



Transform & Edit

From basic transformation tools for objects, to the pose tool for animation rigs and the edit node for reshaping geometry, there are a number of different tools that let you use interactive handles in the viewport. In Houdini, these handles are tied closely to the node you are working with.

TRANSFORM TOOLS

The transform tools give you handles that you can use to manipulate objects or reshape geometry. When you transform objects, the parameters at the object level are updated to reflect your changes.

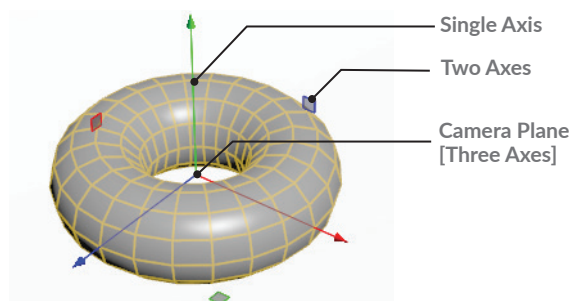
- Move
- Rotate
- Scale
- Pose
- Handle

T
R
E
Ctrl-R
Enter

The **Handle** tool gives you access to handles that are specific to your selected node. While using these tools, you can re-select by **pressing and holding S**, making a new selection then **releasing S** and continuing to transform.

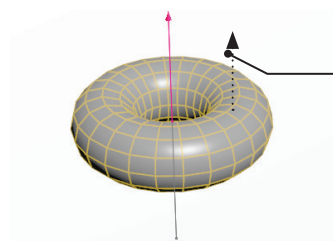
TRANSFORM HANDLES

When you are working with a **Move** handle you can work with a single axis, two axes or move along the camera plane using the center. **Rotate** and **Scale** handles offer similar controls.



MMB TRANSLATION

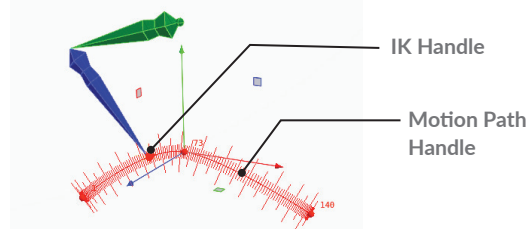
If you don't want to click directly on handles, you can use the **Middle Mouse Button** in open space combined with a drag to move it along the construction plane. To change this to translate along nearest axes go to **Edit > Preferences > Handles** and set Translate Handle to **Map Drag to Axis**.



MMB-Drag up/dwn
Moves along Y axis if the preference is set to Map Drag to Axis

POSE TOOL

When you are animating, you can use the **Pose** tool to work with bones and to display motion path handles that reveal the motion of an object. You can then use tangent handles and keyframe points to modify the motion in the viewport.



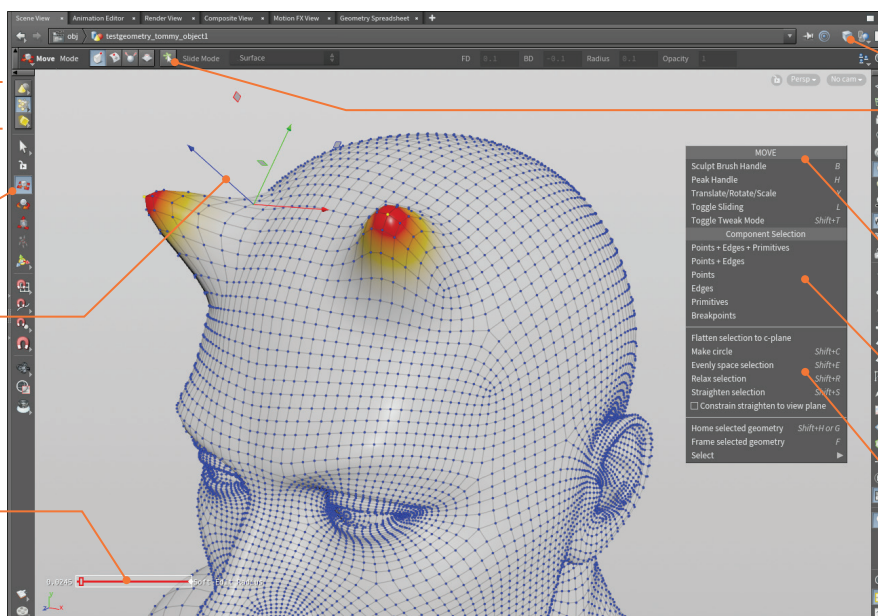
EDITING GEOMETRY

Edit | Components You can choose the components you want to edit using these buttons. The **Points** option has been chosen here.

