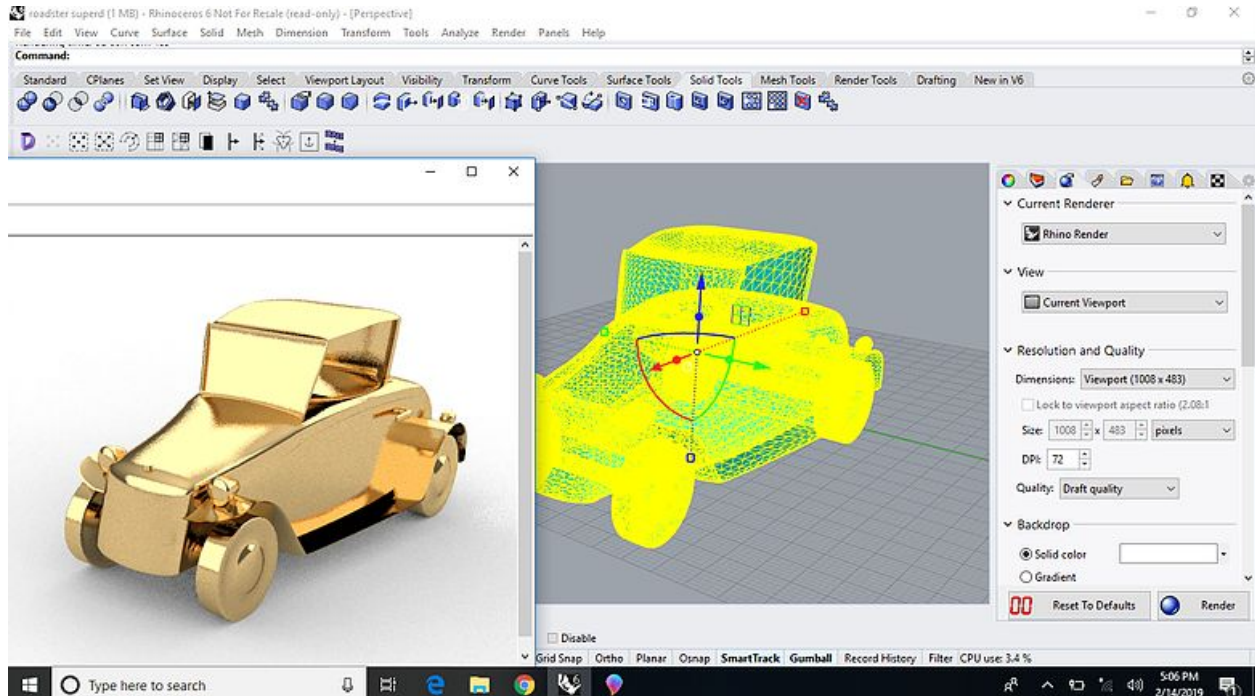


SuperD for Rhinoceros 6

User Guide



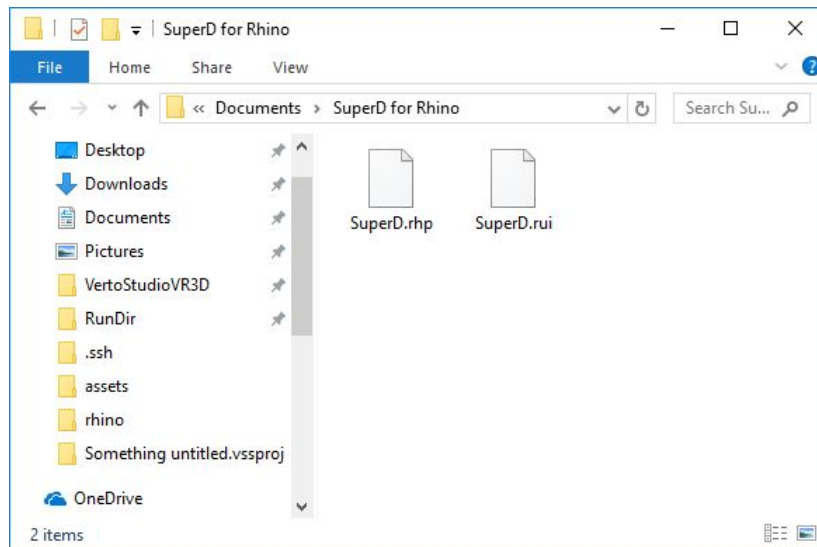
Introduction

Welcome and congratulations on beginning your adventure with the next generation of conceptual 3D modeling. SuperD features an advanced subdivision-style (SubD) interface that produces superior geometric surfaces. The SuperD plugin enables you to define your 3D model with easy to edit, control-cage structures. It then generates a high quality surface in real-time. Any SuperD mesh object can be converted into a polysurface using the included NURBS conversion feature.

