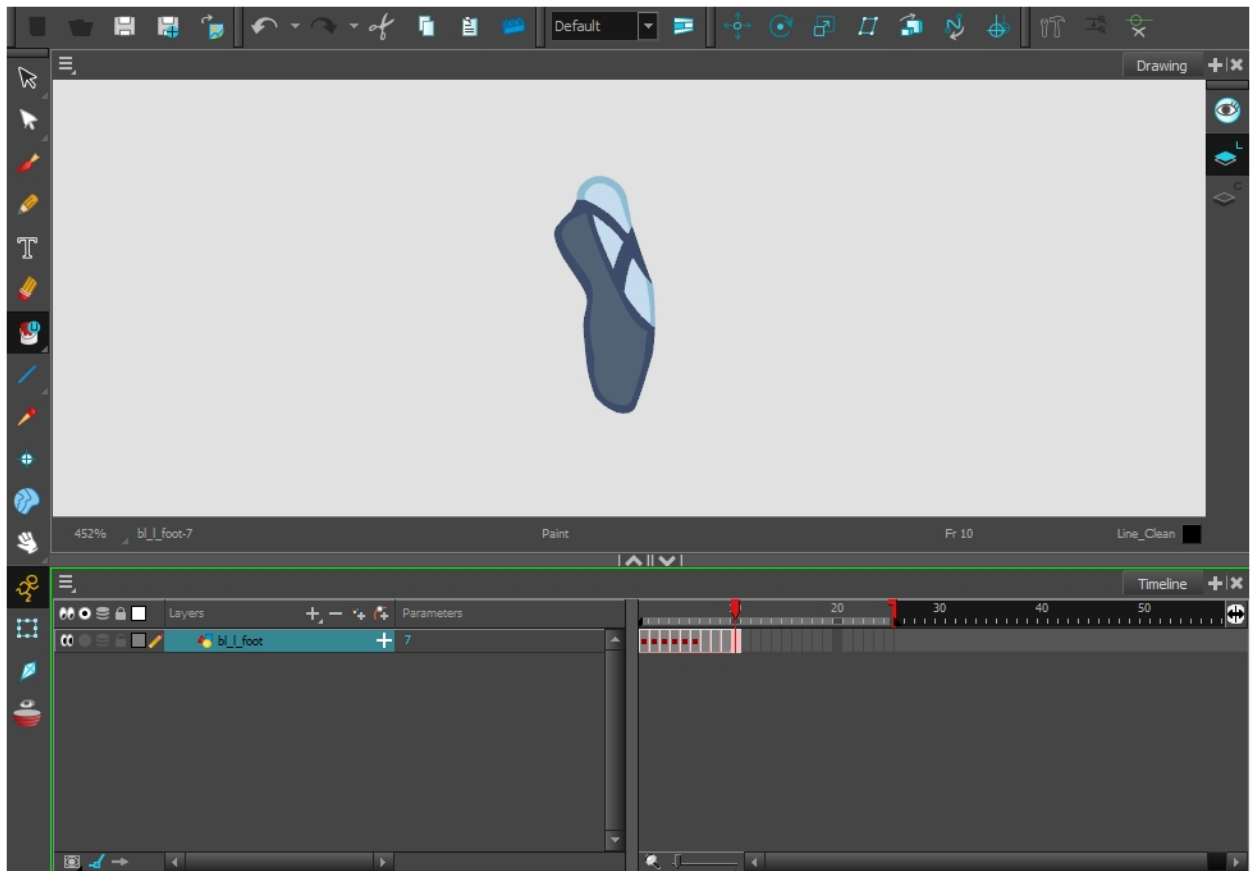
## Adding New Drawings to an Existing Template


### How to add new drawings to an existing drawing template

1. In the Library view, right-click on the library folder containing the template to modify and select **Right To Modify**.
2. In the Library view's right side, right-click on the extra drawings template to modify and select **Edit Template**.

A new instance of Harmony opens.

3. In the Tools toolbar, select a drawing tool.
4. In the Colour view, select a colour.
5. In the template's timeline, select the blank cell where you want to draw your new piece.
6. In the Camera or Drawing view, draw the new pieces.



7. If you are using drawing pivots, in the Tools toolbar, select the Drawing Pivot  tool and in the Camera view, set the pivot directly on the new drawing's cell. If you are using symbols and symbol pivots, you do not set the pivot on the symbol's cell.
8. From the top menu, select **File > Save** or press **Ctrl + S** (Windows/Linux) or **⌘ + S** (Mac OS X).
9. From the top menu, select **File > Quit** (Windows/Linux) or **Stage > Quit Toon Boom Stage** (Mac OS X).

## Chapter 8: Gaming Deformation



Harmony provides you with the deformation technology for producing light, high-quality animations for your 2D games. You can use Harmony's Game Bone deformer to rig your characters and export your animations in spreadsheets to game engines like Unity.

Harmony provides even more advanced deformation features, but they are not supported by game engines. This chapters will only cover the features supported by the gaming export. For additional information on the Harmony deformation features, refer to the Cut-out Animation Guide.

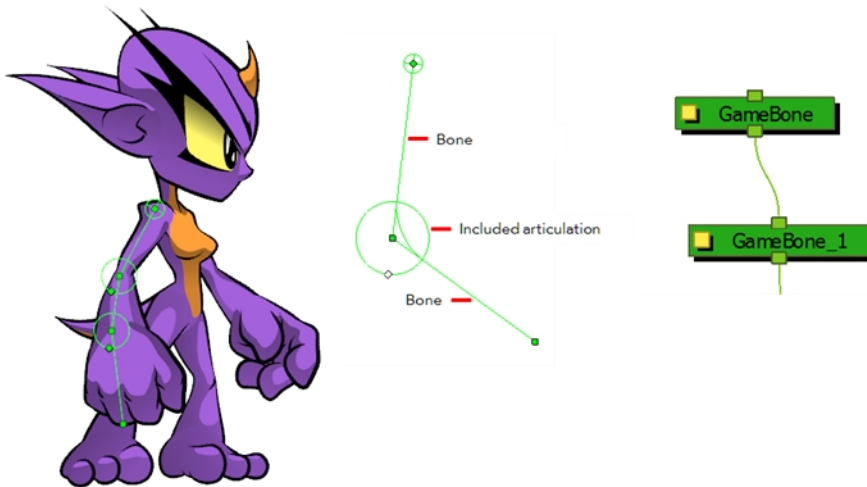
This chapter is divided as follows:

- [About Game Bone Deformers](#) on page 435
- [Creating a Basic Deformation Rig](#) on page 436
- [Setting Up the Resting Position](#) on page 439
- [Displaying the Deformation Controls](#) on page 443
- [Assembling Pieces](#) on page 444
- [Animating Deformers](#) on page 448
- [Deformation Toolbar](#) on page 452
- [Deformation Nodes](#) on page 454

### About Game Bone Deformers

Deformations let you animate bitmap or vector-based graphics, including gradients and textures. Deformations act as a skeleton with limbs and articulations you can bend, reshape, and curve. You can deform a character made out of one, or many, drawing or image layers and make it move as if it were a cut-out puppet. This also allows you to take an area in a single bitmap image and create animation by distortion. A deformation skeleton is composed

of deformation nodes, which are the various pieces (here represented as layers or nodes) required to articulate or deform your drawings, such as a series of bones, curves or game bones.



The Game Bone deformation is very similar to the Bone deformation and allows you to create a skeleton structure in which the parent bone moves the child bone. The difference is that the Game Bone deformation is optimized to export to game engines, mainly Unity.

The Game Bone deformation is mostly used when animating the extremities of a character, such as the arms or legs, adding fluidity and a natural feel to the animation. The Game Bone deformation can be manipulated to rotate a limb at an articulation joint and to shorten or elongate the extremities of a limb. It's also quite useful for bending the torso.



The main differences between the Bone and Game Bone deformations are that the Game Bone deformation doesn't have the Bias parameter and no regions of influence settings. The rendered result is also different for the articulation folds. They are slightly rounded.

## Creating a Basic Deformation Rig

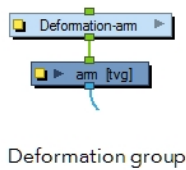
Using the Rigging tool, you can quickly create a basic deformation rig. As you create chains, you can automatically group the deformation nodes to keep your structure clean and organized.

As you create your chains, the controls will be showing. However, whenever you close your project, the deformation controls display is turned off. When you reopen the project, you can display all controls or only some of them—see [Displaying the Deformation Controls on page 443](#).


### How to automatically group deformation nodes

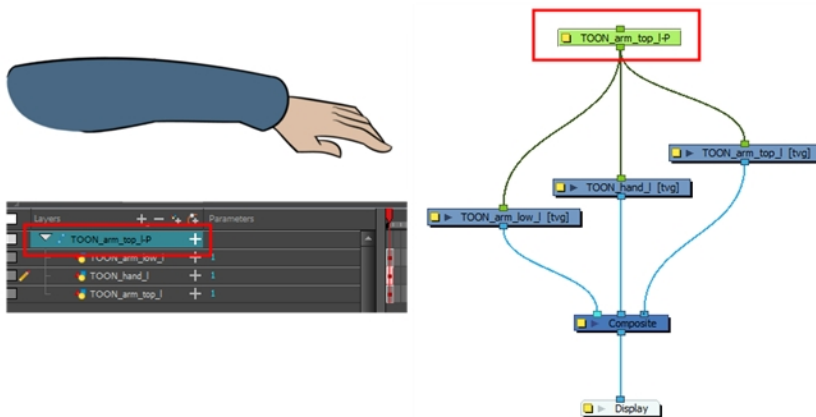
1. From the Deformation toolbar, click the Rigging  tool.
2. In the Tool Properties view, in the Rig Tool Options section, enable the Automatically Create Group when Creating a New Deformation Rig  option.

This option automatically creates a deformation group connected to the input port of the selected element. This group includes all the necessary deformation nodes you created.



## How to select an element to add deformation to


1. From the Deformation toolbar, click the Rigging  tool.
2. In the Node, Camera or Timeline view, select the element on which you want to add a deformation. When selecting a drawing node, the deformation components will be automatically added on top of the drawing node. When selecting a peg node, the deformation components will be added below the peg.

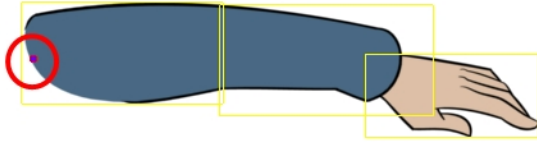


**NOTE:** Never place a deformation node above a peg node. Having a peg below a deformation node (Bone, Game Bone, Curve, etc.) will cause unexpected result. The animation on the peg will move the image out of the defined deformation zone. The same applies to animations created on the drawing layer itself. A drawing layer has an embedded peg.

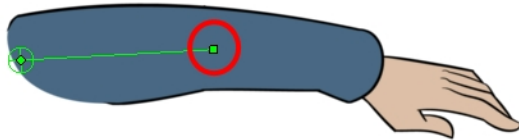
3. In the Camera view, create your rig. See the following procedures to learn how to add a specific deformation type.

## How to add a Bone or Game Bone deformation chain

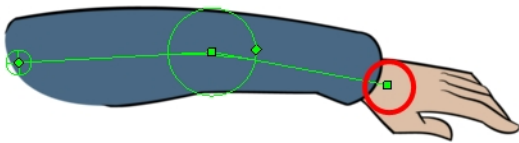
1. Once your element and the Rigging tool selected, in the Tool Properties view, enable the Bone  mode or the Game Bone mode depending on your purpose—see [Main Types of Deformations](#).
2. Place the cursor at the root of your drawing or group of drawings, click once and release. For example, on the shoulder.



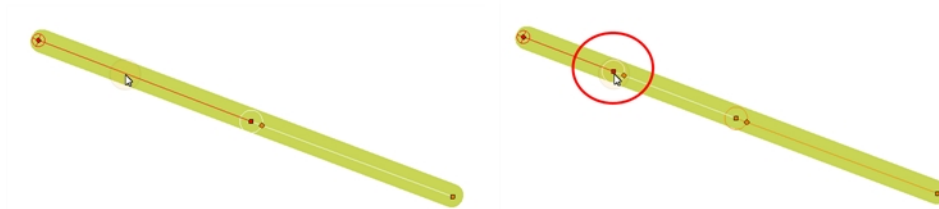
3. Click again at the location where you want your first bone to finish and your second bone to start. An articulation control point will automatically be inserted between each bone you create. Note that the articulation parameters are part of the Bone and Game Bone nodes since Harmony 12.



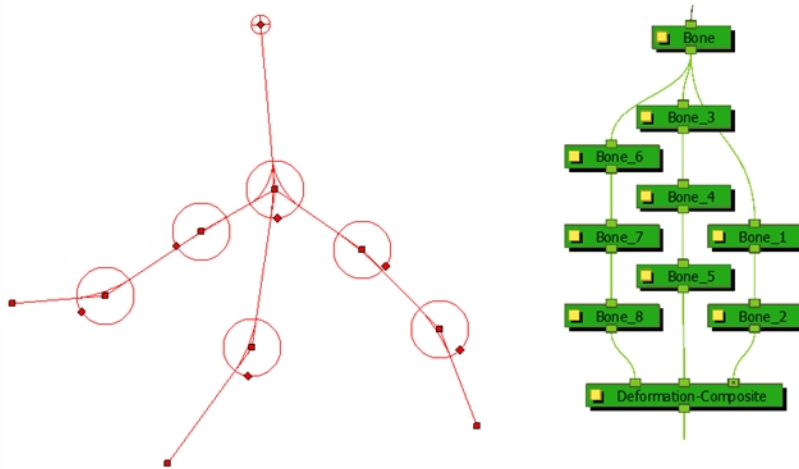
4. Repeat this until you are finished creating the Bone chain.



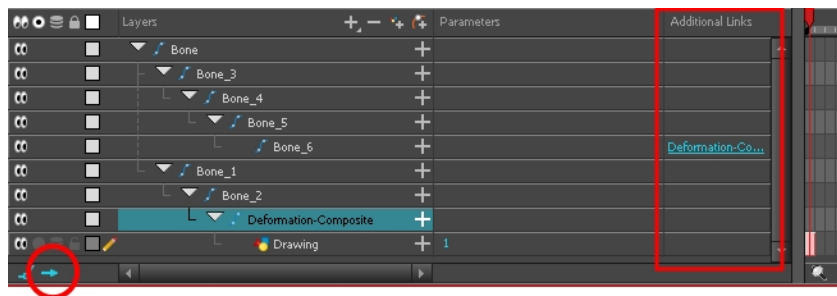
5. If you need to insert a bone between existing ones, hold down the Alt key. When the Insert Bone cursor is displayed, click on the existing bone segment at the location where you want to add an additional bone.




- Note that you can click on any Bone articulation point to start a new bone chain from that point. Once the articulation point is selected (white), click on the location where you want to add a bone and a new bone chain will be created, parented to the previous one.



- When you have several chains controlling the same drawing or group of drawings, a Deformation Composite node is automatically be created and appears in the Timeline view. In the Additional Links section of the Timeline view, you can see which nodes are connected to the Deformation Composite.




6. With the deformation nodes or group still selected, in the Deformation toolbar, click the Reset Current Keyframe  button. This will set the current resting position as the current frame one.

## Setting Up the Resting Position

Once you have a deformation chain created, you can optimize its positioning to fit the element it will deform.

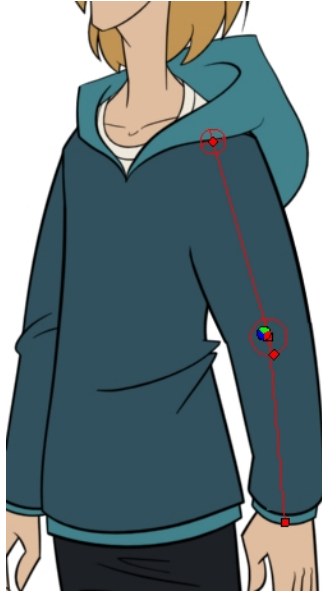
A deformation rig has a resting position and an animated position. The resting position is the original pose the character is in when not animated with keyframes. You can always revert your animated character to its resting position to recover the initial scale, angle, and shape. You can revert the entire character or only certain deformation chains, such as the arm or leg. Just make sure your resting position is fully set before deploying the character in production.

### How to set up Bone and Game Bone deformation chains

1. In the Node or Timeline view, select the deformation group or nodes containing the deformation chain you want to set.
2. In the Deformation toolbar, click the Show Selected Deformers and Hide All Others  button to display the deformer controls in the Camera view. This also hides all the deformer controls that were displayed.

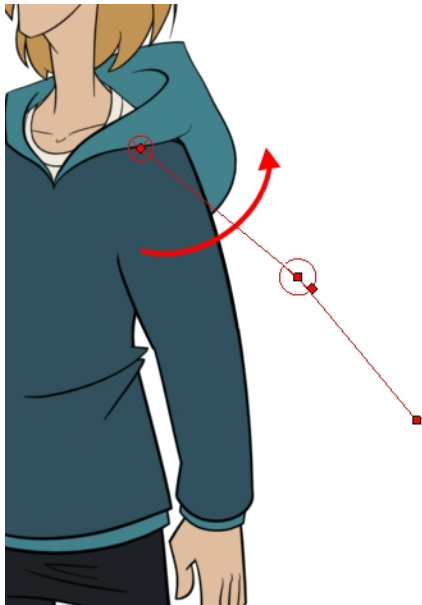
3. In the Deformation toolbar, click the Rigging  tool.

The chain turns from green to red. A green chain indicates the puppet is in animation mode. A red chain indicates the puppet is in a resting position. Make sure your chain is red.



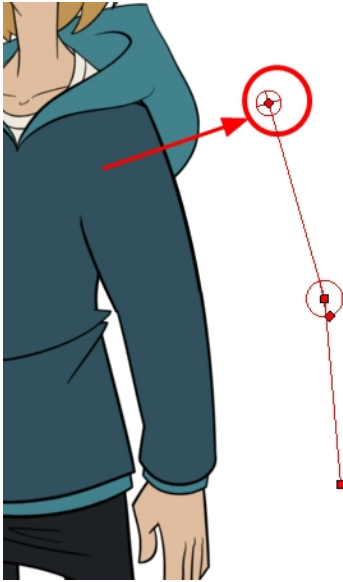
4. In the Camera view, set up the deformation chain.

- ▶ Rotate the first bone to change the angle of the chain.

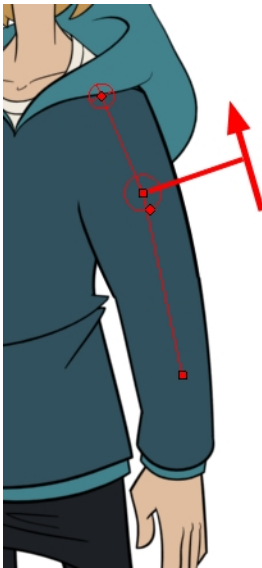


- ▶ Use the root control to reposition (offset) the entire chain.

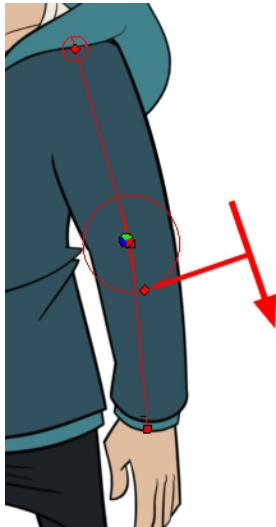






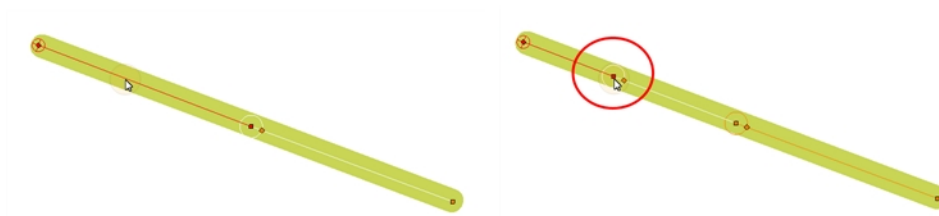
- ▶ Use the control points to reposition the articulations. This will elongate, shorten or change the direction of the bone and offset the subsequent children.



- ▶ Use the articulation's control (square) to change the size of the articulation. For quality purposes, it is recommended to have an articulation which fits the diameter of the part it controls.



5. Repeat until all the articulations and bones of the chain are correctly aligned to the element to which it is linked. You can also set additional parameters in the Layer Properties window.
6. With the deformation nodes or group still selected, in the Deformation toolbar, click the Reset Current Keyframe  button. This will set the current resting position as the current frame one.
7. Use the Transform  tool. For optimal results, make sure the size of the articulation is approximately the same size as the drawing.
8. If you need to insert a bone between existing ones, hold down the Alt key. When the Insert Bone cursor is displayed, click on the existing bone segment at the location where you want to add an additional bone.




## Displaying the Deformation Controls


Before you can manipulate the deformer outside of the Rigging mode, you must display the deformation controls.

If you just created the deformation rig, the controls will still be showing. However, when you close your project, the deformers are turned off. When reopening a project, you must display the controls so you can see the ones you need while animating.


### How to display the selected deformation controls

1. In the Camera, Node or Timeline view, select the drawing layer or deformation group or nodes containing the deformation chain you want to display.
2. Do one of the following:
  - ▶ In the Camera toolbar, click the Show Control  button.
  - ▶ From the top menu, select **View > Show > Control**.
  - ▶ Press Shift + F11.


### How to display the selected deformation controls and hide all the others

1. In the Camera, Node or Timeline view, select the drawing layer or deformation group or nodes containing the deformation chain you want to display.
2. In the Deformation toolbar, click the Show Selected Deformers and Hide All Others  button.  
The selected deformation controls appear in the Camera view and all the others are hidden.

### How to display all the deformer controls at the same time

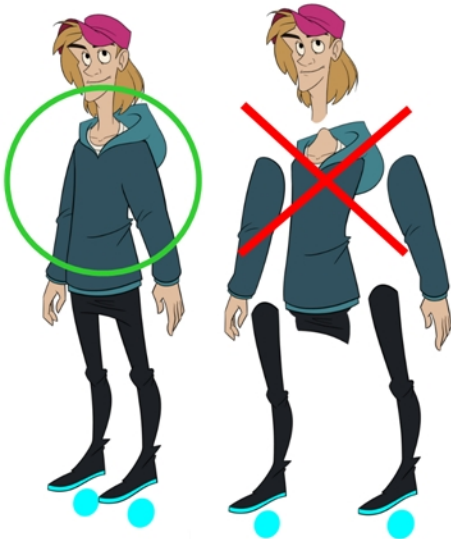
1. In the Top level of the Node view or in the Timeline view, select **Edit > Select All** from the top menu to select all the nodes or press Ctrl + A (Windows/Linux) or ⌘ + A (Mac OS X).
2. In the Camera toolbar, click the **Show Control**  button or press Shift + F11.  
All deformation controls in scene are displayed.

### How to hide the deformer controls

1. Do one of the following:
  - ▶ In the Camera toolbar, click the Hide All Controls  button.
  - ▶ From the top menu, select **View > Hide All Controls**.
  - ▶ Press Shift + C.

## Assembling Pieces

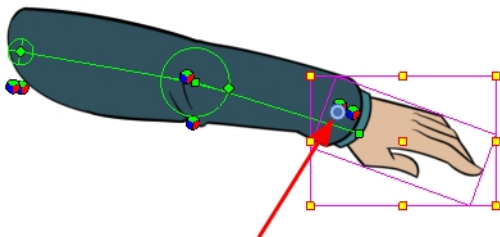
After you have created all the deformation chains for your character, you will need to assemble these separate body parts into a puppet. Your pieces should be properly overlapping and not set apart.



To avoid problems such as having the head stretched by the neck deformers or a hand modified by the body deformers, you can use the Kinematic Output node to assemble your pieces without propagating the deformations down the hierarchy chains.

The Kinematic Output node lets you hook a separate element that you want to be linked to the deformation chain but not be part of the deformation, such as a hand to an arm or an arm to the body. These elements will follow the movement of the chain just like a regular cut-out character hierarchy piece without being influenced by the deformation of the arm. If you don't use the Kinematic Output, the piece's pivot will not follow the deformation.

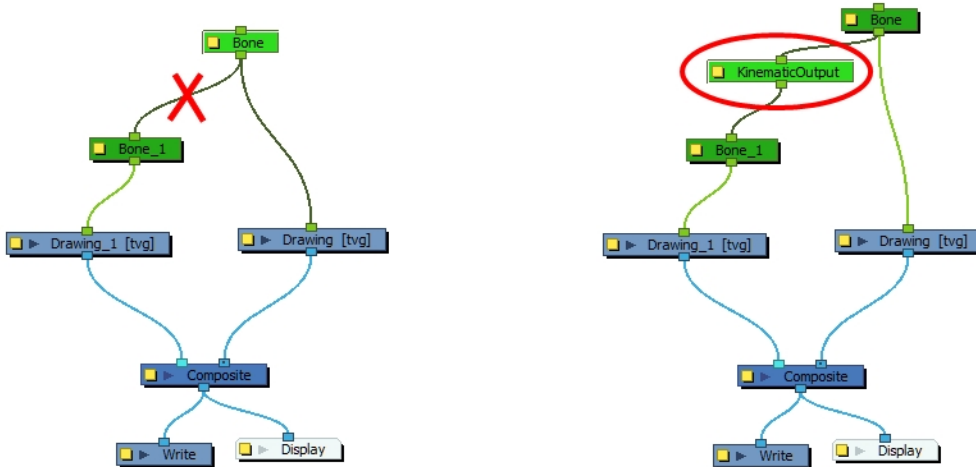
When building a cut-out puppet with deformations, each part controlled by a deformation chain will automatically rotate from the chain root point, which acts like a pivot. Because it is unlikely that every piece of your character will be rigged with a deformation chain, you must set pivot points for the pieces that are not using deformations—see [Setting the Pivots on page 397](#).



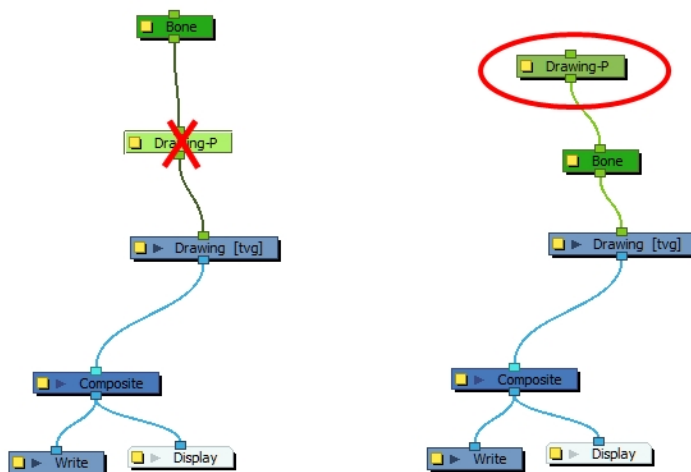
## Assembling Guidelines

When assembling a puppet with deformers, there are some guidelines to keep in mind:

- You cannot parent deformers directly because deformers are not designed to be used on other deformers. To assemble deformers, you must insert a Kinematic Output node.

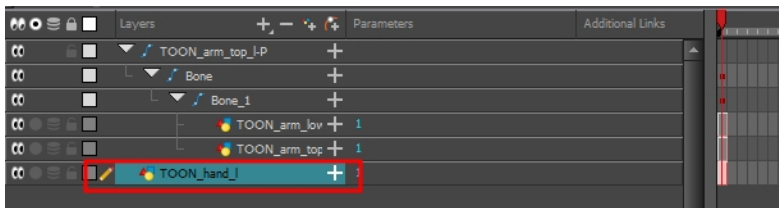


- Your peg must be placed above the deformer.



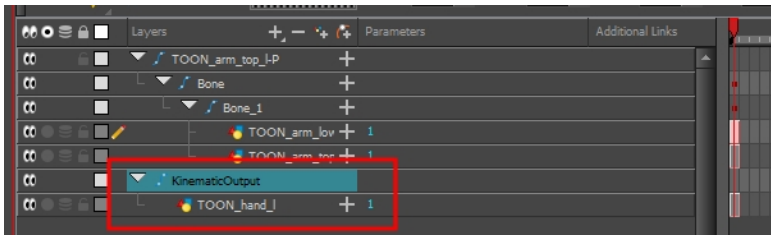
### How to assemble a puppet using the Kinematic Output node in the Timeline view

- Select the element to attach to the Kinematic Output node, such as the hand or head peg.

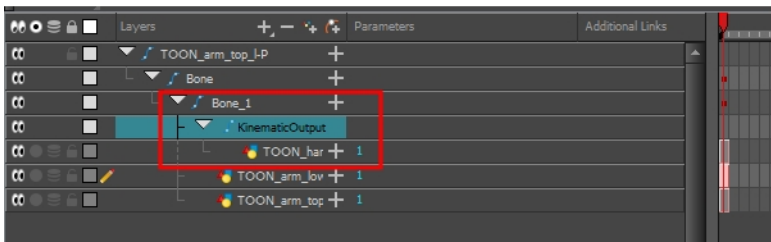
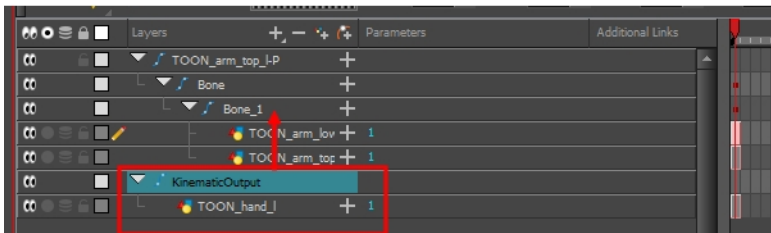


- From the top menu, select **Insert > Kinematic Output**.

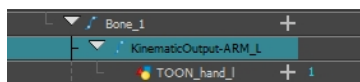
The node appears in the Timeline view as a parent of your selection.



3. In the Timeline view, drag and drop the Kinematic Output layer ONTO the deformation layer you want your limb or piece to follow. For example, onto the neck deformer if you want your head to follow it without being deformed or onto the arm deformer if you want your hand to follow.

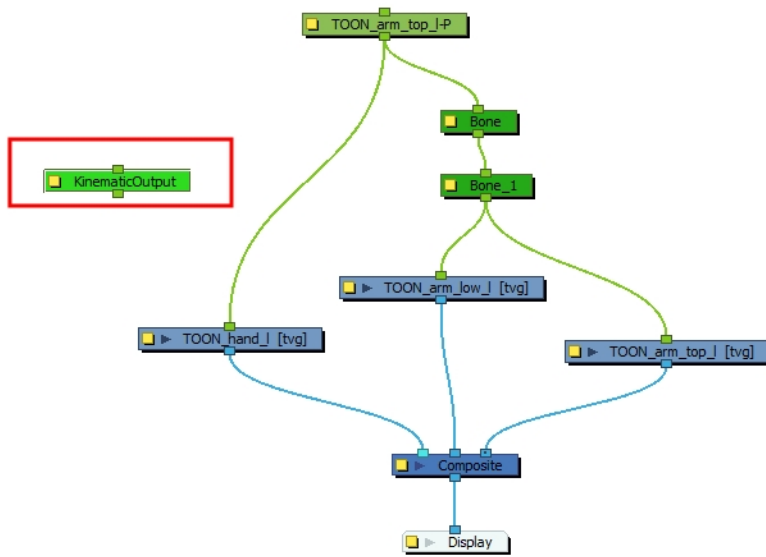


- If your pieces are no longer ordered properly, use the Z-nudging feature to reorder them—see [Nudging Parts Backwards and Forwards on page 376](#).
- It's good practice to rename the Kinematic Output layer to reflect which deformer it is assigned to as the Timeline view can become very large and layers can be positioned far apart. Select the Kinematic Output node and in the Layer Properties window, rename the node. You can also double-click on the layer's name.

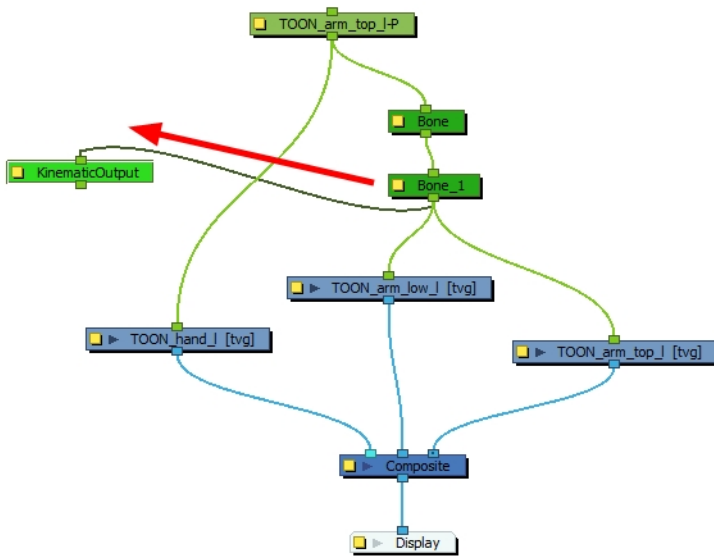


### How to assemble a puppet using the Kinematic Output node in the Node view

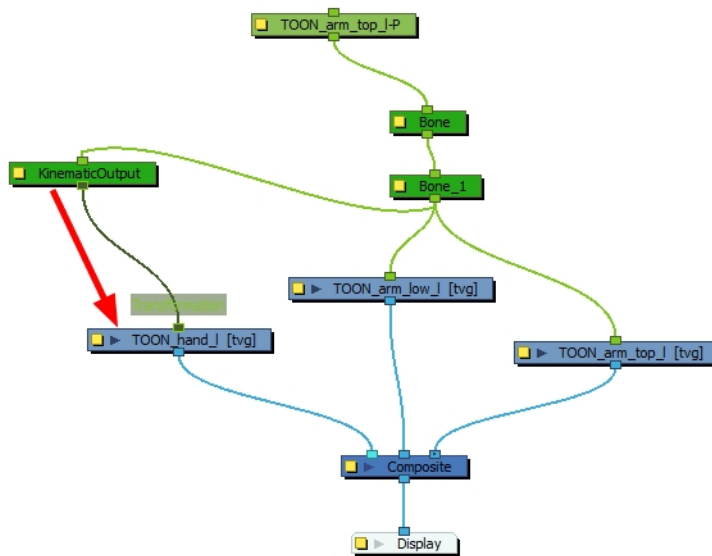
1. In the Node Library view, go to the Deformation section, select the **Kinematic Output** node and drag it to the Node view.



2. Pull out a second output connection (bottom port) from the deformer node you want your piece or limb to follow and connect it to the Kinematic Output port.



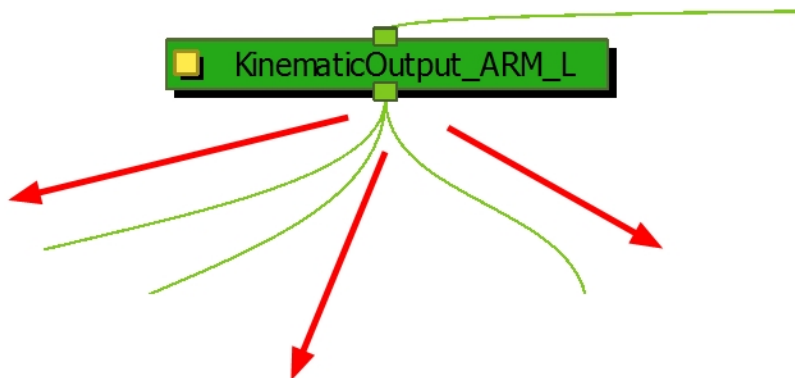
3. Connect the Kinematic Output node to the piece you want to follow the deformer.



- ▶ If it a good practice to rename the Kinematic Output node to reflect which deformer it is assigned to as the node structure can become very large and nodes can be positioned far apart. Select the Kinematic Output node and in the Layer Properties view, rename the node.



- ▶ You can pull out multiple connections from the same Kinematic Output node if many limbs and pieces must follow a single deformer. For example, you can use the same Kinematic Output node for both arms and the neck to follow the body deformer.






## Animating Deformers

The controls to animate deformations work the same as those for setting up the chains. You simply need to create keyframes and position the control points.


### How to animate Bone and Game Bone deformations

1. In the Timeline view, go the frame on which you want to create the first animation pose.



2. In the Tools toolbar, select the Transform  tool.
3. If you want to create animation keyframes, enable the Animate  mode in the Tools toolbar.
4. Do one of the following:
  - In the Timeline toolbar, click the Add Keyframe  button.
  - Right-click and select **Add Keyframe**.
  - Press F6.

A keyframe is added on the current frame.

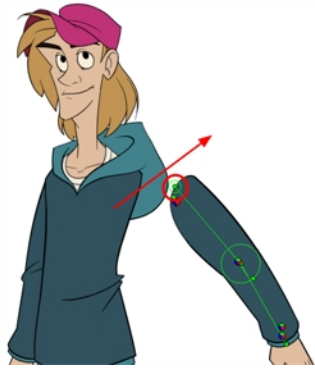
5. In the Node or Timeline view, select the deformation group or nodes containing the deformation chain you want to animate—see [Displaying the Deformation Controls on page 443](#).
6. In the Deformation toolbar, click the Show Selected Deformers and Hide All Others  button to display the deformer of the selected piece.
7. In the Camera view, do the following:
  - Rotate the first bone to rotate the limb.



- Rotate the subsequent bones to bend the limb.



- Use the root control to reposition (offset) the entire chain.




- Use the control points to reposition the articulations. This will elongate, shorten, or change the direction of the bone and offset the subsequent children.



- Use the articulation's control (square) to change the size of the articulation. For quality purposes, it is recommended to have an articulation which fits the diameter of the part it controls.

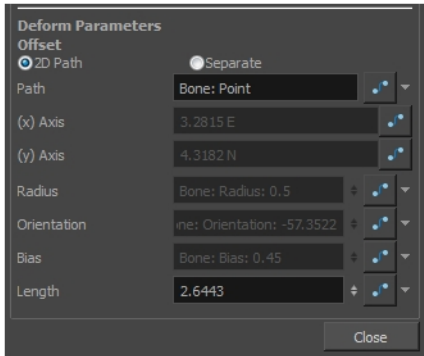


8. In the Timeline view, go the frame on which you want to set the next key pose. You will need to expend the exposure to see your drawings further down the Timeline view.
9. Add a keyframe on the current frame by doing one of the following:
  - In the Timeline toolbar, click the Add Keyframe  button.
  - Right-click and select **Add Keyframe**.

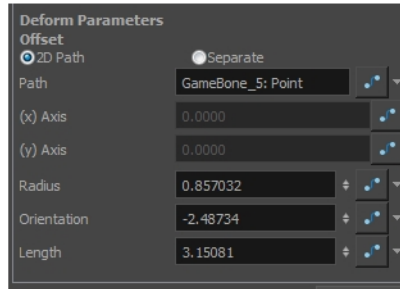
- Press F6.

10. Repeat the previous steps to animate your character.

You can also manipulate the deformer by typing values directly in the Layer Properties of the deformation effect nodes.



Bone layer properties



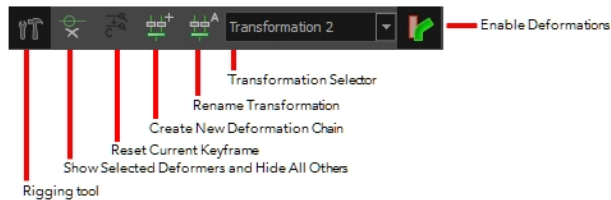
Game Bone layer properties (no Bias)

## Deformation Toolbar

The Deformation toolbar contains the various tools and options used to create a deformation rig. This toolbar is displayed in the default interface.




By default, the Deformation toolbar only contains the essential options. If you right-click on the toolbar and select **Customize**, you can add additional buttons.