Move Tool - The **Move** tool lets you translate the selection using the Scene View handle.

Move Handle - This handle lets you move along one axis using the lines or two axes using the square dots. **RMB-click** on the handle to access the handle options.

Soft Edit Radius - When moving points on a surface, you can use this radius value to create a soft falloff as you move the points. The **Soft Edit Radius** doesn't work with primitives or edges.



EDIT NODE

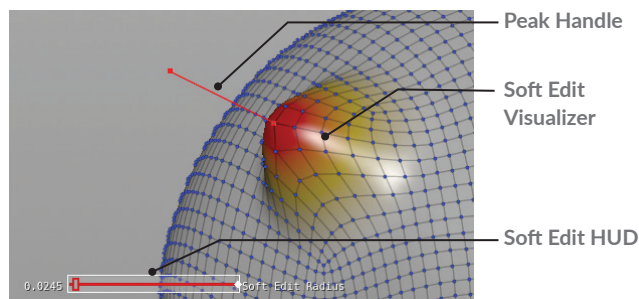
If you try to move geometry components then an **Edit node** is placed down to accept your transformations. In addition to transforming the geometry, you can slide on surface, work perpendicular to the normals or sculpt the surface.

- Edit
- Slide on Surface
- Peak
- Sculpt

T/R/E
L
H
B

SOFT FALLOFF

When you are transforming points, you can use the **Soft Edit Radius** to create a falloff. There is a visualizer that is evoked to show you where the falloff is occurring on the surface.



EDIT OPTIONS

If you **RMB-click** while in the Edit node, you can access options for transforming your selection. You can make a circle or straighten the selection. These options work with points and edges but not always with primitives.

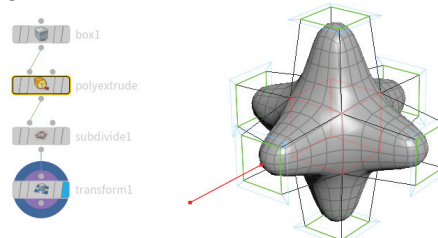
- **Make Circle**
- **Evenly Space Selection**
- **Relax Selection**
- **Straighten Selection**

Shift-C
Shift-E
Shift-R
Shift-S

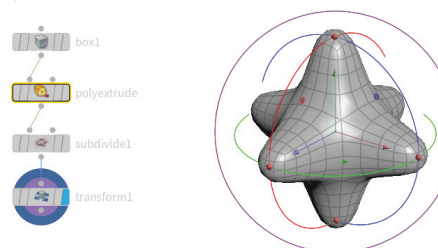
HANDLE TOOL

After using a shelf tool, you often find yourself in the **Handle tool**. Or you can select a node in the network and press the **Enter** key in the Scene view to go into the **Handle tool**. This brings up a handle which focuses on the specific parameters for the selected node such as the **distance** parameter on a **polyextrude** node.

Show Current Operator - By default when you select a node other than the display node, it becomes the current node and you get a wireframe display of the geometry. You can then use the handle to manipulate this intermediate node while evaluating the results on the shaded surface.



Show Display Operator - Another option is to always show the Display Operator. In this case, selecting a node in the chain does not show the wireframe and the handles stay focused on the display node.



You can change parameters in the parameter pane for the current node but the handles will continue to work with the parameters on the display node.

Shading Options - The shading options determine what you see in the Scene view. In this case, we are using Smooth Wired Shading.

