User manual

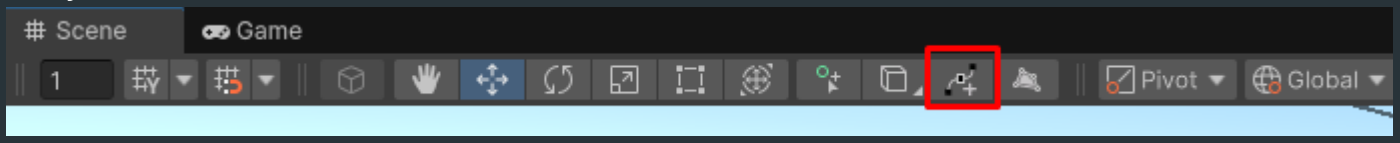
This manual explains how to create splines and control points, deform meshes, animate objects along paths, snap and align deformations, link splines, use the toolbar and menus, export meshes, and more. Spline Architect works in both 3D and 2D environments (version 1.2.0 or higher is required for 2D).

Create splines and control points

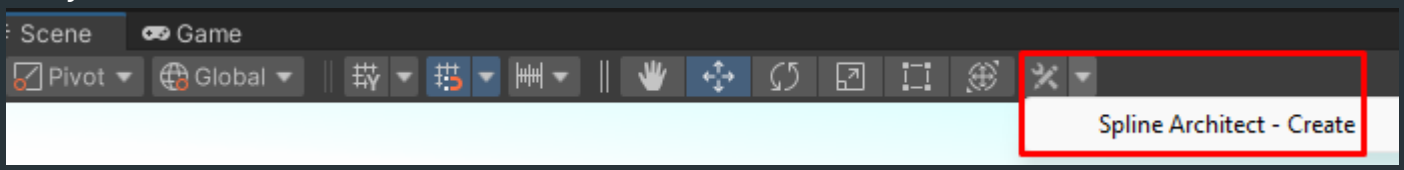
You find the "Spline Architect - Create" button in the regular Tools menu. When its enabled you can either create new splines or new control points on the selected spline.

Delete control points by selecting them and pressing "Delete" or "Cmd + Backspace" on Mac computers.