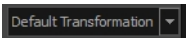




Default toolbar


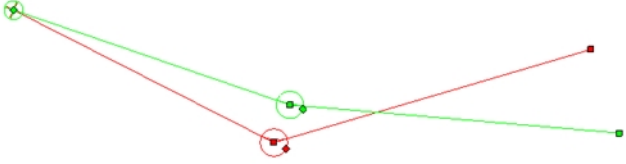




Customized toolbar



Icon	Tool Name	Description
	Rigging Tool	The Rigging tool is used to create either a Bone or Curve deformation chain. You also use it to set up the resting position.  To learn more about the Rigging tool's properties, see <a href="#">Rigging Tool Properties on page 1</a> .
	Show Selected Manipulators and Hide All Others	The Show Selected Manipulators and Hide All Others button hides all manipulators displayed in the Camera view. Only the manipulators of the selected deformation node are displayed—see <a href="#">Displaying the Deformation Controls on page 443</a> to learn how to make the manipulators visible in the Camera view.
	Reset Current Keyframe	The Reset Current Keyframe copies the resting position, the original setup of your skeleton before undergoing any deformation, to your current frame. Once you have created a deformation chain, you can use the Rigging tool to adjust the position and appearance of the rig to fit the element. When the skeleton is in place, you can use the Reset Current Keyframe button to reset the current frame position to the resting position.

	Create New Deformation Chain	The Create New Deformation Chain option allows you to create a new deformation chain on a same character. For example, if you have drawings for the different views of your puppet (front, profile, back, etc.), you can use this feature to setup a new set of chains for each angle without having to create completely different puppets.
	Rename Transformation	The Rename Transformation option allows you to give specific names to your different transformation chains. By default, chains are named Transformation plus the number of the chain, such as Transformation 2. You can rename these to identify them easier, such as front, side, back, and so on.
	Transformation Selector	<p>The Transformation Selector drop-down menu allows you to assign an existing chain to a set of drawings. For example you might want to reuse the front deformation chains for another series of drawing.</p> <p>When creating a new drawing, the Default Transformation is assigned. While on the new drawing frames, from the drop-down menu, select a different chain to automatically assign it.</p>
	Enable Deformations	<p>The Enable Deformations button allows you to display your drawings in their original state or with deformations while creating additional drawings. Depending on the artwork you need to create, you might need to refer to the other images either deformed or in their original position.</p> <p>Note that this will not affect the exported images. It's only a display mode. You can see the result in OpenGL and Render modes in the Camera view, but the exported images will always be deformed.</p>
	Convert Elliptic Zone of Influence to Shape	<p>After you have created a deformation chain using Elliptic as the Zone of Influence type, you can select your deformer and click on this button to convert it to a Shaped type. Control points will appear around the shape making it easy to customize.</p> <div style="border: 1px solid black; padding: 5px; background-color: #e0f2f1;"> <p><b>NOTE:</b> You can also convert the Elliptic zone of influence to a shape. From the top menu, select <b>Animation &gt; Deformation &gt; Convert Elliptic Deformation ROI to Shape</b>. This will create a much smaller initial zone of influence than if you were to convert it directly to a shape.</p> </div>
	Convert to New Drawing and Add Deformation Chain	Takes the pose/drawing and the deformer of the selected frame and converts it to a new pose/drawing with the corresponding deformer.
	Remove All Keyframes	The Remove All Keyframes option removes all keyframes on the selected deformation chain.

	<p>Show All Controls</p>	<p>The Show All Controls button lets you visualize the resting position in red (Setup mode) and the active position (Animation) in green at the same time—see <a href="#">Displaying the Deformation Controls on page 443</a> to learn how to make the manipulators visible in the Camera view.</p> 
	<p>Show All Regions of Influence</p>	<p>The Show All Regions of Influence button displays all regions of influence in the deformer's in your project. Note that the deformer's controls must be visible in order for its zones of influence to show. The regions will not be displayed when a deformer's zone of influence is set to Infinite or Zero.</p>  <p><b>NOTE:</b> Region of influences are not available for Game Bone deformer's.</p>

## Deformation Nodes

The deformation rigs are composed of several different types of nodes. Additional ones such as the Kinematic Output can be used to enhanced the results. Not all deformation nodes are compatible with the Game export. Only the compatible nodes are listed here.

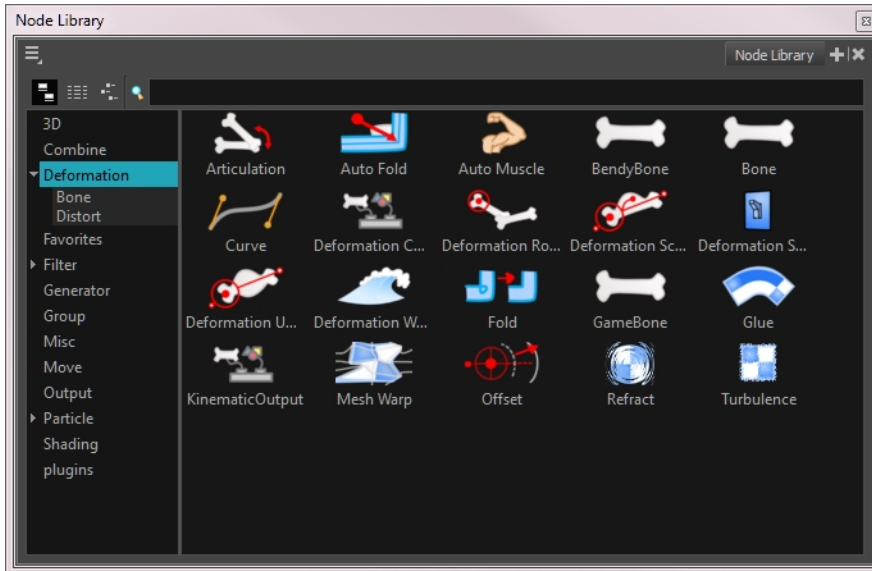
This section is divided as follows:

- [Adding Deformation Nodes on page 455](#)
- [Deformation Nodes on page 455](#)

## Adding Deformation Nodes

### How to add a deformation node

1. In the Node Library view, select the **Deformation** category.
2. From the Node Library view, select a deformation node and drag it to the Node view. Note that the Glue, Mesh Warp, Refract, and Turbulence nodes are not directly related to deformation rigging. You can read more about these effect in the Compositing and Effects Guide.

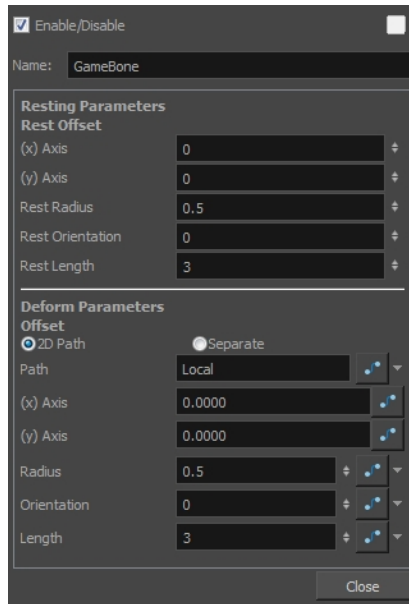


## Deformation Nodes

From the Insert menu and Node Library view, you can insert the following nodes.

### Game Bone

The Bone node is one of the main node used to build a deformation rig. Each Bone node consists of a bone and an articulation. Chaining Bone nodes will create a skeleton chain for your character. The Rigging tool can be used to create and connect those nodes automatically.



Parameter	Descriptions
<b>Resting Parameters Rest Offset</b>	
(x) Axis	This is the bone X-axis (horizontal) coordinates for the resting position.
(y) Axis	This is the bone Y-axis (vertical) coordinates for the resting position.
Rest Radius	This is the articulation's radius value (articulation size) for the resting position.
Rest Orientation	This is the bone's orientation angle for the resting position.
Rest Length	This is the bone's length for the resting position.
<b>Deform Parameters Offset</b>	
2D Path	When this option is enabled, the X and Y axis parameters are controlled by the same 2D path function.
Separate	When this option is enabled, the X and Y axis parameters are individual from each other.
Path	When using a 2D Path, this field displays the name of the function curve.
(x) Axis	This is the bone X-axis (horizontal) coordinates for the animation position. This parameter can be linked to a function curve to be animated over time.
(y) Axis	This is the bone Y-axis (vertical) coordinates for the animation position. This parameter can be linked to a function curve to be animated over time.
Radius	This is the articulation's radius value (articulation size) for the animation position. This parameter can be linked to a function curve to be animated over time.
Orientation	This is the bone's orientation angle for the animation position. This parameter can be linked to a function curve to be animated over time.

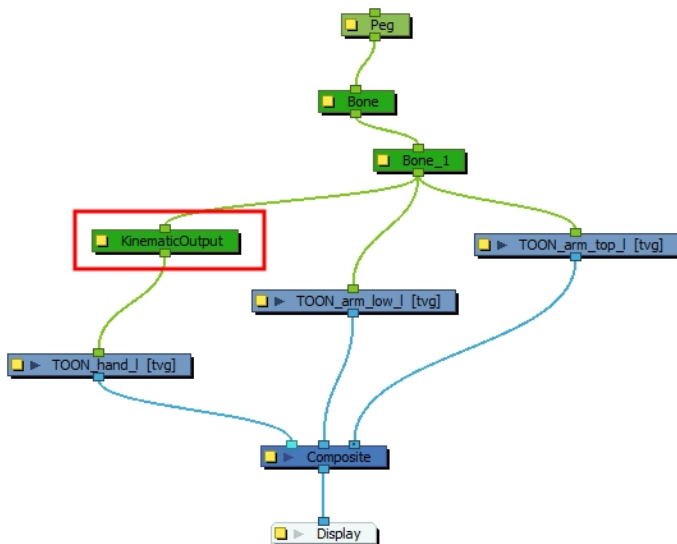


Length	This is the bone's length for the animation position. This parameter can be linked to a function curve to be animated over time.
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## Kinematic Output

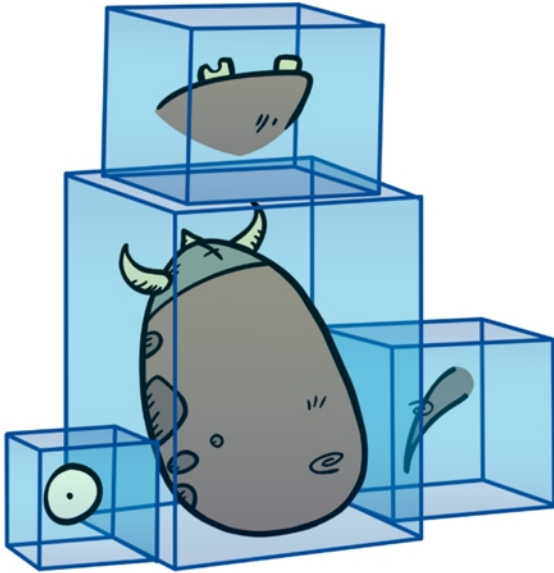
The Kinematic Output node lets you hook a separate element that you want to be linked to the deformation chain but not be part of the deformation, such as a hand to an arm or an arm to the body. These elements will follow the movement of the chain just like a regular cut-out character hierarchy piece without being influenced by the deformation of the arm. If you don't use the Kinematic Output, the piece's pivot will not follow the deformation.

Connect a Kinematic Output node below the deformation node you want your drawing to follow.





## Chapter 9: Library



Using templates and symbols, you can share and reuse any elements you create in Harmony. The Harmony library lets you store several different elements such as puppets, backgrounds, animations and key poses. In fact, anything you create in Harmony can be stored in the library.

This chapter contains the following topics:

- [Understanding the Library Concept](#) on page 459
- [Library View](#) on page 462
- [Structuring the Library](#) on page 464
- [Templates](#) on page 468
- [Symbols](#) on page 472
- [Importing Symbols and Templates](#) on page 481
- [Importing Files Through the Library](#) on page 486
- [Using Paste Special](#) on page 487

### Understanding the Library Concept

The Library view is where you can store and reuse your artwork and animation in other scenes or build props and puppets.

- [What is a Library?](#) on page 460
- [Understanding the Library Concept](#) on page 459
- [What is a Symbol?](#) on page 460
- [Libraries in Harmony Server](#) on page 461

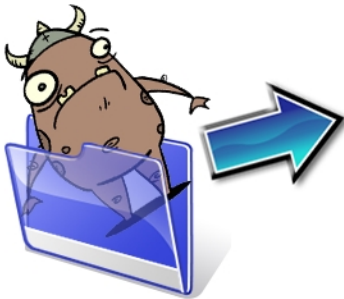
## What is a Library?

The library is a storage centre for all production assets; the elements stored in the library are called *templates*. Although it is mainly used for cut-out animation, the library is also useful for paperless and traditional animation processes. The library can contain any asset used in a Toon Boom Harmony production.

Using the library is as simple as dragging the content into the library to store your artwork and then dragging it to the Timeline or Camera view when you want to reuse it.

You can organize your library using several different subfolders and store them on your hard drive or network.

## What is a Template?



A template is an individual copy of the artwork stored in the library which you can reuse in different scenes. Once a template is stored in the library, you can access it from any project.

Dragging a template into your scene copies the content in your Timeline and does not link it to the original. You can modify this individual copy at any time.

## What is a Symbol?

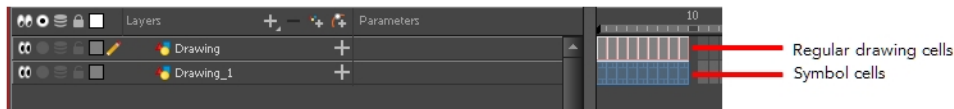


A symbol is a container used to build your props, puppets and looping clips. You can use symbols to contain artwork and animation and manipulate them as a single object. You can also use symbols as a placeholder in which you place a series of different drawings for each body part of your puppets or when you have a repeating cycle. However, symbols are not necessary for creating characters.

To create a symbol, drag your artwork to the Symbol library. When you drag a symbol from the Symbol library into your scene, it will be linked to the original symbol. If you drag a symbol into your scene several times in the Timeline view, they will all be linked to the original symbol. If you modify one, they will all be modified.

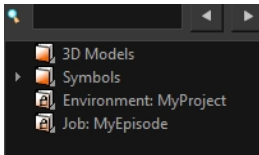
A symbol is local to the project and cannot be accessed directly from other scenes. To reuse a symbol's content in another scene, you must create a template out of it.

When a symbol is exposed in the Timeline view, the symbol's cells are represented as a movie strip.



## Libraries in Harmony Server

When working on the database, the structure of the library differs from when working on Harmony Server.

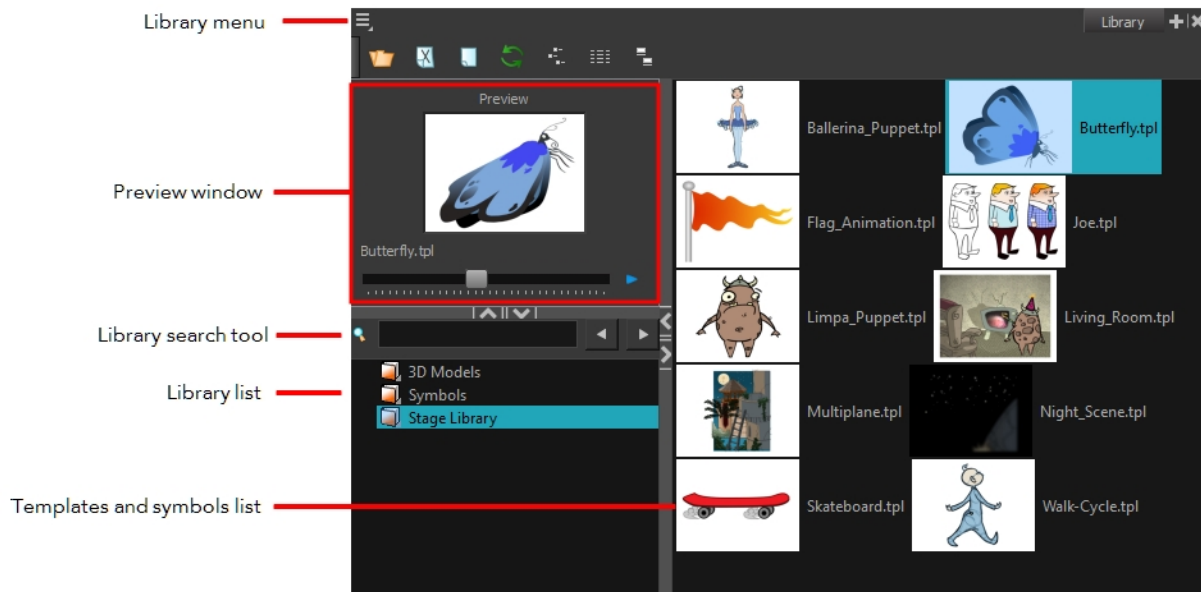


Harmony provides three default library folders:

- **Symbols:** The only library folder containing symbols for your project. You can organize the symbols library folder using subfolders, but you cannot create a second library for your symbols. This library is local to your project.
- **Environment:** A folder located inside the Environment folder. Every asset stored in this folder is accessible from any job and scene contained within this environment.
- **Job:** A folder located inside the Job folder. Every asset stored in this folder is accessible from any scene contained within this job.

**NOTE:** You can create a folder called "library" in the `usa_db` folder on the server to create a global library. Once the Harmony application is restarted, a "Global" library folder will automatically appear in every user's library. Every asset stored in this folder is accessible from any scene, job and environment.

## Library View



You use the Library view to create and manage your symbols and templates, display the folders and manage and all of the content.

### Library View Menu

The Library menu lets you access commands specific to the Library view, such as opening a Library or getting the rights to modify a library folder.

### Preview Window



The Preview window lets you preview the content of a symbol or template, and swap between drawings and symbol cells in the Timeline view. This window is also used as the Drawing Substitution window.

### How to preview a template or symbol's content

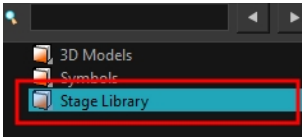
1. In the Library view's right side, click or double-click on the symbol or template to preview.
2. In the Preview window, click the Play ► button or drag the slider to scrub through the frames.

## Library Search Tool

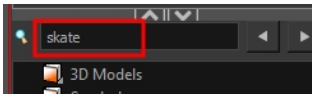
When working on a movie or series, you will probably end up with many templates and symbols in your library. Using the Search tool, you can quickly find the templates and symbols in your folders.

### How to use the Library Search tool

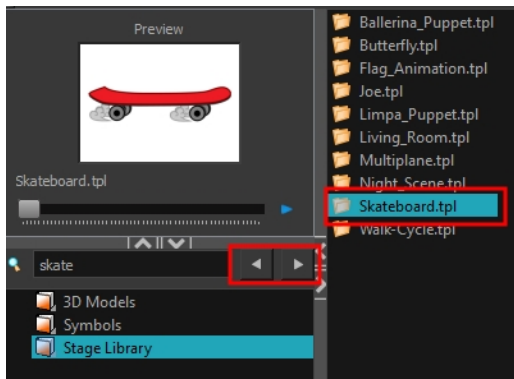
1. From the left side of the Library view, select the library in which you want to search.



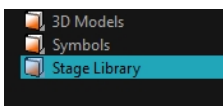
2. In the Search field, type the name or partial name of the symbol or template you are looking for.



3. Click the left ◀ and right ▶ arrows to see the previous and next results. The Search engine will look for results within the library master folder and its subfolders. It will not look in other libraries.



## Library List

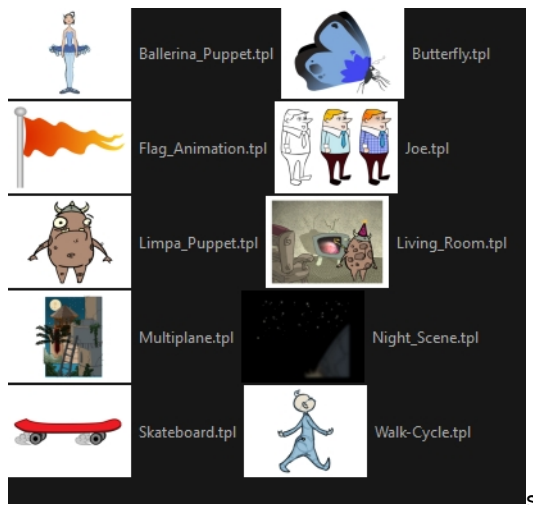


The Library list lets you navigate through the different libraries and subfolders. You can also open, close and create new libraries from here.

The Library folders have these default libraries:

- **Symbols:** The only library folder containing symbols for your project. You can organize the symbols library folder using subfolders, but you cannot create a second library for your symbols. This library is local to your project.
- **Harmony Library:** This folder contains templates and is stored on your hard drive. You can organize the Harmony library folder using subfolders. This folder does not contain symbols.

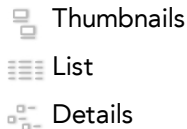
## Templates and Symbols List



The symbols and templates contained in the selected Library list can be displayed on the right side of the Library view as thumbnails, in a list or as details.

### How to access the templates and symbols list display options

- ▶ In the Library view's right side, right-click and select **View > List, Thumbnails** or **Details**.
- ▶ In the Library View toolbar, you can click the following buttons:



## Structuring the Library

As you will probably create a large number of symbols and templates, you will soon realize they need to be organized. You can create different libraries and subfolders to easily access your assets. For example, you can create a different library for each project and divide it into several categories, such as:

- Characters
- Props
- Backgrounds

Although you can only have one symbol library folder, you can organize it by creating subfolders.

There are two ways to create library folders.

- Directly through your operating system
- Using Harmony's interface

Folders can be opened in Harmony when you require it. You can open any folder on your hard drive or network as a library. Opening a library means linking the folder to your Library view. You only need to open the library once. The library folder is available every time you open the application until you decide to close the library and unlink it.



You may not always require all the library folders in the Library List. If so, you can close the ones you do not need. Closing a folder does not delete it; it only unlinks it from the Library view. If you want to reopen it, locate it on your hard drive or network and open it in the Library view.

Symbol and template libraries need to be organized. You can create different subfolders on your hard drive or in the Harmony Library view, so you can easily access assets. By default, any new library you link to your Library view is locked to prevent accidental deletion or modification of symbols and templates. You must obtain the right to modify it before being able to add a new folder to it.

You can delete a folder from the library if its contents are no longer needed.

**NOTE: Warning:** All templates and symbols in the folder will be deleted from your hard drive. Once deleted, the data cannot be retrieved.

Once you add a folder, you can rename it. This also renames the folder on your hard drive.

If you update the content of your libraries through your operating system, you will need to refresh your library folders in the Library view.

When you display thumbnails in the Library view, the system generates a series of small images (thumbnails) for you. You can generate template thumbnails yourself, if they do not display or if the process has been stopped.

You can also delete thumbnails if you want to send a template to another user or studio and keep your packages small.

### How to create a library folder through your operating system

1. On your computer, create a new folder with a relevant name in the location where you want the library to be stored.

### How to create a library folder in Harmony

1. In the Library View menu, select **Folders > Open Library**.

The Browser window opens.

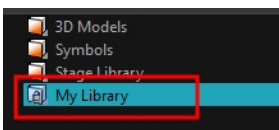
2. Browse for the location where you want to store your new library folder.

3. Click the New Folder button.

A new folder appears.

4. Name the new library folder with a relevant name and click **OK**.

The new library appears in the Library List section.



### How to open a library

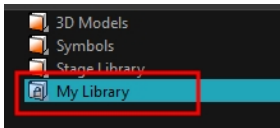
1. In the Library View menu, select **Folders > Open Library**.

The Browser window opens.

2. Browse to the location of the library folder.

3. Select the folder and click **OK**.

The new library appears in the Library Folders section.



### How to close a library

1. On the right side of the Library view, select the library folder to close.

2. In the Library View menu, select **Folders > Close Library**.

The library closes.

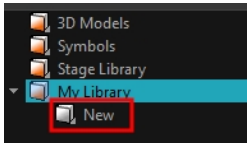
### How to create a folder

1. On the left side of the Library view, select the library folder to which you want to add a subfolder.

2. In the Library View menu, select **Edit > Right to Modify**.

3. In the Library View menu, select **Folders > New Folder**.

The new folder appears in the Library. Click on the library containing the new folder and click the plus [+] sign to expand it.



### How to delete a folder

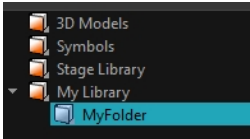
1. In the Library view's left side, select the folder to delete.

2. In the Library View menu, select **Edit > Right to Modify** or right-click on the selected library and select **Right to Modify**.

3. In the Library View menu, select **Folders > Delete Folder** or press Delete.

## How to rename a folder

1. In the Library view's left side, select the folder to rename.
2. In the Library View menu, select **Edit > Right to Modify** or right-click on the selected library and select **Right to Modify**.
3. In the Library View menu, select **Folders > Rename Folder**.
4. Rename the selected folder.



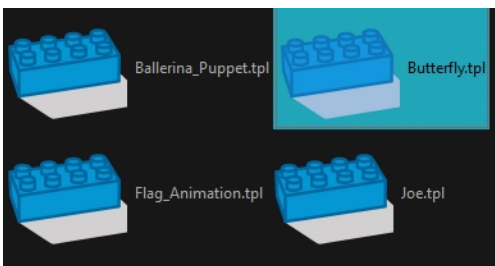
5. Press Enter/Return to validate the operation.

## How to refresh a library

1. In the Library view's left side, select the folder to refresh.
2. In the Library View menu, select **Folders > Refresh** or press F5.  
The library displays the new content.

## How to generate thumbnails

1. In the Library view's right side, select the template in which you want to generate thumbnails.

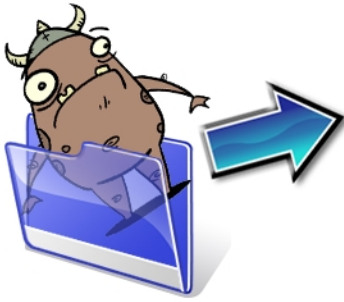


2. In the Library View menu, select **View > Generate Thumbnails**.  
The progress bar appears.

## How to delete thumbnails

1. In the Library View menu, select **Edit > Delete Thumbnails**.  
All the thumbnails contained in the library are removed.

## Templates



When you want to reuse artwork and animation from your project in other scenes, you must create a template from it. A template can be seen as a portable scene or package that you can drag inside your project. You can open a template and edit it just like any other project. If you want modify your templates, you can edit them using the Edit Template command.

You can create a template from both the Timeline and Node views:

- [Master Template on page 468](#)
- [Creating a Template from the Node View](#)
- [Action Templates](#)
- [Creating a Template from the Timeline View on page 470](#)

To delete templates from your library, use the Library view. Harmony lets you undo the action if necessary.

### Master Template

You can create a master template out of a cut-out puppet you created so you can reuse it throughout a single project or a full production. A cut-out character's master template stores the entire rig, structure, drawings, and keyframes of the different poses of your puppet into a single asset.

Master templates are created from the Node view.

### Creating a Template from the Node View

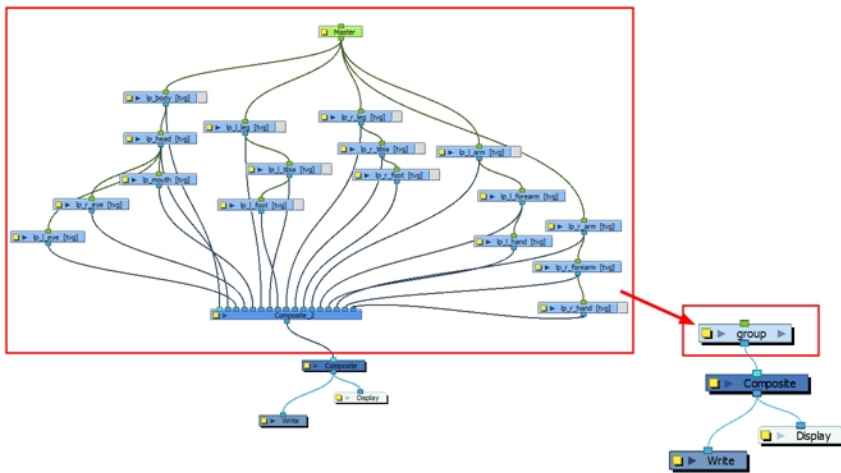
The Timeline and Node views display different information about a scene.

A main character's template, also known as a *master template*, is created from the Node view. This template contains all the connections, effects, composites, nodes, pegs, advanced groupings, function columns, scene lengths, drawings, timings, and so on. The template is saved in the Library view and must be imported back into the scene for use, either into the Node view or the left side of the Timeline view.

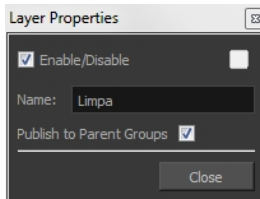
**NOTE:** If you are creating a template from a character rig master template, you should collapse everything inside a master peg and put a keyframe on the first frame before creating the template.

## How to create a template from the Node view

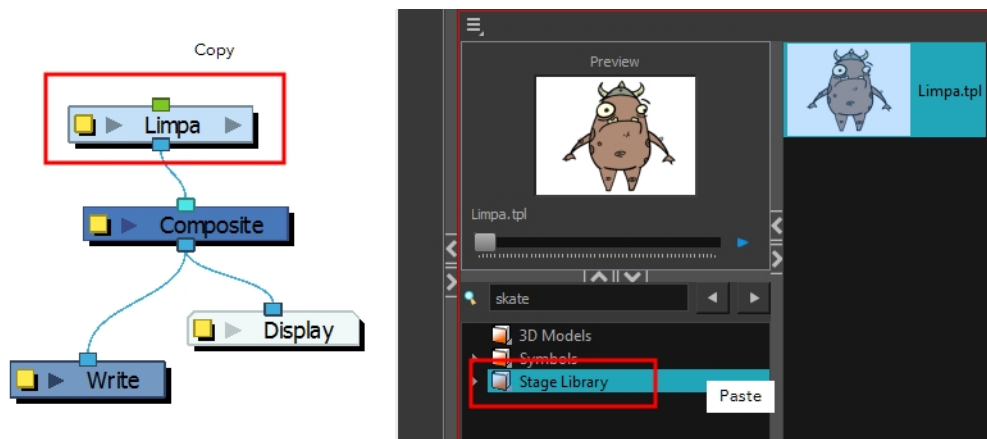
1. In the Library view, select the folder in which you want to store the template.
2. If the library folder is locked, right-click and select **Right to Modify**.
3. In the Node view, select the nodes for creating the template and group them. It is very important to group your cut-out character rig before storing it in the Library, so your files are organized.
4. From the top menu, select **Edit > Group > Group Selected Layers** or press Ctrl + G (Windows/Linux) or ⌘ + G (Mac OS X). Make sure you have a composite under the connections before grouping, otherwise there will be numerous connections going outside the group.



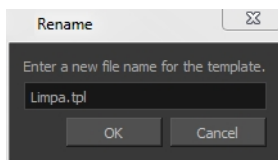
5. In the Node view, click on the group node's yellow button to open the Layer Properties window.



6. In the Node view, select the group node and copy and paste it inside the template folder in the Library view or press Ctrl + C and Ctrl + V (Windows/Linux) or ⌘ + C and ⌘ + V (Mac OS X).



7. In the Rename dialog box, give the new template a name and click **OK**.



## Action Templates

An action template, also known as *animation template*, is created from the Timeline view. This template allow you to reuse animations, key poses and part of an animation and contains mainly keyframes and drawing exposures. For example, you can reuse head positions or a leg animation from a walk-cycle and place them inside other animations. When it is extracted from the Timeline view, it loses the extra connections, effects, and groupings from the Node view.

An action template is used with a master template. It cannot be used on its own since it does not contain all the information required to rebuild the puppet skeleton and advanced connections. The standard process is to first import the master template to the Node view or Timeline's left side, and then slide the action template into the Timeline's right side. This allows you to first build the skeleton and then give it the right pose.

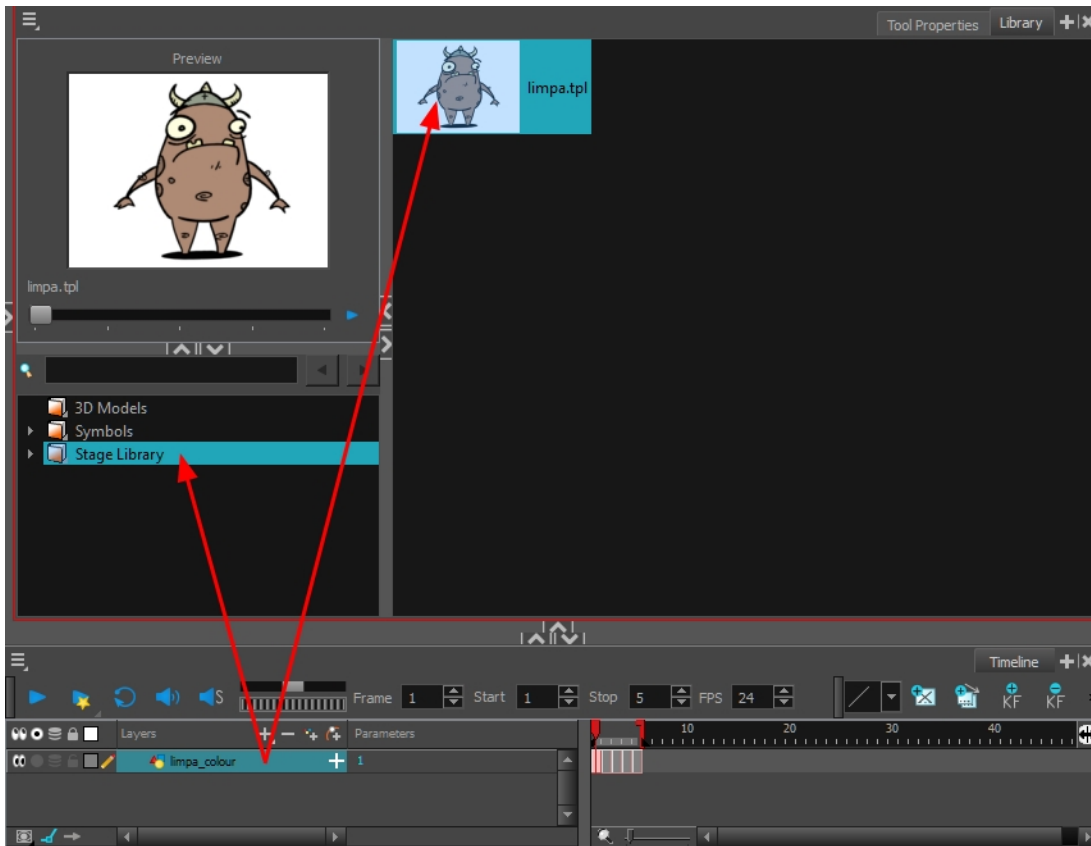
The combination of master and action templates will function as long as the layer order and connections are the same.

When you create an action template, be sure to name it so you can easily identify it as an animation.

## Creating a Template from the Timeline View

### How to create a template from the Timeline view

1. In the Timeline view, select some cells or layers.
2. In the Library view, select a folder to store the template.
3. If a library folder is locked, right-click and select **Right to Modify**.
4. Drag the selection to the Stage Library folder or any other library folder.



5. In the Rename dialog box, give the new template a name.

To rename a template once it is created, right-click on the symbol and select **Rename**.

6. Click **OK**.

### How to delete a template

1. In the Library view, select the folder containing the template to delete.

**NOTE:** If the library folder is locked, right-click on the folder and select **Right to Modify**.

2. Right-click on the selection and select **Delete** or press Delete.

### How to edit a template

1. In the Library view, select the folder containing the template to edit.

**NOTE:** If the library folder is locked, right-click on the folder and select **Right to Modify**.

2. Right-click on the selection and select **Edit Template**.  
A new Harmony application opens.
3. Edit the template.
4. From the top menu, select **File > Save**.
5. In the top menu, select **File > Quit** (Windows/Linux) or **Stage > Quit** (Mac OS X).

## Symbols



A symbol combines animation, artwork or layers into a single object that you can control in one layer. You can also create symbols out of each body part in your cut-out puppets.

You do not need to create symbols in order to create drawings or characters in Toon Boom Harmony.

When you delete a symbol, it will be deleted from your hard drive. You can use the Undo function to retrieve the data. The symbol cannot be retrieved once you close the application.

When you import a symbol from the library to the Timeline view it is linked to the original symbol in the library. If you import a symbol into your scene several times in the Timeline view, they will all be linked to the original symbol. If you modify one, they will all be modified.

If you want to edit a symbol without modifying the other instances, you must duplicate the symbol first. If other symbols are nested inside the new symbol, they are not duplicated. If you modify them, the original and other instances will also be modified.

You can either edit a symbol from the Timeline view or from the Library view.

When you edit a symbol, the drawings contained in it are not placed at the centre of the stage, but are located in the position where they were created. The pivot is translated at the centre of the symbol.





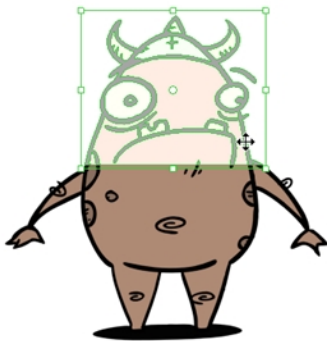



When you enter a symbol to edit it, you are entering another scene with an independent timeline. You can nest many symbols one inside the other. To help you follow the hierarchy of your nested symbol, take note of the Editing stack at the top of the Camera view which displays the path to your symbol's location. You can click on the symbol's name to move up the chain.

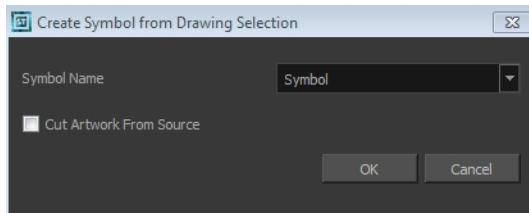
You can share a symbol and use its contents (the drawings) in another scene. To do this, you must first convert your symbol into a template. This conversion breaks the drawing's link with both the original scene and symbol. It then becomes a separate entity that you can import into other projects.

### How to create a symbol from a drawing selection

1. In the Tools toolbar, select the Select  or Cutter  tool.
2. In the Camera view, select the drawing elements to create a symbol.

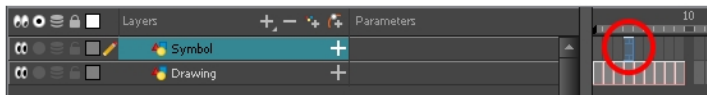


3. From the top menu, select **Edit > Create Symbol** or press F8.
  - ▶ Clicking the Create Symbol  button in the Edit toolbar will create a symbol from the entire layer. The Create Symbol from Drawing Selection dialog box opens.




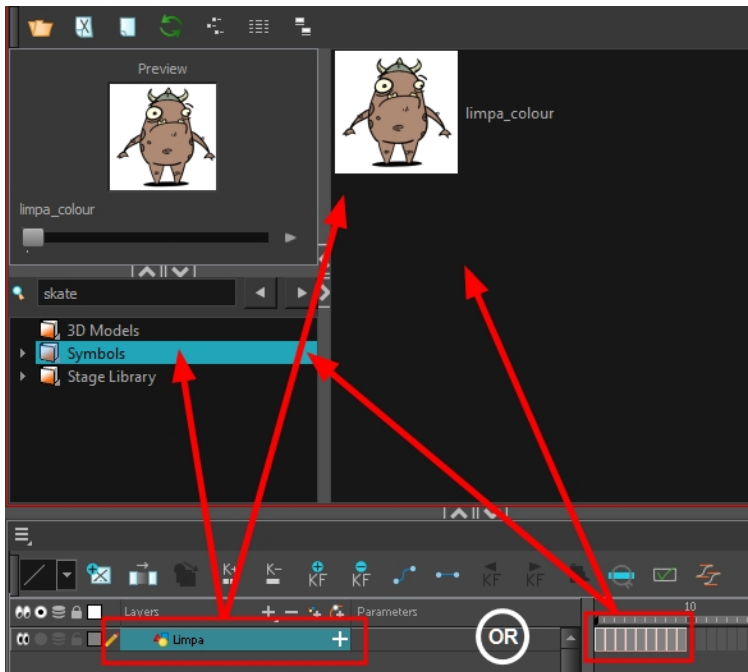
4. In the Symbol Name field, type the name of the symbol.
  - ▶ You can also select an existing layer from the Symbol Name drop-down menu. It will add your symbol on the layer's current cell. If there is already an exposure on that cell, the symbol will be added to a new layer.
5. You can choose to place the current selected artwork in the drawing or remove it:
  - ▶ To remove currently selected artwork from the drawing and place it in the new symbol, select the **Cut Artwork From Source Drawing** option.
  - ▶ To keep currently selected artwork in both the drawing and in the new symbol, deselect the **Cut Artwork From Source Drawing** option.
6. Click **OK**.