Sloppy Selection - Three of the component buttons can be selected at the same time if the Edit node is using Sloppy selection which makes all of them available for a more fluid selection process.

RMB Menu - This menu gives you access to Edit tool options such as which type of edit you want to focus on. This information is also available on the top bar of the Scene view.

Component Selection - You can also select the component type using this menu. This offers you the same options you would find on the main toolbar.

Edit Options - You can use this menu to edit the components using operations such as **Make circles** and **Straighten** the selection.

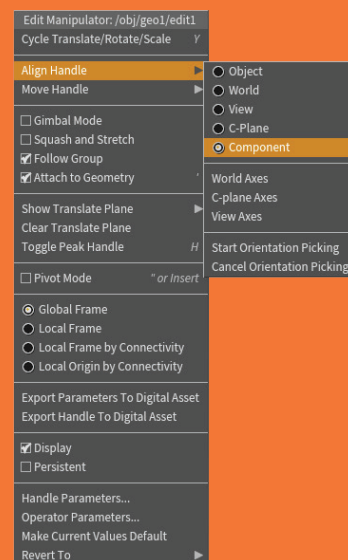


HANDLE OPTIONS

All handles have a menu that can be accessed by **RMB-clicking** on any part of the handle.

This menu gives you options for aligning the handle, detaching it from the parameters of the node, pivot mode and more. You can use these options to customize how the handle works.

You can also keyframe parameters on a handle and promote all parts of the handle to a Digital Asset. By promoting the parameter the handle will be accessible at the asset level.







Modeling Tools


Houdini has a lot of tools for creating, shaping and deforming geometry to achieve a desired look. Here are just a few of the many tools you will use on a regular basis when building models in the geometry, or SOP, context of Houdini.

CREATION

To start creating geometry, you can start with some basic shapes or draw a curve. In each case you get an object with a geometry/SOP node inside with the tool's name. You can access these on the **Create** shelf or in a radial menu.


 **Primitives** - Houdini includes Box, Sphere, Tube and Torus primitive shapes along with a variety of Platonic solids.


 **Grid** - The grid tool offers a great starting point for a wide range of models. You can set its shape and size at the geometry level.

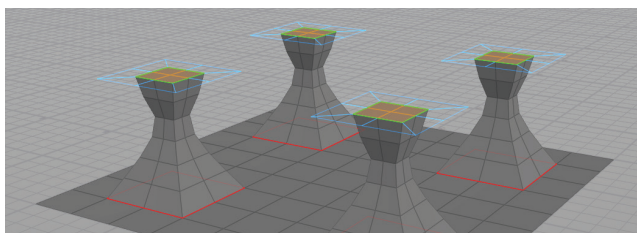
 **Curve** - Draw a curve by laying down control points then create a Bezier, NURBS or poly curve.


POLYGON MODELING


Polygons are one of the most popular geometry types especially in video game projects where they are mandatory. Houdini has a comprehensive set of poly modeling tools which you can use to develop your models.

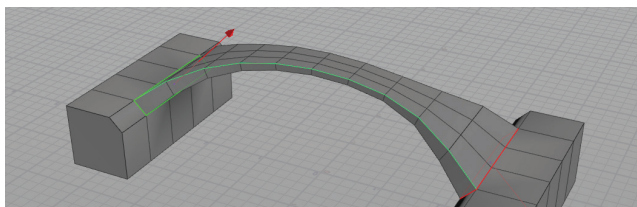
 **PolyDraw** - This tool lets you interactively draw a polygonal mesh on the construction plane or by snapping to existing geometry.


 **PolyExtrude** - Push or pull on one or more polygons to reshape the geometry. Control the extrusion profile to get a wide variety of shapes.





 **PolyBevel** - Bevel selected edges to create chamfered or rounded bevels. You can often use the output group from a previous node such as Polyextrude or Boolean to automatically find the right edges.


