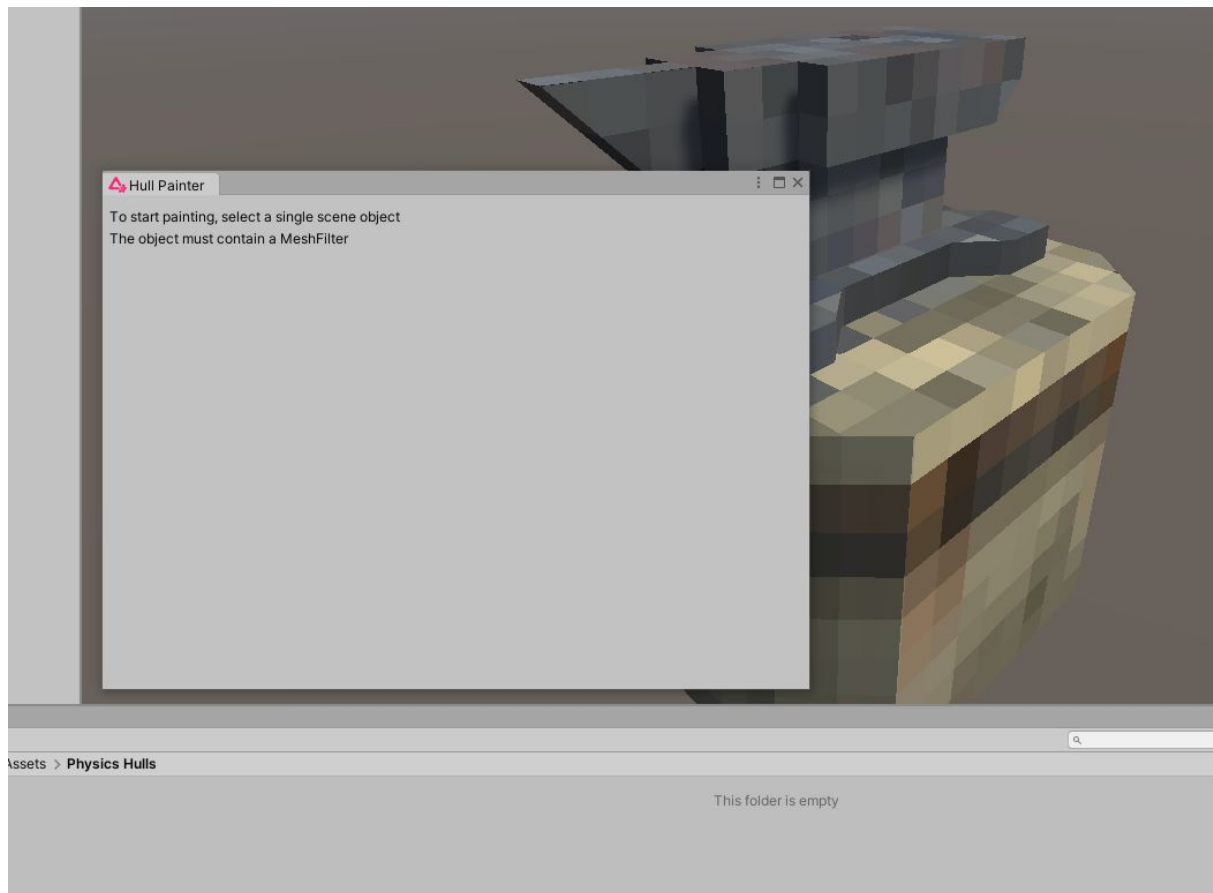# Technie Collider Creator

Instructions And Setup Guide

Quick Start

As Technie Physics Creator is an editor tool, all you need to do is import the package into your project. Then open the `Hull Painter` window via the `Window` menu. Move this somewhere handy as you go through the quick start guide.