The new symbol appears in the Library view's symbol folder and in the Timeline view as a new layer.

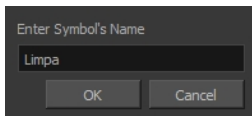


### How to create a symbol from the Timeline view

1. In the Timeline view, select the layer or cells from which you want to create a symbol.
2. Do one of the following:
  - ▶ From the top menu, select **Edit > Create Symbol**.
  - ▶ In the Edit toolbar, click the Create Symbol  button.
  - ▶ Press F8.
  - ▶ Drag your selection to the Symbol folder in the Library view.



The Create Symbol dialog box opens




3. In the Enter Symbol's Name field, type the new symbol's name.

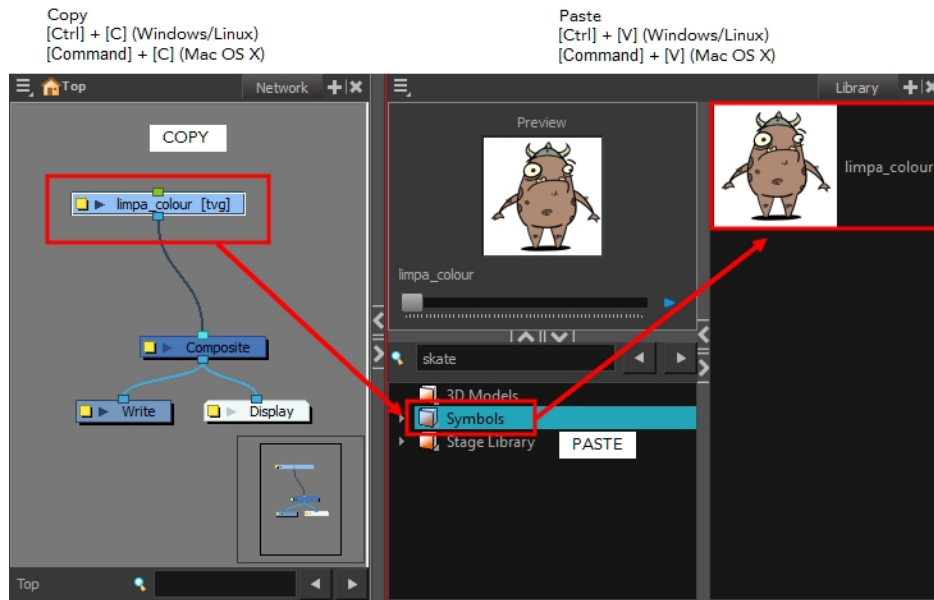
To rename a symbol once it is created, right-click on the symbol and select **Rename**.

4. Click **OK**.

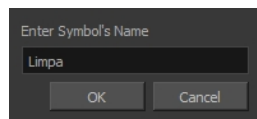
The new symbol appears in the Library view's Symbol folder. The current selection is not replaced by the new symbol. The new symbol only appears in the library. You must drag it into your scene to use it.

### How to create a symbol from the Node view

1. In the Node view, select the nodes from which you want to create a symbol.
2. Do one of the following:
  - ▶ From the top menu, select **Edit > Create Symbol**.
  - ▶ In the Edit toolbar, click the Create Symbol  button.
  - ▶ Press F8.
  - ▶ Copy and paste Ctrl + C and Ctrl + V (Windows/Linux) or  $\text{⌘} + C$  and  $\text{⌘} + V$  (Mac OS X) your selection to the Symbol folder in the Library view.



The Create Symbol dialog box opens.



3. In the Enter Symbol's Name field, type the new symbol's name.

To rename a symbol once it is created, right-click on the symbol and select **Rename**.

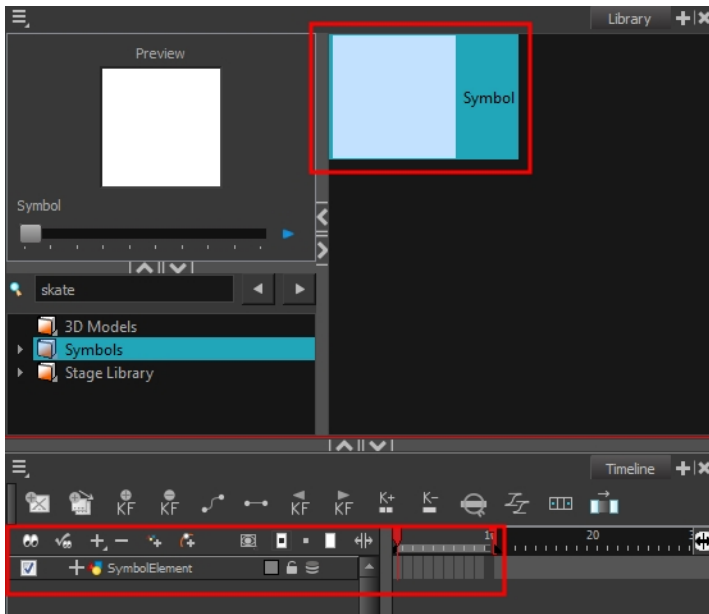
4. Click **OK**.

The new symbol appears in the Library view's Symbol folder. The current selection is not replaced by the new symbol. The new symbol only appears in the library. You must drag it into your scene to use it.

### How to create an empty symbol

1. In the Library view, select the **Symbol** folder.
2. Do one of the following:
  - In the Library view's right side, right-click and select **New Symbol**.
  - From the top menu, select **Insert > Create Empty Symbol in Library**.

The new empty symbol appears in the Library view.

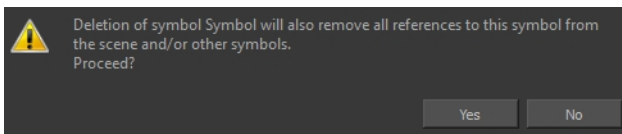


The symbol is ready for you to edit (add content to). To go back to the root timeline, click the Top 🏠 button in the Camera view.

To rename a symbol once it is created, right-click on the symbol and select **Rename**.

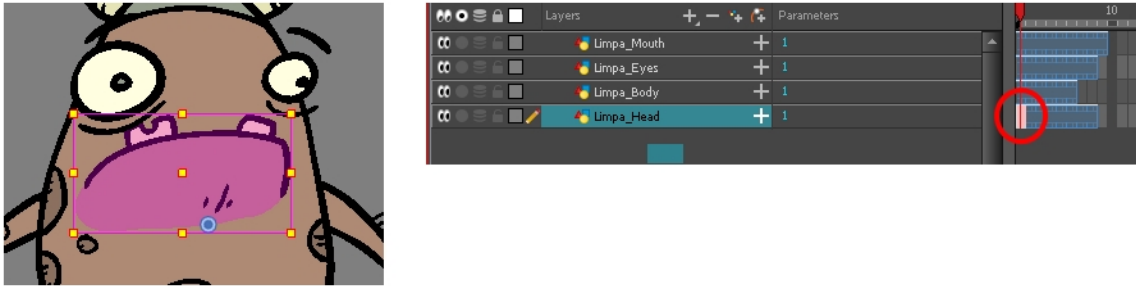
### How to delete a symbol

1. In the Library view, select the symbol to delete.
2. Right-click and select **Delete** or press Delete.
  - ▶ If the symbol is currently in use in the scene, a warning message displays. Click **OK** to delete the symbol from the library and scene.



### How to edit a symbol from the Timeline view

1. Do one of the following:
  - ▶ In the Timeline view, double-click on the symbol's cell to edit the symbol.
  - ▶ In the Camera view, double-click on the symbol or press Ctrl + E (Windows/Linux) or ⌘ + E (Mac OS X)).
  - ▶ Click the Edit Selected Symbol 🖱️ button in the Camera View toolbar's extra buttons.



You are now inside the symbol and you are able to edit it.



2. Do one of the following:

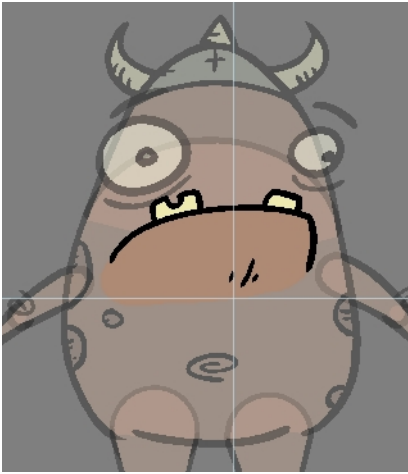
To return to the project's timeline, click the Top  button in the Camera view's top-left corner, press Ctrl + Shift + E (Windows/Linux) or ⌘ + Shift + E (Mac OS X).

- In the Timeline view's right side, right-click and select **Symbols > Leave Current Symbol**.

### How to edit a symbol from the Library view

1. In the Library view, select the symbol to edit.
2. Right-click and select **Edit > Edit Symbol** or double-click on the symbol.

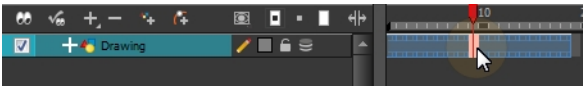
You are now inside the symbol and you are able to edit it.



To return to the project's timeline, click the Top 🏠 button in the Camera view's top-left corner, press Ctrl + Shift + E (Windows/Linux) or ⌘ + Shift + E (Mac OS X).

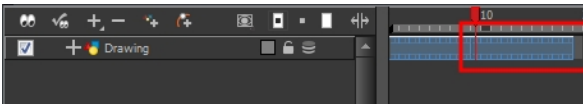
### How to duplicate a symbol

1. In the Timeline view, go to the frame where you want to duplicate the symbol.
2. Select the symbol's cell.



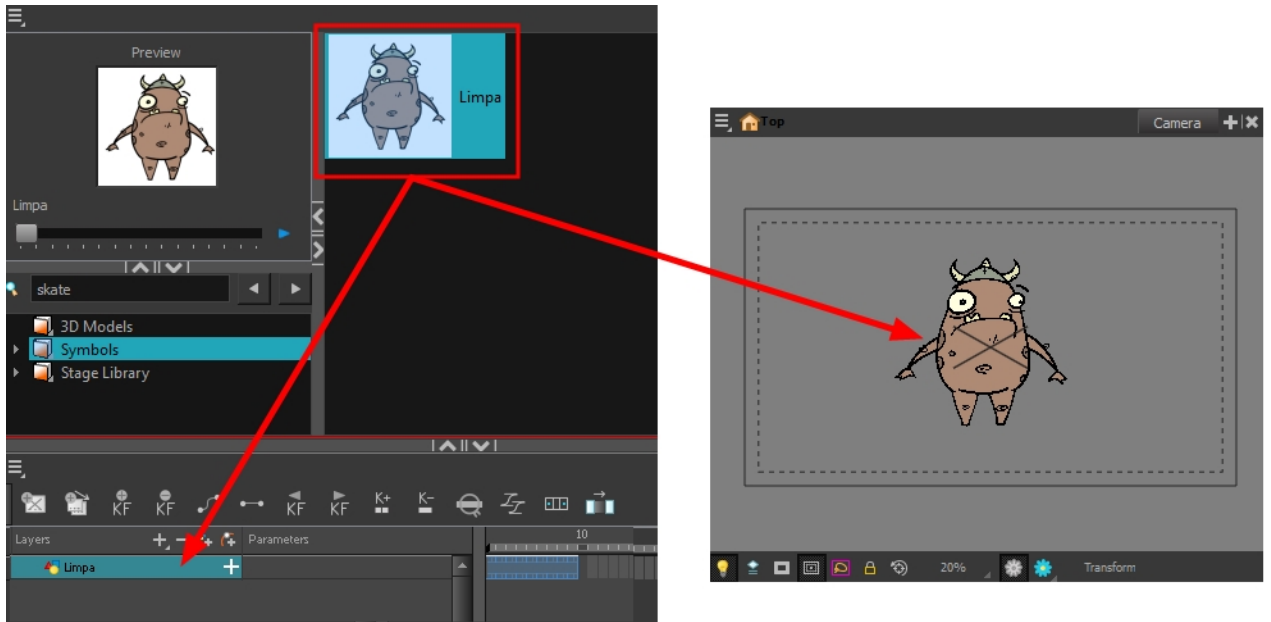
3. From the top menu, select **Edit > Duplicate Selected Symbol**.

In the Library view, the symbol is duplicated and in the Timeline view, the current cell and its held exposure is replaced with the new symbol. You can now modify the symbol's content.

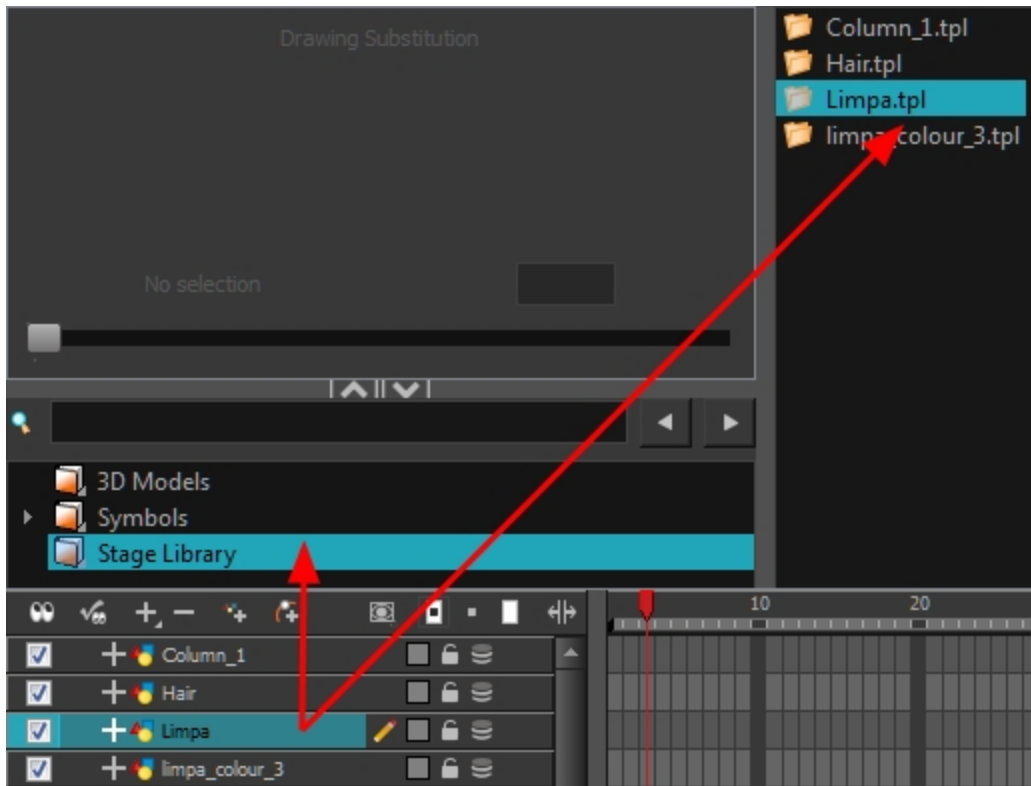


### How to convert a symbol into a template

1. From the Library view, select the symbol to convert into a template and drag it to the Camera or Timeline view. If you drop your symbol into the Camera view instead of the Timeline view, it will not be placed in the centre of your camera frame, but rather wherever your cursor drops it within the camera frame.

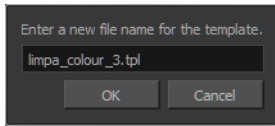


2. In the Timeline view, select the symbol's cells or layer and drag it to the Stage Library folder or to any other library folder. Make sure you have the right to modify the library folder.



3. In the Rename dialog box, rename the new template.





4. Click **OK**.

## Importing Symbols and Templates

There are several ways you can import symbols and templates in your scene.

Sometimes a character rig is not a straightforward matter. Rigs, which are usually saved as templates, can contain symbols such as a leg that was made with a patch. However, a symbol does not work in the same way as an action template. In the Timeline view, you can add an action template into another template of the same structure. When working on a layer on the right side of the Timeline view and you place a symbol into a symbol of the same structure, instead of being added to the previous symbol, the new symbol becomes a copy.

For greater control over how the action template behaves when brought into the Timeline view, you can use the Paste Special feature—see [Using Paste Special on page 487](#).

In Harmony, when you import a symbol in your scene, you can navigate through it in the Node view.

Since a template is like a scene, you can open the template's folder and select elements inside it such as drawings.

Instead of importing the entire contents of a template, you may only want to import a few drawings or a palette. In this case, use the Open As Folder command to import the items you want.

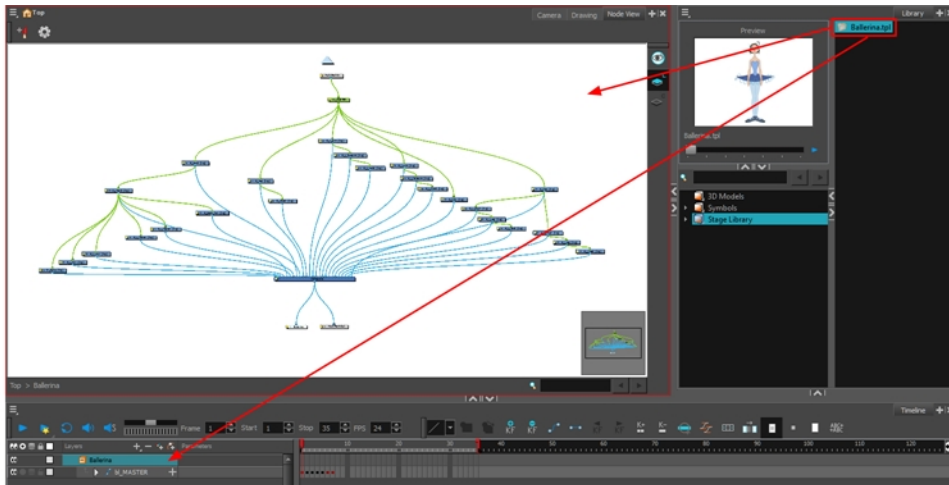
If you want to import a palette, simply drag the palette file into the Palette list section of the Colour view.

You can use the Expand Symbol command to extract a symbol's contents and place it on the root timeline. The symbol will not be removed from the Timeline view. Its contents will be copied and inserted into the root timeline. The symbol's layers will be parented to it in case you created motions and transformations on the drawing layer that contains the symbol. Breaking the hierarchy could result in the loss of any scaling and animation you may have created.

You can also expand a symbol within a group to avoid crowding the timeline with a series of layers. When you expand the symbols, the layers will be contained in a group node that you can expand to see the content.

### How to import a template into the Timeline or Camera view

1. In the Library view, select the template you want to import.
2. Drag the selected template to the Camera view or to the left side of the Timeline view.

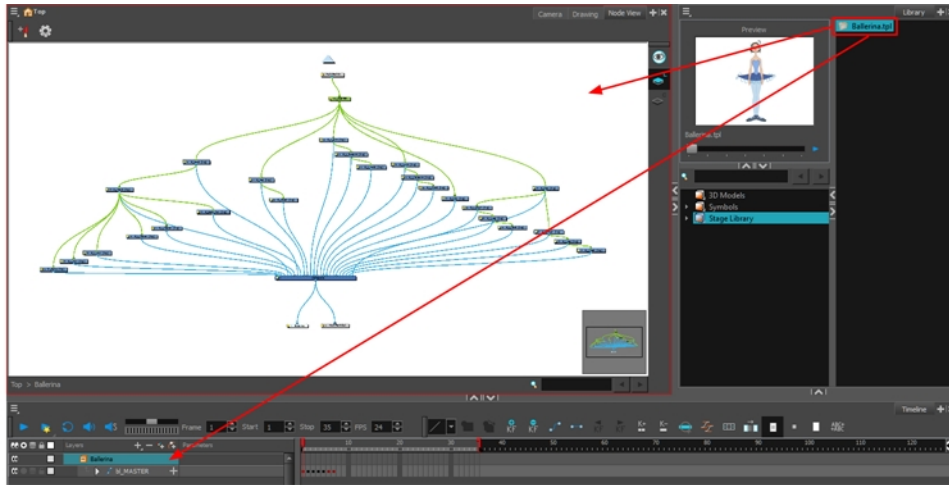


3. You can also drag a template to the right side of the Timeline view and into existing layers if the layer structure is the same as the existing one.

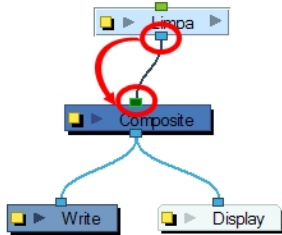


### How to import a node view template

1. In the Library view, select the template or symbol you want to import.
2. Drag the selected template to the Node or Camera view or the left side of the Timeline view.



3. If necessary, in the Node view, connect your template to the Composite node. To do this, click its out-port and drag the connection to the Composite node until an in-port appears.



**NOTE:** If the template you are importing was created in the Node view, make sure to drop it in the Node view or on the left side of the Timeline view. Otherwise, some network connections could be broken. If you are importing a template containing the exact same connections as a template you imported previously, you can drop it on the Timeline view's right side over the existing layer. This will combine both templates and keep the same existing layers.

### How to import a symbol in the Timeline view

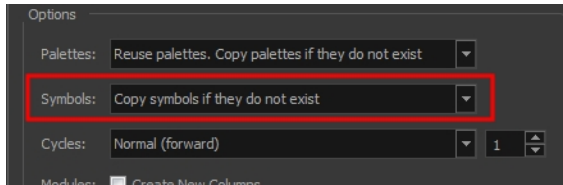
1. In the Library view, select the symbol you want to import.
2. Drag the selected symbol to one of the following:
  - The Timeline view's left side to import it into the centre of the camera frame.
  - The Camera view to place it at the location where you release your cursor.

**NOTE:** This may be useful if you saved a character's body parts as separate symbols. If you dropped them into the Timeline view, then they would all appear in the centre, haphazardly one on top of the other. It would be more efficient to arrange them into their correct places as you bring them into the scene.

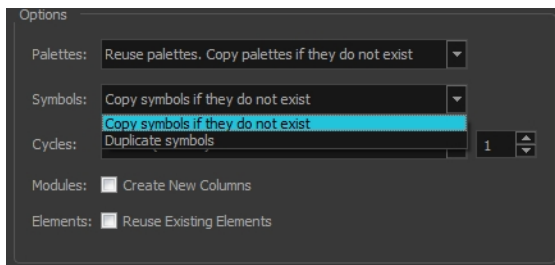
## How to import a template with symbols

1. From the right side of the Library view, select the action template that contains symbols.
2. Hold down Alt (Windows/Linux) or ⌘ (Mac OS X) as you drag it from the Library view to the right side of the Timeline view and drop it next to a template with the exact same rig.

The Paste Special window opens.



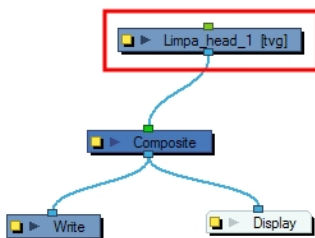
3. Select the **Advanced** tab.
4. Select one of the following options from the Symbols menu:



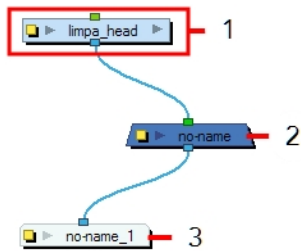
- ▶ **Copy symbols if they do not exist:** This is the default setting for this operation and will prevent symbols in an action template from being copied.
- ▶ **Duplicate symbols:** Makes copies of the symbols in your template.

## How to navigate your symbol in the Node view

1. In the Node view, select the symbol you want to open and press Ctrl + E (Windows/Linux) or ⌘ + E (Mac OS X) to use the Edit Selected Symbol command.



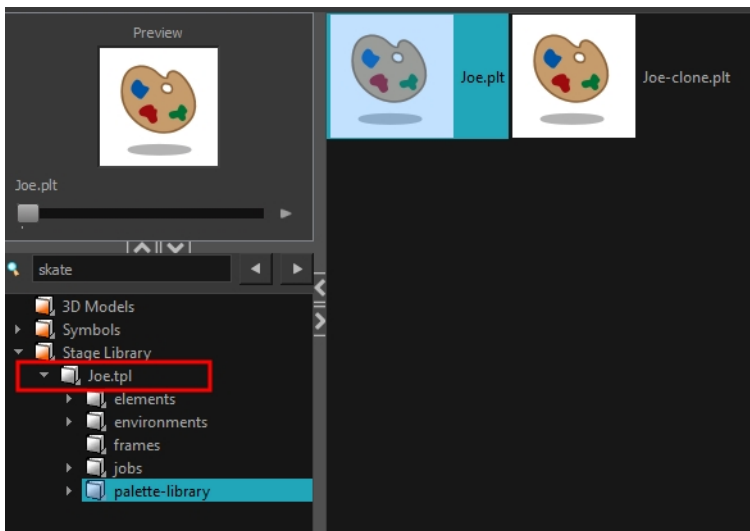
2. In the Node view, inside the Symbol's top node is the composition of your symbol. In this example, a group node was turned into a symbol.



3. In the Node view's top-left corner, click the Top 🏠 button to return to the top node. Or press Ctrl + Shift + E (Windows/Linux) or ⌘ + Shift + E (Mac OS X) to use the Leave Current Symbol command.

### How to open a template as a folder

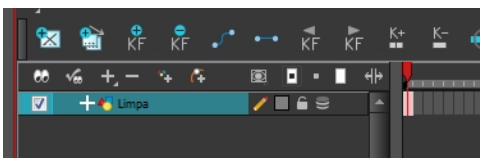
1. In the Library view, select the folder that contains the template to open. If the library folder is locked, right-click on the folder and select **Right to Modify**.
2. Right-click on the selection and select **Open As Folder**.
3. In the library list section, click on the template's folder to display its content.



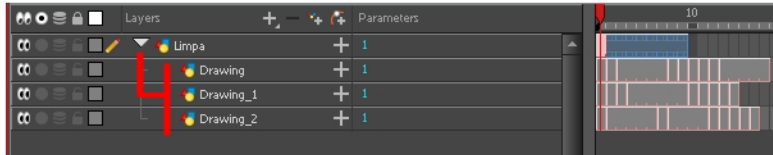
4. Drag the content to the Timeline or Colour view.

### How to expand a symbol

1. In the Timeline view, select the symbol to expand.



2. From the top menu, select **Edit > Expand Symbol** or press Shift + F8.

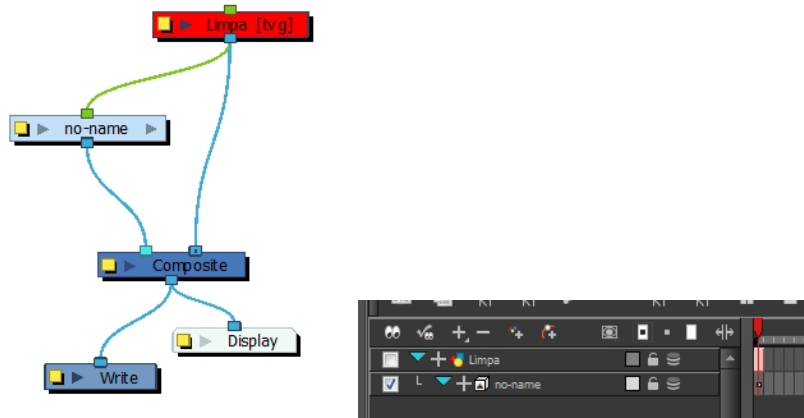


### How to expand a symbol in a group

1. In the Timeline or Node view, select the symbol cell or symbol node you want to expand.



2. From the top menu, select **Edit > Expand Selected Symbol in a Group**.
3. In the Timeline view, click the plus sign (+) to see the group content. In the Node view, click the **Expand Arrow** to enter the group.



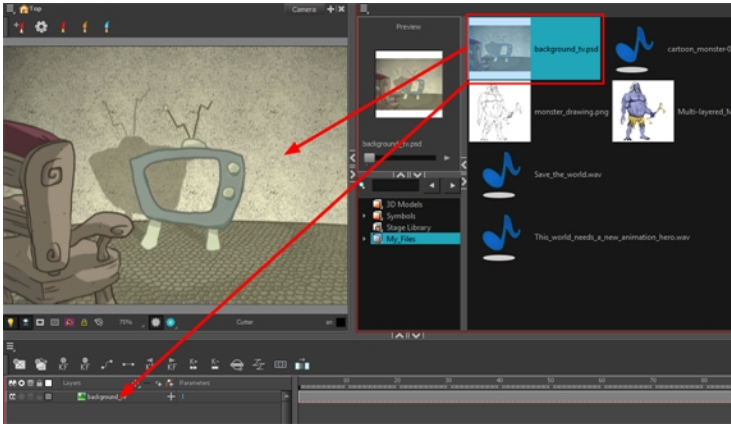
## Importing Files Through the Library

Harmony lets you import sound files and images directly through the library. Simply open the folder containing your files in the Library view and drag them directly from there.

### How to open a file through the Library

1. In the Library View menu, select **Folders > Open Library**.
2. Browse for the folder containing the files you want to import.

3. Click **Open**.
4. From the Library's template list, drag the file you want to import in the Timeline or Camera view.



## Using Paste Special

When you import a template in the Timeline view, all layers are created as well as drawings and keyframes. You can choose to import only the keyframes without the drawings or import only the drawings that are not already in your layers. You can adjust the behaviour using the Paste Special dialog box.

When you import a symbol in your scene, its full length is exposed by default. If you import a symbol in the Timeline view's left side, all the frames will be exposed. However, if you import it into an existing layer, you can use the Paste Special dialog box to adjust the import behaviour to fit your requirements.

Once you set the parameters, Harmony will reuse them each time you import a symbol in the Timeline view's right side until you set new parameters.

### How to open the Paste Special dialog box

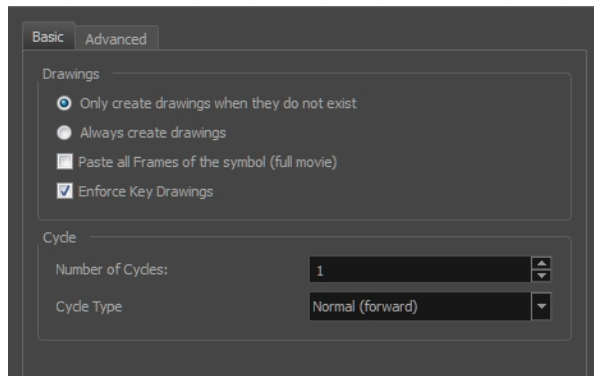
1. In the Library view, select the symbol or template to import.
2. Hold down Alt (Windows/Linux) or ⌘ (Mac OS X) and drag the selection to the Timeline view.

**NOTE:** Drop the selection in the Timeline view before releasing the keyboard shortcut key.

The Paste Special dialog box opens.

3. Set the parameters and click **OK**.

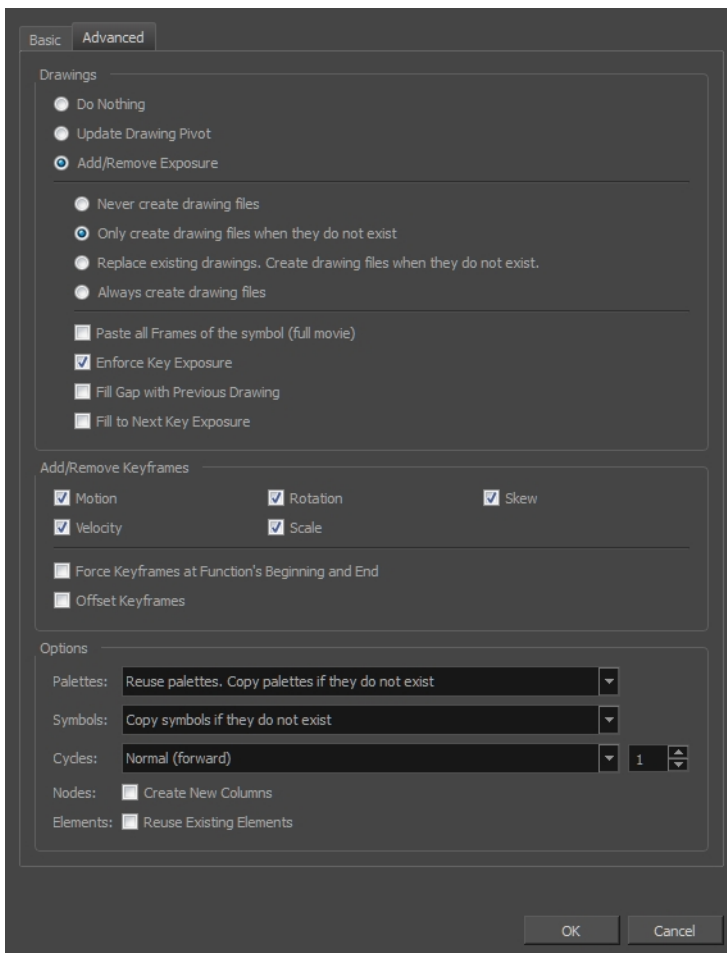
## Basic Tab



Parameter	Description
Drawings	
Only create drawing files when they do not exist	When adding exposures to a drawing layer, new drawings will be created only when drawings with the same name do not already exist in the destination.
Always create drawing files	When adding exposures to a drawing layer, new drawings will always be created. If drawing files with the same name already exist, Harmony will create a new name for the drawing.
Paste all Frames of the Symbols (full movie)	When enabled, the Paste Special command exposes all the symbol's frames instead of only the first one.
Enforce Key Drawings	Creates a key exposure on the same drawing.
Cycle	
Number of Cycles	Lets you set the number of cycles.
Cycle Type	<b>Normal (forward):</b> Pastes your selection as is, starting with the first cell and ending with the last.
	<b>Reverse:</b> Pastes your selection in reverse, starting with the last cell and ending with the first.
	<b>Forward &gt; Reverse:</b> Pastes your selection as a yo-yo, starting with the first cell, going to the last one and ending with the first cell.
	<b>Reverse &gt; Forward:</b> Pastes your selection as a reverse yo-yo, starting with the last cell, going to the first one and ending with the last cell.



## Advanced Tab



Parameter	Description
Drawings	
Do Nothing	Does not create or overwrite drawings.
Update Drawing Pivot	Revises the drawing pivot in the destination to use the same drawing pivot as the first drawing in the template. If you have a range of drawings selected in the destination, the pivot points of all selected drawings will be updated.
Add/Remove Exposure	<b>Never create drawing files:</b> When adding exposures to a drawing layer, drawing files will not be created.
	<b>Only create drawing files when they do not exist:</b> When adding exposures to a drawing layer, new drawings will be created only when drawings with the same name do not already exist in the destination.
	<b>Replace existing drawings. Create drawing files when they do not exist:</b> Replace drawings with the same names to update a scene with new modified drawings and preserve the animation.

	<p><b>Tip:</b> If you don't want to lose the existing animation when pasting a template, such as when placing new drawings after the animation, then delete the template's animation. It will still have updated the drawings but not override the existing animation.</p>
	<p><b>Always create drawing files:</b> When adding exposures to a drawing layer, new drawings will always be created. If drawing files with the same name already exist, Harmony will create a new name for the drawing.</p>
	<p><b>Paste all frames of the symbol (full movie):</b> When enabled, the Paste Special command exposes all the symbol's frames instead of only the first one.</p>
	<p><b>Enforce Key Exposure:</b> If there are key exposures that exist on copied drawings, they are preserved when pasting. No key exposures are added. This is the default behavior when pasting.</p>
	<p><b>Fill Gap with Previous Drawing:</b> Fills selected area in the Xsheet or Timeline view with the previous drawing.</p>
	<p><b>Fill to Next Key Exposure:</b> Fills selected area till the next key exposure.</p>
Add Remove/Keyframes	
Motion	Copies the properties of the selected motion keyframe to the new frame.
Velocity	Copies the properties of the selected velocity keyframe to the new frame.
Rotation	Copies the properties of the selected rotation keyframe to the new frame.
Scale	Copies the properties of the selected scale keyframe to the new frame.
Skew	Copies the properties of the selected skew keyframe to the new frame.
Force Keyframes at Function's Beginning and End	Adds a keyframe to the beginning and end of the pasted function, reproducing the source function.
Offset Keyframes	When pasting functions, offsets keyframes from the function's last frame value by the values in the pasted function. This will continue the progression of a function instead of repeating the values.
Options	
Palettes	<p><b>Do nothing:</b> Does not create, overwrite, merge or link palettes.</p> <p><b>Reuse palettes. Copy palettes if they do not exist:</b> Palettes in the destination drawings are left as they are.</p> <p><b>Copy and overwrite existing palettes:</b> Overwrites destination palettes with the palettes from the source drawings.</p> <p><b>Copy and create new palette files:</b> Creates new palette files, placing them at the same relative environment and scene level as the source. If the palettes in the templates were stored at the environment level of the source scene, the paste operation will place the palettes in the environment level of the destination scene.</p> <p><b>Copy and create new palette files in element folder:</b> Creates new palette files in the element folders of the destination scene, rather than in the same</p>

	<p>relative job or environment.</p> <p><b>Copy palette and merge colours. Add new colours only:</b> Adds new colours to the destination palettes and ignores colours that are the same in the two palettes.</p> <p><b>Copy palettes and update existing colours:</b> Adds new colours to the destination palette and updates duplicate colours in the destination with colour values from the source.</p> <p><b>Link to original palettes (colour model):</b> Links the colour palettes in the destination scene to the palettes in the source. Use this to link drawings to the palettes in a colour model.</p> <p><b>Copy scene palettes and merge colours. Add new colours only:</b> Adds new colours to the destination scene palettes and ignores colours that are the same in the two palettes.</p> <p><b>Copy scene palettes and update existing colours:</b> Adds new colours to the destination scene palette and updates duplicate colours in the destination with the colour values from the source.</p>
Symbols	<p><b>Copy symbols if they do not exist:</b> This is the default setting for this operation and will prevent Symbols in an Action template from being copied.</p> <p><b>Duplicate symbols:</b> Creates a duplicate of the symbol instead of linking the Symbol instance to the original one. The new Symbol is created in the Library.</p>
Cycles	<p><b>Normal (forward):</b> Pastes your selection as is, starting with the first cell and ending with the last.</p> <p><b>Reverse:</b> Pastes your selection in reverse, starting with the last cell and ending with the first.</p> <p><b>Forward &gt; Reverse:</b> Pastes your selection as a yo-yo, starting with the first cell, going to the last one and ending with the first cell.</p> <p><b>Reverse &gt; Forward:</b> Pastes your selection as a reverse yo-yo, starting with the last cell, going to the first one and ending with the last cell.</p>
Nodes	<p><b>Create New Columns:</b> A new column is created when you copy and paste nodes from the Node view or layer in the Timeline view. If the layers are linked to function curves, the function curves, drawings and timing will be duplicated.</p>
Elements	<p><b>Reuse existing elements:</b> Lets you paste existing elements without creating new ones. This should be used only when pasting within versions of the same scene.</p>



# Chapter 10: Cut-out Animation



Harmony provides some great tools for animating puppets. You can create simple animation using the Transform tool, as well as create advanced animation using both forward and inverse kinematics. Harmony has advanced onion skinning and image swapping features to help you animate efficiently and quickly. For animation freedom, you have the ability to mix several different techniques of animation, such as simple rigging, hierarchy and symbol animation.