Unity 6000



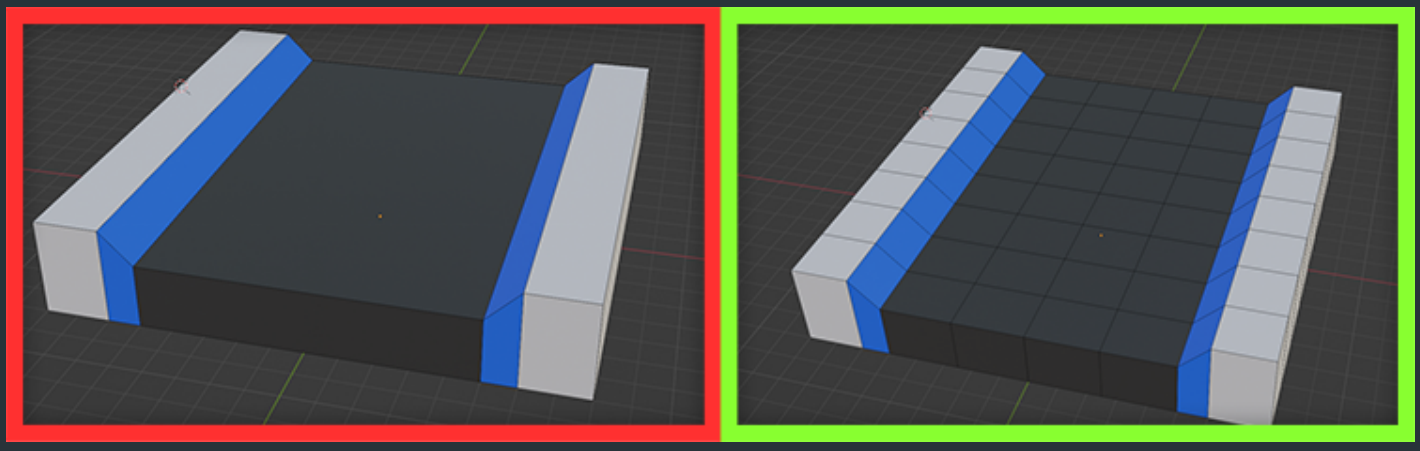
Unity 2022



Create deformation

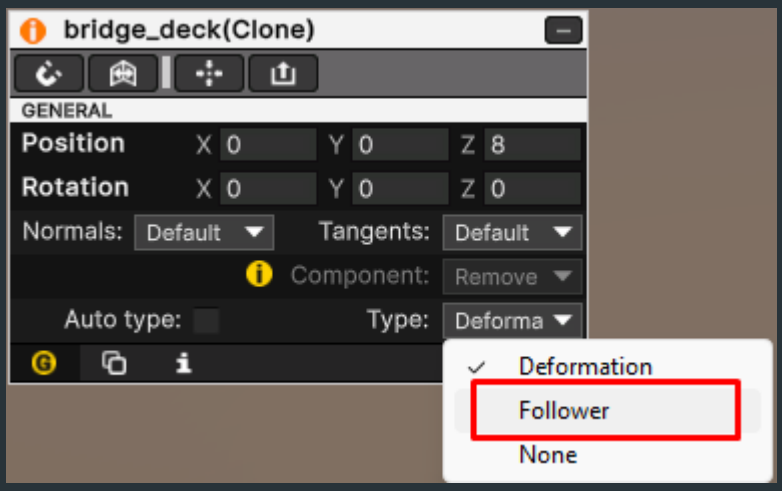
Parent the object to any Spline or Spline Object. This will automatically generate a new mesh derived from the original mesh that the GameObject had in its Mesh Filter or/and Mesh Collider component. Now you can move, delete, duplicate, rotate, and scale the deformation freely on the spline.

Remember to have enough vertices on your meshes. Otherwise, they will not look smooth when deformed.



Create follower

Parent the GameObject to an Spline or Spline Object. After that, select the Game Object and change type to Follower.

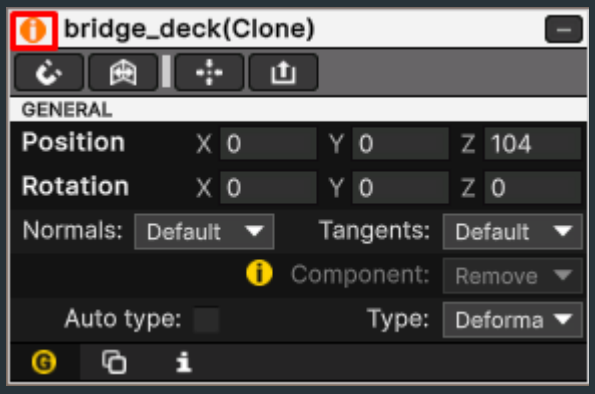


Snapping

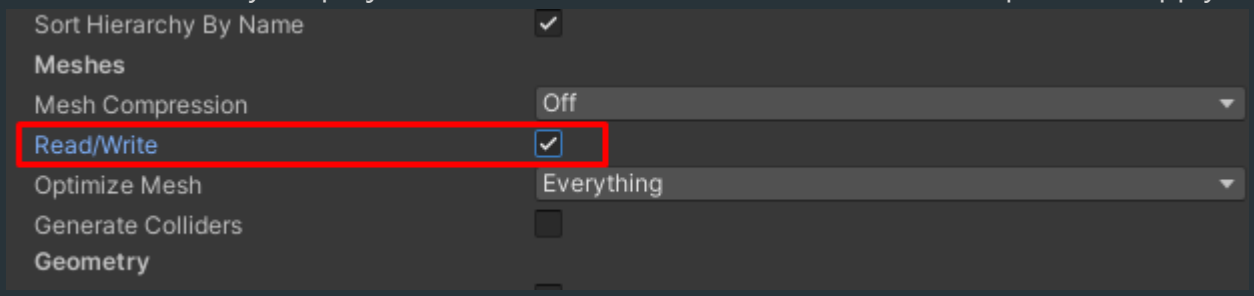
You can snap and align deformations by enable Unity's snapping feature.

Animations

You can animate any deformation or follower using Unity's built in animations system or script your own behaviours. If you see the small orange icon in the upper left corner (in the Spline Object menu), you need to enable read/write access for that mesh (only for deformations). Otherwise, you can't animate it.