Hull Painter window with no object selected

Now select a single object in your scene that you want to paint physics colliders for. The object must have a MeshRenderer component on it, this is what we'll paint onto. The Hull Painter window will change to show that this can be used to paint on.
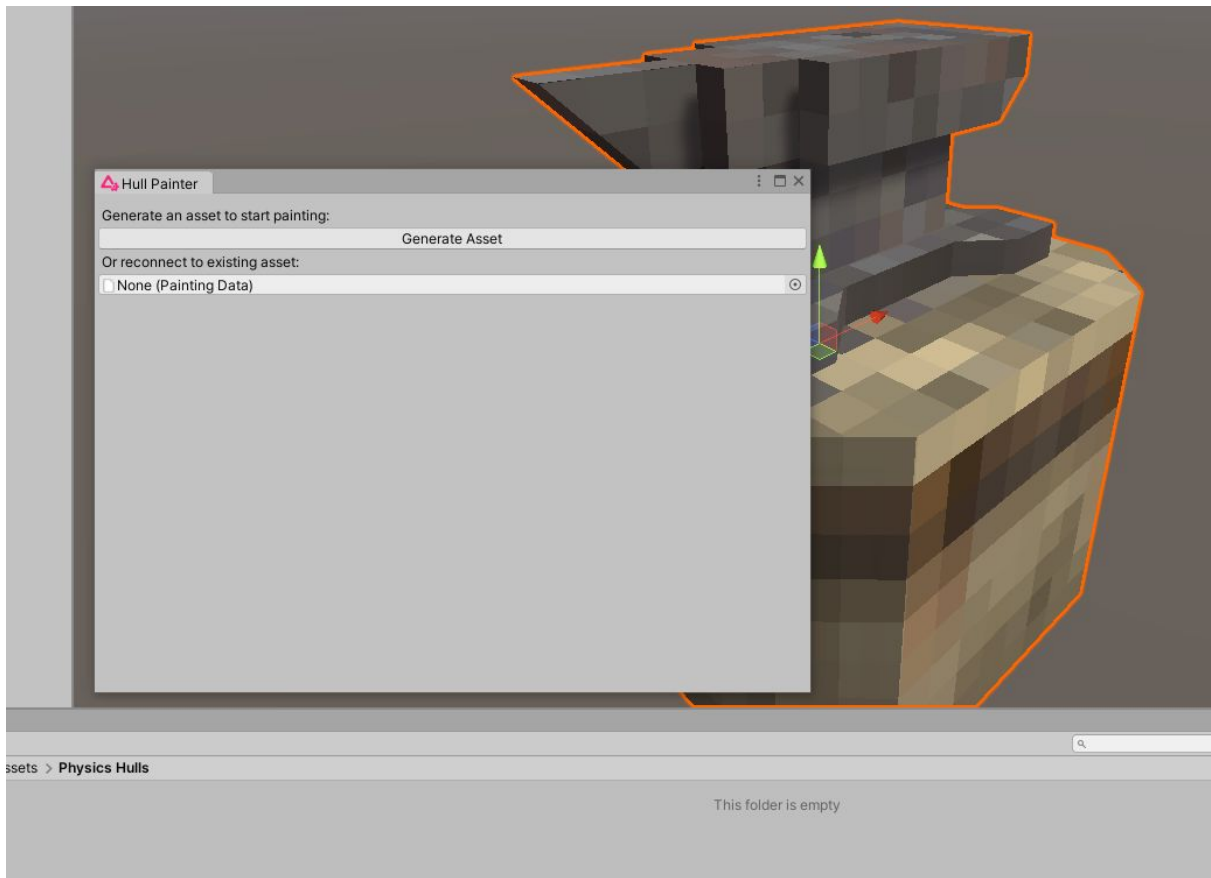
Hull Painter window with valid selection

Now click `Generate Asset` to set this object up for painting. This will do three things:

- Assets for painting and hull data will be created in your project in `Assets/Physics Hulls`. These store the data about the painted surfaces and also the generated collision meshes.
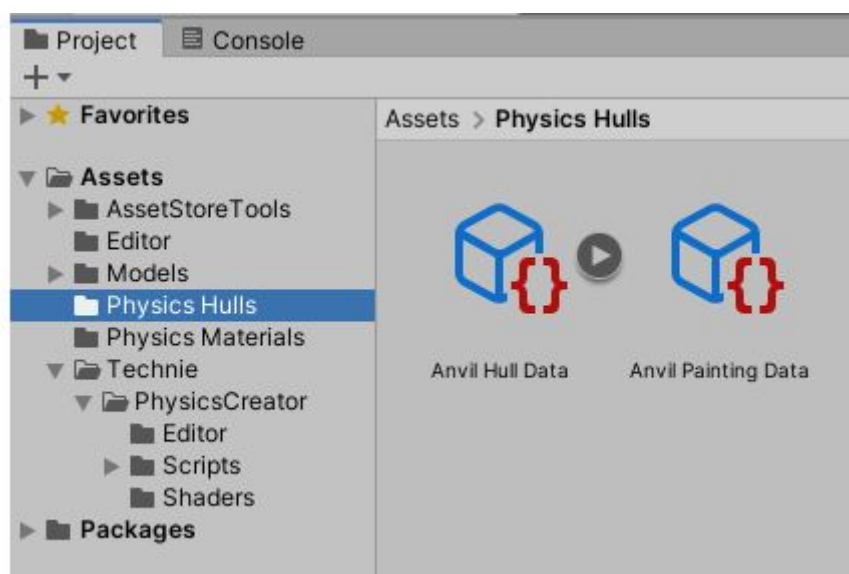
- A `HullPainter` component will be added to the object. This is what connects the assets to this particular object so you can paint on it.
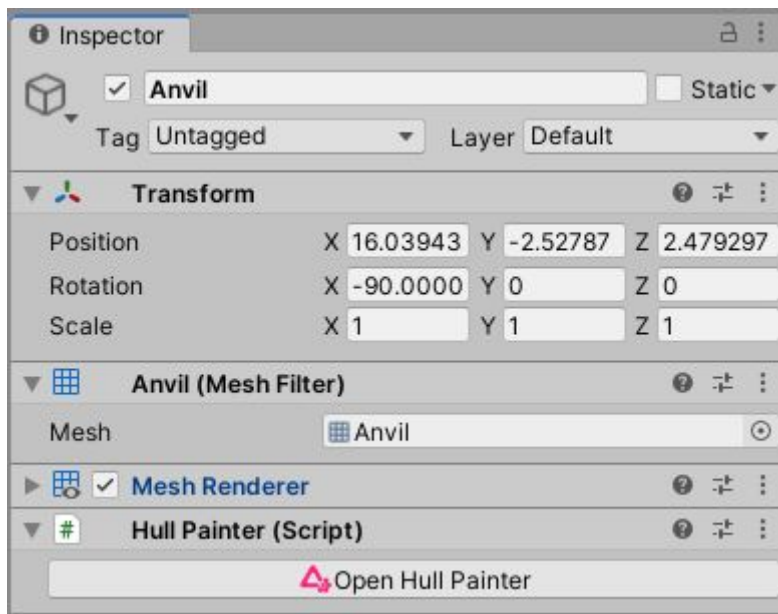