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- [Creating a Simple Cut-out Animation](#) on page 501
- [Selecting Layers to Animate or Position](#) on page 503
- [Navigating the Hierarchy](#) on page 506
- [Animating Using the Transform Tool](#) on page 507
- [Animating Using Inverse Kinematics](#) on page 509
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- [Animating Using Computer-generated Interpolation](#) on page 525
- [Marking the Timeline](#) on page 531
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- [Using the Onion Skin in Cut-out Animation](#) on page 535
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- [Swapping Drawings](#) on page 540
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## Getting the Character

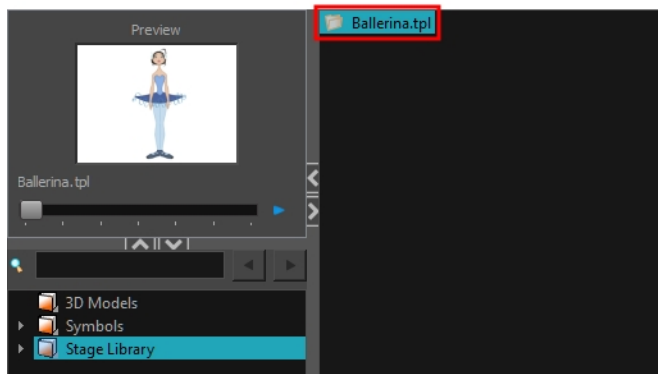
The first step in animating your character is to import a master template from the library.

In Harmony, you can create your character template from the Node view.

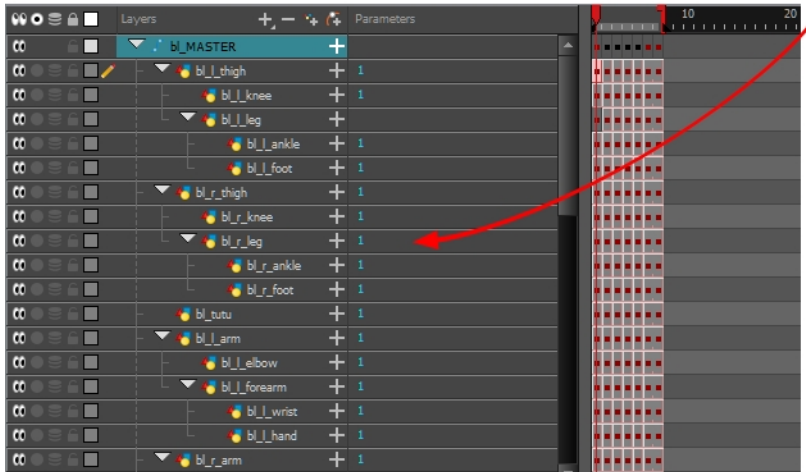
**NOTE:** If the template you are importing was created in the Node view, make sure to import it first and drop it into the Node view or the left side of the Timeline view. Otherwise, some network connections may be broken.

### How to import a character from the library

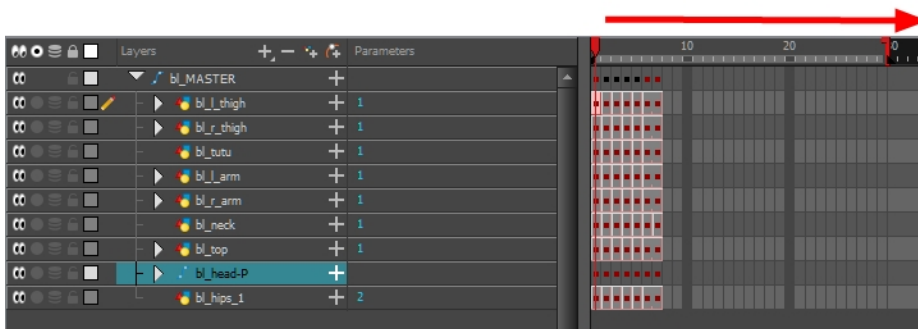
1. Create a new Harmony project.
2. In the Library view, select a character master template to animate.



3. Drag the selected template to the Camera or Timeline view's left side. You can also import a template directly in the Node view.

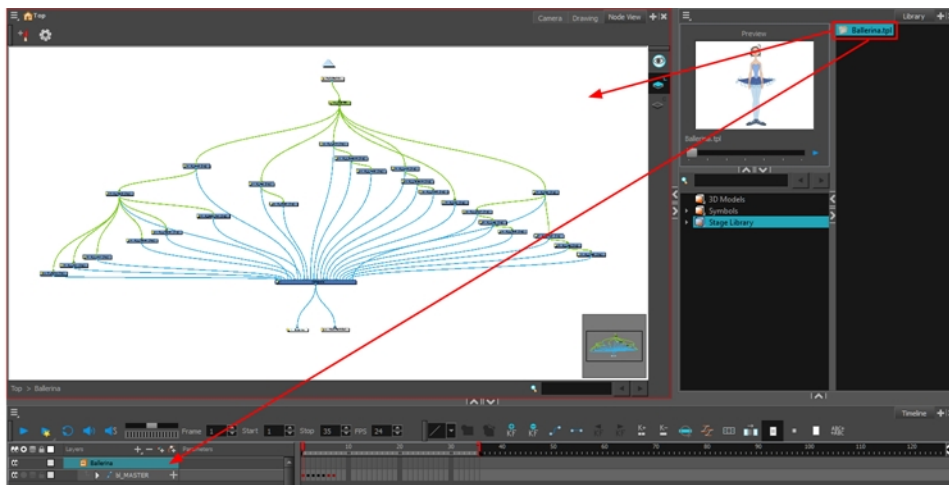


4. In the Timeline view, drag the red scene length bracket to extend or shorten the scene length.

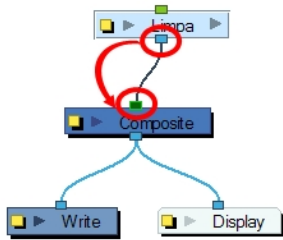


### How to import a network template

1. In the Library view, select the template or symbol you want to import.
2. Drag the selected template to the Network or Camera view or the left side of the Timeline view.



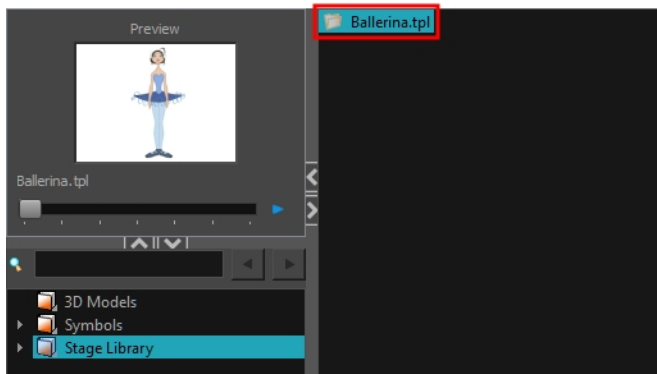
3. If necessary, in the Node view, connect your template to the Composite node. To do this, click its out-port and drag the connection to the Composite node until an in-port appears.



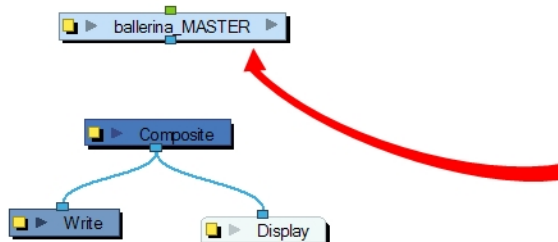
**NOTE:** If the template you are importing was created in the Node view, make sure to drop it in the Node view or on the left side of the Timeline view. Otherwise, some network connections may be broken. If you are importing a template containing the exact same connections as a template you imported previously, you can drop it on the Timeline view's right side over the existing layer. This will combine both templates and keep the existing layers.

### How to import a network template (master template)

1. Create a new Harmony project.
2. In the Library view, select the character's master template you want to animate.

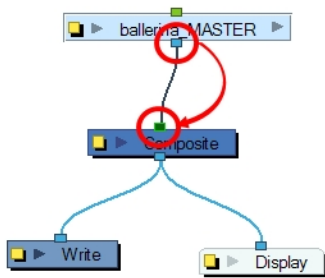


3. Drag the selected template in the Node view.

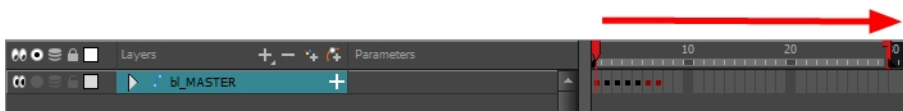




- In the Node view, connect the template's group node to the Composite node by clicking its out-port and dragging the connection to the Composite node until an in-port appears.



- In the Timeline view, extend or shorten the scene length by dragging the scene length bracket.



## Selecting the Pose



If the template you imported contains several poses, you must choose the pose for starting the animation and remove the others.

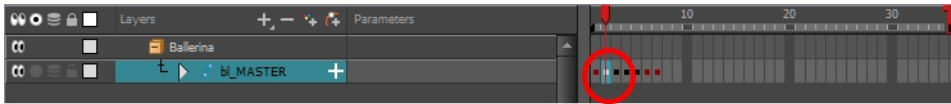
If you created your different views in separate templates, you can import them on separate layers, and turn them on or off in the Timeline view depending on which one you need.

### How to select the character's pose

- In the Timeline view, collapse the character's layers.



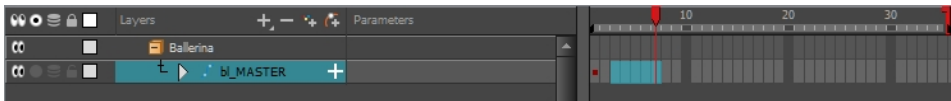
2. In the Timeline view's right side, select the keyframe corresponding to the pose you want to keep.



3. Drag the selected keyframe to the first frame.



4. Select all the extra drawings and keyframes that you don't need and press Delete.

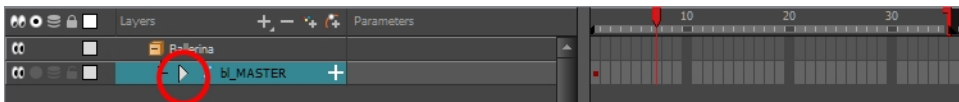


## Extending the Exposure

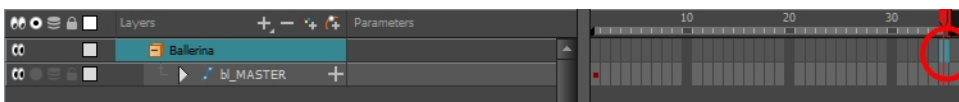
Once you have chosen a pose, all that's left to do is extend the exposure of the character to the end of the scene.

### How to extend the exposure of the character

1. In the Timeline view, collapse the character.

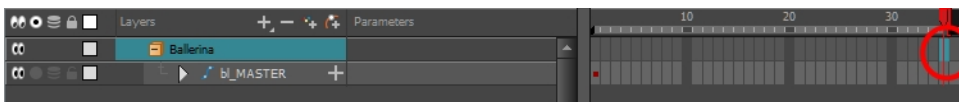


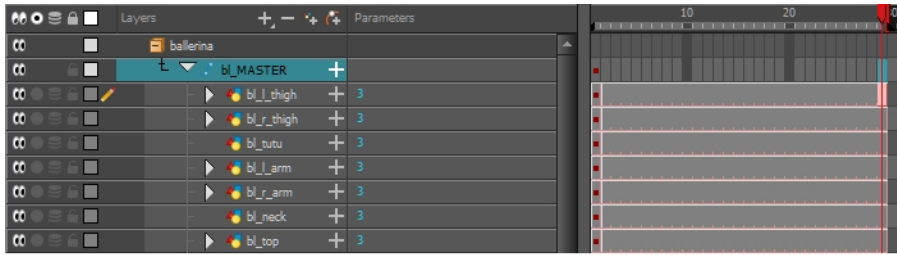
2. In the Timeline view's right side, select the last cell of the character.



3. Right-click and select **Extend Exposure** or press F5. You can also copy the first pose and paste it in the last cell.

The drawing exposure is extended to the end. You will not see any changes in the Timeline view when the master peg is collapsed.



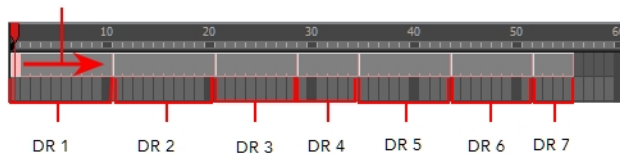


## Keyframes and Drawing Blocks

When you extend the exposure of a drawing, it is represented by a grey block in the Timeline view. When you expose a second drawing, a second grey block is displayed.

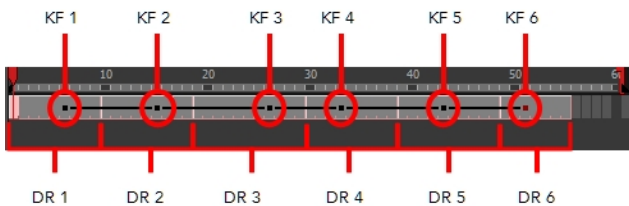
You can consider these blocks as drawing blocks.

Drawing exposure duration



To animate the position of a block over time, you don't need to create a second block, just add a position keyframe. The position keyframes are coordinates indicating the position of your drawing on a particular frame. These appear as black squares in the Timeline view.

In the example below, notice that the keyframes are positioned on frames independently from the beginning and end of each drawing block.




You can keyframe three different positions for a drawing in the same drawing block and create a motion path between them.

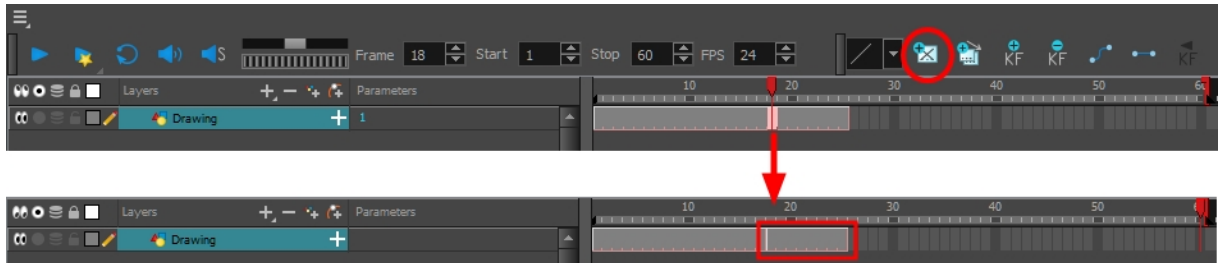
## Creating Keyframes and Drawings in the Timeline View

You can see how the Timeline view behaves differently depending on whether you create a new drawing, a new keyframe, or both at the same time.


### How to create a drawing in the Timeline view

- Do one of the following:
  - From the top menu, select **Drawing > Create Empty Drawing**.
  - In the Timeline toolbar, click the Create Empty Drawing  button.
  - Press **Alt + Shift + R**.

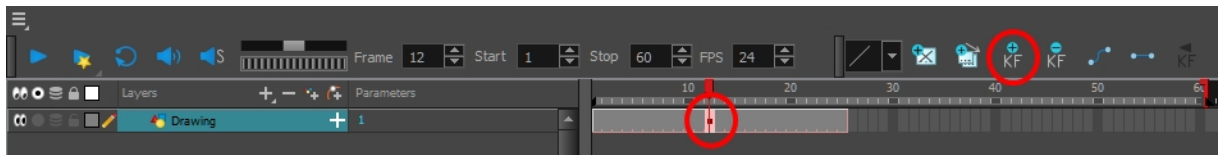
A new drawing block is inserted.



### How to create a keyframe in the Timeline view

- Do one of the following:
  - From the top menu, select **Insert > Keyframe**
  - In the Timeline toolbar, click the Add Keyframe  button.
  - Press F6.

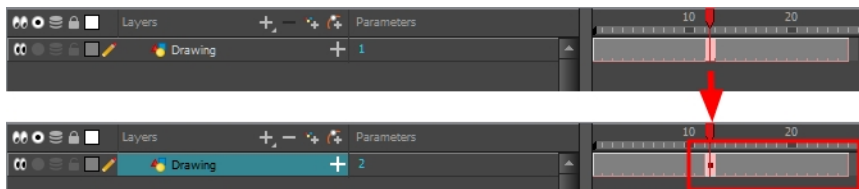
A keyframe is created in the layer.



### How to create a drawing and a keyframe simultaneously in the Timeline view

- From the top menu, select **Insert > Keyframe and Duplicate Drawing**.

A drawing block is created which contains copies of the selected drawing and a keyframe.





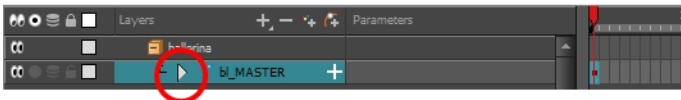
## Creating a Simple Cut-out Animation



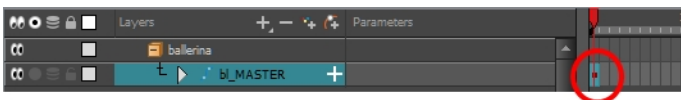
Here is how you can create a simple cut-out animation. Follow these steps so you can try the animation tools you'll be learning in the next topics.

### How to create a simple cut-out animation

1. In the Tools toolbar, select the Transform  tool or press Shift + T.
2. In the Tools toolbar, enable the Animate  mode so everything you move will be keyframed automatically.
3. From the top menu, select **Animation > Stop-Motion Keyframe** so the interpolation is not created automatically between keyframes.
4. In the Timeline view, collapse your character.




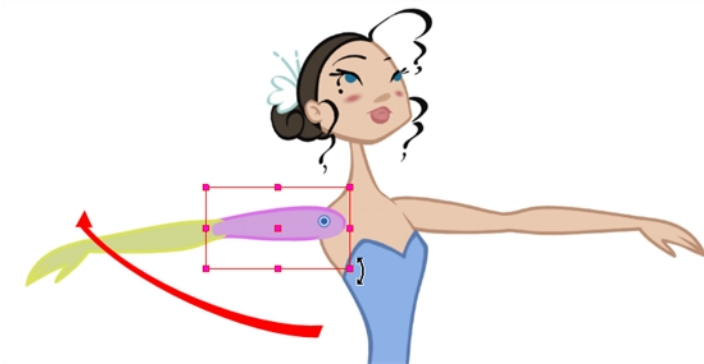
5. In the Timeline view, go to the frame where you want to set the first pose.



6. To ensure that nothing moves on the new pose, in the Timeline view, select the frame corresponding to the pose, right-click and select **Add Keyframe** or press F6.
7. In the Camera view, select the parts to animate.

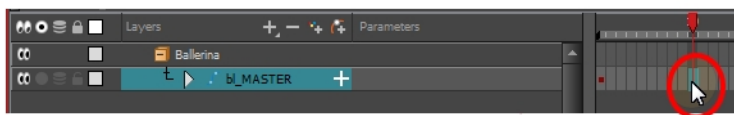


8. Use the Transform  tool to rotate, skew, scale or translate the selection to its new position. To rotate the piece, place your cursor slightly outside of a corner until you see the rotation cursor.



A new keyframe appears in the Timeline view if you did not create one previously. Always create your keyframe first.

9. In the Tools toolbar, enable the Onion Skin  feature.
10. In the Timeline view, go to the frame where you want to set the second keyframe. You will need to extend the exposure to see your drawings further down the Timeline view.

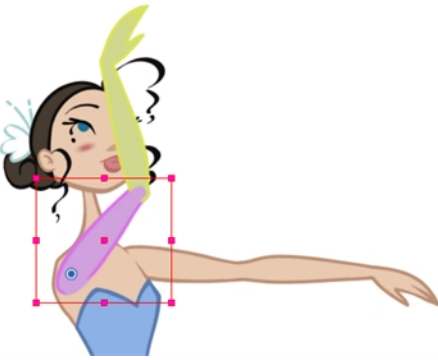


11. To ensure that nothing moves on the new pose, in the Timeline view, select the frame corresponding to the pose, right-click and select **Add Keyframe** or press F6.
12. In the Camera view, animate your character.




13. Repeat this process for all the poses.

## Selecting Layers to Animate or Position



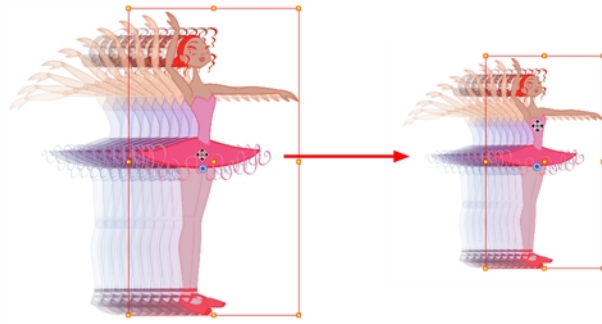
When you're animating characters, it's important to understand how the Animate mode allows you to create keyframes on the current frame or reposition the entire layer.

## Animate Mode

The Animate  button, in the Tools toolbar, turns keyframing on or off. With this mode enabled, as soon as you move an element in the Camera view, a keyframe is positioned on the current frame in the Timeline view to indicate the new position.



When you turn off the Animate mode, and you select and move an element, the entire animation in the layer will be offset.




This means that when you are animating a character, you must enable the Animate mode. If you are scaling down your puppet to fit the scene composition and want to resize the entire animation, you must disable the Animate mode.

### How to turn the Animate mode on or off



1. In the Tools toolbar, click the Animate  button or select **Animation > Animate**.

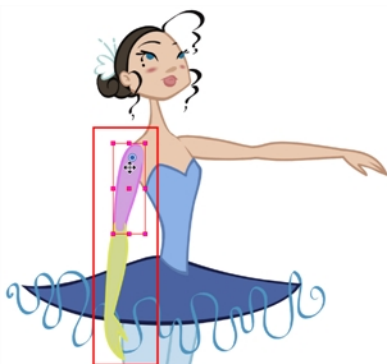
## Selecting Drawing Layers Using the Transform Tool

To manipulate the drawing layers in order to animate them, you must use the Transform  tool. The Select tool is used to modify the drawing strokes and not the actual drawing layer.

When selecting the drawing layers with the Transform tool, make sure the Peg Selection Mode option is turned off in the Transform Tool Properties view. Otherwise, if it's left on, it will limit the selection in the Camera view to pegs only.



### How to select using the Transform tool

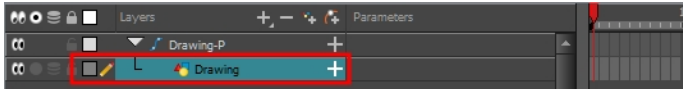
1. Do one of the following:
  - ▶ In the Tools toolbar, click the Transform  tool.
  - ▶ From the top menu, select **Animation > Tools > Transform**.
  - ▶ Press Shift + T.
2. In the Transform Tool Properties view, make sure the Peg Selection  mode is deselected.
3. In the Camera view, select the element to animate.





## Selecting an Element in the Camera View Using the Transform Tool

When you select an element in the Camera view using the Transform tool, make sure the Peg Selection  mode is disabled in the Transform Tool Properties view. The element selected is the actual drawing layer corresponding to the selected element. If you have a layer parented to a peg, you must use the keyboard shortcuts to go up the hierarchy chain, select it in the Timeline view, or enable the Peg Selection  mode option in the Transform Tool Properties view. This will limit the selection in the Camera view to pegs only.

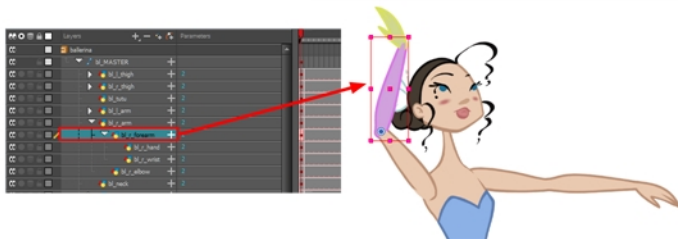


If the layer has child layers, they will also be highlighted. Depending on whether you're using pegs or only drawing layers in your rig, the selection can be magenta, yellow or both.



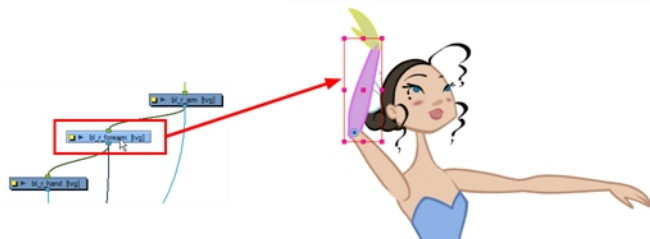
## Selecting a Layer in the Timeline View

When you select a layer in the Timeline view, the corresponding element is highlighted in the Camera view. If the selected layer has child layers, they are also highlighted.



## Selecting in the Network View



As with the Timeline view, when you select a node in the Node view, the corresponding element will be highlighted in the Camera view. If the selected node has child layers, they will also be highlighted.

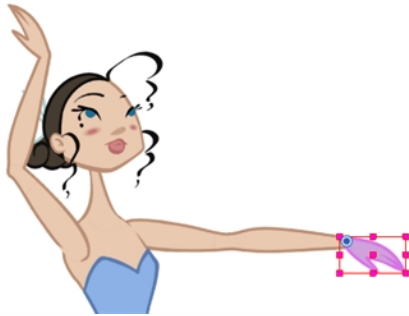


## Navigating the Hierarchy

If there is a layer hierarchy in the puppet you built, use the keyboard shortcuts to travel up and down the parent-child chain. You can also navigate between the children of the same parent.

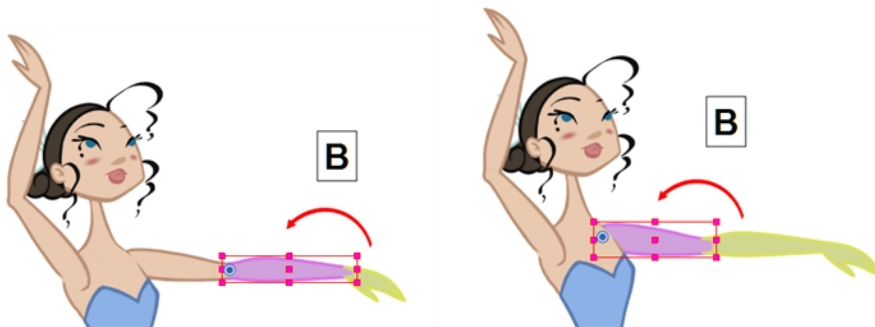
### How to select the parent or child layer

1. In the Tools toolbar, select the Transform  tool.
2. In the Transform Tool Properties view, make sure the Peg Selection  mode is deselected.
3. In the Camera or Timeline view, select a layer attached to a hierarchy.



4. From the top menu, select **Animation > Select Parent** or press B to select the parent layer. Select **Animation > Select Child** or press Shift + B to select the child layer.

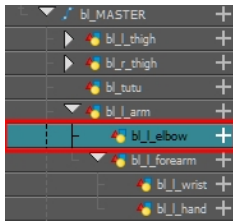
**NOTE:** These keyboard shortcuts ignore any effect node encountered in the Node or Timeline view. Only drawing and peg nodes are considered. If you want to navigate the hierarchy including the effect nodes, you can create a custom keyboard shortcut in the Preferences dialog box for the Select Parent Skipping Effects and Select Child Skipping Effects commands on the General tab. Refer to the Harmony Preferences Guide to learn how to create custom keyboard shortcuts.



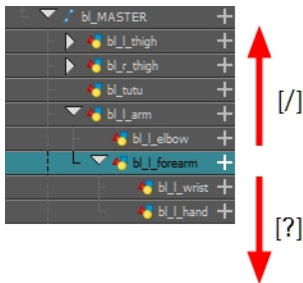
### How to select the children layers

1. In the Tools toolbar, select the Transform  tool.

- In the Camera or Timeline view, select a layer attached to a parent layer with several children or not parented at all.

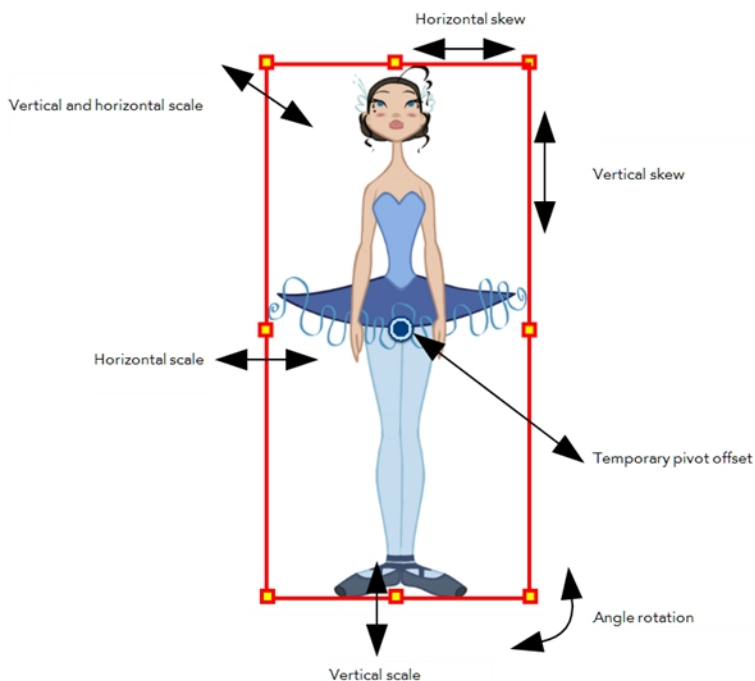


- From the top menu, select:
  - ▶ **Animation > Select Previous Sibling** or press / to select the previous child layer.
  - ▶ **Animation Select Next Sibling** or press ? to select the next child layer.
  - ▶ **Animation > Select Children** to select all child layers at the same time.




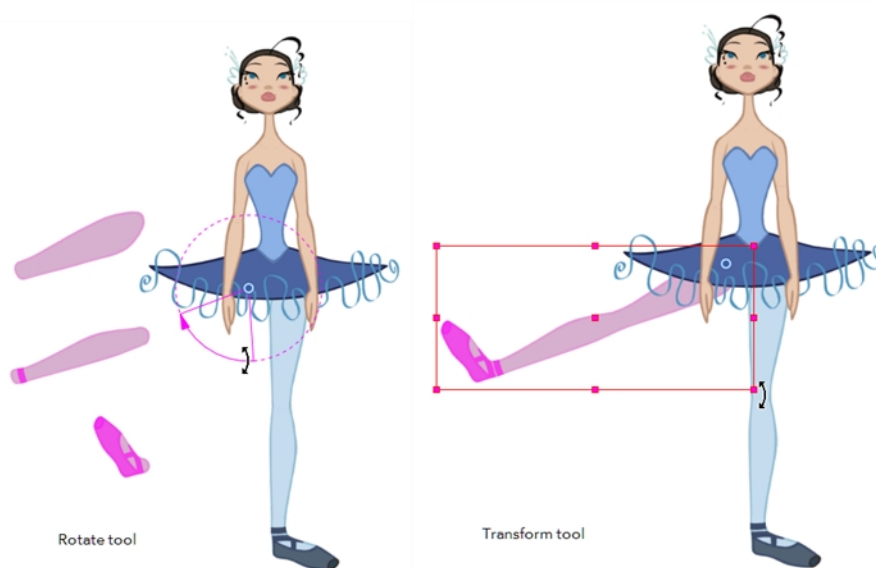
## Animating Using the Transform Tool

The Transform tool is the main tool to use when working with a cut-out character. The Transform tool has many useful functions:



Using the individual Rotate, Translate, Scale and Skew tools is not recommended, as they move each piece from their own pivot point. They are compositing tools. The Transform tool creates a global selection, so when many parts are selected, you can move them as one unit. The Transform tool is highly recommended for cut-out animation.

When animating with the Transform tool, make sure to select the right selection mode. In this example, make sure that the Peg Selection  Mode is disabled in the Tool Properties view or it will limit the selection in the Camera view to pegs only.






If there are hierarchy connections in the cut-out character, the Transform tool will also be used as the Forward Kinematics equivalent.

The Transform tool can be used on any kind of rigging.

When many parts are selected with the Transform tool, the first selected part's pivot will be used as the global selection's pivot. This pivot can be moved temporarily for the animation. When you offset the pivot, the permanent pivot is displayed as a ghost.

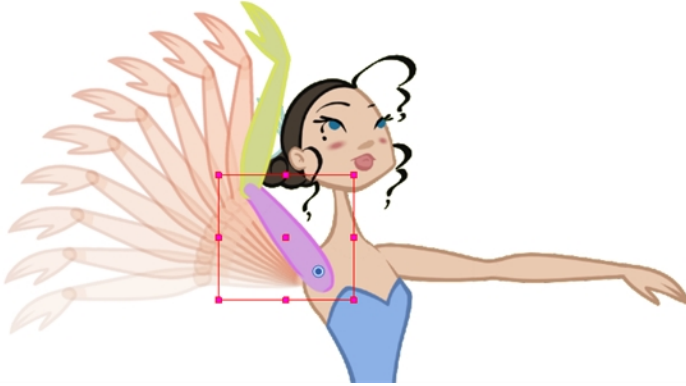
**NOTE:** The interpolation of the animation poses is always calculated from each individual part's permanent pivot. If there's a parent peg on a limb, make sure to select it instead of making a selection of each part to avoid setting individual keyframes.

### How to use the Transform tool

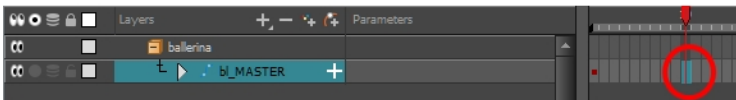
1. In the Tools toolbar, click the Transform  tool or press Shift + T.
2. In the Transform Tool Properties view, make sure the Peg Selection  mode is deselected.
3. In the Timeline view, go to the frame on which you want to set the first position.
4. In the Timeline toolbar, click the Add Keyframe  button or press F6. It is recommended to add a keyframe before moving the character. Moving a character's part without setting a keyframe will create

keyframes only on certain parameters of the animation. You could run into issues later on when setting poses between existing ones. Creating a keyframe on all layers and parameters will ensure your pose is set and will not be modified by other poses later on.

5. In the Camera view, select the element to animate and move it.



6. In the Timeline view, go to the frame where you want to set the next position.



7. In the Timeline toolbar, click the Add Keyframe button or press F6.
8. In the Camera view, animate the character.

## Animating Using Inverse Kinematics



The Inverse Kinematics (IK) tool allows you to pull on a character's extremities, such as the hands and feet, and have the rest of the body follow. It can be used on any piece connected in a hierarchy. However, you don't have to

use IK every time you have a hierarchy rig. This tool is useful when you want to bend a character's knees, make it sit and move the rest of the body, and so on. It will also assist you with posing difficult moves.

In most 3D animation software, Inverse Kinematics is implemented as a skeleton system. Harmony uses the rigging hierarchy already created in the Timeline view, so there is no need to place bones in the character. Inverse Kinematics in Harmony uses the connection between each of the parts' pivots.

Inverse Kinematics will not work on basic rigs without hierarchy because there is no hierarchy chain present. IK only works on a hierarchy where the pivots are properly set.

When animating a hierarchy puppet, you will use both the Transform and Inverse Kinematics tools.

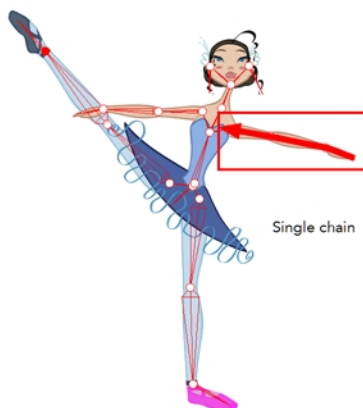
- [About IK Hierarchy Chains on page 510](#)
- [Where to Start with Inverse Kinematics? on page 511](#)
- [Inverse Kinematics Tool Properties on page 513](#)
- [Setting Up the Character to Use IK on page 515](#)
- [Nails on page 518](#)
- [Minimum and Maximum Angle on page 519](#)
- [IK Keyframes on page 520](#)
- [When to Use the Inverse Kinematics \(IK\) Tool on page 522](#)

## About IK Hierarchy Chains

Before going any further, a word about IK chains. There are three types of chains:

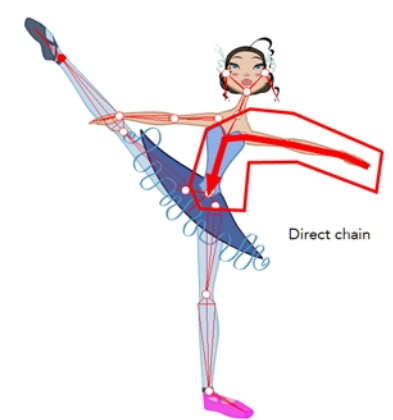
- [Single Chains on page 510](#)
- [Direct Chains on page 511](#)
- [All Chains](#)

### Single Chains



The single chains are the most basic of chains. A single chain is a straight line with no secondary chain attached. It goes up to the first intersection.

## Direct Chains



A direct chain is a single chain which goes directly to the core (root).

## All Chains




All chains are attached and move together when one part is moved.

## Where to Start with Inverse Kinematics?

Inverse Kinematics works best when you lock a part of the character on the spot, such as a foot on the floor, then select the entire body or another extremity and move it. It also works well in single chain mode when you need to simply position a limb.

**NOTE: Tip:** To lock a part in place, use the IK Nail option—see [Nails](#) on page 518.

### How to use the Inverse Kinematics tool

1. In the Tools toolbar, select the Inverse Kinematics  tool or press Shift + I.
2. In the Camera view, Ctrl + click (Windows/Linux) or ⌘ + click (Mac OS X) on a part of the body.

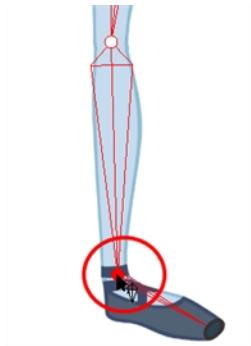
The entire IK skeleton appears.



3. Click on a part of the body and pull on it to move the character.



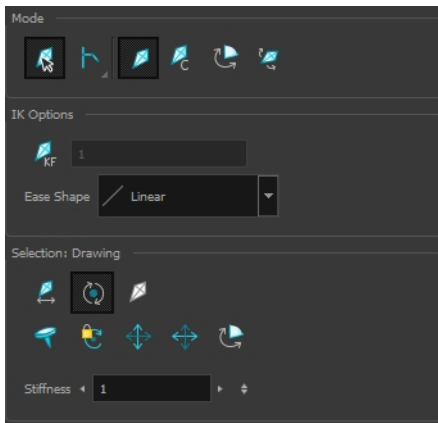
4. Hold down the Shift key and click on the pivot belonging to the part you want to lock in place. You can Shift + click on a bone to lock the orientation of the bone.



5. Click on another part of the character and pull on it.





## Inverse Kinematics Tool Properties



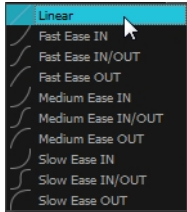
### Mode

The IK tool has a series of different modes available in the Tool Properties view.

Mode	Button	Description
Bone Selection		<p>Enabled by default, this mode lets you click on any bone in a character and move it without having to select the actual layer.</p> <p>When you disable this mode, you cannot move any bone except the selected one. This allows you to grab and rotate the selected part from many angles and locations. You can click completely outside the character and move the pieces.</p>
Chain		<ul style="list-style-type: none"> <li> <b>Simple Chain Mode:</b> This is the default mode and will only allow for the movement of parts attached to a single chain up to the point of intersection. A single chain is a straight line with no secondary chain attached.         </li> <li> <b>Direct Chain Mode:</b> This mode allows you to move parts up a simple secondary chain to a principle chain, as long as translation movement is possible (the principle chain is attached to its own peg), but will ignore all secondary chains. A direct chain is a single chain which goes directly to the core.         </li> <li> <b>All Chain Mode:</b> This mode allows you to move all parts attached to all chains in the IK skeleton. All chains are attached and move simultaneously when one part is moved.         </li> </ul>
IK Manipulation		<p>The main working mode for the IK tool. Enable this mode when you want to animate and position a puppet.</p> <p>Ctrl + click (Windows/Linux) or ⌘ + click (Mac OS X) on a body part to select it. You do not need to select a part to be able to move it.</p>
Apply IK Constraints		<p>Lets you correct a part's position on a series of frames. For example, if the character's foot is sinking into the floor, you can correct its position and angle over a series of frames.</p>


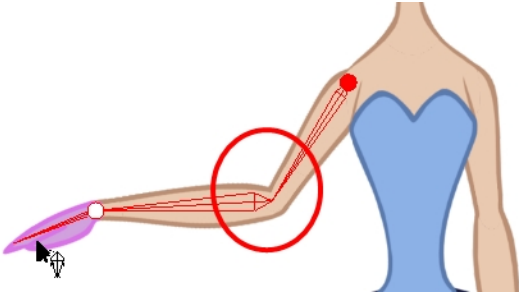
Edit Min/Max Angle		Lets you set a rotation restriction on some of your parts, such as elbows, knees and ankles.
Bone Editing		Lets you fix the bone orientation on extremities, such as hands and feet.