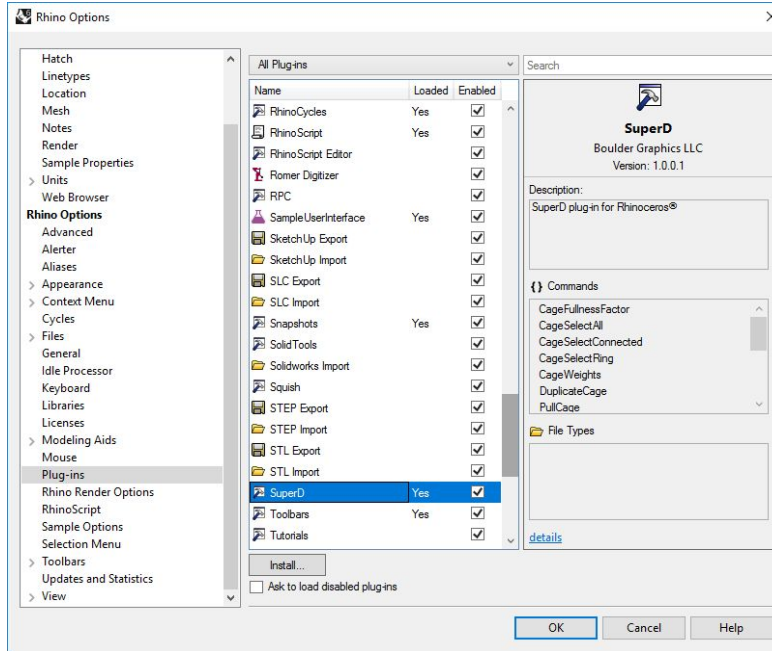
Installation

Note: When running on older versions of windows, you'll likely need to install the Visual Studio 2017 redistributable package found [here](#)

To get started, locate your install package .zip file and extract it to a safe location (you should not move the plugin files from this location after installation).



Next, start Rhino and navigate to *Tools* -> *Options*. On the left of the options pane, select *Plugins*, and click the *Install* button. Navigate to your *SuperD.rhp* file and select it.





You should now be prompted for your license key. Enter your key and you should be ready to go!











Getting Started

The SuperD Toolbar



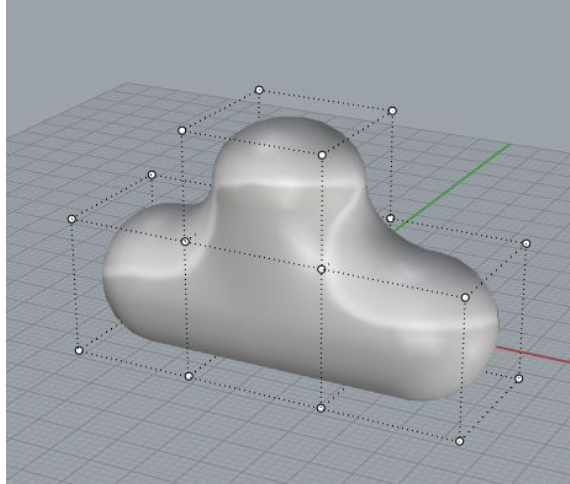
Included with the SuperD plugin is a *SuperD.rui* toolbar file that should automatically install when your plugin is activated. Each button is a shortcut to a SuperD feature command. The commands are discussed briefly below. For information on some of the more complex functions, refer to the **Editing** section below.

Icon	Rhino Command	Function
	SuperD2	Converts a selected Rhino Mesh type to a SuperD mesh, the Control Cage. Note that the input object must be a mesh.
	PointsOn	Displays Control Cage and points for a SuperD mesh type. This is a shortcut to the existing Rhino <i>PointsOn</i> command.

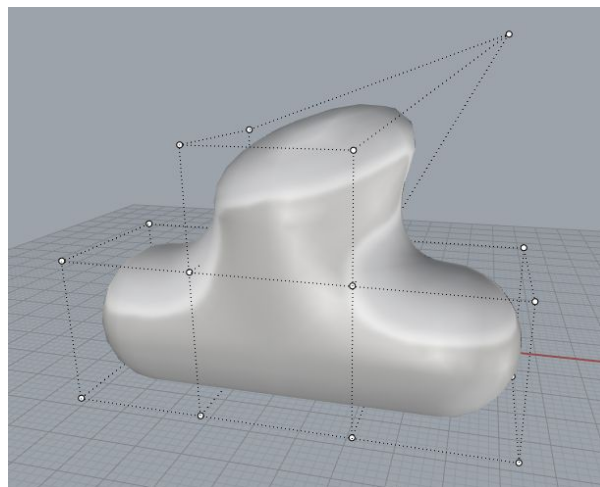
	CageSelectAll	Selects all control points for the selected SuperD mesh.
	CageSelectConnected	Selects all connected points in a component for the selected control point(s).
	CageSelectRing	Selects all points in a edge ring defined by two selected control points. The ring are connected points perpendicular to the pair selected.
	SubdivideCagePreserveQuads	Subdivides the selected control cage edges. It perpetuates the subdivision to keep faces four-sided..
	SubdivideCage	Subdivides the selected control cage edges. Three sided faces may occur, No perpetuation.
	DuplicateCage	Duplicates the selected control points & faces.
	PullCage	Initiates an extrude operation on a selected control face.
	CageWeights	Modifies the sharpness of the surface associated with the selected control points.
	SharpenOutsideEdges	For the selected SuperD Mesh, modifies vertex weights so that surface fully extends to all outside edges.
	SuperD2NURBS	Performs a conversion of a SuperD Mesh object to an exploded polysurface.