After the assets are generated the window will show you have a single hull ready for painting.
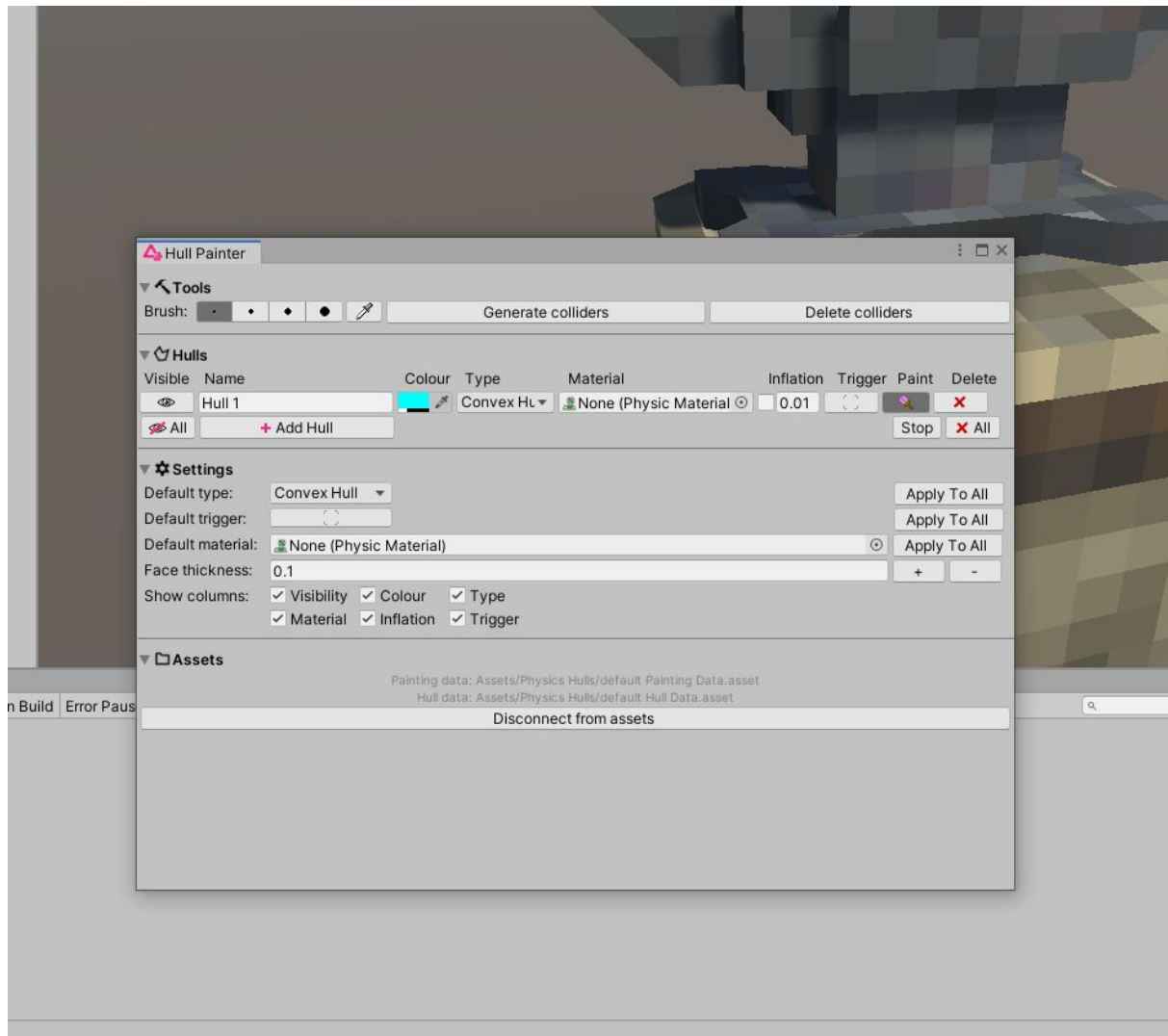
Click and drag on the surface of the object to paint faces to include in the collider. To remove faces click or drag on a face that is already marked. You can also set the name, colour and type of the hull in the window.
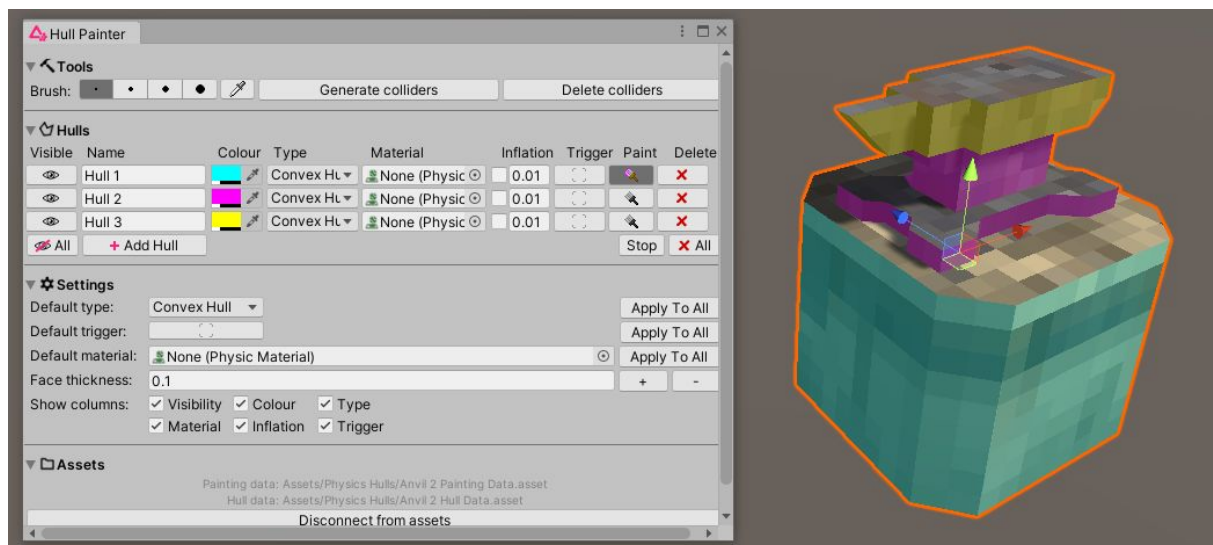
Three hulls painted on one object