## IK Options

Parameter	Description
IK Keyframe	Used in combination with the IK Constraints mode, this option determines the starting frame of the constraint you will apply.
Ease Shape	<p>While animating with the IK tool and before doing a movement, set an easing preset so the motion is not so mechanical.</p> <p>Before moving the part, select a preset from the Ease Shape menu:</p>  <p>If you select a new preset in the list and move the part again on the same keyframe, the easing will automatically update.</p>

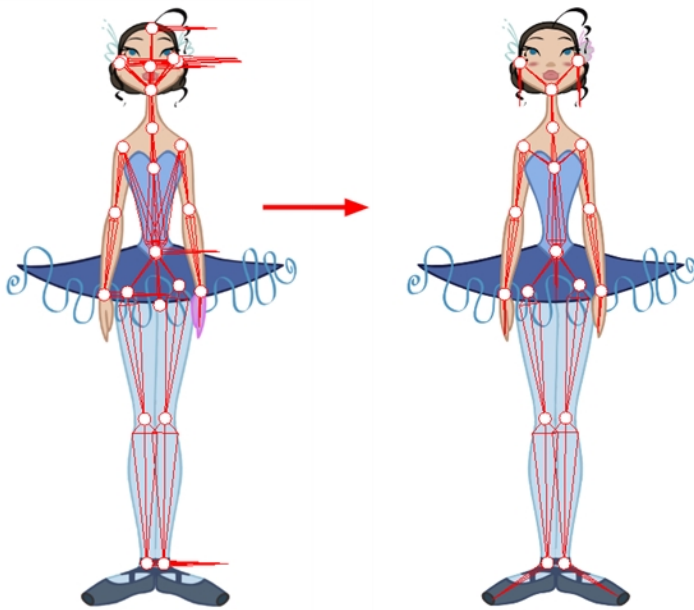
## Selection

Parameter	Description
Enable Translation If Top of Hierarchy	

	 <p>Used only on master pegs. This option is useful when you have this particular situation: You want the character to do a perfect split (sitting down with the legs at right angles to the body or at the sides with the torso facing forwards), then the hip will need to translate and not just rotate on the spot. And since IK is all about rotation, you would select the hip layer and enable the translation option.</p>
Enable Rotation	 <p>This option is enabled by default. The pivot disappears but you can still see the bone. When this option is disabled, the selected part cannot be rotated and will remain in the same position. You can use this option to simulate an arm in a plaster cast.</p>
Exclude from IK	This option lets you exclude certain parts of the puppet from the IK influence, such as the eyes and mouth.
IK Nails	These options let you temporarily fix a part of a character to a spot either in translation or rotation, or enable maximum and minimum angle usage.
Stiffness	When a certain part is selected, you can apply a stiffness value to it. A different stiffness value can be set to each body part individually. The greater the stiffness, the more difficult it is to make that part rotate, thereby rendering it stiff while the other parts continue to move freely on their joints.

## Setting Up the Character to Use IK

The first time you display the character's skeleton, notice a series of bones on the extremities which are out of place. There may also be some elements that you would like to exclude from the IK chain.



It is highly recommended to set up the skeleton before starting your animation.



Before fixing any bones, or excluding layers from the IK skeleton, make sure all the elements you want to be parented in a chain are set up.

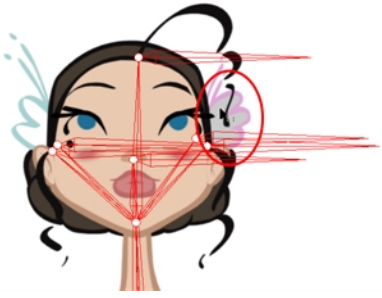
You do not need to have hierarchy chains all over the body. They could exist only on the legs and arms. If the body is not completely rigged in hierarchy, the skeleton will look a bit more messy, but the IK tool will still work properly.

When working with the IK tool, you will probably want to move the main parts around, but not necessarily the small ones such as the nose or ears. To do this, you can select some elements on your character and exclude them from the skeleton.

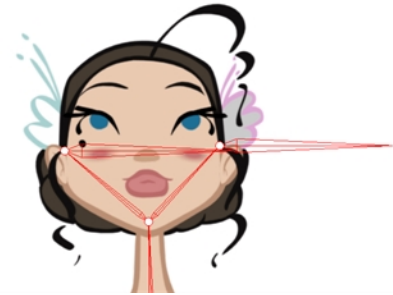
Once you remove the extra elements from the skeleton, set the bone orientation for the extremity parts. By default, they are oriented horizontally towards the right. This orientation often works for the feet but not necessarily for the hair or hands.

### How to exclude elements from the skeleton

1. In the Tools toolbar, select the Inverse Kinematics  tool or press Shift + I.
2. In the Tool Properties view, make sure the IK Manipulation Mode  is enabled.
3. In the Camera view, Ctrl + click (Windows/Linux) or ⌘ + click (Mac OS X) on the part to exclude from the skeleton.





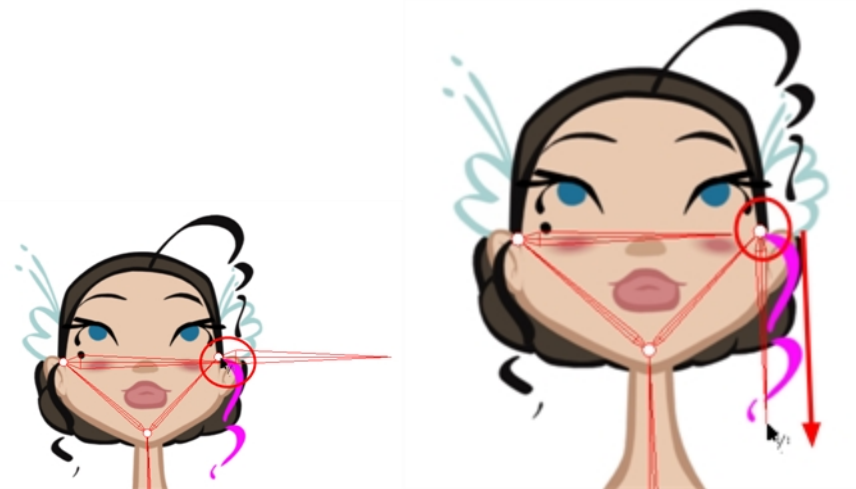
4. In the Tool Properties view, click the Exclude from IK  button.



5. Repeat the process for every part to be excluded from the skeleton.

### How to set the bone orientation

1. In the Tools toolbar, select the Inverse Kinematics  tool or press Shift + I.
2. In the Tool Properties view, enable the Bone Editing  mode.
3. In the Camera view, click on the pivot belonging to the part whose bone you want to reposition, then pull the pivot in the desired direction.



4. Repeat this process for each bone you want to position.






**NOTE:** This command only works on the extremities.





## Nails

Often, you will want to animate only part of a character, such as the arm and not the entire body. You can do this using IK nails, which are IK constraints that temporarily cut or constrain the chain. With IK nails, you can cut an IK chain or block a part on the spot. For example, you can fix a character's feet to the ground when it walks.

There are different types of constraints you can place on the chain:

-  **IK Nail:** Blocks the X, Y and Z positions.
-  **Hold Orientation:** Blocks the angle.
-  **Hold X:** Blocks only the X position.
-  **Hold Y:** Blocks only the Y position.
-  **Enable Maximum and Minimum Angles:** Sets limitations on the angle parameter to prevent the puppet from bending too far.

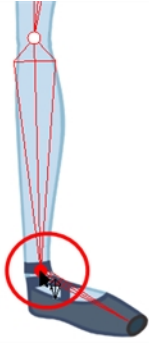
### How to set an IK nail

1. In the Tools toolbar, select the Inverse Kinematics  tool or press Shift + I.
2. In the Tool Properties view, make sure the IK Manipulation Mode  is enabled.
3. In the Camera view, Ctrl + click (Windows/Linux) or ⌘ + click (Mac OS X) on the part to set a nail on.
4. In the Tool Properties view, select a type of nail:



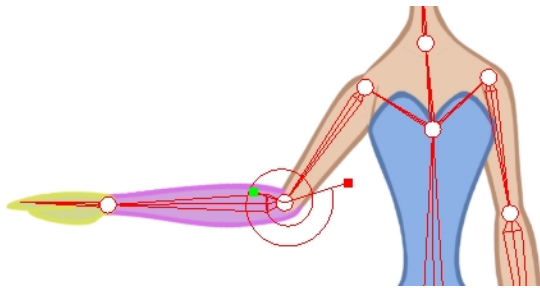
- Hold the Shift key and click on any part's pivot to set a regular nail on it without having to select it.
- Hold the Shift key and click on the bone to set a Hold Orientation nail.

- ▶ Select the nail type in the top menu by selecting **Animation > IK Constraints > *desired nail***.



- ▶ Remove the nail at any time using the same technique you did for placing the nail. It will not affect the animation.
5. To remove all nails except the Enable Min/Max Angle ones, from the top menu, select **Animation > IK Constraints > Remove All Constraints**.

## Minimum and Maximum Angle



Harmony allows you to set a minimum and maximum angle constraint on certain joints, such as the knees or elbows. When using the Inverse Kinematics tool or even the Forward Kinematics (Transform tool), it is possible that some joints will bend in the wrong direction.



If you plan to animate a lot with the Inverse Kinematics tool, it's a good idea to try the angle constraints. The angle constraints can be set by the character builder or by the animator in particular scenes where it's needed.

### NOTE:

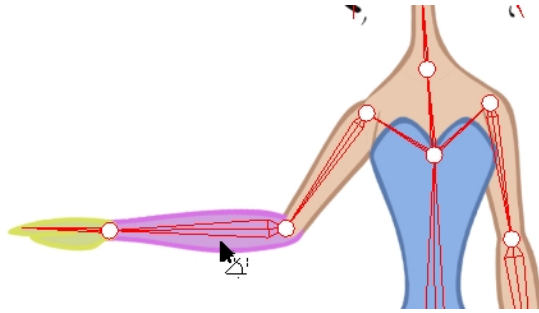
It is recommended to use the minimum and maximum angles only if the character does not change view within the same layers. For example, if a character is facing the camera and has some angle limitations enabled, it could be problematic if the character switches to side or quarter view since the joints won't bend the same way.


Use the minimum and maximum angle constraints if your character's views are in different templates or layers. If the character's views are in the same layers, then it's better not to use the angle constraints.

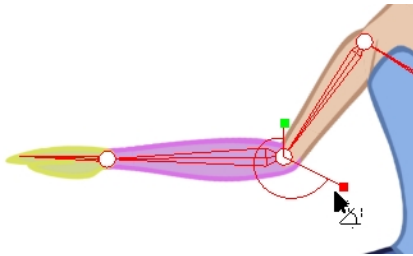
### How to set the minimum and maximum angles


1. In the Tools toolbar, select the Inverse Kinematics  tool or press Shift + I.
2. In the Tool Properties view, in the Mode section, make sure the Edit Min/Max Angle Mode  is enabled.

3. In the Camera view, Ctrl + click (Windows/Linux) or ⌘ + click (Mac OS X) on the piece to set the minimum and maximum angle.



4. In the Tool Properties view, in the Selection section, click the Enable Min/Max Angle  option.
5. In the Camera view, rotate the Minimum and Maximum handles to set the angle.



6. Test the angles using the IK Manipulation  mode.
7. For additional control over the Min/Max Angle, go to **Edit > Preferences** (Windows/Linux) or **Stage > Preferences** (Mac OS X). Select the **Camera** tab. In the Inverse Kinematics section, look at the Min/Max Angle Constraint Weight. Although the maximum value goes up to 1.0, in a production setting, the most practical value would be closer to 0.1. This value acts similar to the Stiffness setting in the Tool Properties view. The higher the value, the more difficult it becomes to approach the minimum and maximum values.

## IK Keyframes



When you animate a walking character and lock the feet down, the locked position will be perfect on the key poses. However, when you use motion keyframes to auto in-between the animation, you'll notice a movement of the feet. This motion is caused by the in-betweening of the rotations.




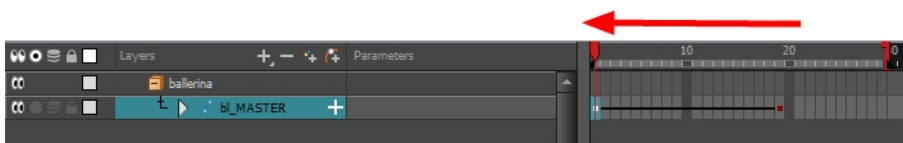
The nail holds in place the body part on the keyframe, but it will not hold it for the entire duration between keyframes.



If you place a nail on the shoulder to move just the arm, you don't necessarily want to keep the shoulder in the same place until the next key pose. You will probably want the shoulder, or any other part that is nailed, to have a slight, natural motion following the main body action. Of course, this is not the case when you fix a hand or a foot on the spot. If you have a fixed hand or foot, you will probably want it to stay exactly where you placed it. That is why you can apply an IK constraint on a frame range and on selected body parts.

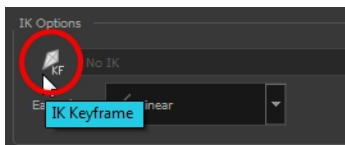
To fix the part on the same spot requires an angle (rotation) correction on the parts that are moving too much. For example, to fix a foot that is moving too much, you must correct the angles on the foot, leg and thigh. To fix a hand, you must correct the angles on the hand, forearm and upper arm.

### How to apply IK constraints on a frame range

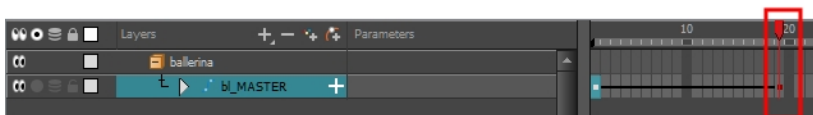
1. In the Tools toolbar, select the Inverse Kinematics  tool or press Shift + I.
2. In the Camera view, click on the part on which you want to apply the constraint.
3. In the Timeline view, select the first frame on which you want to start applying the constraint.



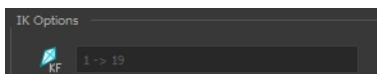
4. In the Tool Properties view, enable the Apply IK Constraints  mode.
5. In the Tool Properties view, click the IK Keyframe  button to enter the first frame number.



6. In the Timeline view, move the playhead to the last frame on which you want to apply the constraint.





The IK Keyframe field should now look like this:

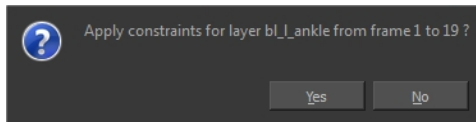


7. In the Camera view, set a nail at the top of the limb you are correcting. For a foot, set the nail on the thigh by holding down the Shift key and clicking its pivot.



8. In the Tool Properties view, select the type of constraint to apply to the piece. The most common one is a combination of the regular Nail  and Hold Orientation  options.
9. In the Camera view, click on the bone of the part you want to apply a constraint to.

A warning message appears asking you to confirm that you want to add a constraint on that particular piece and for that frame duration.



10. Click **OK**.

The constraint is applied.

## When to Use the Inverse Kinematics (IK) Tool

Harmony provides different tools for animating cut-out characters and trajectories. The two main tools used to animate characters are the Transform and Inverse Kinematics tools.

Here, we'll compare the usage of these tools and explain the Inverse Kinematics philosophy.

- **Transform Tool**

Also known as *forward kinematics*, the Transform tool is the main tool to use for cut-out animation. This tool rotates, scales, moves and skews selected elements as one global element.

Forward kinematics means that the limb is animated from the parent down to the last child as a single piece. In other words, if the shoulder is animated, then the arm, forearm and hand follow as a complete arm drawing.

- **Inverse Kinematics Tool (IK)**

This tool helps you achieve complex motions, such as sitting down or knee bending. The Inverse Kinematics tool moves and rotates every selected element as a chain.

Inverse kinematics means that the element is animated from the child up to the parent. In other words, if the hand is animated, then the forearm, arm and shoulder follow the hand in a fairly natural way in terms

of the movement, rotation and bending.

## IK Tool and Rigging

The IK tool cannot be used on every type of cut-out character. It depends on the way the pieces and parts are attached to one another. In other words, it depends on the rigging type.

There are several ways to rig a puppet. These are the three main rigging techniques:

### The Basic Rig Technique

- This is the simplest rig technique.
- There are no connections between the parts.
- They are free to move, rotate and scale independently from each other.
- The Inverse Kinematics tool CANNOT be used on this type of rigging.

### The Hierarchy Rig Technique

- This is a complex rig technique.
- All the parts are connected to each other.
- As they move, rotate and scale, they will influence all the other parts.
- The Inverse Kinematics tool can be used on this type of rigging.

### The Mixed Rig Technique

- This is the best of the basic and hierarchy rig.
- Some parts are independent such as the torso.
- Some parts are set up in a hierarchy such as the arms and legs.
- Independent parts are rigged in hierarchy using parent pegs.
- The Inverse Kinematics tool can be used on this type of rigging.

## Animating with the Tools

Puppets are animated by using a combination of the Transform and Inverse Kinematics tools.

You will mainly use the Transform tool (forward kinematics) as it has all the main motions: rotate, scale, skew, move and select. You can also control the exact position of the parts while using the Transform tool. As well, the Transform tool creates a temporary global pivot on the selection that can be moved around for the animation purpose.

To complete complex motions, such as bending the knees while keeping the feet on the ground, you can use the Inverse Kinematics tool as an assistance tool. By adding IK constraints (nails), it is possible to lock the feet or any other part to a particular spot and move the rest of the body, which will react to the constraints.

## Inverse Kinematics Philosophy

It is important to keep in mind that the Inverse Kinematics tool is an assistance tool. You will not be using it to animate all the time.

Also, the Inverse Kinematics tool can be used to create the character's posing faster. Posing is a crucial part in the animation process. The Inverse Kinematics tool can be used to pose the character more naturally, depending on your own preferences.

An IK nail can be added anywhere on the character to animate only a small part of the hierarchy chain, such as an arm or a portion of the arm.

## Tips and Tricks for Inverse Kinematics

Here are some tips and tricks to help you to use the Inverse Kinematics tool.

- **Inverse Kinematics on Mixed Rigs**

The Inverse Kinematics tool can be used on a full puppet's body even if it's connected as a mixed rig, meaning some parts are rigged in a hierarchy and others not. For example, you can add IK nails on the puppet's feet, select the full body master peg and move the character as if it was connected in a full hierarchy rig. This technique works on most mix rigs.

- **Inverse Kinematics Constraints**

It's important to remember that you can add and remove IK constraints (nails, hold orientation, etc.) at any time during the animation. They hold a certain part on the spot while you animate the rest of the body. Because they're not constricting one part to another object, you can add or remove them without affecting any of the animation you have already completed.

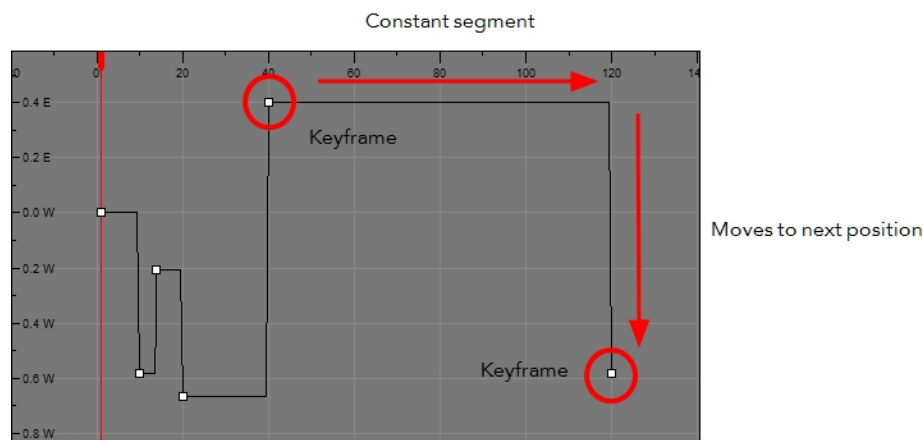
- **Useful Shortcuts**

- While using the Inverse Kinematics tool, you can Ctrl + click (Windows/Linux) or ⌘ + click (Mac OS X) to select any part.
- Hold Alt to rotate the selected part without affecting the IK chain.
- Press Shift and click in a part's pivot to add or remove an IK Nail.
- Press Shift and click on a bone to add or remove and Hold Orientation constraint.

## Animating in Stop-motion

To start animating your character, start by doing your key poses. In fact, most of your time will be spent doing key poses. It is better to work with stop-motion keyframes so Harmony does not automatically create the interpolation between your keyframes.

When using stop-motion keyframes, also known as *step keyframes*, the segment between two keyframes is constant. There is no animation generated by the computer between the poses. The drawing remains in position until the next keyframe, then moves to its new position.

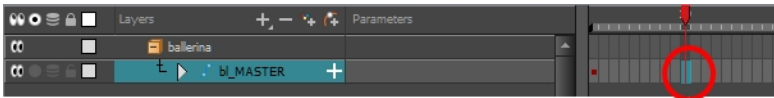


## Creating a Stop-motion Keyframe

You can create a stop-motion keyframe in several different ways. You can have Harmony create it automatically, transform a motion keyframe into a stop-motion keyframe, or even switch your preferences to get Harmony to always create stop-motion keyframes by default.

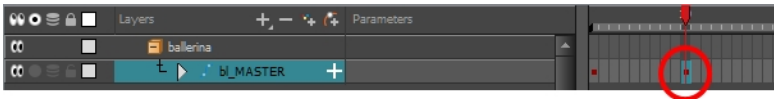
### How to automatically create stop-motion keyframes

1. In the top menu, make sure the **Animation > Stop-motion Keyframe** option is selected.
2. In the Timeline view, select the cell on which you want to add a keyframe.



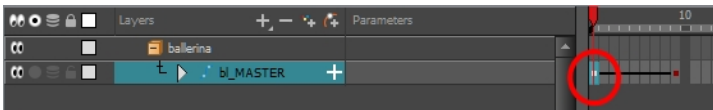
3. Do one of the following:
  - ▶ Right-click and select **Insert Keyframe**.
  - ▶ In the Timeline toolbar, click the Add Keyframe **KF** button.
  - ▶ Press F6.

In the Camera view, if the Animate mode is enabled, as soon as you move the selected element, a keyframe is automatically created on the current frame.

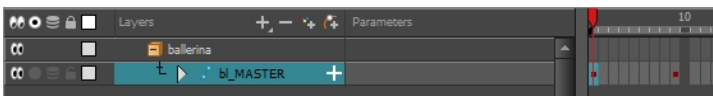


### How to convert a motion keyframe into a stop-motion keyframe

1. In the Timeline view, select the motion keyframes to convert into stop-motion keyframes or press S.

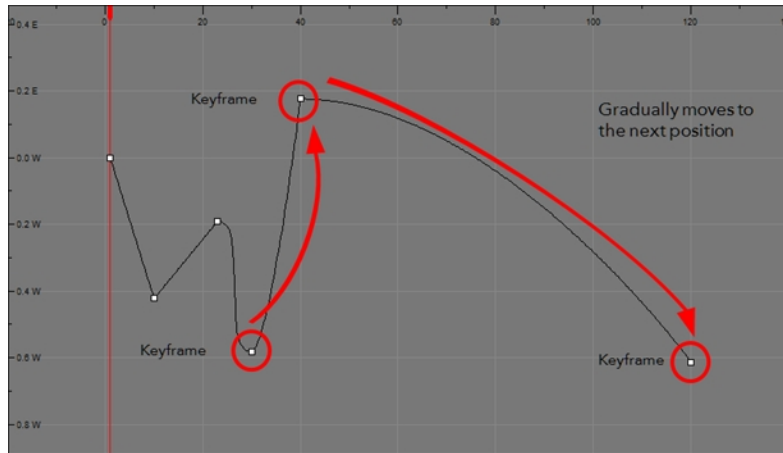


2. Do one of the following:
  - ▶ Right-click and select **Set Stop-Motion Keyframes**.
  - ▶ In the Timeline toolbar, click the Stop-Motion Keyframe **●—●** button.
  - ▶ Press Ctrl + L (Windows/Linux) or ⌘ + L (Mac OS X).



## Animating Using Computer-generated Interpolation

After you have created the key poses, you can animate the in-between poses yourself or let Harmony do it using motion keyframes. When you use motion keyframes, the drawings gradually move to the next position instead of staying on the spot until the next keyframe.

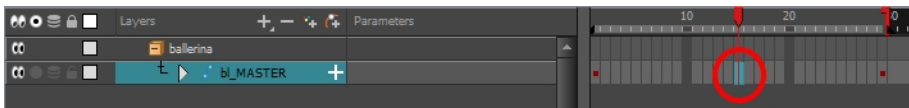


## Creating a Motion Keyframe

You can create a motion keyframe in several different ways. You can have Harmony create it automatically, transform a stop-motion keyframe into a motion keyframe and even switch your preferences to have Harmony always create motion keyframes by default.

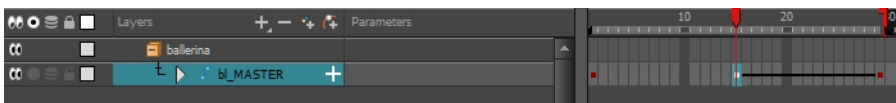
### How to automatically create motion keyframes

1. In the top menu, make sure the **Animation > Stop-Motion Keyframe** option is disabled.
2. In the Timeline view, select the cell on which you want to add a keyframe.



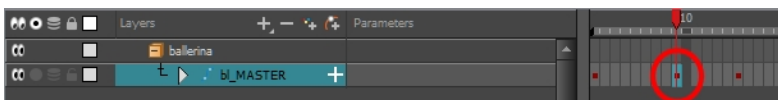
3. Do one of the following:
  - ▶ Right-click on the selection and select **Insert Keyframe**.
  - ▶ Click the Add Keyframe **KF** button in the Timeline toolbar.
  - ▶ Press F6.

In the Camera view, if the Animate mode is enabled, as soon as you move the selected element, a keyframe will be automatically created on the current frame.




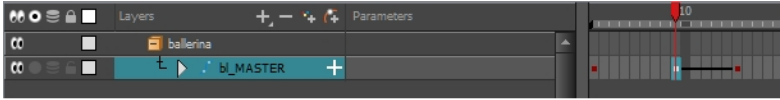
### How to convert a stop-motion keyframe into a motion keyframe

1. In the Timeline view, select the stop-motion keyframes to convert into motion keyframes.



2. Do one of the following:

- ▶ Right-click on the selection and select **Set Motion Keyframe**.
- ▶ Click the Motion Keyframe  button in the Timeline View toolbar.
- ▶ Press Ctrl + K (Windows/Linux) or ⌘ + K (Mac OS X).



## Adjusting the Ease




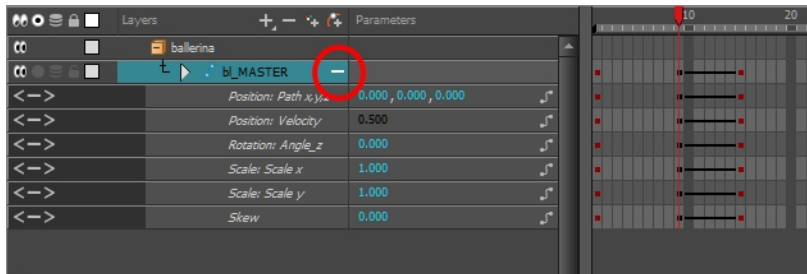
To add ease in and ease out on motion paths, you can display the function curve and modify the Bezier or Ease curve. To apply an ease to multiple functions and keyframes, use the Set Ease for Multiple Parameters feature and set the amount desired.

The velocity, or ease, is used on motion keyframes. The velocity must be adjusted directly on the function curve in the Function view or Function editor. When a keyframe is selected, easing values appear in the right handle and left handle fields, as well as the Bezier handle or Ease wheel controls on each selected keyframe. You can pull on them to adjust the ease in and ease out, or type values in the fields.

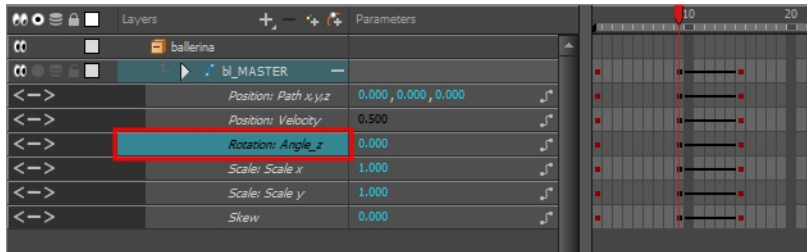
If there are several functions whose velocity you want to adjust at the same time, such as the hand, forearm and arm of a cut-out character, you can apply the same velocity parameters to all the selected keyframes in one frame.

### How to adjust the velocity in the Function view

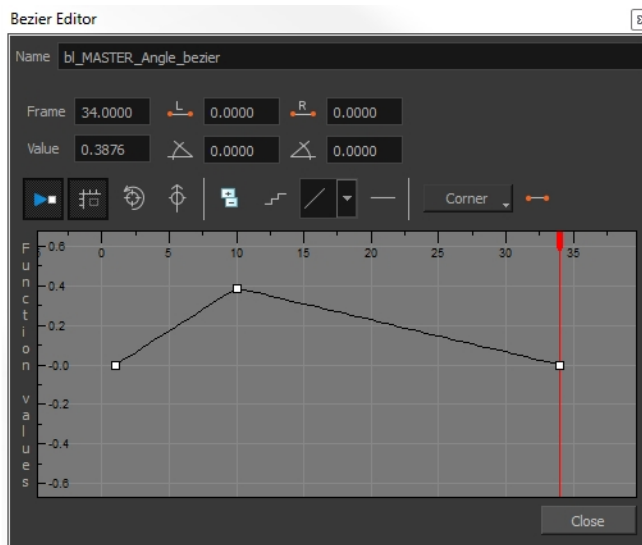
1. In the Timeline view, click the Expand Function  button to display all the layer's functions.



2. Double-click on a function.



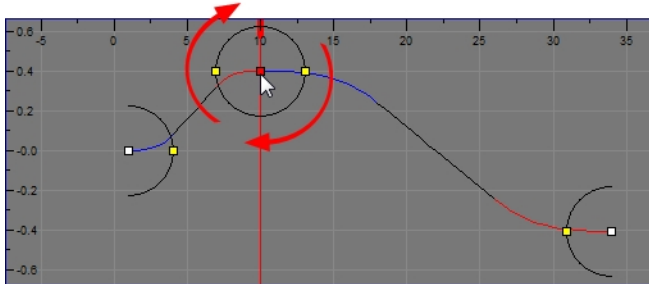
The Function Editor opens.



**NOTE:** The Function editor will not display if the function does not already exist. Add a keyframe to create the function.

3. Select a keyframe and pull on its Bezier handles or Ease wheel to adjust the velocity. Refer to the Compositing and Effects Guide to learn how to create Ease curves instead of Bezier curves.






## How to set ease on multiple parameters

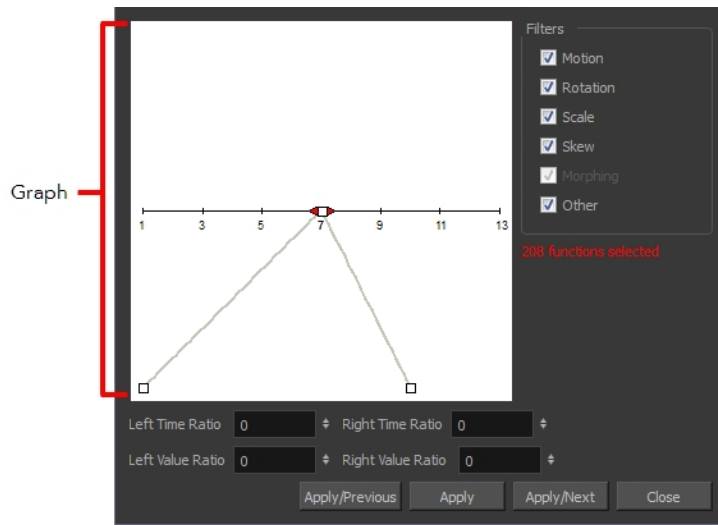
1. In the Timeline view, select a keyframe from one or more layers.



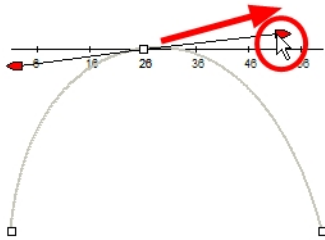
**NOTE:** Only the first keyframe selected on each layer is considered when using the Set Ease for Multiple Parameter function. If many keyframes are selected on the same layer, the ease values will be applied only to the first one and the rest will be ignored.

2. Do one of the following:
  - ▶ In the Timeline view, right-click and select **Set Ease For Multiple Parameters**.
  - ▶ In the Timeline toolbar, you can click the Set Ease For Multiple Parameters  button. If the button is not in the toolbar, you can add it through the Toolbar Manager. Right-click on the toolbar and select **Customize**.

The Set Ease For Multiple Parameters dialog box opens.



- In the graph, pull on the Bezier handle to adjust the velocity for all the selected functions.



- To apply these easing parameters to a certain type of function only, such as Rotation or Scale, in the Filters section, deselect the function types you do not want to affect.
  - ▶ **Motion:** Applies the easing parameters to the selected Position X, Position Y, Position Z and 3D Path functions
  - ▶ **Rotation:** Applies the easing parameters to the selected Angle functions.
  - ▶ **Scale:** Applies the easing parameters to the selected Scale functions.
  - ▶ **Skew:** Applies the easing parameters to the selected Skew functions.
  - ▶ **Morphing:** Applies the easing parameters to the selected Morphing Velocity functions. Note that it is applied to the Morphing Velocity function in the Layer Properties window, not to the basic Morphing ease in the Tool Properties view.
  - ▶ **Other:** Applies the easing parameters to all the other selected functions, such as all functions created to animate effect parameters.
- You can also adjust the easing by typing values in the Time Ratio and Value Ratio fields. The values are calculated in percentage.
  - ▶ In the Left Time Ratio and Right Time Ratio fields, type the percentage value corresponding to the length of time you want the easing to last. The value must be between 0% and 100%.
  - ▶ In the Left Value Ratio and Right Value Ratio fields, type the percentage value of how strong you want the easing out. The value must be between 0% and 100%.
  - ▶ If your Time Ratio and Value Ratio values are equal, you will have a linear motion.

6. Click one of the following buttons:

- **Apply:** Applies the easing parameters to the selected keyframes.
- **Apply/Previous:** Applies the easing parameters to the selected keyframes and then selects the previous keyframe in the timeline.
- **Apply/Next:** Applies the easing parameters to the selected keyframes and then selects the next keyframe in the timeline.
- **Close:** Closes the dialog box. If you did not apply the modifications, they will be cancelled.

## Marking the Timeline

As you animate, the Timeline view will contain many layers and keyframes. You might want to identify them using coloured layers and scene markers.

Scene markers are visual indicators displayed at the top of the Timeline view in the frame counter area. You can use it to denote anything relevant to your work. You can indicate the frames you want to clean up, a change in action, an impact, or where you intend to apply an effect. You can also add a note to a scene marker, which is displayed when you hover over the scene marker.

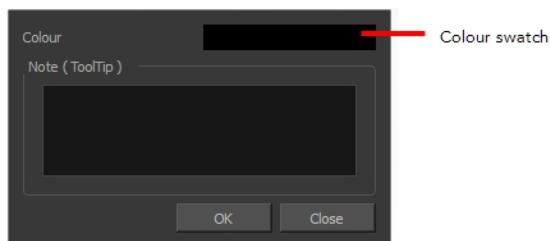
There are two ways to add a scene marker. You can mark the current frame or make a frame range selection and mark the whole section.

### How to mark the current frame

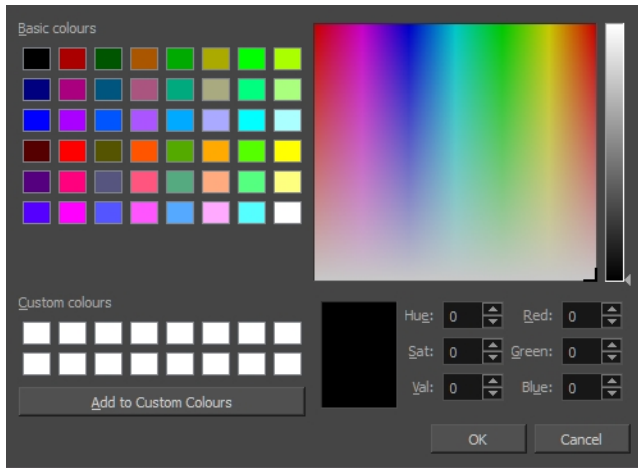
1. In the Timeline view, make sure the red playhead is set on the frame you want to mark. Even if you right-click on a different frame, the scene marker will be created on the current frame on which the playhead is positioned.
2. Right-click in the frame counter area and select **Scene Markers > Mark Current Frame**.



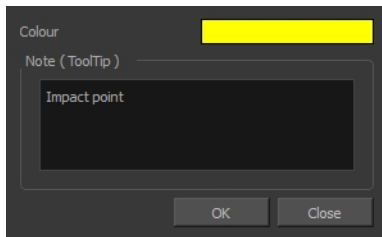
The Timeline Scene Marker dialog box opens. The Colour box displays a black colour swatch, or the colour of the last scene marker you created.



3. Click the Colour swatch to open the Mark Colour dialog box and select a colour for the scene marker. Click **OK**.

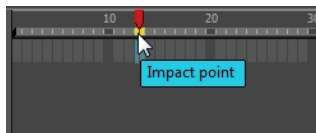


4. In the Note field, enter text to display as the tooltip and click **OK**.



In the Timeline view, the scene marker is displayed at the current frame.

5. Hover over the scene marker to display its tooltip.

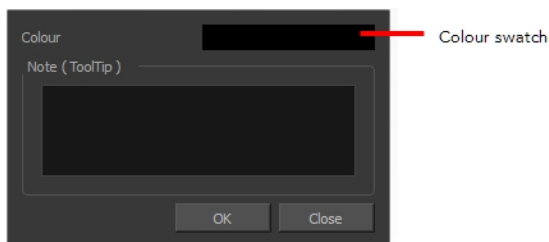


### How to create a scene marker on a frame range

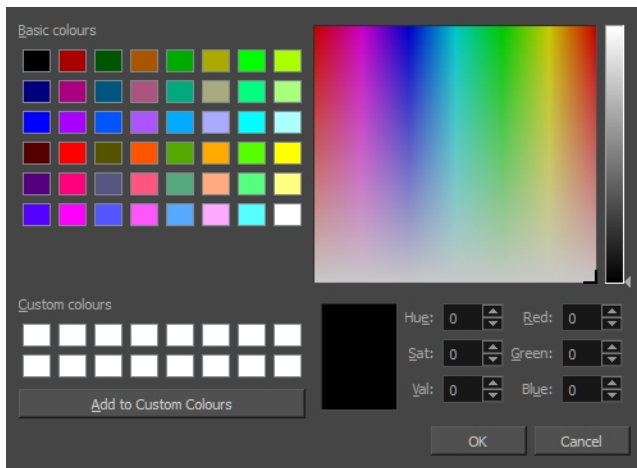
1. In the frame counter area of the Timeline view, select the frame range you want to mark.



