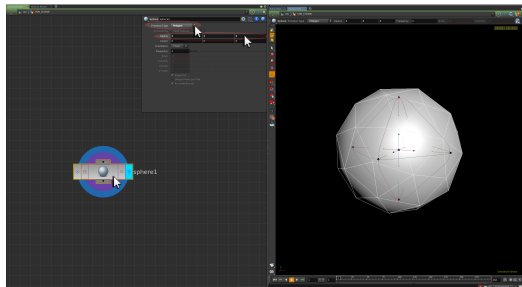


VDB Modelling Homework – Houdini 14

VDB COOKIE MODELLING

Both the **Cookie SOP** and the **SurfSect SOP** can be used to cut out precise sharp holes in geometry. There are times however when more organic forms are required with blending between the intersecting shapes. Blended Cookie (or Boolean) operations can be done in Houdini using **VDB SOPs**. In a **new Houdini scene**, create a piece of geometry and inside it, **delete** the **default File SOP**. In its place create a **Sphere SOP**, specifying in its **parameters**:

Primitive Type	Polygon		
Radius	3	3	3

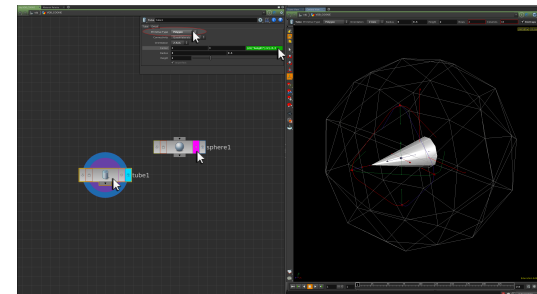


Template the **Sphere SOP** and alongside it create a **Tube SOP**. In the **parameters** for the Tube SOP specify:

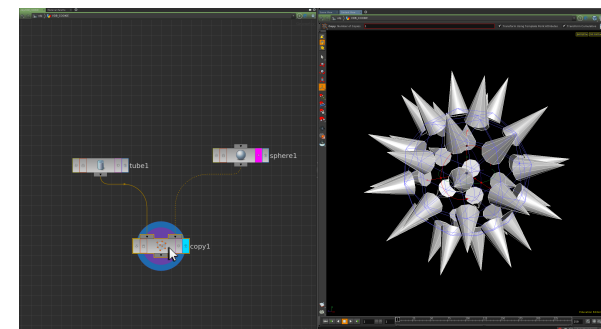
Primitive Type	Polygon	
Orientation	Z Axis	
<input checked="" type="checkbox"/>	End Caps	
Radius	0	0.5
Height	2	

RMB on the **Height parameter** and from the resulting menu choose **Copy Parameter**. **RMB** on the **Center Z parameter** and from the resulting menu choose **Paste Copied Relative References**. Modify this channel reference expression to read:

Center **0** **0** **(ch("height") / 2) - 0.3**



This will ensure that the growth of the tube using the height parameter takes place from just behind the origin point of the scene facing the Z Axis.

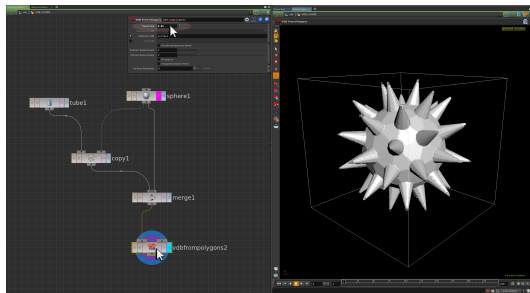


Append a **Copy SOP** to the **Tube SOP**, wiring the **output** of the **Sphere SOP** as it's **second input**. This will create a ball of spikes.

VDB Modelling Homework – Houdini 14

Use a **Merge SOP** to combine the output of the Copy SOP with the Sphere SOP, and **append** to the Merge SOP a **VDB From Polygons SOP**. This will convert any incoming polygon geometry into a Volume based representation. In the **parameters** of the VDB From Polygons SOP specify:

Voxel Size **0.05**



A Voxel is a 3-Dimensional pixel (a box rather than a square), and adjusting the Voxel Size parameter controls the resolution of the resulting volume geometry (ie the number of Voxel boxes contained within the bounding box wireframe). This entire bounding box is filled with Voxels; however only those intersecting with the incoming geometry are rendered visible.

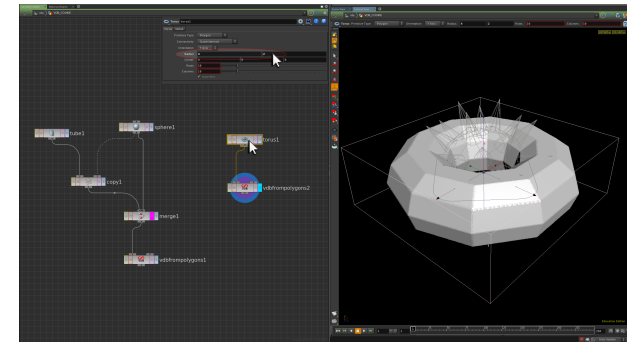
Template the Merge SOP and as a new network create a Torus SOP. In its **parameters** specify:

Primitive Type **Polygon**
Radius **4** **2**

As with the spike ball network, **append** a **VDB From Polygons SOP**. In the **parameters** of the VDB From Polygons SOP specify:

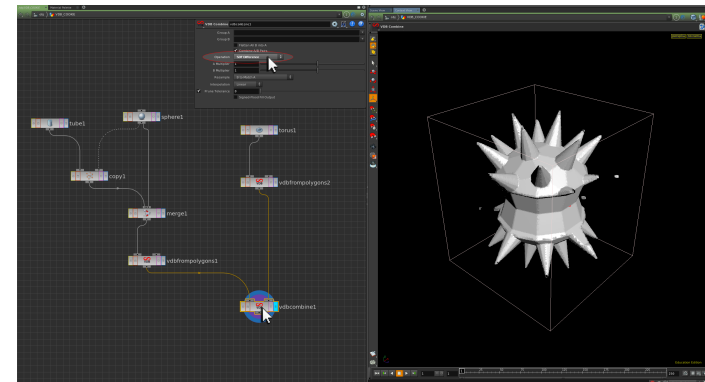
Voxel Size **0.05**

This will create a second piece of volume geometry that can be cut away from the spike ball.



Create a **VDB Combine SOP**, and **wire** the **output** of each **VDB From Polygons SOP** into its **two inputs**. In the parameters for the VDB Combine SOP specify:

Operation **SDF Difference**



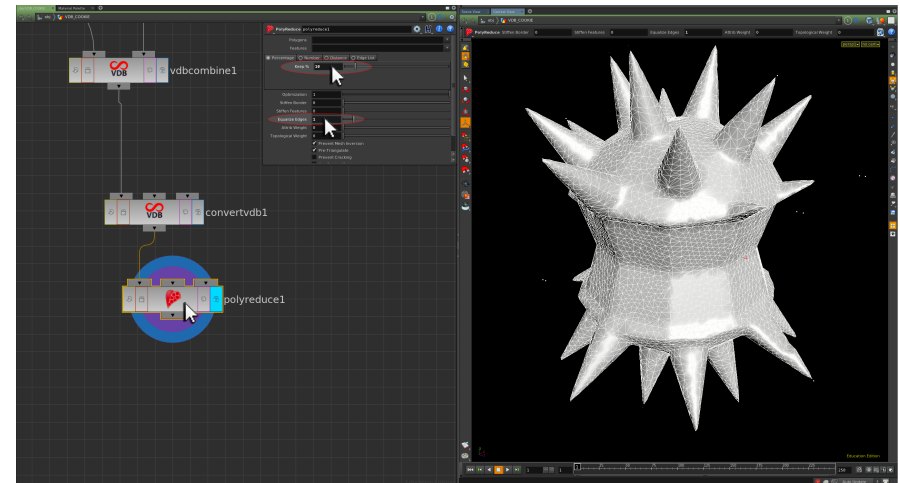
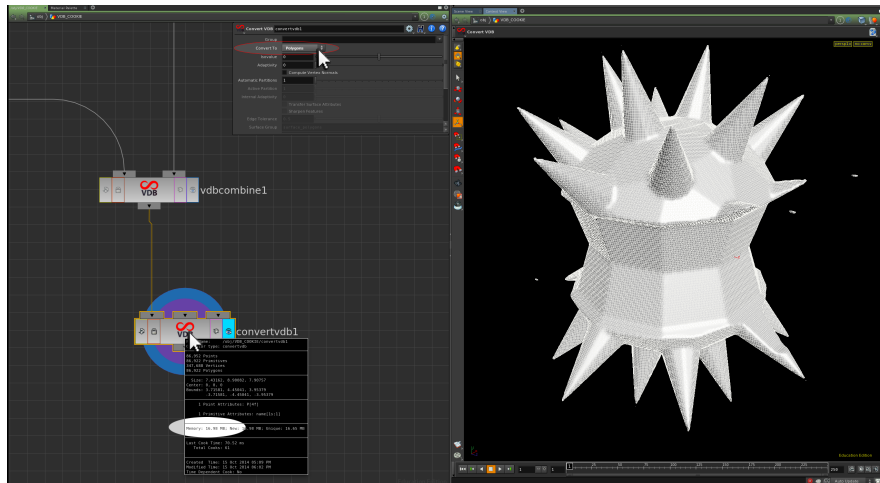
This will cut out the torus volume from the spike ball volume.

VDB Modelling Homework – Houdini 14

Append a **Convert VDB SOP** to the network, and in its **parameters** specify:

Convert to **Polygons**

This will create a unified polygon mesh from the intersecting volume geometry.



Creating Cookies (or Booleans) using VDB SOPs is a useful way to create naturalized organic shapes, whilst retaining a unified mesh. In this example, the parameters of the Tube SOP, Sphere SOP or Torus SOP could also be animated to create a morphing effect.

NOTE: MMB on the **Convert VDB SOP** reveals the **large memory overhead** that such a dense polygon mesh will create. This can be minimized by using a PolyReduce SOP.

Append to the Convert to VDB SOP a **PolyReduce SOP**. In its parameters specify:

Keep % **10**
Equalize Edges **1**

This will reduce the number of polygons to a more reasonable memory overhead, whilst retaining it's shape (thanks to the Equalize Edges parameter).