 **PolyBridge** - Connect two sets of polygons with control over the shape of the bridge.



 **PolySplit/Edge Loop/Knife** - These tools let you split polygons to add more detail to your model.


 **PolyExpand 2D** - Take curves and edges that sit on a 2D plane and creates geometry based on a desired offset value.


 **PolyReduce** - Create different levels of detail by reducing the number of polygons while preserving quads and UVs.


 **PointWeld** - Interactively snaps groups of points to another target point, and merges them.


UTILITY NODES


Because of Houdini's procedural nature, modeling actions like copy, clip and mirror create nodes in your network. This can make it easier to go back and make changes later on.

 **Clip** - Cut your model based on a clipping plane. You can set the direction of the clip and whether you keep one half, the other or both.

 **Mirror** - This tool flips the geometry based on a clipping plane. There is an option to fusing the points after mirroring.

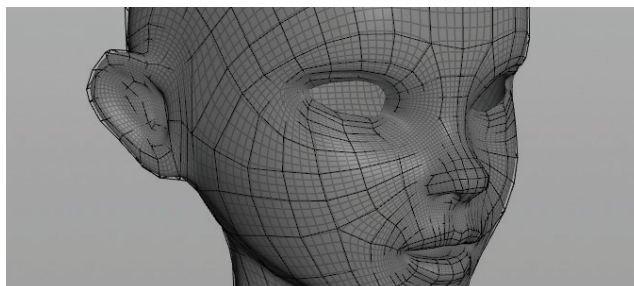
 **Copy and Transform** - This node will let you create multiple copies based on transformation values.

 **Blast** - This node lets you delete polygons from your model. You can choose to remove or keep the selected polygons. If you press the **Delete** key when points or a polygons are selected they will be blasted.

 **Dissolve** - This tool lets you remove edges without breaking up the surrounding geometry. Pressing the **Delete** key when an edge is selected will dissolve it.


SUBDIVISION SURFACE MODELING


In Houdini, you can model with polygons then **display** and **render** them as subdivision surfaces using options found on the **Render** tab on the object's parameter pane. You can also create a **Subdivide** node at the geometry level to add polygons to give you a more detailed topology to work with.




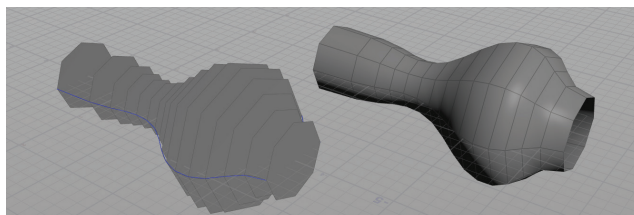
SURFACING TOOLS

There are tools in Houdini that will take profile curves and build surfaces. Those input curves can be either bezier, polygonal or NURBS or a mixture of them.

 **Revolve** - Create geometry by revolving a profile curve around an axis. There is a handle available for tweaking the results.

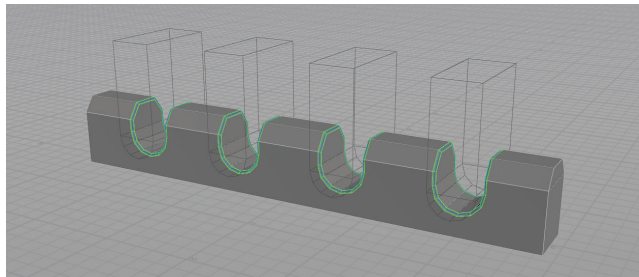
 **Skin** - Take a series of profile curves and turn them into a surface.

 **Rails** - Copy one or more profile curves along two or more rail curves, then Skin the results to get a surface.



BOOLEANS

Subtract, Union or Intersect geometry using the Boolean tool. This node can handle very complex topologies and can be used to break up a surface for destruction using rigid body dynamics. This often creates more realistic results compared to the Voronoi-based **Shatter** node.