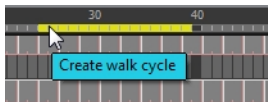
The Timeline Scene Marker dialog box opens. The Colour box displays a black colour swatch, or the colour of the last scene marker you created.



- Click the Colour swatch to open the Mark Colour dialog box and select a colour for the scene marker. Click **OK**.



- In the Note field, enter text to display as the tooltip and click **OK**.  
In the Timeline view, the scene marker is displayed over the selected frame counters.
- Hover over the scene marker to display its tooltip.



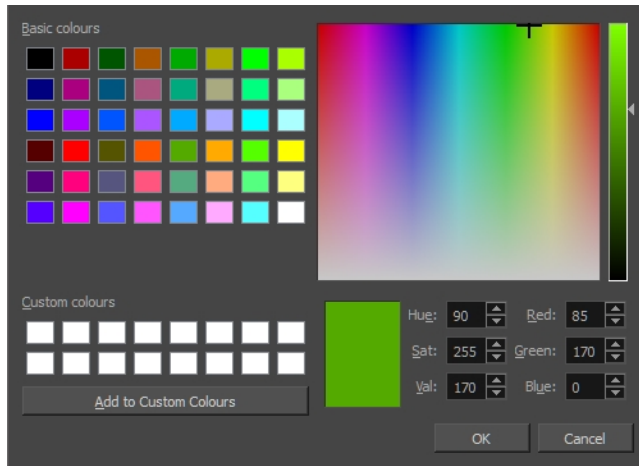
## How to modify a layer's colour

- Click the Change Track Colour  button of a layer.

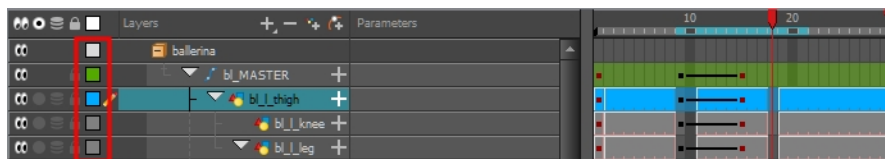


Change Track Colour

The Select Colour dialog box opens.



2. Select a colour for the layer. You can modify the colour for any type of layer, such as group, peg, drawing and effects.



Change Track Colour

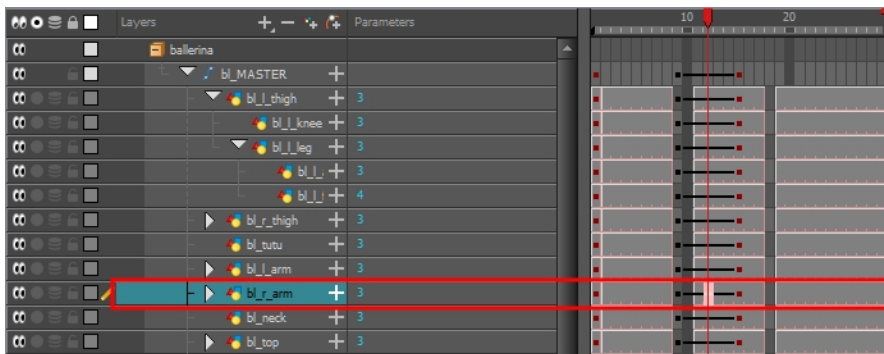
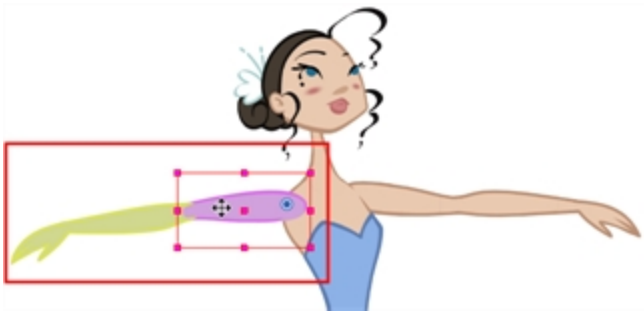
## Flipping Through Poses



When animating, it is useful to flip through poses to see the flow of your animation without going through each frame in the Timeline view. Harmony lets you flip between the selected element's keyframes.

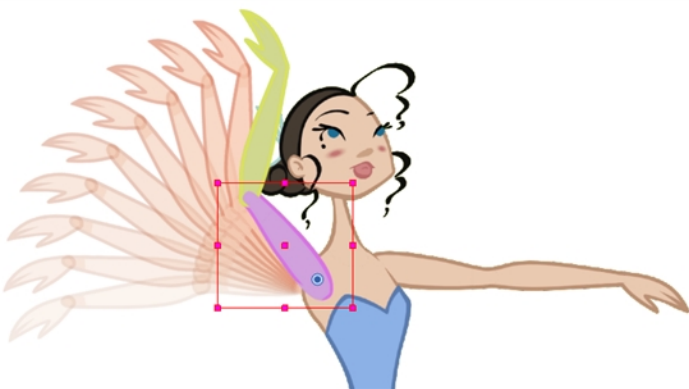
## How to flip through poses

1. In the Camera or Timeline view, select a layer that contains the poses you want to view.




2. Do one of the following:
  - ▶ From the top menu, select **Animation > Go to Previous Keyframe** or **Go to Next Keyframe**
  - ▶ Press semicolon (;) and single quote (').

## Using the Onion Skin in Cut-out Animation





When animating cut-out characters, it is useful to see the previous and next frames on the animation. However, it can sometimes be confusing to see the onion skin for every part of the character. You will often only want to see the onion skin on a single part or a few parts, such as the arm that is currently being animated. Harmony offers that possibility.

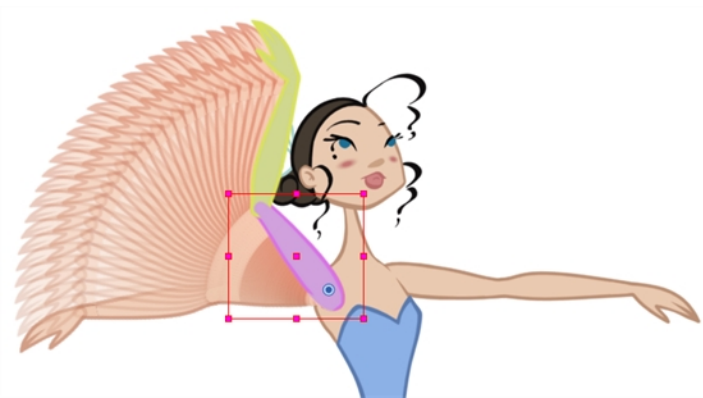
While animating in the Camera view, there is a series of different onion skin options. You can enable these options in the menu or manually in the Timeline view using the layer's Show Onion Skin  button. Unless you change the

onion skin options when you display the onion skin, only the selected layers will be displayed in the onion skin preview.

### How to use the onion skin

1. In the Tools toolbar, click the Onion Skin  button or press Alt + O.
2. In the Tools toolbar, click the Transform  tool or press Shift + T.
3. In the Camera view, select one or more elements.
4. From the top menu, select **View > Onion Skin > Add to Onion Skin, Remove From Onion Skin, Remove Unselected from Onion Skin, Add All to Onion Skin or Remove All from Onion Skin.**

### Add to Onion Skin



The Add to Onion Skin command is used to add a series of selected elements to the onion skin preview. The keyboard shortcut is Shift + S.

### Remove from Onion Skin



The Remove From Onion Skin command is used to remove a series of selected elements from the onion skin preview.



### Remove Unselected from Onion Skin



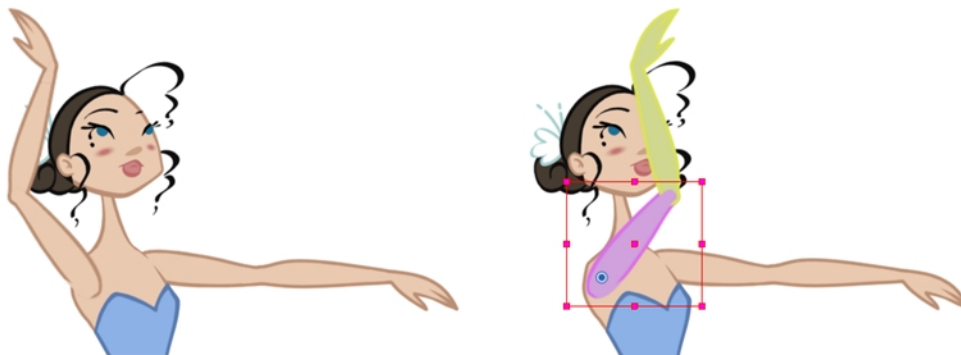
The Remove Unselected from Onion Skin command is used to remove all elements except the ones selected from the onion skin preview.

### Add All to Onion Skin



The Add All to Onion Skin command is used to add all of the scene's elements to the onion skin preview. The keyboard shortcut is Alt + Shift + O.

### Remove All from Onion Skin





The Remove All Onion Skin command is used to remove all of the scene's elements from the onion skin preview. The keyboard shortcut is Ctrl + Shift + O (Windows/Linux) or ⌘ + Shift + O (Mac OS X).

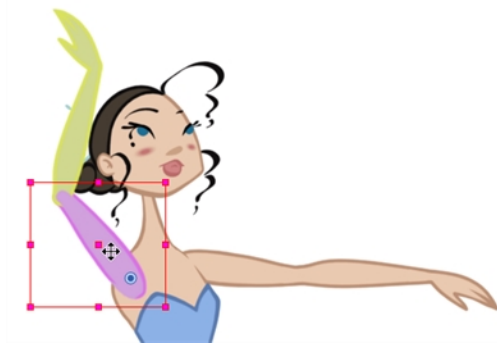
## Flipping Parts





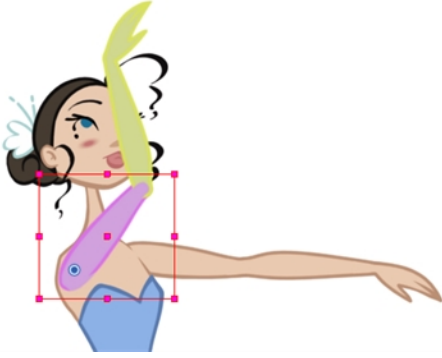
If you want to flip a part, a limb or a whole puppet, use the Transform tool and the Flip Horizontal and Flip Vertical options. If the Scaling parameter is not set to Separate Scale, the flip is not applied to the selection.

### How to flip a selection

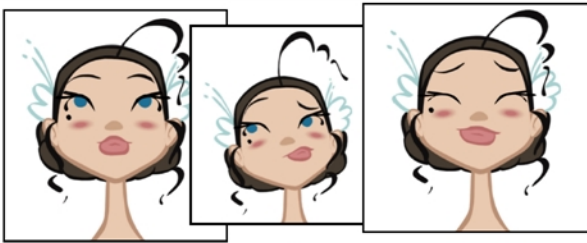
1. In the Tools toolbar, select the Transform  tool or press Shift + T.
2. In the Tool Properties view, make sure the Peg Selection Mode  is disabled.
3. In the Camera view, select the parts to be flipped.



4. In the Tool Properties view, click the Flip Horizontal  or Flip Vertical  option or press 4 or 5 respectively.



## Using Action Templates



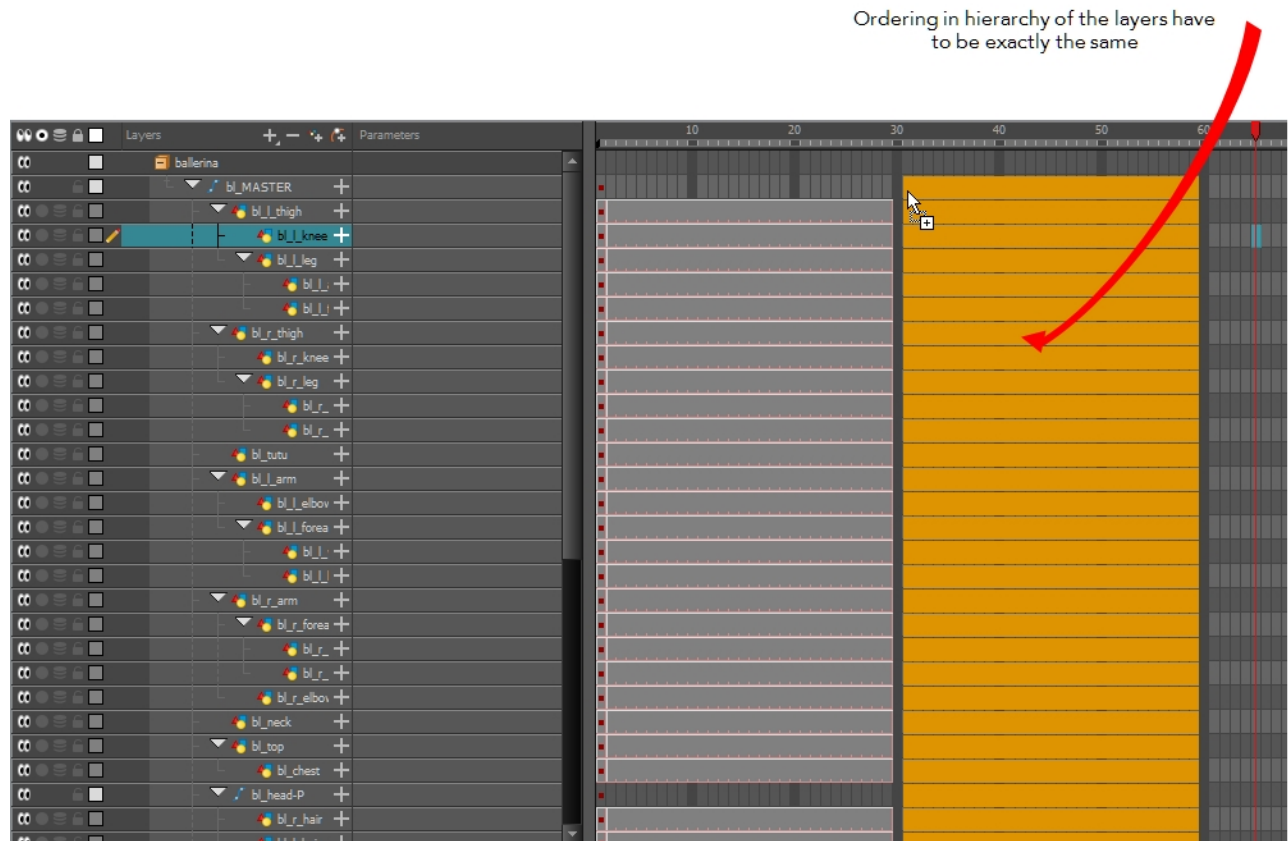
Reusing animation and assets is an important aspect of cut-out animation. This is why Harmony includes a library for storing all the reusable information.

When you created the character rig, you most likely created a master template along with some action templates

To save time, you can take an action that you've already animated, such as a walk-cycle or jump, and reuse it. You can store the initial animation's keyframes in the Library view, then drag it into a master template of a new scene.

You can import a master template into the Timeline view (or Node view) and start animating with it. You can import an action template into the right side of the Timeline view. An action template is composed of drawings (like a blink) or keyframes (like a walk cycle) that you can reuse in an animation sequence.

To insert an action template into a master template, the layer ordering has to be exactly the same. If it's inconsistent, the templates cannot be combined.



You can create a single keyframe action template of the different views (front, three-quarter or side view). Then import and insert them into the animation to turn the character. The same pattern can be created for a head, arm, full upper body, etc.

If the master template you are importing was created in the Node view, make sure to import it first and drop it into the Node view or the left side of the Timeline view. Failure to do this may break some node system connections.

If you created templates for different body parts, you can reuse them in your scene by dragging them to your layers. You can also open a template as a folder and select a particular drawing from it and drag it onto a drawing layer.

## Swapping Drawings



Cut-out animation is not only about moving parts around. It's also about swapping drawings to give the animation a more traditional animation look. You can add as many new drawings as you want in your scene and use them in your current animation. You can also add new drawings to the library and use them in other scenes.

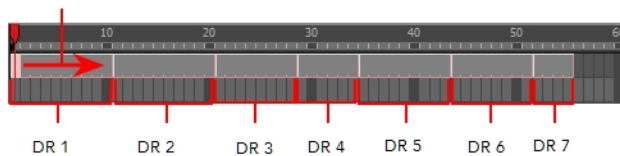
But before starting to swap drawings, it's important to understand how keyframes, exposure and key exposure work in Harmony:

- **Keyframe:** A keyframe is a point in time where a change to the properties of the object or character occurs. In Harmony, keyframes consist of the coordinates that determine how an entire layer and its contents are moved. Keyframes include these parameters: XYZ position, skew, scale, angle and pivot.
- **Exposure:** Exposure is a property; it is the length of time that a drawing is visible over a series of frames. In Harmony, exposure is independent of keyframes. That is, keyframes are not linked to drawings. Keyframes can be moved independently from the drawing exposure.
- **Key Exposure:** A key exposure in Harmony is a type of exposure that forces a drawing to remain exposed on a specific frame. If a drawing is exposed before a key exposure and you swap out that drawing for another one, then the original drawing is retained. This preserves the key drawing. Note that Harmony automatically sets a key exposure when you perform a drawing swap.

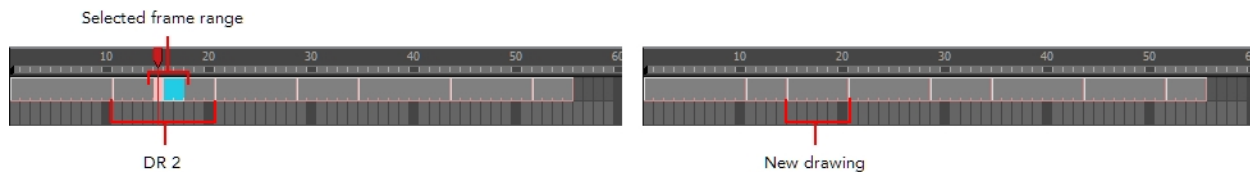
When you want to swap drawings, you can do so in the Timeline or Library view. In the Timeline view, the Parameters area is where you can select a drawing to swap. In the Library view, the Drawing Substitution window lets you see the drawings before selecting one for swapping. In this view, you are actually selecting drawings in your scene layers, not drawings in the Library.

**NOTE:** Keep in mind that when you swap a drawing, its entire exposure is replaced up to the next drawing exposure.

Drawing exposure duration



When selecting a certain frame range to be swapped, the behaviour of the Timeline and Library views is different. If you are using the Parameters area of the Timeline view to select a drawing to replace a selected frame range, the new drawing will replace the frame range and continue until the next key exposure. In the following example, drawing 2 (DR2) is replaced by a new drawing, starting at the beginning of the selected frame range and ending at the next key exposure.



Selected frame range is replaced by a drawing selected from the Parameters area of the Timeline view. The exposure starts at the beginning of the frame range and continues until the next key exposure.

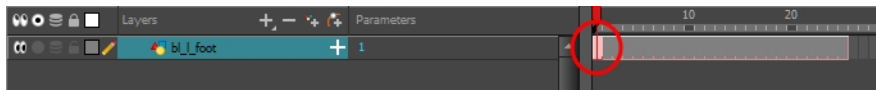
If you use the Drawing Substitution window in the Library view to select a drawing, the drawing is split in two and the exposure before and after the frame range remain the same. In the following example, drawing 2 (DR 2) is split in two and the selected frame range is filled with a new drawing.



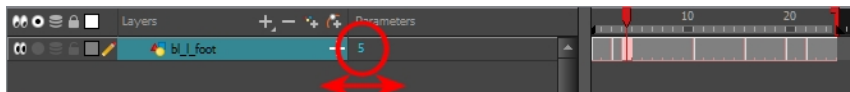
Selected frame range is replaced by a drawing selected from the Library view. The drawing is split in two. The exposure remains the same before and after the new drawing.

### How to swap a drawing in the Timeline view

1. In the Timeline view's right side, select the cell containing the drawing or symbol cell to swap.






2. In the Drawing Substitution field, position the pointer over the value and drag left or right to change the cell or drawing exposed for another one. You can also type in the drawing name or symbol's cell number if you know it.



Drawing Substitution field

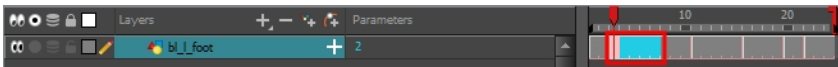
### How to swap images in the Library view

1. In the Tools toolbar, select the Transform  tool.
2. In the Transform Tool Properties view, make sure the Peg Selection  button is deselected.
3. In the Camera view, use the Transform  tool to select a part of the drawing to swap.

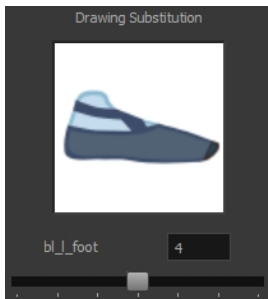
**NOTE:** You can swap the frames in symbols or the drawings in a layer. However, you cannot swap one symbol for another.



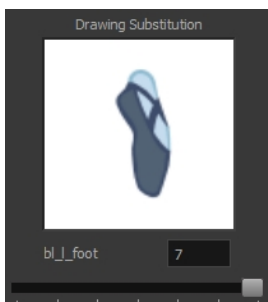
4. In the Timeline view, select the cell range in which you want to swap the drawing.



5. In the Library view, go to the Drawing Substitution window.



6. Scroll through the symbol's frames or drawings by doing one of the following:
- ▶ From the top menu, select **Animation > Substitute Drawing Previous** or **Substitute Drawing Next**.
  - ▶ Drag the slider left or right.
  - ▶ Press +.



The drawing or symbol's cell on the current frame is replaced.



## Adding Key Exposures

If there is a particular drawing you want to keep on a specific frame, you can set it as a key exposure. This prevents it from being overwritten by a drawing swap on a preceding frame. A key exposure is simply a property of an exposure that forces it to be exposed on a certain frame regardless of whether the previous exposure is the same drawing or not.

**NOTE:** Keep in mind that if you modify the artwork in a drawing, all instances of that drawing will be automatically updated even if set as a key exposure. This keeps your existing animation key poses intact. It is frequently used on a mouth or eyes layer.

### Example: Swapping a drawing with no key exposure

In the following example, drawing 3 (DR 3) is selected on the timeline and it contains no key exposure.



When it is swapped for drawing 4 (DR 4), the entire duration of drawing 3 substituted for drawing 4.



### Example: Swapping a drawing with a key exposure

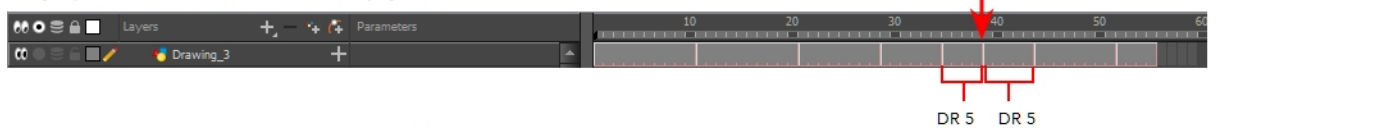
Here's what happens when swapping a drawing with a key exposure. In the following example, the playhead is positioned in the middle of drawing 5 (DR 5) to set the position for the new key exposure. When the new key exposure is added, drawing 5 is split in two; both halves contain drawing 5. Now if you swap the first drawing 5 for drawing 1, the second drawing 5 retains its exposure.



A location is selected for a new key exposure.




A key exposure is added at the location of the playhead.



One drawing is swapped for drawing 1 (DR 1). The second drawing retains its exposure.



## How to add a key exposure

1. In the Timeline view, select the drawing cell to set as the key exposure.
2. Do one of the following:
  - In the Timeline toolbar, click the Add Key Exposure  button.
  - In the Timeline menu, select **Exposure > Add Key Exposure**.
  - Right-click and select **Exposure > Add Key Exposure**.

A new key exposure is added.

If you added a key exposure at the beginning of the drawing, the entire exposure is filled with that same drawing. If you added a key exposure anywhere other than the beginning of the drawing, then the drawing is split in two and both parts contain the same drawing.

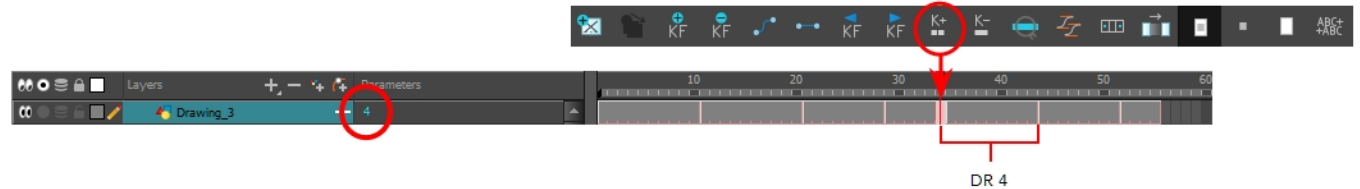
## Removing Key Exposures

When you no longer need a key exposure, you can remove it. When you do this, the existing key exposure is replaced by the preceding exposure. In the following example, a key exposure is set to drawing 1 (DR 1). When the key exposure is removed, the exposure is replaced by the preceding exposure, drawing 4 (DR 4).

Before: Key exposure is set to drawing 1.



After: Key exposure is removed. The preceding exposure, drawing 4, replaces the exposure.



### How to remove a key exposure

1. In the Timeline view, select a key exposure to remove.
2. Do one of the following:
  - In the Timeline toolbar, click the Remove Key Exposure **K-** button.
  - In the Timeline menu, select **Exposure > Remove Key Exposure**.
  - Right-click and select **Exposure > Remove Key Exposure**.

The key exposure is removed and replaced by the preceding exposure.

### How to remove a key exposure

1. In the Timeline view, select a key exposure to remove.
2. Do one of the following:
  - In the Timeline toolbar, click the Remove Key Exposure **K-** button.
  - In the Timeline menu, select **Exposure > Remove Key Exposure**.

The key exposure is removed and replaced by the preceding exposure.

## Animating Lip-Sync



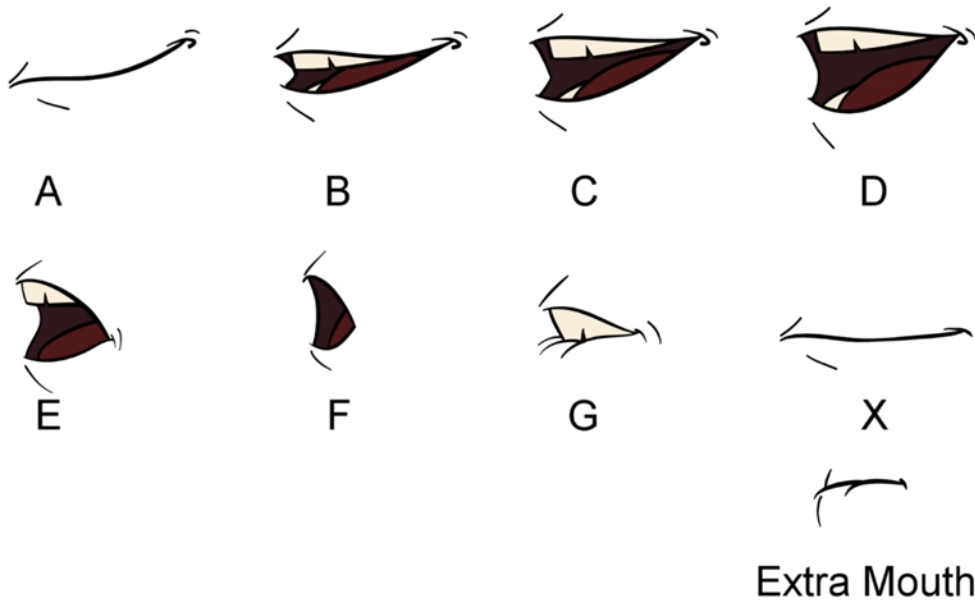
Adding a lip-sync to a project can really enhance its quality and storytelling. However, it can be difficult to shape a character's mouth to match the sound at a precise frame.

To solve this problem, Harmony provides a lip-sync feature which analyzes the contents of a sound element and generates a mouth chart (see below) based on the eight animation phonemes (A, B, C, D, E, F, G, and X for silence).

The mouth shapes used by Harmony are based on the conventional mouth chart used in the animation industry.

**NOTE:** The letters used to represent the shapes do **NOT** correspond to an actual sound.

**NOTE:** If you are doing cut-out animation, refer to the Cut-out Animation Guide, Character Building chapter, "Adding Extra Drawings" topic to learn how to add extra drawings to your character.



Here is an approximation of the sound each mouth shape can produce:

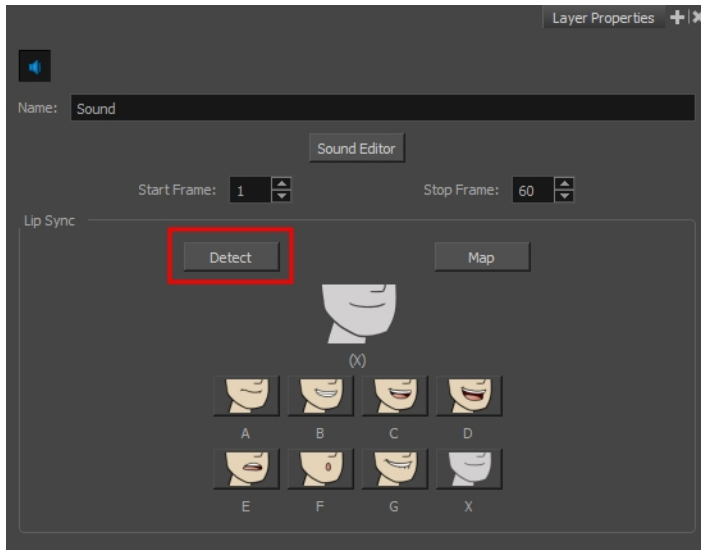
- **A:** m, b, p, h
- **B:** s, d, j, i, k, t
- **C:** e, a
- **D:** A, E
- **E:** o
- **F:** u, oo
- **G:** f, ph
- **X:** Silence, undetermined sound

You can lip-sync the traditional way or let the system automatically create the basic detection.

You can refer to the mouth chart positions as you draw the shape of the character's mouth.

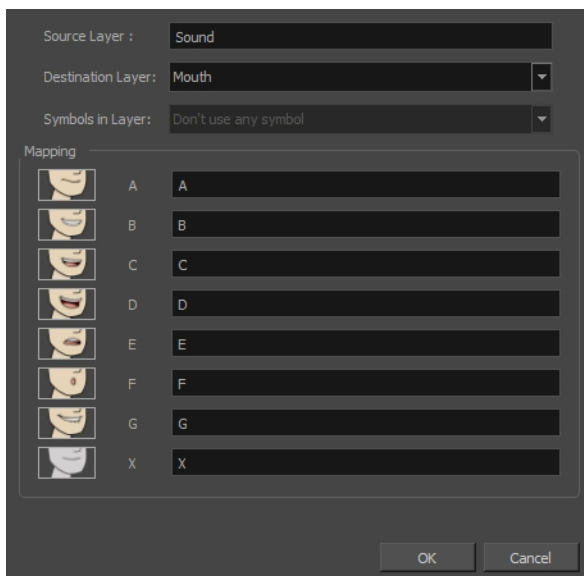
### How to generate a sound detection for lip-sync using the Layer Properties view

1. In the Timeline or Xsheet view, select the sound layer.  
The options for that layer will appear in the Layer Properties view.
2. In the Layer Properties, click **Detect**.

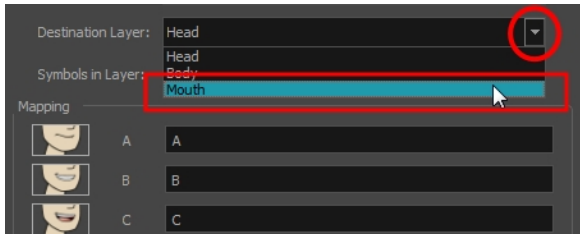




A progress bar appears while Harmony analyzes the selected sound clips and assigns a lip-sync letter to each sound cell.

3. Click the **Map** button to open the Lip-Sync Mapping dialog box.





4. From the Destination Layer menu, select the layer that contains the mouth positions for the character's voice track.



5. If the selected layer contains symbols, you can map the lip-sync using drawings located directly on the layer or use the symbol's frames. In the Symbol Layer field select **Don't Use Any Symbol** if you want to use the drawings or select the desired symbol from the drop-down menu.
6. In the Mapping section, type the drawing name or Symbol frames in the field to the right of the phoneme it represents. If your drawings are already named with the phoneme letters, you do not have to do anything.
7. Click **OK**.
8. Press the Play  button in the Playback toolbar to see and hear the results in the Camera view. To play back your scene with sound, enable the Sound  button in the Playback toolbar.


Harmony allows for the manual swapping of mouth position drawings to match a voice track. For this process, both sound scrubbing (listening to a sound wave broken up frame-by-frame) and drawing substitutions are used.

### How to animate lip-sync using the Timeline view

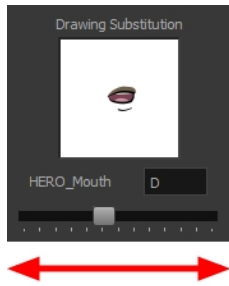
1. In the Playback toolbar, enable the **Sound Scrubbing**  button.
2. In the Timeline view, drag the red playhead along the sound layer waveform.
3. When you reach a frame where a mouth position should go, for example, an open mouth with rounded lips for an "oh" sound, click on that frame on your mouth shapes layer.
4. In the Parameters section, staying on your mouth shapes layer, place your cursor on top of the drawing name (often a letter) until it changes to the swapping  pointer.
5. Pull the cursor to see the list of mouth shape names and choose the one you want. The current drawing automatically changes to the new selection.



### How to animate lip-sync using the Library view

1. In the Playback toolbar, click the Sound Scrubbing  button.
2. In the Timeline view, drag the red playhead along the waveform of your sound layer.
3. When you reach a frame where a mouth position should go, for example, an open mouth with rounded lips for an "oh" sound, click on that frame on your mouth shapes layer.

- In the Drawing Substitution window of the Library view, drag the slider to choose a mouth shape. The current drawing is swapped for the one in the preview window.



## Adding a New Drawing

If you need to add a new drawing to a scene, you can do so by duplicating the existing drawing on the current frame. If you're using symbols, you can also add a new drawing inside the body part's symbol.

## Duplicating a Drawing

If your character doesn't use symbols, you must duplicate the drawing on the cell on which you need a new drawing. You could also create a new blank drawing, but duplicating the existing drawing allows you to keep the pivot you previously set (if you're using drawing pivots) and you can also reuse a portion of the existing artwork. When you create a new drawing, you get a blank cell with a pivot set at the centre of the Camera view.

### How to duplicate a drawing

- In the Timeline or Camera view, select the drawing to duplicate.



- From the top menu, select **Drawing > Duplicate Drawing** or press **Alt + Shift + D**.

The new drawing appears in the currently selected cell.




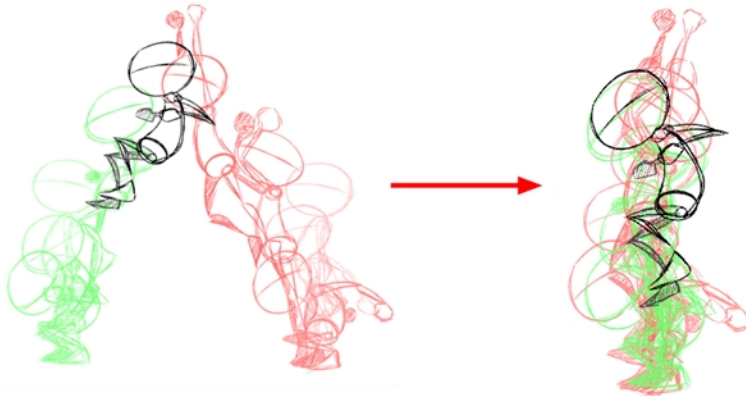
- In the Camera view, draw the new piece.

## Reposition Drawing Tool


When creating additional drawings for a cut-out puppet, you should generally try to create them in the same location as the original drawings (resting position) so you can scale and rotate the same pivot.



Although, when adding drawings that are specific to an animation, it may be easier to draw it in relation to the character's position and scene's composition. If you draw a series of drawings that are not in the same location, you can use the Reposition Drawing  tool to reposition the drawing strokes while simultaneously creating keyframes in the Timeline view to compensate for the repositioning. In the Camera view, the drawings will retain the location and position in which you drew them while in the Drawing view, all your drawings will be aligned.

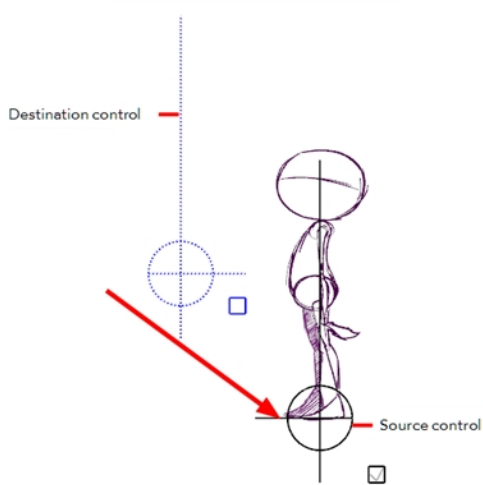


### How to reposition and align drawings

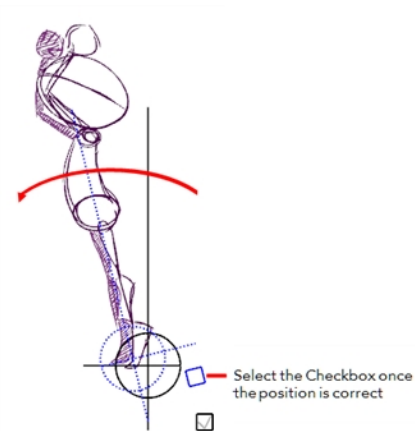
1. In the Advanced Animation toolbar, select the Reposition Drawing  tool.
2. In the Camera view, Ctrl + click (Windows/Linux) or ⌘ + click (Mac OS X) to select the drawing to reposition. You can also select the drawing layer or the parented peg in the Timeline view.

The Reposition Drawing controls appear in the Camera view. They are positioned on top of each other. The source controls are represented by black lines. The destination controls are represented by dotted blue lines.

3. On your first drawing (reference drawing), position the black source controls to indicate the position at which all other drawings will be aligned.

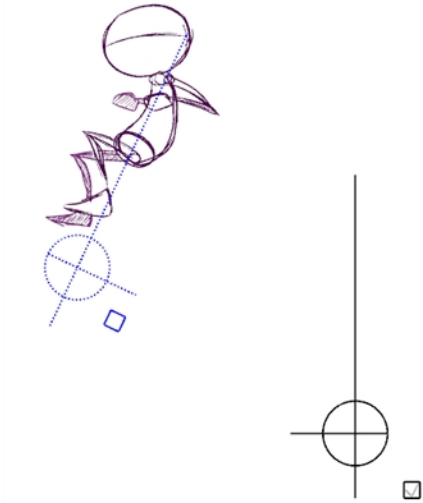


4. In the Timeline view, move to the next drawing.
5. In the Camera view, move the blue destination controls to match the reference position you set on the original drawing. You can use the long handle to rotate the position. If you rotate the control multiple times, the drawing will rotate multiple times.



6. Select the blue checkbox once the position is correct.
7. Repeat the previous two steps for all drawings in your animation.

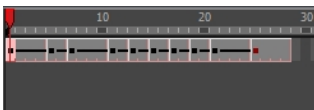





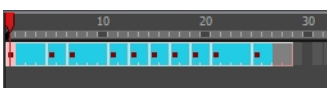
8. Once all the drawings are completed, in the Drawing view, verify that the drawing strokes are correctly aligned.