Find the mesh in your project folder --> check the Read/Write box --> press the apply button.



> **Note:** Remember that the component option on the spline and SplineObject needs to be set to Active. Otherwise, you won't be able to use them in your built game. More about this below.

Children of Deformations

You can parent a deformation or follower to another deformation, and it will be updated and deformed within that deformation's local space. This can be useful for animating a train with different wagons. You can animate the train using Unity's built-in animation system or through scripting, parent them to the train, and all the wagons will follow.

Note: A deformation can be an empty GameObject.

Children of Followers

Parenting a deformation or follower to another follower will make the object behave like a normal GameObject that ignores the curve space.

Toolbar/Menus

Spline Architect has its own toolbar, menus and selection system. You have different menus depending on what you have selected. Splines, control points and deformations all have their own with different submenus and settings. Toggle between submenus with the bottom buttons. Some menu items have yellow icons. You can hover over these icons to get information about the specific menu item. You access the menus trough the toolbar, where you also find some other features.

Nearly all functionality in Spline Architect can be found within these menus/toolbar. The exceptions are how you adjust snapping and creating new splines.

Below, we'll go through the toolbar and each menu, and explain all the features.

> **Note:** If you can't see the Toolbar you need to enable it in Unity's overlay menu.

Toolbar

From the toolbar you have access to all Spline Architect menus and some other features.

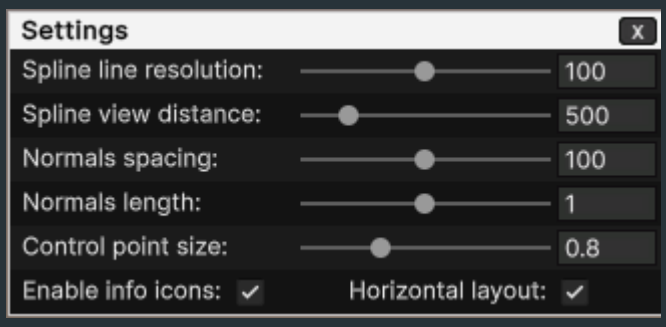
Note: If you are using Unity 2022 you may want to dock the Toolbar because of a visual bug (the bug has no implications on any features).

Buttons:

- **Control panel menus** | Access the spline, spline object and control point menus. You can toggle them by pressing (alt + h).
- **Settings menu** | Access the settings menu that contains various user settings.
- **Info menu** | Access the info menu where you have links to documentations, can see addons installed and more.
- **Grid system** | Toggle the grid system on or off. You also have a small drop down menu where you can change various settings for the grid system.

- **Handle type** | Change between Mirrored, Continuous and broken handle types.
- **Hide splines** | Has 3 modes: show all splines (default), hide all none selected splines, hide all none selected splines and occlude the selected spline. Disabling gizmos will hide all splines, even the selected spline.
- **Show normals** | Toggle normals on or off.

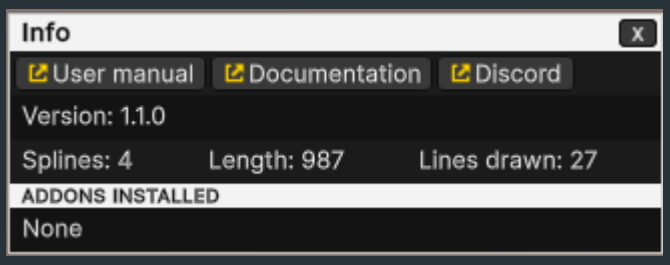
Settings menu



Settings:

- **Spline line resolution** | The resolution on all lines that draws splines.
- **Spline view distance** | Splines will not be drawn beyond this distance.
- **Normal spacing** | How many normals will be drawn for every 100 meters of a spline.
- **Normal length** | The length of the normals displayed along the spline.
- **Control point size** | Change the size of all control points on splines.
- **Enable info icons** | Turn on/off info icons (yellow (i) icons).
- **Horizontal layout** | Determines the layout of the control panel menus.

Info menu



General info about Spline Architect.