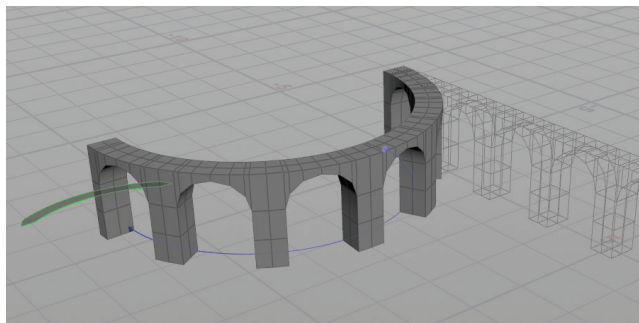


The Boolean tool can create output groups that you can use to feed other nodes such as the **Polybevel** node. This way any updates you make to the boolean will update properly when it feeds into the second node.

DEFORM TOOLS

While you can shape your geometry by editing points directly, there are times that you need a more generalized approach. The following nodes provide options for shaping your geometry procedurally.

Bend - This node lets you set a capture range and direction then bend, twist, taper and squish the encompassed geometry.



Lattice - This builds a lattice around your geometry then lets you edit points on the cage to reshape it. You can also use a custom cage.

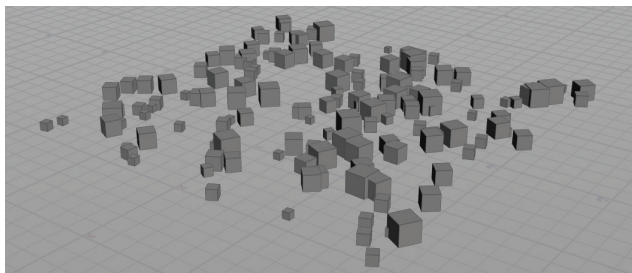
Mountain - Apply a noise function to deform the surface to create a random result. The points are actually being moved with this node.

Ripple - This node creates a ripple shape in your geometry.

Waves - This node adds noise functions to create a wave-like pattern that animates over time. Perfect for creating realistic oceans.

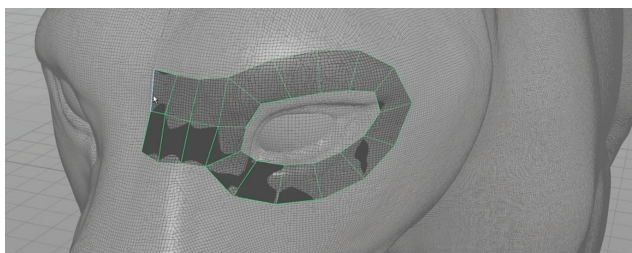
COPY TO POINTS + SCATTER & ALIGN

A typical Houdini workflow is to **Scatter & Align** points on a surface then **Copy to Points**. Attributes for scaling and rotating the objects can then be applied to create a more organic result. This is often used to create landscapes with trees and rocks.



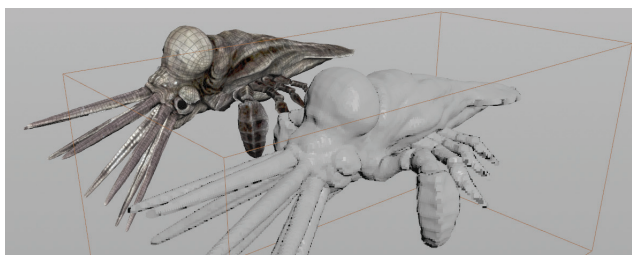
TOPOBUILD

Houdini has a **Topobuild** node that lets you draw polygons directly onto high-resolution geometry that you either scanned or created in an application such as Pixologic's Z-Brush. You can create a cleaner topology for animation then bake the details from the original model into a normal map.



VOLUMES

Volumes allow you to store values for voxel, or three dimensional pixels, in a space. These are often used to support collisions when using dynamic tools or to create clouds. They can also be used for modeling to combine multiple shapes into a single volume which you then convert back to a surface.



GEOMETRY TYPES

Houdini supports a number of different geometry types including **Primitives**, **Polygons**, **NURBS** and **Beziers**. You can **Convert** back and forth between them and you can have more than one geometry type merged together in a single object.

Polygons models can be set up to display and render as **Subdivision Surfaces** using **PIXAR's OpenSubdiv** standard. Both Subdivisions and NURBS will render in Karma and Mantra as perfectly smooth without relying on any tessellation settings.