9. If necessary, delete the last keyframe if the last drawing moves back to the reference drawing's position.



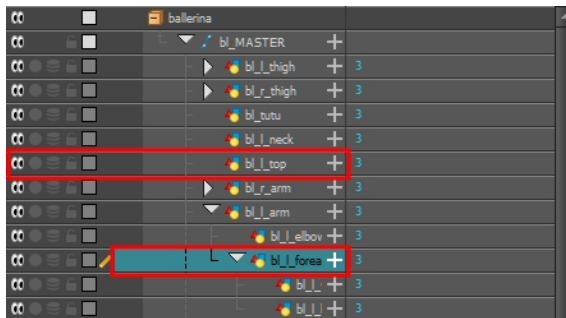
10. If the animation does not require interpolation, in the Timeline view, select the newly created keyframes. In the Timeline toolbar, click the Set Stop-Motion Keyframe  button to remove any computer-generated interpolation.



## Ordering Layers Over Time





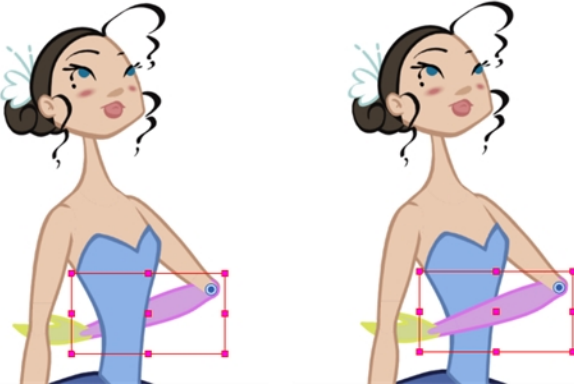
The layer ordering system in Harmony saves time and simplifies your work. There is no need to create a new layer or copy and paste artwork into other layers to change the order. The Z-axis (forward/backward) allows you to create a multiplane and move elements closer or farther from the camera. This allows you to move the puppet's pieces in front of or behind other ones without physically changing the layer position.



Harmony provides you with a shortcut to move the piece with a micro nudge on the Z-axis. A keyframe is created where different Z values can be entered. This allows the piece to move forward and backwards in space without requiring you to change the drawing's original position or break the layer hierarchy. This also means that the layer ordering is maintained throughout the scene. You can combine animation assets so Harmony can interpolate them.



### How to nudge elements on the Z-axis

1. In the Tools toolbar, select the Transform  tool or press Shift + T.
2. In the Tools toolbar, click the Animate  button.
3. In the Camera view, select the part to be repositioned and hold down the Alt key.
4. Using the Up or Down arrow keys, nudge the part until it moves to the desired position.



## Resetting a Transformation

If you made too many transformations and it's not going where you want it to go, or simply because you want to reset a pose you're reusing from another animation, you can reset your character's position. Once the layers are positioned in the Camera view, you can easily return them to their original position. There are three different ways to reset a transformation.

Using the Reset command, you can reset the value of the selected element to the initial value of the active tool. For example, if the Rotate  tool is active, the transformation angle will be reset to 0 and if the Transform  tool is active, all the transformation values will be reset.



The Reset All option resets all transformations on the current frame in a selected layer. Your keyframe will remain, but all the values will return to the default position. All transformations are reset regardless of the tool you're using.

The Reset All Except Z option resets all transformations on the current frame except the Z position. This is useful when doing cut-out animation. Cut-out puppets often have a particular Z ordering for the different views of a character. You might want to reset the transformation, but not necessarily the Z position.

In the Timeline view, you can also use the Clear All Values command to reset all transformation values on the selected layers. Right-click on the selected layers and select **Layers > Clear All Values**.



**NOTE:** When using the Transform tool to select elements in the Camera view, always make sure the Peg Selection Mode option in the Tool Properties view is disabled or it will limit the selection to peg only.

### How to reset the transformation on the current frame



1. In the Tools toolbar, select the Transform  tool or any Advanced Animation  tool.
2. In the Timeline view or directly in the Camera view, select the drawing layer(s) to reset.
3. From the top menu, select **Animation > Reset** or press Shift + R.

The selected layer(s) return to their original position.

### How to reset all transformations on the current frame

1. In the Tools toolbar, select the Transform  tool or any Advanced Animation  tool.
2. In the Timeline view or directly in the Camera view, select the drawing layer(s) to reset.
3. From the top menu, select **Animation > Reset All** or press Shift + R.  
The selected layer(s) return to their original position.

### How to reset all transformations except the Z position on the current frame

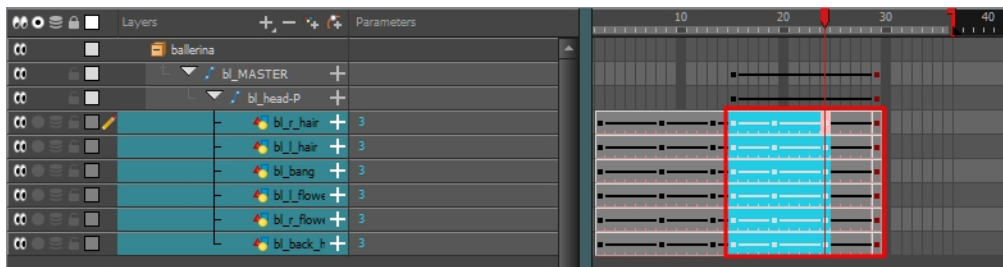
1. In the Tools toolbar, select the Transform  tool or any Advanced Animation  tool.
2. In the Timeline view or directly in the Camera view, select the drawing layer(s) to reset.
3. From the top menu, select **Animation > Reset All Except Z**.  
The selected layer(s) return to their original position, except for the Z values.

## Creating Cycles

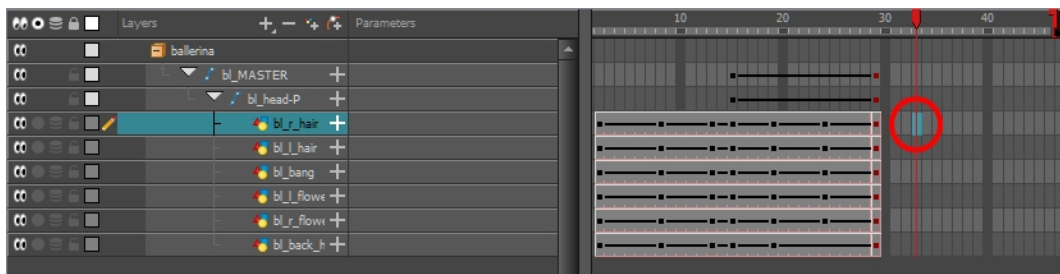
You can create cycles from a portion of your animation or completely reverse the flow of your animation.

### How to create an animation cycle

1. In the Xsheet or Timeline view, select the cell range and keyframes to loop.

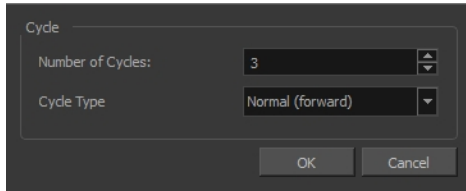


2. From the top menu, select **Edit > Copy Cells From the Timeline**.
3. In the Xsheet or Timeline view, select the cell where you want your cycles to start.



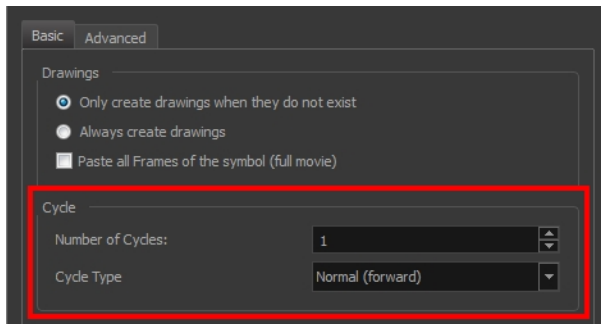
4. From the top menu, select one of the following:
  - **Edit > Paste Cycle** or press Ctrl + / (Windows/Linux) or ⌘ + / (Mac OS X).

The Paste Special dialog box opens.

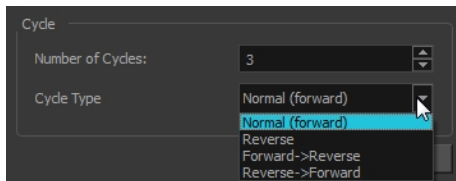


- ▶ **Edit > Paste Special** or press Ctrl + B (Windows/Linux) or ⌘ + B (Mac OS X).

The Paste Special dialog box opens.

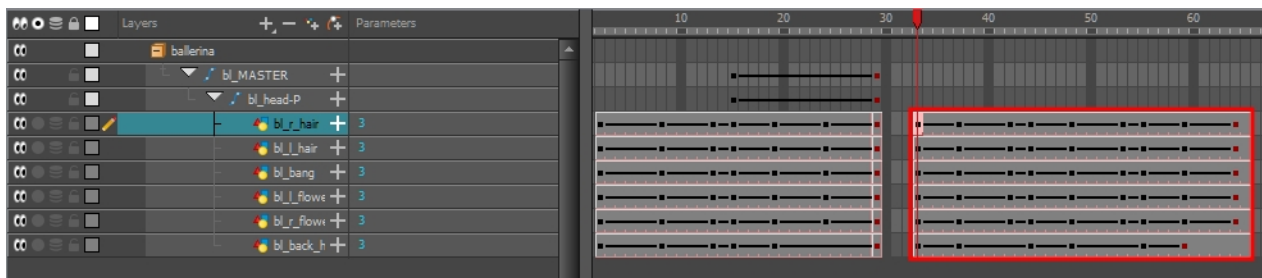


5. In the Number of Cycles field, enter the number of cycles to paste.
6. In the Cycle Type menu, select a type of cycle to paste.



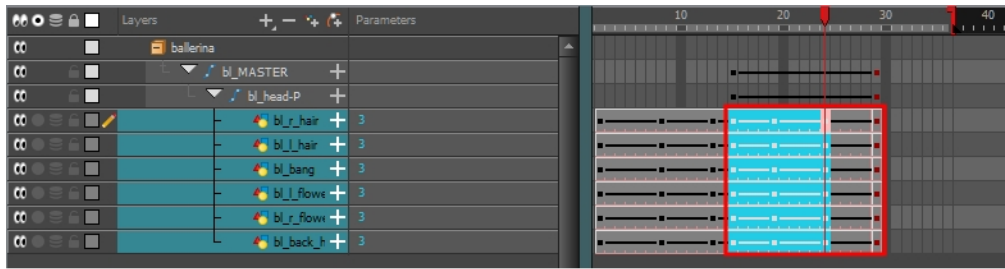
- ▶ **Normal (forward)**: Pastes the selection as is, starting with the first cell and ending with the last.
- ▶ **Reverse**: Pastes the selection reversed, beginning with the last cell and ending with the first.
- ▶ **Forward -> Reverse**: Pastes the selection as a yo-yo, starting with the first cell, going to the last cell and ending with the first cell.
- ▶ **Reverse -> Forward**: Pastes the selection as a reversed yo-yo, starting with the last cell, going to the first one and ending with the last cell.

7. Click **OK**.

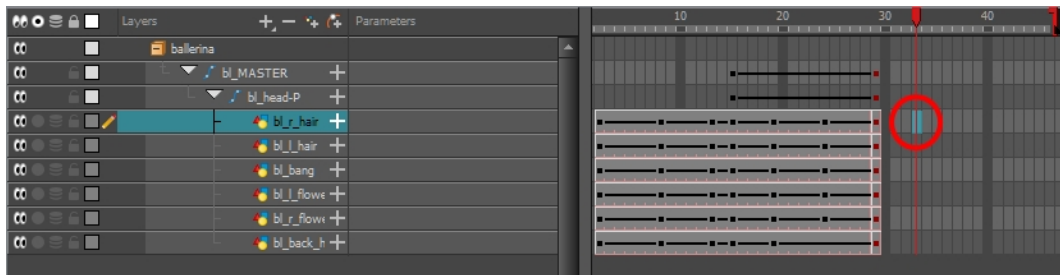


## How to create a reverse animation cycle

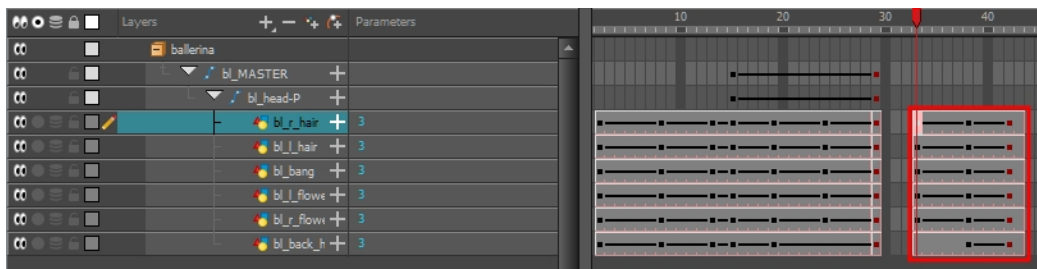
1. In the Xsheet or Timeline view, select the cell range and keyframes to paste inverted.



2. From the top menu, select **Edit > Copy**.
3. In the Xsheet or Timeline view, select the cell where you want the cycles to start.



4. From the top menu, select **Edit > Paste Reverse** or press **Ctrl + .** (Windows/Linux) or **⌘ + .** (Mac OS X).



## Copying and Pasting Animation

As you animate, you will find that you reuse many positions, drawings, and keys. However, you may only want to paste the drawings or just the keys or maybe everything. There are different paste options available in the Timeline view which give you maximum flexibility when reusing and pasting.

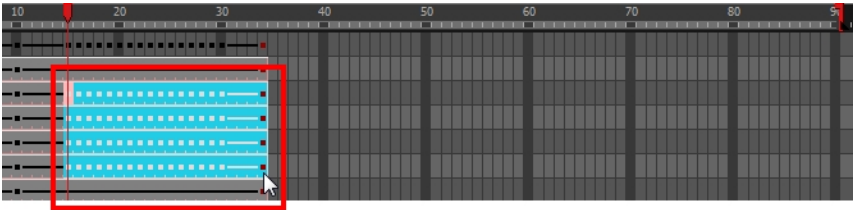
Note that these modes also apply when you drag instead of copying and pasting.




There are three different modes for pasting your selection:

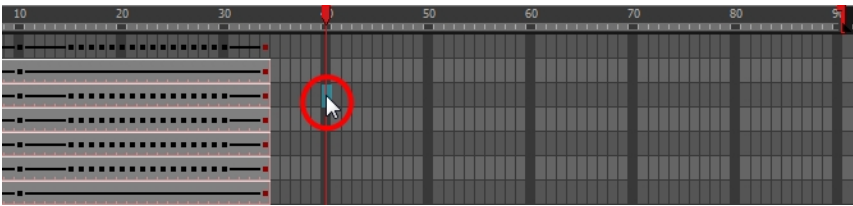
- **Paste Mode: All Drawing Attributes:** Pastes the drawing exposure and keyframes.
- **Paste Mode: Keyframes Only:** Pastes only the keyframes.
- **Paste Mode: Exposures Only:** Pastes only the drawing exposure.

## How to paste a selection using different modes

1. In the Timeline view, select the cells you want to copy and paste.

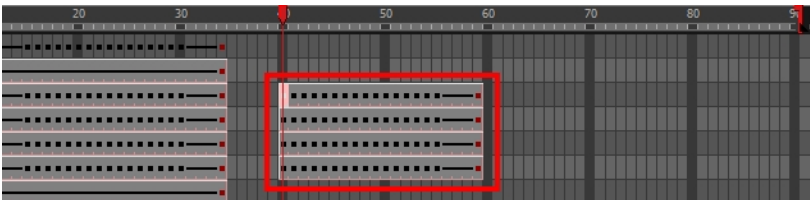


2. In the Timeline toolbar, click the desired Paste    mode button.
3. From the top menu, select **Edit > Copy Cells from the Timeline** or press Ctrl + C (Windows/Linux) or ⌘ + C (Mac OS X).
4. In the Timeline view's right side, select the cell on which you want to paste your selection.

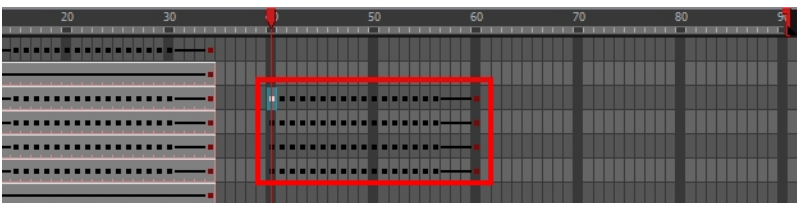


5. Select **Edit > Paste Cells in the Timeline** or press Ctrl + V (Windows/Linux) or ⌘ + V (Mac OS X).

**Paste Mode: All Drawing Attributes**



**Paste Mode: Keyframes Only**



**Paste Mode: Exposures Only**



## Adding Pegs

Now that you have your puppet on stage, you probably need to resize and reposition it to fit the scene. When you need to scale down or move a character, it's a good idea to hook (attach) the whole puppet to a trajectory.

In Harmony, there is a type of layer you can add to your timeline, allowing you to create a motion path or reposition drawings. This trajectory layer is called a *peg*. Any drawing or layer you hook to a peg will follow the defined motion path, rotation, scaling and skewing information.

Attaching your puppet to a peg allows you to scale and reposition it without having to do the same on all the different parts and pieces. Only one layer will contain the position information, making your animation easier to modify and control.

Next, position your character on the stage by moving it and scaling it to the correct size. You will not scale each layer individually. You can do it on the top symbol or top peg layer.

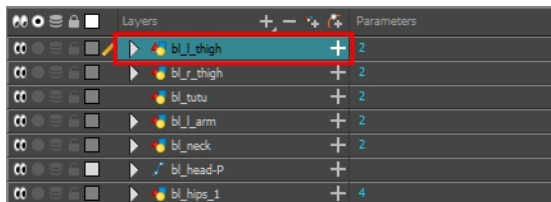
### How to add a repositioning peg

1. In the Timeline view, select the top layer on which you want to parent a peg.

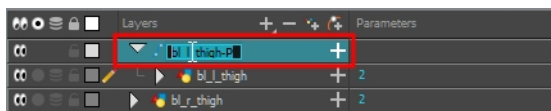
**NOTE:** You must select a layer to be able to add a peg to your scene. Unless you use the Display All mode from the Display toolbar, an error message will display if you try to add a peg without any selection.

2. In the Timeline view, click the Add Peg  button.

A new peg is added to the timeline as a parent of the selected layer.

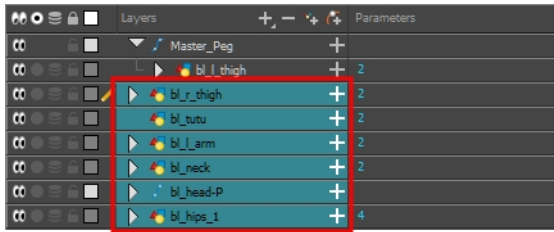


3. Double-click on the name of new peg layer and rename it: **Master\_Peg**.

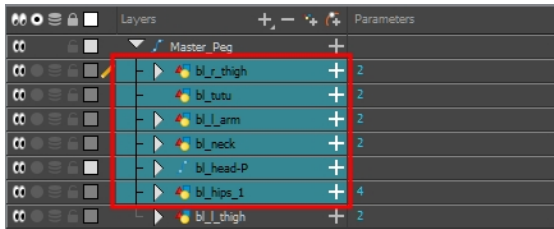


4. In the Timeline view, select all the layers you want to attach to the new peg. Remember that one item is already parented to that peg.





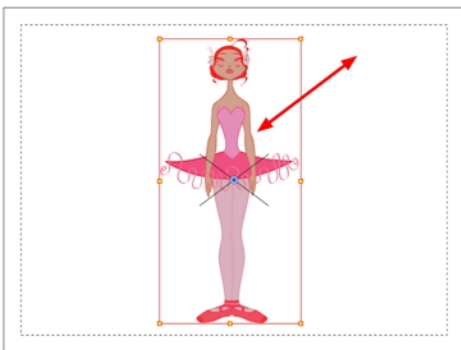


5. Drag the selection and drop it on the peg layer to parent all the character's pieces to the peg. If your layers are added above the already-parented layers, move that parented layer back on top of the layer stack.



### How to reposition a character


1. In the Timeline view, select the top peg layer (master peg).
2. In the Tools toolbar, select the Transform  tool and disable the Animate  mode.
3. In the Camera view, position the character.

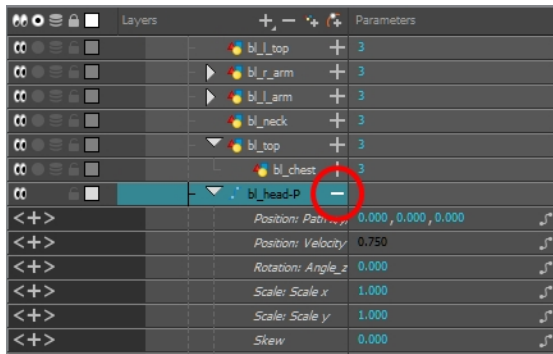


## Offsetting a Portion of an Animation

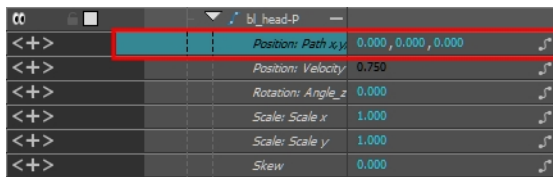
If there is a section of the animation that you want to reposition, such as the head's height or the puppet's position, you can do so using the function curve.

### How to reposition a portion of an animation

1. In the Timeline view, click the Expand Function  button of the body part layer to reposition. If you want to reposition the entire body, expand the master peg's parameters.



2. Double-click on the layer's parameter controlling the keyframes you want to reposition.



The Function Editor opens.

3. In the Function editor, select the keyframes you want to reposition by tracing a selection box.



4. Click the Show Current Frame button to view the transformation results in the Camera view as you do them.
5. Drag the keyframe selection up or down to reposition the sequence.



6. Close the Function editor.

# Chapter 11: Export Harmony Animations to Unity



At this point, if you have a custom game engine, you can take the exported data and proceed with your usual process. Or you can modify the export script to fit your convention.

If you're going into Unity, here are some things you need to do:

- [Exporting the Animation on page 563](#)
- [Opening the Sample Unity Project on page 568](#)
- [Working in Unity on page 568](#)

## Exporting the Animation

First, you must put the script in your Scripting toolbar (TB\_ExportToSpriteSheets). This script is included in the latest build of Harmony. Make sure to verify that you have the latest version of Harmony.

If you were already using a previous build of the Gaming Pipeline, you will need to remove the old scripts from your preferences, so you can use the new scripts.

### How to clear your scripts


1. Close Harmony if it is open.
2. Browse to the script folder location:
  - **Windows:**
    - Toon Boom Harmony Premium: C:\Users\[user\_name]\AppData\Roaming\Toon Boom Animation\Toon Boom Harmony\1200-scripts
  - **Mac OS X:**

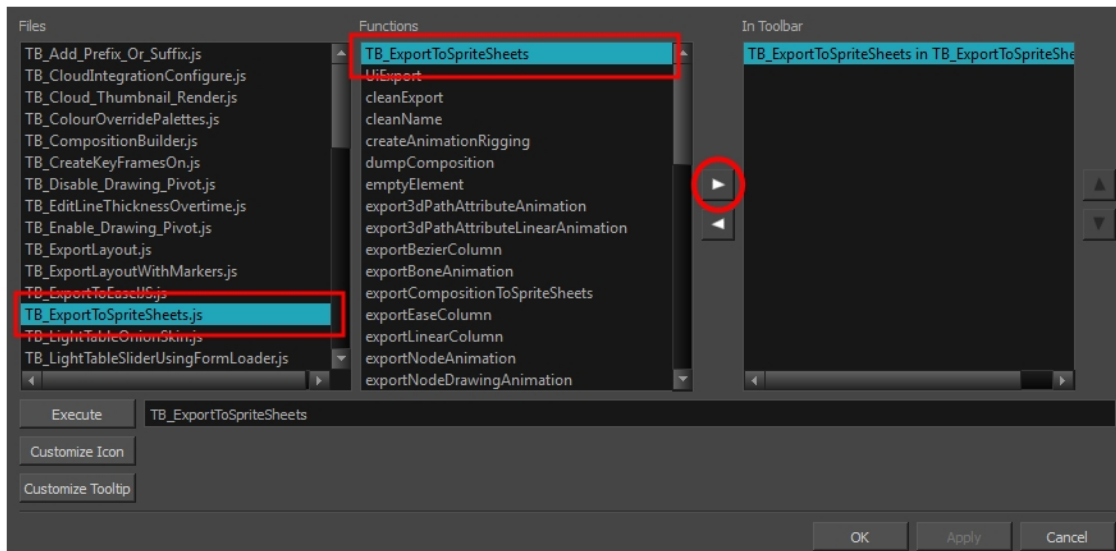
On Mac OS X, the Library folder is a hidden folder. To display the display the folder, hold down the Alt key.

    - Toon Boom Harmony Premium: /Users/[user\_name]/Library/Preferences/Toon Boom Animation/Toon Boom Harmony/1200-scripts

3. Delete the **1200-scripts** folder.
4. Restart Harmony and test the export.

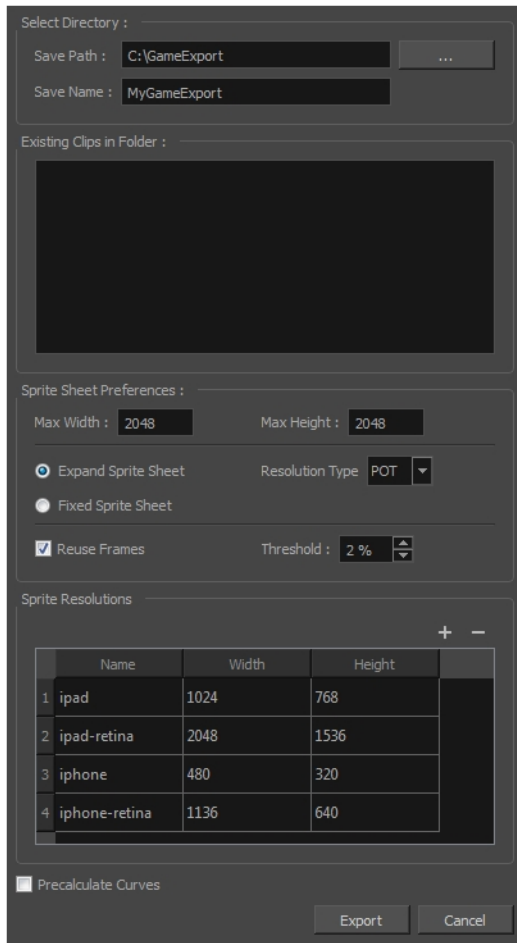
### How place the script in the Scripting toolbar

1. From the top menu, select **Windows > Toolbars > Scripting**.
2. In the Scripting toolbar, click the Manage Scripts  button to display the Scripts Manager.



3. In the Scripts Manager, select **TB\_ExportToSpriteSheets** from the Files column.
4. In the Functions column, select **TB\_ExportToSpriteSheets** and then click the right arrow button to add it to the toolbar.
5. Click **OK**.
6. Run the script by clicking the New icon on the right side of the Scripting toolbar.

The Export to Sprite Sheets dialog box opens.



7. Set the Save Path to the correct folder in your Unity project if you want it to update automatically. If not, you can save anywhere, then transfer the animation into your Unity project, or any other game engine you want to use.
8. Set your sprite sheet preferences:

Parameter	Description
Max Width, Max Height	This is a value, in pixels, for the maximum width and height the exported sprite sheet should be. By default, both values are set to 2048 pixels.
Expand Sprite Sheet	Uses the minimum size necessary up until it reaches the maximum resolution.
Fixed Resolution	Creates a texture of the specified size (Max Width and Max Height) even if it does not fill it up completely.
Resolution Type	<b>POT:</b> Exports to sprite sheets with sizes that are a power of 2. For example: 1024 x 1024. This is optimized for many graphics cards, but consumes more memory. <b>NPOT:</b> Some game engines are optimized specifically to render to non powers of two, so that it will avoid those numbers. Example: 1000 x 1000.
Reuse Frames	

Threshold	
Sprite Resolutions	Size of the render of the individual sprite, when it exports each drawing out.
	The exporter will export to multiple resolutions based on the settings.
	Saves different animations of the same character into the same Save Name. For example, if there's an idle, run, and jump animation, these should all share the same Save Name. You can think of it as the overall collection of animations. Inside are the different saved scene versions whose drawings you can reuse for all the animations in that character set. Each scene version will be displayed as an item in the list.
	When you export an animation, only the drawings used in that scene are exported. All the drawings are exported individually first and then atlased together into a sprite sheet.
	If you save multiple animations to the same Save Name (i.e. SpaceDuck: run, idle), then it will re-atlas the sprite sheet to include all the drawings from all the animations in that folder, creating a new animation file, but reusing the same skeleton.
Precalculate Curves	Makes linear values for interpolation. This increases the amount of memory used but frees up the calculation so it is not done on the fly.

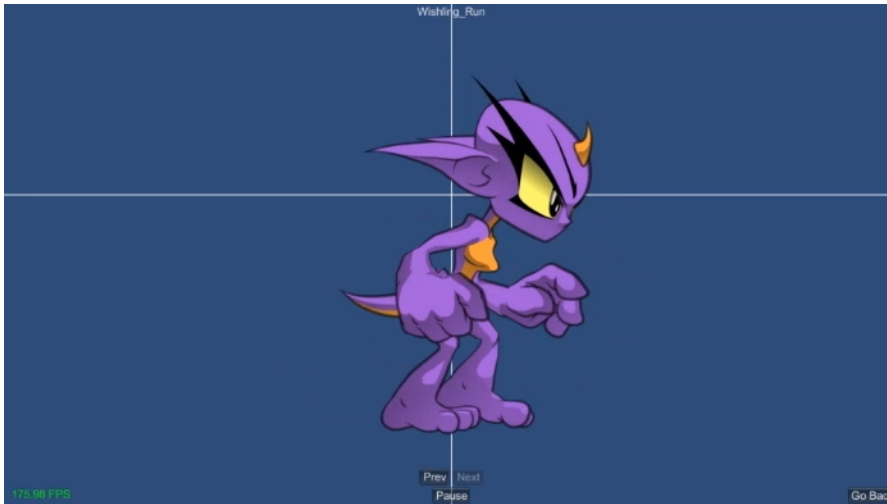
**NOTE:**

Programmers may be interested to note that the XML data exported by Harmony can be converted afterwards to a more optimized binary data structure. The binary converter is not yet available for Harmony, but it can be compiled manually in the game engine package. The C++ code that handles the data structure can be reused and parsed in your own code if you want to integrate with other game engines.

**Additional Note**

- The Transparency parameter attached to the element node is exported along with the animation. You can set the transparency through the Layer Properties window (Advanced tab).

## Harmony Game Previewer



If you are not a developer and would like to see if your animations and rigs will work once imported in Unity, you can use the Harmony Previewer application. You can visualize your characters in the Unity game engine with no programming required.

To get the latest version of the Harmony Game Previewer, visit our Gaming landing page:

- [toonboom.com/games](https://toonboom.com/games)

### How to use the previewer on Windows

1. Download the Harmony Game Previewer for Windows:
  - [download.toonboom.com/games/GamePreviewer-11.1.0.0047-windows.zip](https://download.toonboom.com/games/GamePreviewer-11.1.0.0047-windows.zip)
2. Extract the following to your hard drive:
  - GamePreviewer-[version].exe
  - GamePreviewer-[version]\_Data folder
3. Copy your export from Harmony to this folder:
  - GamePreviewer-[version]\_Data\StreamingAssets\HarmonyResources\
4. Start the Game Previewer application.
5. Select the export you want to preview.

### How to use the previewer on Mac OS X

1. Download the Harmony Game Previewer for Mac OS X:
  - [download.toonboom.com/games/GamePreviewer-11.1.0.0047-macosx.zip](https://download.toonboom.com/games/GamePreviewer-11.1.0.0047-macosx.zip)
2. Extract the GamePreviewer-[version].app.

3. Right-click on the GamePreviewer-[version].app and select **Show Package Contents**.
4. Copy your export from Harmony to this folder: Contents/Data/StreamingAssets/HarmonyResources/
5. Start the Game Previewer application.
6. Choose the export you want to preview

## Opening the Sample Unity Project

Toon Boom includes a sample Unity project that contains all the scripts necessary to import the data exported from Harmony. Inside this project is an Assets folder which contains the following folders:

- Plugins
- Scenes (demo scenes and a previewer)
- Scripts (all Harmony scripts)
- StreamingAssets (this is where all the Harmony scene files should be exported to)

By configuring the Harmony script, you can automatically export animations into the StreamingAssets folder. This way, Unity will dynamically load the most up-to-date assets as soon as they appear in the folder. You can also manually place exported Harmony data into this location.

## Working in Unity

The Harmony Gaming Animation Guide is a basic guide on how to import Harmony projects and configure them, design and animate characters, and includes some tips. It is not meant as a guide on how to program games.

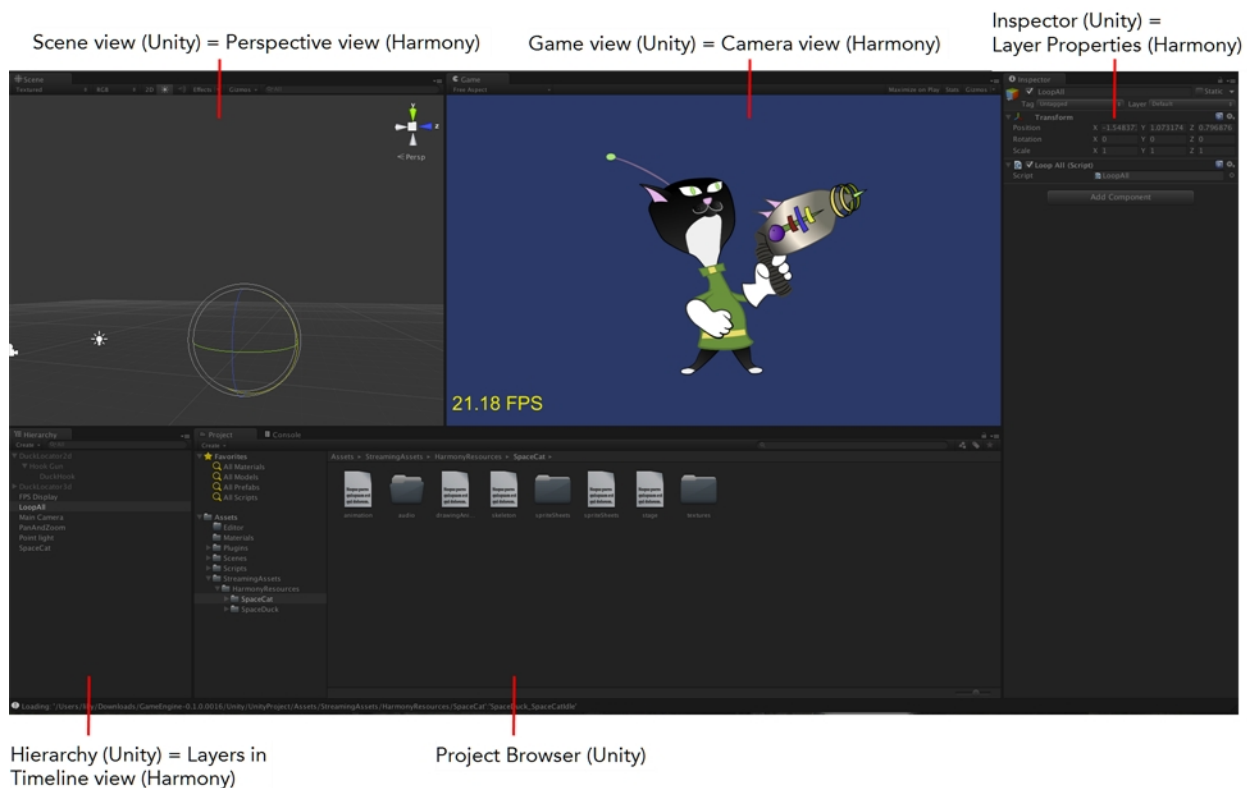
### The Unity Interface

Here are the main components of the Unity interface and their equivalents in Harmony:

Unity	Harmony	Description
Scene view	Perspective view	This is where you set the scene—selecting and positioning environments, the player, the camera, enemies, and all other GameObjects.
Game view	Camera view	The rendered view from the camera(s) in your game. It is representative of your final, published game.
Inspector	Layer Properties	Displays detailed information about the selected GameObject, including all attached Components and their properties.
Hierarchy	Layers in Timeline view	Displays the hierarchy of elements in the scene, and lets you set up parent-child relationships for different game objects.
Project Browser	---	Lets you access and manage a project's assets.



The Main camera displays the scene and is located in the Hierarchy. To show a Harmony object, you must add a special component. With the main camera selected, in the Inspector, select **Add Component > Scripts > Harmony Camera**.



## GameObjects

GameObjects are the fundamental objects in Unity that represent characters, props and scenery. Basically everything you create in Unity will be a GameObject. There are two main types of GameObject you can use to import Harmony data:

- **Create Empty**: This creates a regular GameObject in which you can load the exported Harmony data. All the individual body parts on the sprite sheet come in as separate elements, but are treated as one whole object with a dynamically created bounding box. If you put a transparency on this object, you would see the overlapping transparencies of all the individual objects. This creates a higher-quality render and should be the default if you're not animating the transparency of an object. With this option, direct rendering will read the depth information in the scene but not write it. Note that with this option, the rendering cannot be customized.
- **Create Other > Plane**: Renders the entire character to a plane. This renders your character to texture data. If you animate the transparency of the plane, then the transparency of the rendered output is animated; you won't see the transparencies of the overlapping elements. However, you will have one static bounding box the size of the plane that you render to.

Use this option when you want to animate the transparency of a character in a scene. Also, you can write your own custom shaders. Simply set the Render Target to `eRenderTarget`. You can see an example of this in the sample project *DemoRenderTarget*.

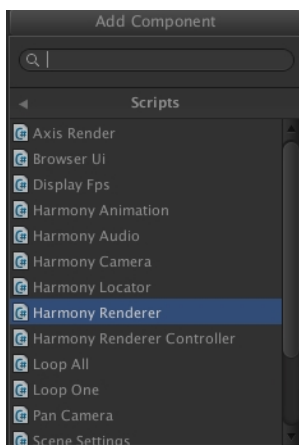
There is a quick way to import Harmony data:

- **Harmony > Harmony Object:** Lets you browse for the exported Harmony project folder. If you've already saved this to your StreamingAssets folder, you can browse to it through there. Then it adds the Harmony scene to your Unity file, and sets up the rendering, audio, and animation scripts you need to get going.
- **Harmony > Harmony Texture Object:** Lets you browse for the exported Harmony project folder similarly to Harmony Object, but creates a Unity plane to render your animation on it.

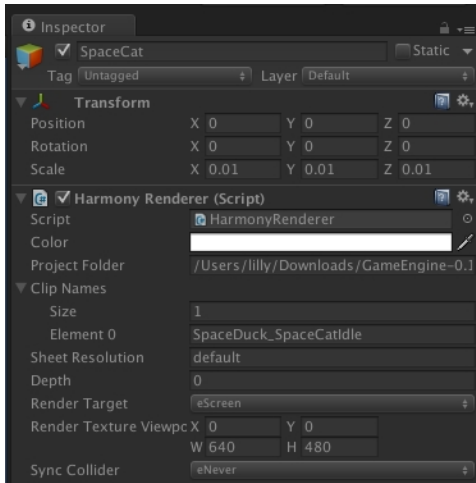
To understand fully the process, here's are two examples using an empty GameObject and a plane GameObject with the SpaceCat demo file. Everything you do will be based on the GameObject you create to load your Harmony data.

### How to use an empty GameObject

1. Select **GameObject > Create Empty**.
1. Rename the empty GameObject so it's clear in the Hierarchy. Since we're using the SpaceCat demo file, rename the GameObject to **SpaceCat** by doing one of the following:
  - Double-click on the name and rename it in the Hierarchy.
  - Select the GameObject and rename it in the Inspector.
2. At this point, it's an empty object. Accessing Harmony data is done through scripts.
  - Select the SpaceCat GameObject.
  - In the Inspector, go to **Add Component > Scripts > Harmony Renderer**.