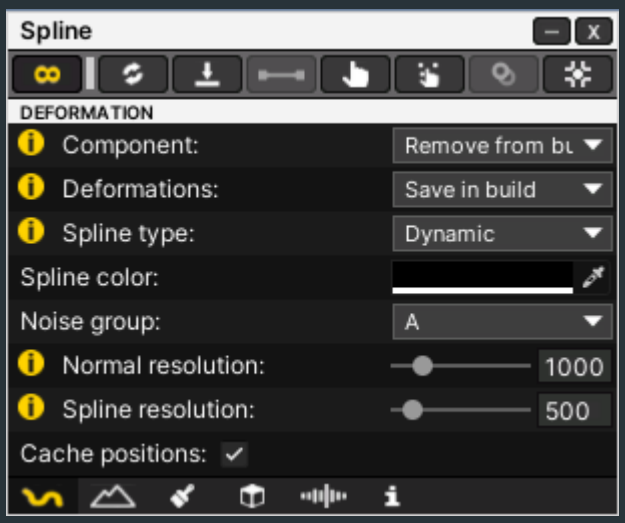
Grid menu

All settings for the grid system.

Buttons:

- **Color** | Change the color of the grid.
- **Size** | Change the size of the grid.
- **Occluded** | Should the grid be occluded or not by other GameObjects.
- **Distance labels** | Show or hide distance labels.

Spline menu - deformation



This panel appears when a Spline is selected, allowing you to configure various settings related to the splines mesh deformation feature.

Top buttons:

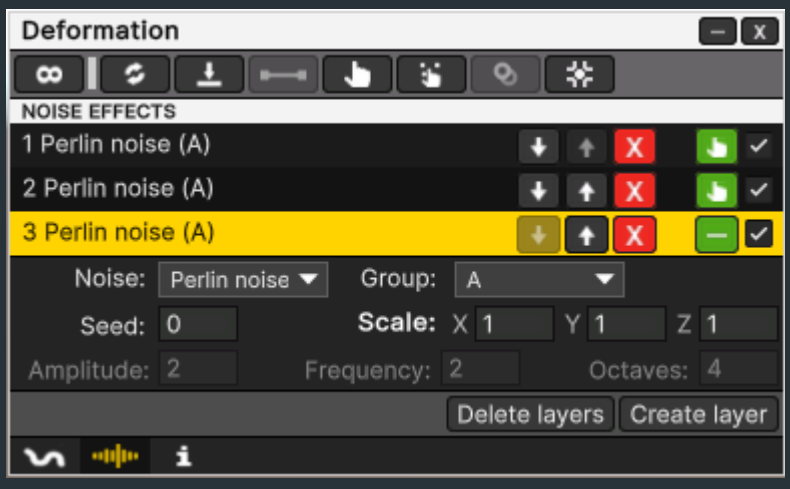
- **Toggle loop** | Toggle loop for the selected Spline.
- **Reverse control points** | Reverses the order of all control points.
- **Flatten control points** | Flatten all control points to the same Y value.
- **Align control points** | Aligns all selected control points so it becomes a straight line.
- **Select and center Spline transform** | Selects the Spline's transform and centers it to the center of all control points.
- **Select all anchors** | Selects all the anchors of the Spline.
- **Join selected Splines** | Joins all currently selected Splines.
- **Align grid for selected Splines** | Visible only when "Grid" is enabled. Aligns the grid for all selected Splines so you can work on the same grid across multiple Splines. If only one spline is

selected it will center the grid to the center of all control points instead.

Deformation:

- **Components** | How to handle the Spline and SplineObject components during runtime. You can set it to **Active**, **Inactive** or **Remove from build**. If set to **Active** you can use the Spline for various animations or other logic, no spline data will be removed. Setting the spline to **Inactive** will keep the component in your build but removes all spline data during the start function call on the Spline component. Good choose if you want to generate meshes during scene load. Using **Remove from build** will completely remove the component from your built game.
- **Deformations** | How to handle all deformations of the specific spline. You can generate them during runtime, saved them in the scene file or save them only in your build. Saving the meshes in your build will reduce the size of all the scene files in your project. Because all the meshes will be generated at editor startup (same with all other settings except "Save in scene").
- **Spline Type** | Change between Static 3D, Static 2D, and Dynamic. Static splines don't use cached normals and therefore consume less memory. Their normals remain fixed. Dynamic splines are better suited for complex deformations, such as loops. Static 2D splines are primarily for working in 2D environments, while Static 3D splines are primarily for 3D environments.
- **Spline color** | Change the color of the spline's control points and unselected line. The selected spline will always display with a yellow line.
- **Noise group** | The noise group you want to be applied to mesh deformations and animations.
- **Normal resolution** | The resolution of cached normals. Only used by dynamic splines.
- **Spline resolution** | The resolution of the spline. If you're working with very long splines you might need to increase this value.
- **Cache positions** | Enabling this option improves overall performance, but the spline will use more memory. In most cases, the memory usage is so small that you don't need to worry about it.