More hulls can be added by clicking `Add Hull`, if you have multiple hulls on an object then choose which to edit by pressing the `Paint` button.

Once you're happy with your painting, hit `Generate Colliders` and colliders will be created on the object.

Hull Types

When creating hulls, you have a few types available:

BOX - generates BoxColliders. Very efficient, but can only be axis-aligned so may not be a good fit. Use this where possible.

SPHERE - generates the smallest possible SphereCollider that encloses the hull. Very efficient, use this when you need a smoothly curved surface.
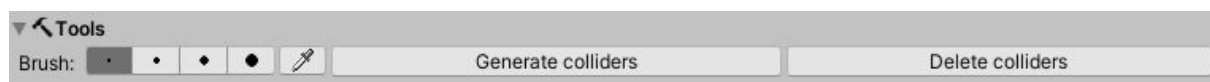
FACE - takes the selected faces, and gives them a thickness (from the 'face thickness' setting). Useful for flat surfaces such as floors, walls, ceilings, etc.

CONVEX HULL - creates a convex hull around the selected faces. Highest accuracy and still fast and allows for rigidbodies. Use for the most awkward objects.

UI
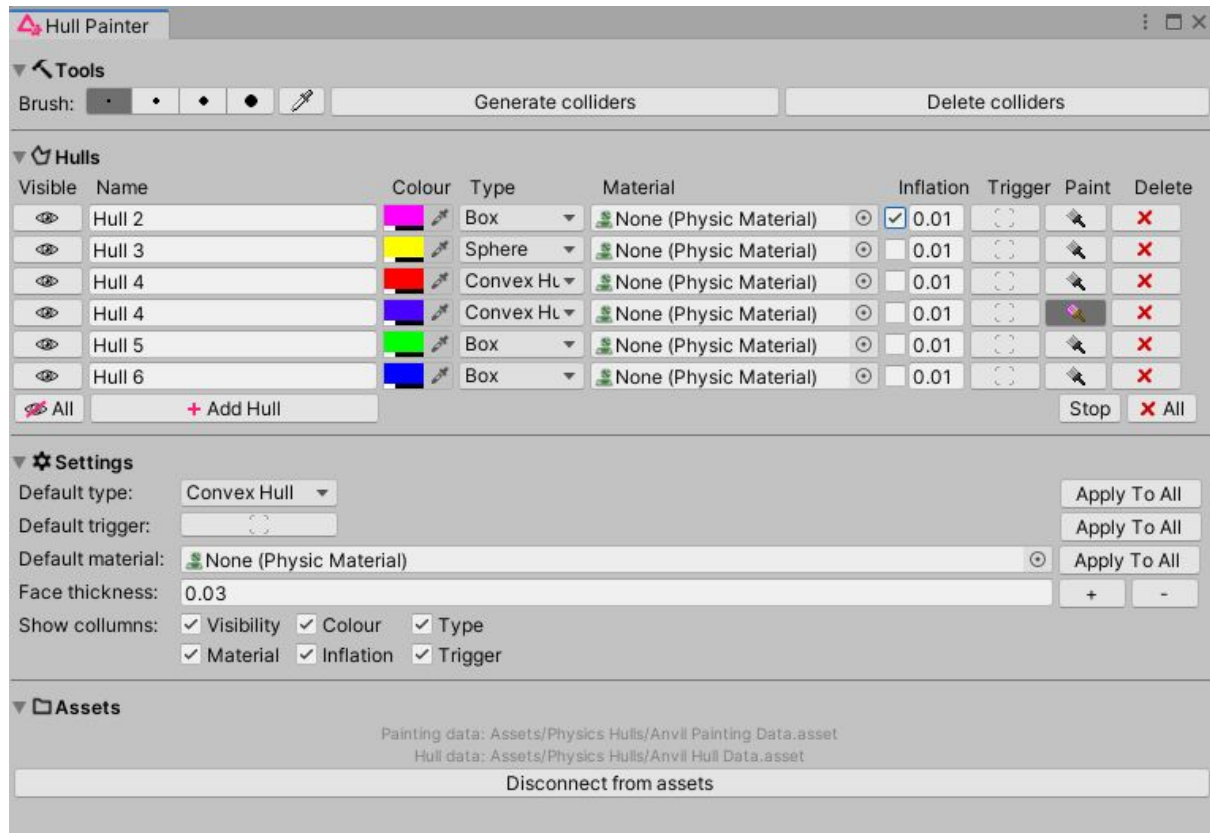
Tools UI

Brush size - choose a brush size to paint faces for specific hulls.

Pipette - used for selecting a hull from the scene view. Select this then click on a hull in the scene view to select it for painting.