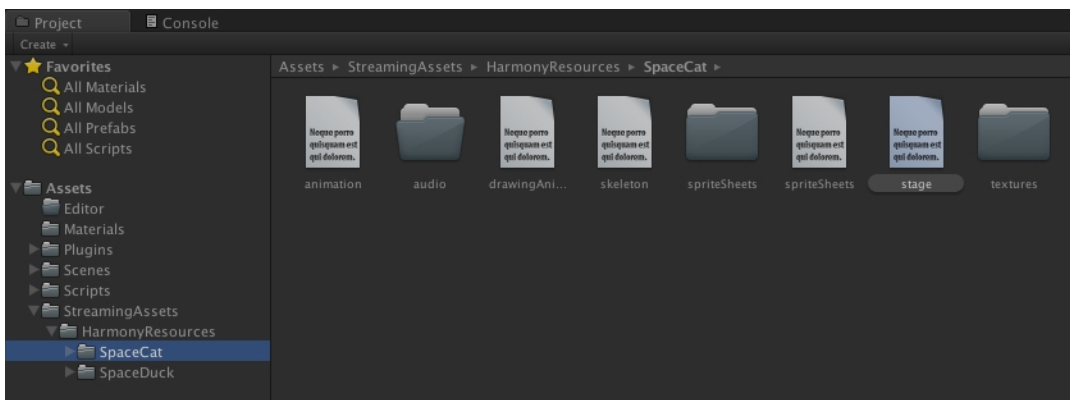
A new section appears in the Inspector called Harmony Renderer (Script).



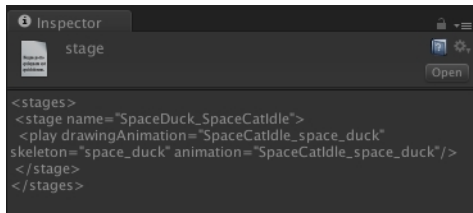
This will let you load an animation file. You must put the path of the asset relative to the HarmonyResources folder. Before this, you must export from Harmony directly to this folder, or manually copy and paste the data here.

3. You exported a scene called *SpaceCat*. In the Project Folder, place **HarmonyResources/SpaceCat** under the Transform information at the top, under Scale. Set the values to 0.01 for X, Y, and Z because the default Harmony project is for an HD screen.
4. You won't see anything until you define a few parameters:
  - Set the Clip Name Size to 1. A second field will appear, Element 0.
  - Enter the clip name for the animation you want to load.
5. Double-check on the right Clip Name to put in Element 0; you can check the output you exported from Harmony.
6. Double-check the **stage.xml** file, which was exported to the folder you specified when exporting from Harmony. Our default export path is to StreamingAssets, so it will automatically load in the game engine.
7. Look in the Project tab, under **Assets > StreamingAssets > HarmonyResources > [ExportName]**.

You'll find the data that was exported. In this case, we're looking for *SpaceCat*. Select the file marked **stage** to load the data you want to double-check.



The text data appears in the Inspector.



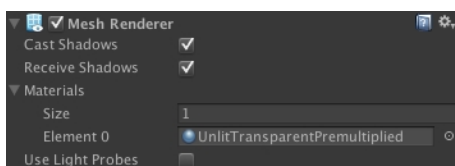
The name to use for loading the object is the stage name. In this case, **SpaceDuck\_SpaceCatIdle**.

8. If your GameObject has animation in it, and you want it to load the animation data from the Harmony export, add one more component by doing the following:
  - Select the GameObject.
  - In the Inspector, select **Add Component** and select **Scripts > Harmony Animation**.
2. To loop the animation, you must set a GameObject to define it:
  - Select **GameObject > Create Empty** and rename it: **LoopAll**.
  - Click the **LoopAll** GameObject to display its properties in the Inspector.
  - Click **Add Component > Scripts > Loop All**.

When you play the animation, it will loop as it plays back. The Loop All command simply iterates on all GameObjects on runtime and asks them to loop, which is useful when testing the animation. When programming the actual game, you should write additional scripts to control the different elements separately.

### How to use a plane GameObject

1. Select **GameObject > Create Other > Plane**.
2. Select **Add Component > Scripts > Harmony Renderer**.
3. Set Size to **1** and Element to **0** on the clip name as per previous instructions.
4. Set Render Target to **eRender Texture**.
5. Render Texture Viewport:
  - **X**: To reposition the animation correctly; it should be  $-\frac{1}{2}$  the width of your Harmony project.
  - **Y**: To reposition the animation correctly; it should be  $-\frac{1}{2}$  the height of your Harmony project.
  - **W**: Width of your Harmony project
  - **H**: Height of your Harmony project.
6. Use the custom Shader created by Toon Boom to have a transparent background with premultiplied alpha channel. This is what produces nice, antialiased drawings in your output.
1. With the Plane selected in the Inspector, go to **Mesh Renderer > Materials**. Under Element 0, select **UnlitTransparentPremultiplied**.
7. If you're starting with the Toon Boom demo project, this renderer should already be loaded in your list.



You can also write your own custom shaders and use them here.

2. You must also add the animation component. Select the Plane. In the inspector, click **Add Component > Scripts > Harmony Animation**.

## Placing a Target in an Imported Animation

It's possible that after importing the Harmony animation into the Unity scene, you may want to assign a target to some piece of the animation. For example, in the Space Duck scene, the character has a gun. Perhaps you want to attach some other action, such as shooting spheres and cubes out of the end of the gun.

You can see some examples of this in the provided Unity project. The first example in the demo scene is called *DemoLocator* which shows a simple cylinder attaching to the end of the gun.

The second example called *DemoCallback* shows the gun shooting spheres and cubes.

When you set up your character in Harmony, you can access any drawing layer in Unity later and use its pivot point to attach things. For this reason, you should set the pivot points on your drawing layers with the Rotate tool.

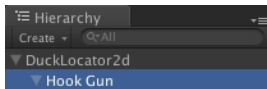
You can also create an empty drawing layer. Use Create Empty Drawing to create a blank drawing, ensuring that this drawing layer will be exported. Then you can use the Rotate tool to set the pivot point on this drawing layer. In the Space Duck example, an empty drawing layer called `hook_gun` was created on which you can attach the locator.

When you access the imported Harmony character in Unity, you can access the data with a script.

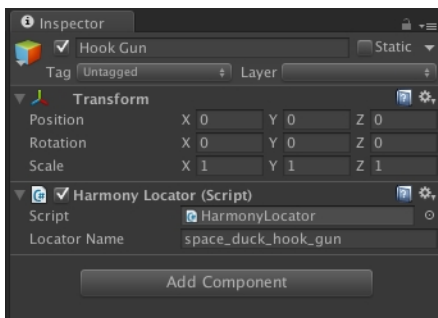
### How to set a target to a part of a character

1. Select **Game Object > Create Empty** to add a new GameObject to extract the target's position, rotation, and scale.
2. Drag and drop the new object so that it's a child of the character.  
It becomes indented.

1. Rename the GameObject to: **Hook Gun**.



2. In the Inspector of the target object, select **Add Component > Scripts > Harmony Locator**.
3. Enter the name of the drawing layer to which you want to attach.



4. To find the exact name for the Locator Name, look at the `skeleton.xml` file in the Streaming Assets folder. You can find it in **Streaming Assets > Harmony Resources > Name of Harmony File > skeleton**.

```

<read name="space_duck_gun_details" />
<peg name="space_duck_glow-P" />
<read name="space_duck_glow" />
<read name="space_duck_hand_02" />
<read name="space_duck_hook_gun" />
<peg name="space_duck_arm_02-P" />
<read name="space_duck_arm_02" />
<peg name="space_duck_BOTH_legs" />
<peg name="space_duck_legs_01-P" />
<read name="space_duck_legs_01" />

```

All the drawing and peg layers are listed. In this example, look for **space\_duck\_hook\_gun**. Having drawing layers with distinctive names makes them easy to recognize when you need to retrieve them.

You can copy the name of the layer into the Locator Name to see the Transform information updating dynamically as you run the simulation.

- Now you can attach anything as a child of this Locator Object. For testing purposes, you could attach a cylinder for example. In a real example, you'd want something to shoot out of the end of the gun, so you can see the Callback example to verify how that works.

## Bounding Boxes and Collisions

Extracting the bounding box information is useful when you want to make something collide with your character. When you put a 2D character into a 3D scene, you may want to use Physics to make the 2D character collide with the 3D plane. To use the following scripts, you will need Unity 4.3 or higher.

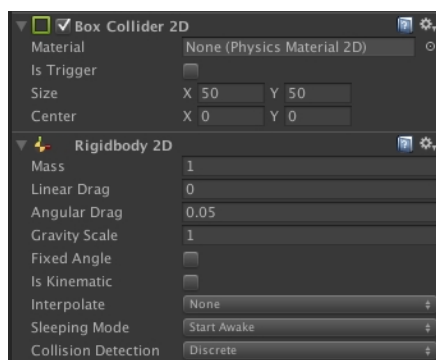
In the Demo scene, open the DemoPhysics example to see collisions and bounding boxes. In this example, there's a 3D plane and some 2D characters. The 2D characters have a collision defined with their bounding box, and they're also reacting to the physics of the scene to fall with gravity.

Colliders were improved to provide several different types of colliders for use in Unity. You can select polygon colliders and box colliders for a more accurate bounding box.

### How to enable a collision based on the bounding box of the character

- Select your imported character.
- In the inspector, select **Add Component > Physics 2D > Box Collider 2D**.
- To enable the Physics on the character, go to **Add Component > Physics 2D > Rigid Body 2D**.

**NOTE:** You can also use 3D physics on the imported files.



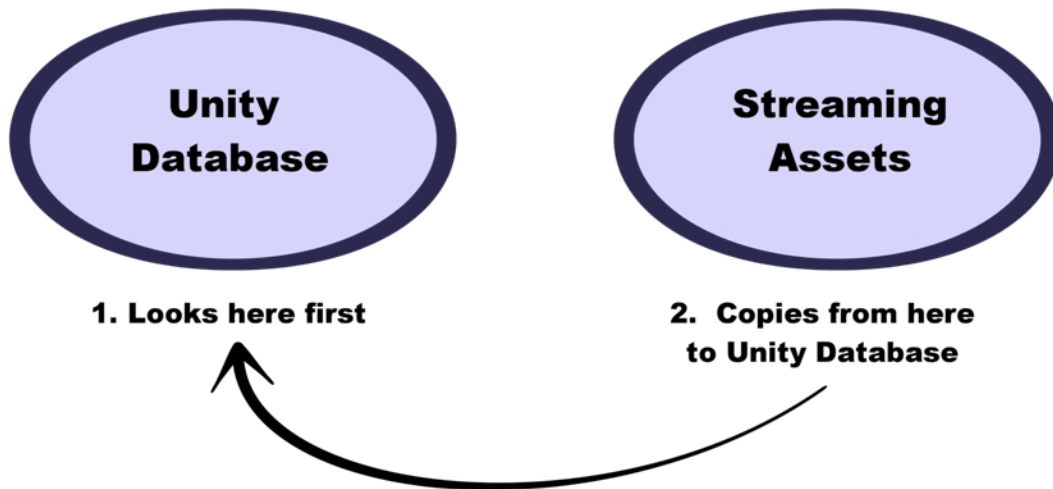
You can now adjust the variables and see the results.

## Working with Audio

When you create scene files in Harmony with audio, the audio is exported into the project folder. However it's important to understand how the game is built to determine the best way to handle audio.

When a game is built from Unity, it creates its own database for holding the assets. Within the export, the Streaming Assets folder is preserved intact. This is what enables the Toon Boom plugin to access those assets on the fly, and render them in the camera to create the final animation you see on the screen.

However when it comes to audio, the game first looks for the audio in the Unity database. So this is the most efficient place to store the audio for the real game.



If audio can't be found in the Unity database, then the game looks in the Streaming Assets folder to find the audio. When it does, it copies the audio on-the-fly back into the Unity database. Since this action is quite costly, don't leave the audio in the Streaming Assets folder for the final game. It's fine to leave it there while you're testing, but not for the final game.

The audio should be copied back into the Unity database, either manually or by automating this process with a script.





# Chapter 12: Troubleshooting

## Unity Questions

**Q.** My Harmony asset does not appear in the Unity Editor.

**A.** There are several possible reasons for this. Check the following:

- ▶ Has the HarmonyRenderer plugin been copied to the Assets/Plugins directory? The plugin is named **HarmonyRenderer.bundle** on Mac OS X and **HarmonyRenderer.dll** on Windows.
- ▶ Is the clip name valid? Make sure the clip name exists in the stage.xml file.
- ▶ Are the binary files up to date? If you updated the Toon Boom Game Engine SDK to a newer version, make sure to regenerate the binary files if you use them so they're compatible with the SDK.

**Q.** My Harmony asset does not appear in iOS or Android when exported from Unity.

**A.** There are several possible reasons for this. Check the following:

- ▶ Make sure the Harmony assets are copied in the **StreamingAssets** directory. Since the HarmonyRenderer plugin cannot use Unity's asset database, the Harmony assets were packaged as plain files so they are accessible to the plugin.
- ▶ Is the plugin for iOS the same version as the one used for the editor? The plugin for iOS is in the **Assets/Plugins/iOS** directory.
- ▶ Is the clip name spelled correctly? Windows and Mac OS X aren't usually case sensitive file systems, but iOS and Android are. This implies that an asset that is visible on the editor will not appear on the mobile platform because it cannot be found.
- ▶ Make sure the size of your sprite sheets does not exceed the hardware limit of the device you're working on. Otherwise, the texture might not appear at all.
- ▶ Is the path to the project folder an absolute path? If it is, it might not work on the mobile device as that path will not exist on the platform. Make sure to use relative paths to the **StreamingAssets** directory.

**Q.** My Harmony asset does not composite properly with other 2D sprites in Unity. The 2D sprites always appear behind the Harmony assets even if I change the order index in the GameObjects.

**A.** The 2D sprites from Unity and the Harmony assets cannot currently composite together. There are, however, several solutions for working around this problem:

Use 2D textures instead of 2D sprites. The 2D textures, when attached to a geometry in Unity, will composite like the other 3D elements in the scene and you can change the compositing order by incrementing or decrementing the Z value of the transform.

Use multiple cameras to render your scene in parts. Here's how:

### Harmony Camera

1. Create a new camera.
2. Make sure you set the Harmony GameObjects to a specific layer (top-right of the game object inspector).
3. In the camera, set the culling mask to this layer (and the other layers you want rendered in the background).
4. Add the HarmonyCamera component to this camera so the Harmony GameObjects render properly.

## Sprite Camera

1. Create a new camera.
2. Make sure to set the 2D sprite objects to a specific layer.
3. In the camera, set the culling mask to this layer (and the other layers you want rendered in front of the 2D sprites).
4. Make sure to set the clear flags to **Depth Only** or **Don't Clear**.
5. Set the depth to be higher than the Harmony camera.
6. Afterwards, if you move the camera, make sure to move both cameras simultaneously if you want to keep Game Objects in sync.

**Q.** How can you specify the frame rate of the animation? My animation does not play at the same frame rate in Harmony and in the Game Previewer in the Unity Editor.

**A.** The Game Previewer previews the animation at a default of 24 frames per second. In your game, using the HarmonyAnimation component, you can schedule animations at the speed you want.

### Example

```
HarmonyAnimation animation = GetComponent<HarmonyAnimation>();  
if (animation != null)  
{  
    animation.PlayAnimation( frameRate, clipName );  
}
```

**Q.** I cannot see my character in the Scene view in Unity. Is there any way to preview the Harmony asset?

**A.** Since the rendering of Harmony assets is implemented in a plugin, it does not update any Renderer component in the GameObject, and so cannot be shown directly in the Scene view.

However, you should still be able to preview your assets in the Game view (even when not playing). To help find and position assets, we also added bounding box shapes rendered in the editor and the Game view.

**Q.** How is memory management handled in Unity for Harmony assets?

**A.** Most of the memory extensive algorithms are executed in the C++ plugin. The data structure is maintained alive as long as a GameObject refers to it. This means you can instantiate as many clones of a character without reloading the data. Upon destruction, the GameObject will issue a clean-up call to the plugin and delete its associated rendering object. The sprite sheet and animation data are kept alive as long as a single GameObject uses them and a cleanup call is issued once they are destroyed.

**Q.** The Harmony assets memory does not appear in the Unity profiler. Can we profile the assets memory?

**A.** The Unity profiler does not pick up Harmony assets in its traces. Since the Harmony GameObject refers to a C++ plugin for its asset management and rendering, its memory cannot be recorded in the profiler. Profilers such as the one provided with XCode or Visual Studio should allow you to track your application's memory including the Harmony assets and should also provide a more accurate result.

## General Questions

**Q.** How can you specify the resolution used for the drawings in the sprite sheet?

**A.** The drawing resolution is not fixed in Harmony. Since you're exporting the scene to multiple sprite sheets in multiple resolutions, every drawing will have a different resolution in the end. You can use the Drawing view to see the resolution of a drawing compared to the rest of the scene. By enabling the light table in the Drawing view, you will see all of the scene's drawings untransformed in the same proportion as they will appear in the sprite sheet. More specifically, the resolution used in the sprite sheet for a drawing is the size it appears untransformed in the Camera view, scaled to the sprite sheet resolution ("Sprite Resolutions" in the Export Sprite Sheet dialog box).

Once you know that, you can easily adjust the size of a single drawing. Use the Select tool to scale down a drawing and use the Transform tool to scale it back up so it does not change visually in the Camera view. This should allow you to alter the size of drawings in the sprite sheet.

**Q.** The assets take time to load on mobile devices. Is there any way to speed up the process?

**A.** Harmony exports an interchange XML format that is intended to be compatible with multiple game engines. However, reading data from the XML files is slow and this is mostly intended to test the assets in your project. At some point, they should be converted to a binary compact data structure that can be read into memory a lot faster than the XML.

You can use the `Xml2Bin` tool provided with the game engine SDK to convert your XML files to binary. This tool is in the `Utils/Xml2Bin` folder and a precompiled version for Mac OS X is available in the `Utils/macosx` folder.

**Q.** There are problems with the character I exported in the game engine. Pieces are not exported or are not showing in the proper order. What can I do?

**A.** To integrate with the game engine SDK, all animations in Harmony must follow certain guidelines. Here are some of the key points for building a character that is compatible with the rendering in the game engine SDK:

- ▶ Build your rig in the Timeline view. The game engine SDK data structure is similar to what is displayed in the Timeline view and an advanced node system might not always export properly.
- ▶ Because every top level node in your scene will render separately in the game engine SDK, they may not intersect. A top level node is also isolated in its separate sprite sheet to allow the artist better memory segmentation of the character. If you created a character with top level nodes and this was not the intended result, create a top level group or peg to group them all together.
- ▶ Use micro-Z ordering if necessary. With no Z ordering, a child layer will appear behind its parent (as it does in Harmony). To change the ordering, add some Z offset to the child layer.
- ▶ The export script does not handle plain bitmap images. Toon Boom vector drawings and Toon Boom bitmap drawings are supported though.
- ▶ The export script does not handle symbols.



## Glossary

<b>alpha channel</b>	An image channel that carries transparency information. An image already has three channels: red, green and blue (RGB). The alpha channel is the fourth channel (RGBA). The matte, or the transparency information, is stored in this fourth channel. An image without an alpha channel is always opaque.
<b>animatic</b>	A movie with sound that is developed from the storyboard. The storyboard panel is exposed for the duration of the scene and at times, the characters are placed on a trajectory to indicate motion. The camera moves are also animated. The animatic is used to determine the rhythm of a project and provides a good overview of the project before beginning production.
<b>animation</b>	A simulation of movement created by displaying a series of pictures or frames.
<b>anime</b>	An animation style known for its sinister and dark feel; popular in Japan.
<b>arc</b>	Action rarely occurs in a straight-forward manner; rather it typically unfolds in what storytellers refer to as an arc. The purpose of a story arc is to move a character or situation from one state or scenario to the next.
<b>aspect ratio</b>	The relationship between the width and height dimensions for any scene, frame or film format. Television ratio is 4:3 and widescreen ratio is 16:9.
<b>auto-feed</b>	An automated method of feeding drawings into a scanner in which multiple drawings are stacked into a sheet feeder. When the scanner is activated, the drawings are scanned consecutively, without further user intervention.
<b>automatic lip-sync detection</b>	Automatically mapping drawings in an element to the mouth chart generated for a sound. This can save time when lip-syncing a voice track.
<b>axis</b>	An imaginary line around which an object rotates. For 2D graphics, there are two axes: X (horizontal) and Y (vertical). For 3D graphics, there are three axes: X (horizontal), Y (vertical) and Z (depth).
<b>background</b>	The part of a scene that is farthest to the rear. The background is the artwork, or decor, against which the animation takes place.
<b>Bézier</b>	A method of defining curved lines invented by French mathematician Pierre Bézier. A Bézier curve is a mathematical or parametric curve. Bézier curves use at least three points to define a curve.
<b>bitmap</b>	An image composed of pixels with a single resolution (size). If it is enlarged too much, it will lose definition and pixels will begin to appear. This is known as <i>pixelation</i> .
<b>breakdown</b>	In cut-out animation, breakdown is the action of breaking a character into pieces to create a puppet with articulations. To break down a character, the artist cuts parts, such as the hands and arms, from the character's model and pastes them in separate layers. Next, the joints are fixed and the pivots set.  In traditional animation, a breakdown is an animation pose generally found between two key poses. The key poses are the main poses in an animation and the breakdowns are secondary poses, ones that help describe the motion and the rotation curve (usually referred to as an <i>arc</i> ).

<b>camera shake</b>	Camera shake occurs in a scene when the camera moves slightly and quickly in several directions. This gives the impression of an impact, vibration or, for example, bumps on the road.
<b>caption</b>	A text field containing dialogue, effects, sound, or slugging information in a storyboard.
<b>cel</b>	In traditional animation, a cel (also known as <i>celluloid</i> ) is a transparent sheet on which the animation is inked and painted before being sent to the camera. The picture's outline is drawn on the front of the cel and then coloured along the back.  In Harmony, a cel is an individual space in an Xsheet column from which you can expose a drawing or a function's coordinate.
<b>character design</b>	Each character in an animated film is drawn from multiple angles in poster-style format, called a <i>model sheet</i> , which serves as a reference for the animators.
<b>clean up</b>	After rough drawings have been tested and approved, all the noise in the image (excess lines, notes, etc) is removed to create final drawings which can be inked, painted and shot. The cleanup process refers to either tracing a clean line over a rough drawing to achieve the final version, or removing dirt and extra lines left by the scanning process.
<b>CMYK</b>	Cyan, Magenta, Yellow, Black. Refers to the process used by printers to define colour on the printed page.
<b>colour card</b>	A colour card is a solid colour card that is the same size as the camera. The colour card can be used to fill the background with a solid colour when there is no background image included.
<b>colour model</b>	The official colour design that must be used to paint the animation. A model is the definitive character, prop, or location design that each artist must follow for the production.
<b>colour wheel</b>	A display of the colour spectrum in the form of a circle.
<b>compositing</b>	Compositing is the action of incorporating all of a scene's elements to create the final result prior to rendering. For example, the compositing artist will import all the animation sequences, background, overlays and underlays in the scene and position them correctly. The artist will then set the camera frame and animate it, if needed. Finally, the animator will create all the computer-generated effects for the project.
<b>cross dissolve</b>	An effect used to fade two scenes, one into the other.
<b>cut</b>	A direct transition between two scenes. When a cut is used, there are no transition effects inserted to pass from one scene to the next. The first scene ends and the second one starts immediately.
<b>cut-out animation</b>	The action of animating characters made of several pieces by moving them around frame by frame. Cut-out animation can either be computer generated or done traditionally using paper.
<b>cycle</b>	A group of images that together make up an action, such as walking. A cycle is an action repeated as a loop over a period of time. It can be a series of animated drawings or keyframes.

<b>dialogue</b>	The text spoken by a character in a movie or animation.
<b>dope sheet</b>	Used by animators, directors and other members of a crew to track the sequence and timing of images, dialogue, sound effects, sound tracks and camera moves. Also known as an <i>exposure sheet</i> or <i>Xsheet</i> .
<b>doping</b>	To assign a particular drawing to a range of frames.
<b>DPI</b>	Dots per inch is the standard measure of resolution for computerized printers. It is sometimes applied to screens, in which case it should more accurately be referred to as <i>pixels per inch</i> . Either way, the dot is the smallest discrete element making up the image.
<b>ease/velocity</b>	In animation, the ease, also known as <i>velocity</i> , is the acceleration and deceleration of a motion. It can be a motion created by a function curve, or a series of animated drawings. Other common terms for ease-in and ease-out are slow-in and slow-out.
<b>ease-in</b>	Gradual acceleration in the action. Also known as <i>slow-in</i> .
<b>ease-out</b>	Gradual deceleration in the action. Also known as <i>slow-out</i> .
<b>establishing shot</b>	A scene in which the viewer can see the whole area in which a sequence is happening. For example, if a child is playing on the ground in front of his house, the establishing shot would be a scene where the viewer can see the house, the ground, a part of the street and the buildings around the central point of action. This helps the viewer understand the story location and scene orientation.
<b>exposure</b>	In animation, an exposure is the number of cels on which a drawing appears in the scene. For a drawing to appear longer, the exposure must be extended over a greater number of cels.
<b>exposure sheet</b>	A sheet with several vertical columns and horizontal frames used to indicate a scene's timing. Each column represents a scene layer. The drawing numbers in each column are indicated and repeated over the particular amount of frames they need to appear.  The exposure sheet is used by animators, directors and other members of a crew to track the sequence and timing of images, dialogue, sound effects, sound tracks and camera moves. Also known as a <i>dope sheet</i> .
<b>fade in/fade out</b>	Fade in or fade out is a transition effect used to open or close a sequence. A fade in occurs when the first scene appears progressively, from complete transparency to its complete opacity. A fade out occurs when the last scene progressively disappears, going from complete opacity to complete transparency.
<b>fast-in</b>	Dramatic acceleration at the start of the action.
<b>fast-out</b>	Dramatic deceleration at the end of the action.
<b>field</b>	In animation, a field is a measurement unit used to calculate motion, registration and camera positioning. A standard animation scene will vary between 6 to 12 fields.
<b>field chart</b>	A guide containing all the field units that animation and layout artists use to determine a scene size or camera motion.

<b>film-1.33</b>	A resolution that is ideal for the widescreen film format that conforms to the standard 4:3 pixel aspect ratio.
<b>film-1.66</b>	A resolution that is ideal for the widescreen film format that conforms to the 16:9 pixel aspect ratio. (The pixels are wider than they are high).
<b>flipping</b>	In traditional animation, flipping is the action of going through the drawings of an animation sequence very quickly in order to see the animation in motion. Flipping can also be the action of creating a mirror transformation of an object.
<b>follow-through</b>	The secondary motion caused by the main action. For example, a character wearing a cloak is running. The main action is the body running. This will cause the cloak to follow the motion, although it will not move at the same time, but react a few frames later and follow the main motion curve.
<b>forward kinematics</b>	Forward kinematics is a feature used to animate principally 3D characters and cut-out puppets with hierarchy. It is used to animate a puppet from one of parent parts, such as a shoulder, and make the rest of the arm move with it as a single piece.
<b>frame</b>	A single photographic image in a movie. In traditional animation, the North American standard generally contains 24 frames per second, while in Europe the standard is 25 frames per second.
<b>frame rate</b>	<p>The frame rate is the speed at which the frames are played. They are generally calculated by frame per second. For example, a scene could be played back at 12, 24, 25, 30 or 60 frames per second or any other number.</p> <p>This is the measurement of the frequency (rate) at which an imaging device produces unique consecutive images, called <i>frames</i>. The term applies equally to computer graphics, video cameras, film cameras, and motion capture systems.</p> <p>Frame rate is most often expressed in frames per second (fps) and in progressive-scan monitors as hertz (Hz).</p>
<b>functions</b>	A computer-generated motion, trajectory or path on which elements, other trajectories and effects parameters can be attached. The function can be controlled by adding keyframes and control points on the function curve.
<b>gamut</b>	The range of colours that a particular device can represent.
<b>HDTV</b>	High Definition Television delivers a higher quality image than standard television does because it has a greater number of lines of resolution. To take advantage of the superior quality and make full use of your resolution setting, the output device must be compatible with HDTV technology.
<b>hold</b>	A frame in the animation in which the character maintains its position without moving. A hold can be created between any two keyframes.
<b>HSV</b>	Hue, Saturation, Value. A method of defining colours in terms of hue (tint), saturation (shade) and value (tone or luminance).
<b>in-between</b>	The drawings that exist between the key poses. These are drawn to create fluid transitions between poses.
<b>ink and paint</b>	The ink and paint process is the action of painting the empty zones and



	colouring the lines on the final animation drawings, while following a colour model.
<b>interpolation</b>	The computer-generated motion created between two keyframes. You have the choice to create interpolation, or not, between your keyframes.
<b>jump cut</b>	A jerky cut between two scenes. Typically, a jump cut is not visually pleasing. It is generally caused by one scene ending, and a second one starting, with a similar image. The lack of difference causes the eye to see a little jump between the two scenes.
<b>key pose</b>	Important positions in the action defining the starting and ending points of any smooth transition. Keys, or key poses, are the main drawings in an animation sequence describing the motion. For example, if an arm is waving, the keys will be of the arm at one extremity of the wave motion and the other extremity. By flipping those drawings, the animator can see the skeleton of the motion without having all the drawings.
<b>keyboard shortcuts</b>	One or more keyboard keys which, when used, cause an operation to be performed.
<b>keyframe</b>	Important positions in the action defining the starting and ending points of any action. A keyframe is a computer-generated position at a specific moment (frame) on a given trajectory.
<b>layers</b>	In animation, a layer is an individual column, level or character. A scene's layers are superimposed to form the final image.
<b>layout</b>	<p>The communication step between the storyboard and the animation. It is the action of putting the storyboard on model. That is, drawing the character by following the design in the model pack, so the animator can start working.</p> <p>The layout artist draws the background, creates the camera and field guide matching the scene and camera motion. Lastly, the animator draws on model the main action poses.</p>
<b>layout and posing</b>	The action of putting on model. That is, at the right scale, the storyboard for the animator to start working.
<b>library</b>	A storage area containing templates and assets that can be reused in any project or scene.
<b>light table</b>	A device that allows you to see other layers in transparency while you are working on a particular layer.
<b>line of action</b>	The direction that the action will follow. Also known as <i>path of action</i> .
<b>lip-sync</b>	The character's mouth synchronization with the dialogue sound track. Frame by frame, the mouth will be adjusted to fit the sound to give the illusion of the character is speaking.
<b>low resolution</b>	A format that is ideal for videos destined for the web, where size and fast download of a video file take precedence over quality. A low-resolution image is one that lacks fine detail.
<b>manual lip-sync detection</b>	The manual swapping of mouth position drawings to match a voice track. For this process, both sound scrubbing (listening to a sound wave broken up frame-by-frame) and drawing substitutions are used.

<b>master palette</b>	A group of colours attributed to a character or prop. The palette is used throughout the entire production to maintain consistency in the look and to ensure that the same colours are used throughout the production. Also known as <i>palette</i> .
<b>model/colour model</b>	The definitive character, prop or location design each artist must follow for a production. A colour model is the official colour design that must be used to paint the animation.
<b>motion keyframe</b>	A keyframe with computer-generated interpolation.
<b>mouth chart</b>	A chart based on the eight animation phonemes (A, B, C, D, E, F, G, and X, which is used to represent silence) used for lip-sync.
<b>multiplane</b>	The effect of passing through multiple levels of drawings to create a sense of depth in a shot. A multiplane is a scene in which the layers are placed at different distances from the camera so that when the camera moves, a depth illusion occurs. With a multiplane, all the perspective and scale is calculated automatically.
<b>NTSC</b>	The standard analogue television broadcasting system used in North America. NTSC conforms to North American standards on how rectangular pixels are displayed for computer and television screens.
<b>nudge</b>	A small push (left, right, up, down, forward or backward) done with the keyboard arrow keys on a selected element. Nudging is used to move a selection very slightly and precisely.
<b>onion skin</b>	A feature that lets you see the previous and next drawings of a sequence.
<b>overlay</b>	A part of the scene environment, such as a chair or a bush, that is placed in front of the main animation.
<b>PAL</b>	A resolution that works best with the European format for television and computer screens, as the rectangular pixels are displayed at a different orientation.
<b>palette/master palette</b>	A palette or master palette is a group of colours attributed to a character or a prop. The palette is used throughout the entire project to maintain a consistency in the look and avoid the colour changing during the animation. Also referred to as a master palette.
<b>palette style</b>	A palette style is a second version of an existing palette with a slight change in the tint and value. A palette style can be used to create the night version of a palette. It may also be called a clone palette.
<b>pan</b>	To move the camera across the scene in any direction.
<b>panel</b>	In a storyboard, a panel is a frame in a shot. A shot can be composed of one or several panels.
<b>paperless animation/tradigital</b>	The paperless animation process is the action of animating digitally. The main paperless animation process is to draw, frame by frame, the animation directly in the software.
<b>passing position</b>	When drawing a walk sequence for a character, the passing position is the point at which one leg passes the other.
<b>path of action</b>	Direction that the action will follow. Also known as <i>line of action</i> .

<b>peg</b>	In traditional animation, a tool used to ensure accurate registration of action as cel layers move. In digital animation, in which you are doing a more advanced puppet rigging, you can use peg layers. Peg layers are trajectory layers that do not contain drawings. They are motion paths that you can use to add path articulations. For the latter, you can also use the Inverse Kinematics tool.
<b>phoneme</b>	A unit of sound in a language.
<b>pivot</b>	The point around which a peg or drawing rotates.
<b>pixel</b>	The smallest element of an image displayed on a monitor or TV screen.  Pixel, short for <i>picture element</i> , is a single point in a graphic image. It is a small sample of an image, a dot, a square, or a very small section made out of smooth filtering. If you zoom in close enough on a digital image, you will see the pixels, which look like small squares of different colours and intensity.
<b>pose-to-pose animation</b>	The pose-to-pose animation process is the action of creating all the main action poses, called <i>key poses</i> , and then placing the secondary poses between the keys. The secondary poses are called <i>breakdown</i> . Finally, the animator fills the gaps with the in-between drawings to achieve a smooth animation.
<b>rendering</b>	The final step when animating by computer. During rendering, the computer takes each pixel that appears on screen and processes all of the components, as well as adding motion blur before it produces a final image. The process of calculating the final images after the compositing process.
<b>resolution</b>	The size of a scene, generally calculated in pixels. For example, the NTSC resolution is 720 x 480. The resolution should match the final output: HDTV, film-1.33, film-1.66, NTSC, PAL, low.
<b>RGB</b>	Red, Green, Blue. A method of defining colour by specifying amounts of these three colour components.
<b>rigging</b>	The process of attaching the various parts of a cut-out puppet.
<b>rotary table</b>	Equivalent to the animation disk/table, a device that allows you to rotate the workspace for greater comfort while drawing.
<b>rotoscoping</b>	An animation technique in which animators trace over live-action film movement, frame by frame, for use in animated films. The act of sketching over live-action footage to create an animated sequence.
<b>roughs</b>	The skeleton sketch of an animation or design. Roughs mainly consist of sketch lines and shapes, though they can also contain design details.
<b>safe area</b>	The zone at the center of a scene's frame that is safe from being cropped by the TV frame. As a TV frame cuts a margin off the original frame size, maintaining a safe area ensures that the scene's main action will remain clearly visible once the film is screened on television.
<b>scene</b>	A shot in a movie or show. A sequence is composed of several scenes. A scene changes to another scene by a simple cut or transition.
<b>script</b>	The original text containing all the movie or show information. In animation, the script contains all of the location descriptions, dialogue, time and more. A project starts with a script.

<b>sequence</b>	A series of scenes or shots forming a distinct part of the story or movie, usually connected by unity of location or time.
<b>shot</b>	A scene in a movie or show. A sequence is composed of several shots. A shot changes to another shot by a simple cut or transition.
<b>slow-in</b>	The gradual acceleration in the action. Also known as <i>ease-in</i> .
<b>slow-out</b>	The gradual deceleration in the action. Also known as <i>ease-out</i> .
<b>slugging</b>	To indicate the start and stop times of dialogue and relevant actions.
<b>sound scrubbing</b>	A process that lets you hear sound in real time while you move the playhead forward or backward. This is very useful for finely-tuning a lip-sync.
<b>stop-motion keyframe</b>	A keyframe with no computer-generated interpolation.
<b>storyboard</b>	A visual plan of all the scenes and shots in an animation. The storyboard indicates what will happen, when it will happen and how the objects in a scene are laid out.
<b>straight-ahead</b>	A technique in which an entire sequence is drawn from the first position to the last, in order. There is very little planning in this methodology. Where the character ends up and how it gets there can be a surprise for both the audience and the animator. While this approach is spontaneous and creative, it can create inaccurate results.
<b>strokes</b>	Invisible vector lines forming the drawing zones. They can be adjusted with Bézier handles.
<b>tablet/pen</b>	A device used in conjunction with, or instead of, a mouse to move a mouse pointer (sometimes referred to as the <i>cursor</i> ) around the computer screen.
<b>template</b>	An asset stored in the library that can be reused in any project. A template can be a drawing, a series of keyframes, a sound file, a panel, a cut-out character, an effect, a trajectory, an animation, or anything else used in the animation.
<b>thumbnails</b>	A very small image used as a reference or indicator.
<b>timecode</b>	The timing information printed on a movie clip to indicate the scene, hour, minute and second that is currently displayed on the screen.
<b>timeline</b>	A horizontal representation of a scene's elements, timing and keyframes.
<b>trace and paint</b>	After the rough animations have gone through cleanup and a final line or pencil test, each drawing is traced and painted for the final animation. In today's digital world, this may be done in a variety ways other than the traditional celluloid or acetate methods.
<b>track breakdown</b>	The break down of an animated film's soundtrack into individual sounds to produce the precise frame-by-frame position of each sound.
<b>traditional animation</b>	A type of animation process whereby all the animation sequences are drawn by hand on paper before scanning or inking them on cels.
<b>trajectory</b>	A computer-generated path or trajectory that elements can follow. The trajectory can be controlled by control points, keyframes and velocity.
<b>transition</b>	An effect placed between two scenes as they pass from one to the other. Common transition effects are cross-dissolve and wipe.

<b>underlay</b>	In animation, an underlay is a specific part of the decor placed behind the main animation.
<b>aspect ratio</b>	The aspect ratio describes the shape of the grid unit. A square grid unit would have a 1:1 ratio , whereas a grid unit of aspect ratio 4:3 is a unit with one side 1.33 times as big as the other side.
<b>vector</b>	A vector-based image is composed of points and Bézier curves. The computer reads the points and traces the segments, linking them to reproduce the image shape. There is no fixed size or resolution in a vector image. The graphic can be enlarged and distorted as much as desired and the system will simply recalculate the segments and rebuild the shapes. Vector images are translated and displayed in pixels once the calculation is done.
<b>velocity</b>	In animation, the velocity, also known as <i>ease</i> , is the acceleration or deceleration of a motion. This can be achieved by a function curve, or via a series of animated drawings. Other common terms for ease-in and ease-out are <i>slow-in</i> and <i>slow-out</i> .
<b>walk cycle</b>	A series of drawings "on the spot" that describe the walk for a character. The illusion of movement is created by the use of background pans. To avoid making innumerable drawings, animators routinely make a walk cycle for a character.
<b>Xsheet (exposure sheet)</b>	<p>The Xsheet or exposure sheet, is a sheet with several vertical columns and horizontal frames used to indicate a scene's timing.</p> <p>Each column represents a scene's layer. In each column, the drawing numbers are indicated and spread over the specific number of frames in which they appear.</p> <p>The exposure sheet is used by animators, directors and other members of the crew to track the sequence and timing of images, dialogue, sound effects, sound tracks and camera moves. Also known as <i>dope sheet</i>.</p>
<b>zone</b>	An area which can be painted with colour.



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