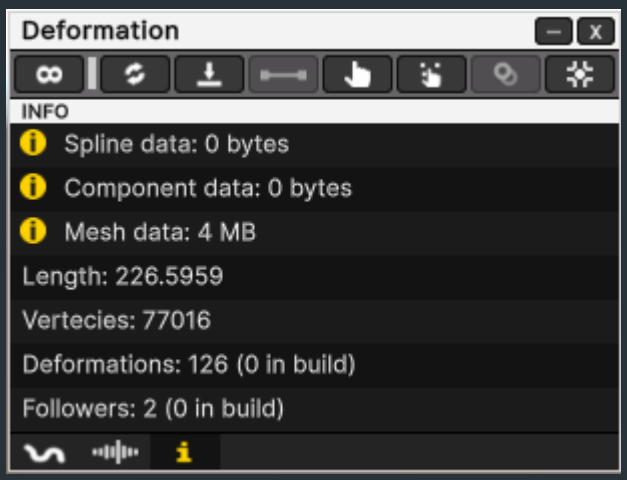
Spline menu - noise



Will appear when a Spline is selected and you have pressed the bottom noise button. Displays all the noise settings that will change the behaviour on mesh deformations and animations.

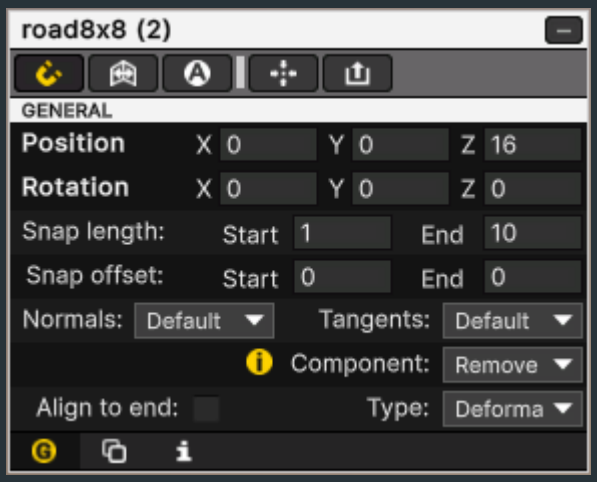
- **Noise** | Choose between 8 different noise effects.
- **Group** | Set the group for the noise layer. You can use the same group for multiple layers and stack noise layers together to create various effects.

Spline menu - info



General info about the Spline, size in memory, length, and so on.

Spline object menu - general



This menu appears when a Spline Object is selected, providing controls for deformation mirroring, centring, and general transformation settings.

Top buttons:

- **Snap** | You can snap your deformations to other objects or the control points on the spline. It has 3 modes: disabled, snap to control points, snap to objects.
- **Mirror deformation** | You can achieve the same deformation effect by scaling negatively, but this approach may cause collision issues in some physics systems. Using the mirror function ensures compatibility across all physics systems without any collision problems.
- **Auto type** | Will automatically switch type between deformation and follower. For example, if you have a road where parts of it is a straight line. All deformations on that straight line will

switch to type follower instead and not be deformed. This works really well with the "Align control points" feature and is also very good for performance and memory usage.

- **To center** | Reset the object's X and Y position to 0 and its Euler rotation to (0, 0, 0).
- **Export mesh** | Export meshes for all selected Spline Objects.