Generate Colliders - regenerates the collider components for this hull

Delete Colliders - deletes all colliders generated by this hull (note that this still keeps the Hull authoring data in Hull Painter).

Hulls UI
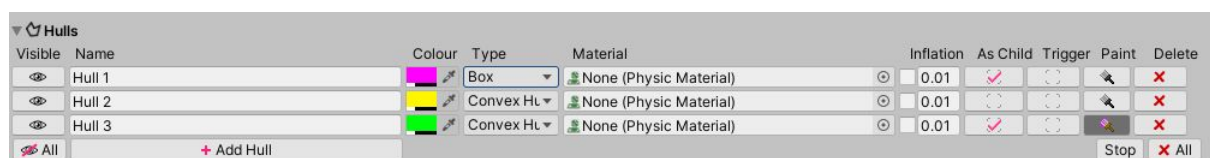
Visibility - toggle whether this hull is shown in the scene view or not

Name - enter a name here so you can easily keep track of different hulls

Colour - choose the colour this hull will use in the scene view

Type - choose the type of collider this hull will generate

Material - drag in a physics material and it will be assigned to the generated collider
Inflation - tick the box to enable hull inflation, and specify an amount to inflate by
Trigger - tick this box to make the generated collider a trigger
As Child - tick this box to create this collider as a child object
Paint - this selects which hull is the active hull for painting
Delete - click to delete this hull
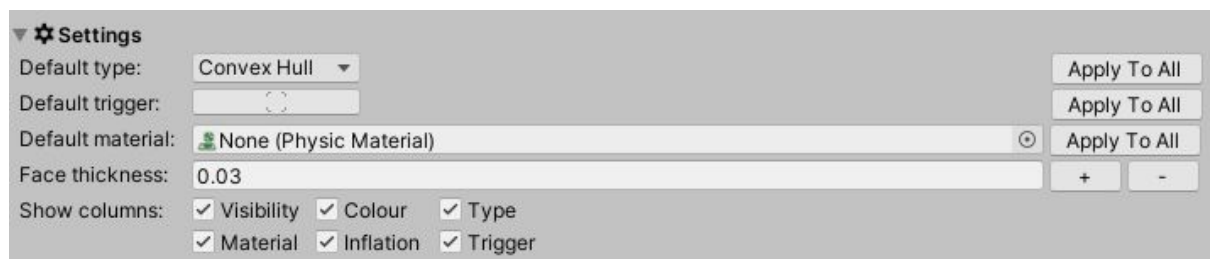
And on the bottom row:
Visibility All - Toggles visibility of all hulls at once
Add Hull - Adds a new hull
Stop - Stops painting and deselects active hull
Delete All - Deletes all the hull authoring and painting data you have created on this object

Settings UI

Default type - this type will be set to any newly created hull (from Add Hull)
**Default trigger** - should new hulls be marked as a trigger by default?
Default material - drag a physics material to use this as the default for new hulls
Face thickness - when generating face colliders, this sets how 'deep' the faces are
Show columns - toggle the columns in the Hulls section to slim down the UI

Apply to All - will apply this setting to all the Hulls you have already created.

Assets UI
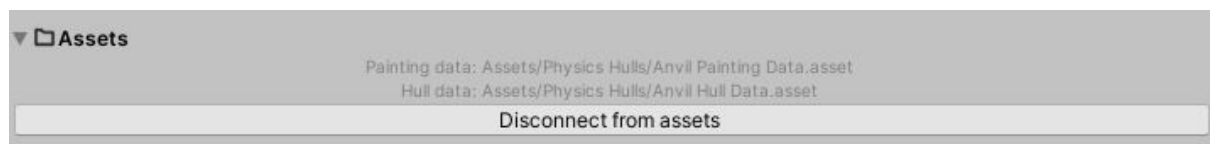
Displays the assets linked to this hull. See 'Disconnecting from Editor Data' section.

Hull Inflation

Hull inflation can be turned on by ticking the 'Inflate' check box in the row for the hull. This will expand the hull outwards in all directions by the entered amount. This is particularly useful for convex hulls, as inflating it will reduce the amount of faces needed and therefor increase the performance for only a small loss in accuracy. If you have highly smooth geometry then you should definitely enable this.

For sphere and box hull types, this will simply expand their size by the entered amount. This can be useful if you want your collision to be larger than the object (eg. to make it easier to shoot/hit an enemy).

For face hull types then the inflation amount will be how far backwards the face is projected to give it it's thickness. In these cases you may want the thickness to be somewhat larger than the default to prevent physics objects 'leap frogging' very thin face hulls if they're moving very quickly.

Due to change in the Unity physics engine in 2019.3, hull inflation is currently disabled in this version.

Disconnecting From Editor Data

Physics Creator has been deliberately written to have zero CPU overhead when your game is actually running. The HullPainter component itself does no work, and only uses a tiny amount of memory for the painting data. Colliders are all created at editor-time and not game startup. So while building your game you can leave the `HullPainter` component on your objects for when you want to further edit your hulls.

If you want zero CPU and memory overhead (such as when you ship your game) you can remove the `HullPainter` component. This means that the painting data asset will no longer be loaded, but all colliders will still work as before.

Reconnecting Editor Data

If you disconnect an object from the painting data you can later reconnect it by dragging the painting data asset into the hull painter window. This will let you paint the hulls again.

Install Location

Collider creator will auto-detect it's install location, so once you've added it to your project you can move it to any folder in your Assets folder. If for some reason the auto-detect fails and no icons are shown then you can set the default install path in the HullPainterWindow.cs file.

Generate Colliders From Selection

```
Window > Technie Collider Creator > Generate Colliders From Selection
```

A useful starting point when you're authoring physics for a level. Clones the current selection and wraps colliders around any object with a MeshRenderer on it. Use this to quickly fill in physics before hand adjusting the trickier areas.

Span Physics

`Window > Techie Collider Creator > Span From Selection`

Tool for guided creation of colliders, especially for level geometry. Select several objects (such as the corners of a wall) and this will try and wrap the tightest possible box collider around them. Very useful for rapidly authoring collision for walls, floors, ceilings, etc.