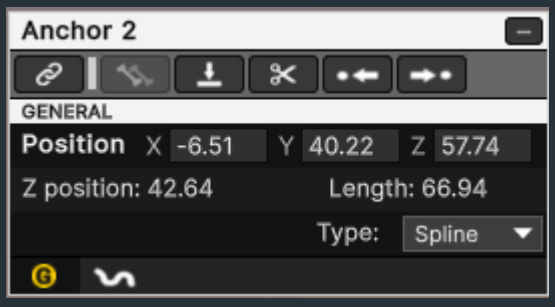
General:

- **Position** | Set the object's position in spline space.
- **Rotation** | Set the object's rotation in spline space.
- **Snap length** | How long the deformations start and end points can snap to a control point or object on the spline.
- **Snap Offset** | Offset the snapping position for the start or end of the deformation.
- **Normals** | Choose between Smooth normals, Default normals, or disable normal calculations. Smooth normals can resolve lighting issues on broken meshes.
- **Tangent** | Enable or disable tangent calculations.
- **Align to end** | If enabled, the Spline Object will originate from the end of the spline instead of the start.
- **Type** | Change between Deformation, Follower and None. "None" objects will behave as normal objects and don't interact with the Spline. Followers will just follow the spline and not be deformed. Deformations will be deformed if it has a mesh inside the mesh filter or mesh collider.
- **Component** | How to handle the SplineObject component during runtime. You can set it to **Active**, **Inactive** or **Remove from build**. If set to **Active** you can use the SplineObject for various animations in your built game. Setting the SplineObject to **Inactive** will keep the component in your build, but it will be inactivated during the start call. Good choose if you want to generate meshes during scene load. Using **Remove from build** will completely remove the component from your built game. **Note:** You can only change this setting if the Spline Component setting is set to Active. If you have an hierarchy of SplineObjects, you will set the whole hierarchy to the same component value when this value is changed.

Spline object menu - info

General info about the Spline Object.

Control point menu - general



This menu appears when a control point is selected.

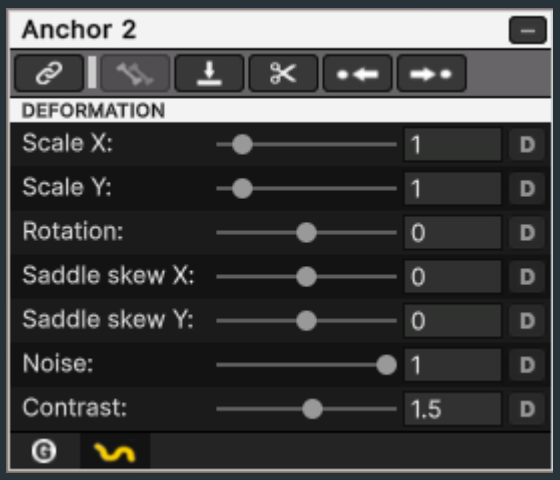
Top buttons:

- **Link to closest control point** | Links the selected control point to the closest control point on any spline or closest Spline Connector.
- **Next control point** | Move selection to the next control point.
- **Prev control point** | Move selection to the previous control point.
- **Flatten control points** | Flatten only the selected control segment.
- **Split spline** | Split the Spline into two at the selected control point.

General:

- **Position** | World position for the selected control point.
- **Z position** | The control points position on the spline. The z position is also equivalent to the spline length at that specific point.
- **Length** | The length of the segment.
- **Type** | Change between Spline and Line type. Creating new control points will have the type of the closest control point.

Control point menu - deformation



Will appear when a control point is selected and the bottom deformation sub menu button has been pressed. Has different effects that can be applied to deformations.

Other features

Snap/Move control points on object surfaces - Select a control point, hold down Shift + Ctrl, and then click the control point again to activate surface snapping. Now, as you move the control point, it will snap to and follow the surface of any object with a collider.

Create control points using the nearest splines direction - Holding ctrl while creating control points will automatically align the new control point with the closest spline.

Shortcuts

Spline Architect has different shortcuts that can be changed in Unitys shortcut menu. Edit --> Shortcuts...

Components

Spline
Add this component to any GameObject to create an Spline.

Spline Object
This component is handled automatically while working in the editor. You don't need to remove or add it.

Spline Connector
You can connect a splines control point to the GameObject that has this component. This is useful for animating splines using Unity's animation system or for creating road intersections. Moving the SplineConnector GameObject will update all connected splines.

Mesh pooling

Spline Architect tracks all deformed meshes. For example, if a Mesh Filter and a Mesh Collider on the same Game Object use the same original mesh, only one mesh will be created and used. If you have two different meshes on a collider and mesh filter it will pool two different meshes.