Tips

Remember that you do not need to paint all the triangles! The hulls will be made as small as possible around those that are painted. Often you only need to paint a few surfaces to get the shape you want, so experiment.
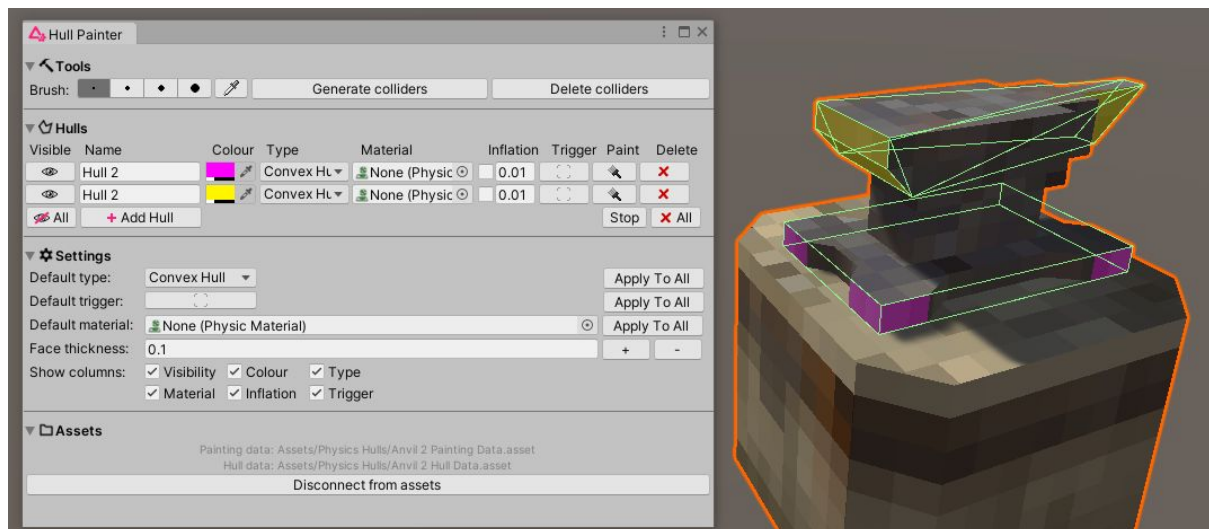
These hulls only have a few faces painted but still produce a suitable collider

If your model is small or contains small, difficult to select triangles then scale the whole model up while hull painting by scaling the transform. Your mouse / camera movement will be more precise. Then just return to normal scale at the end and generate the colliders again.

When you start painting you will add faces if you start your drag over an unpainted face, and subtract if you start over an already painted face. If you need to explicitly add or subtract then hold SHIFT (for add) or CONTROL (for subtract) when clicking.

Use the Box hull type where possible, as this will generate BoxColliders rather than convex hulls. These are quicker for the physics engine to process and do not require an external asset. Use the Convex Hull type for tricky shapes or for when it would save you having multiple box colliders.

Since colliders are generated to always fully enclose painted faces, you do not have to paint every face. Often you only need to paint the faces at the far extremes of the shape you want. This can be quicker to edit in some situations.

The `Generate Colliders` button will update existing colliders after the first usage, so use it often.

If you edit a generated collider manually then the painter will decide you have taken ownership of it and will no longer update it. Delete the collider and press `Generate Colliders` to return ownership.

Known Issues

If you're trying to paint but instead are seeing the selection rectangle then you need to enable gizmos (press the `Gizmos` button at the top right of the Scene view). This is fixed for 2019.1 onwards.

Caveats

Since painting data is stored using triangle indices for efficiency, painting data will be lost if the original mesh changes. You will need to repaint your hulls for the new mesh.

Problems? Feature Requests? Bugs?

Send an email to `technie@triangularpixels.com` for support and feature suggestions.

Please include your Unity version, and OS in any support emails. If reporting a bug then if you include a (small!) reproduction project with instructions on how to reproduce your bug then we'll be able to fix things *much* quicker. Thanks!