Control Cages

SuperD creates and modifies surfaces through editable structures known as *Control Cages*. Control cages define a polyhedral structure that the underlying mesh will approximate. Control cages are made up of *Control Points* which are connected to one another by edges and faces much like a 3D polygon model. You can think of a control cage as a scaffolding that is used to construct your final model.



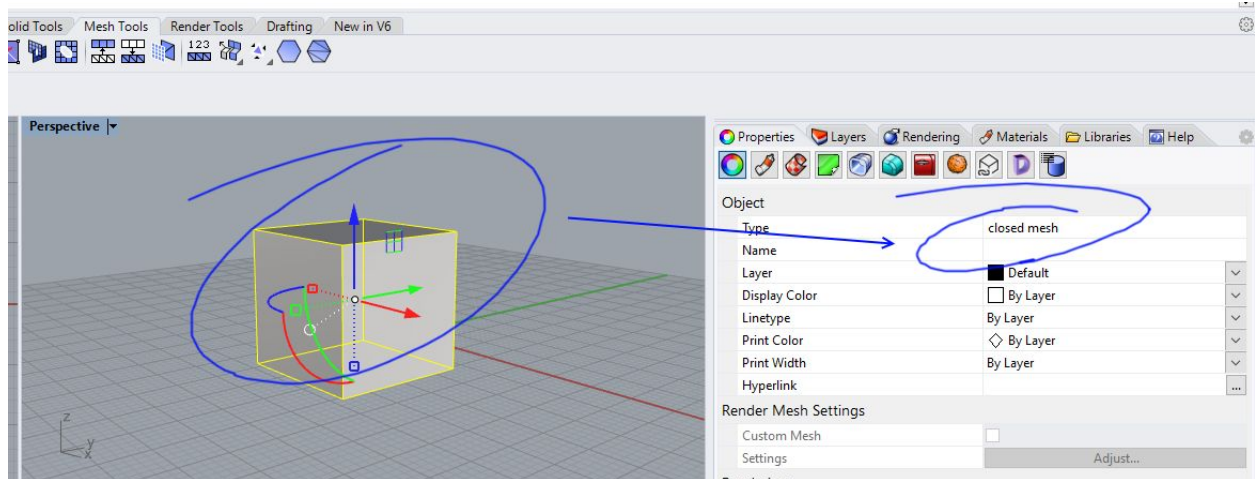
Manipulating control points of the control cage will modify the mesh surface model, as shown below.





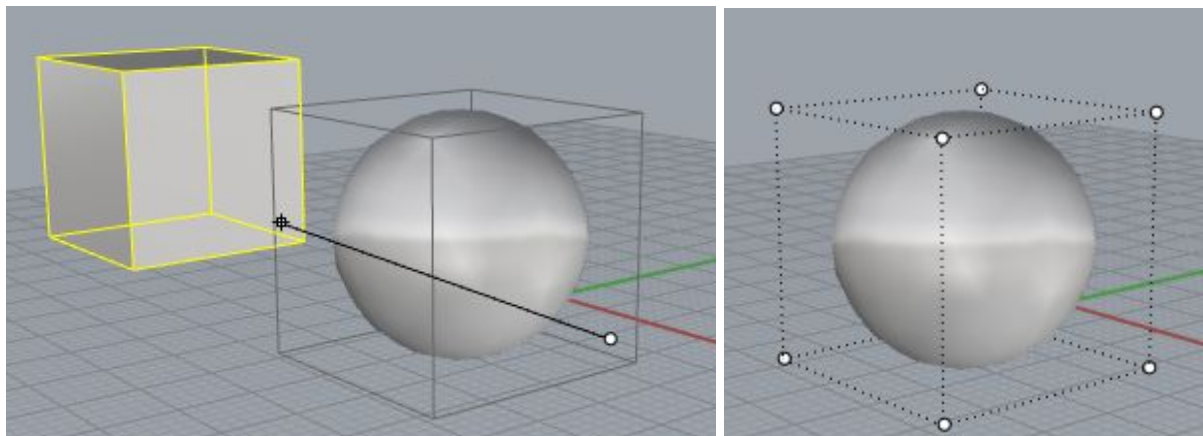
There are several settings and factors that affect the final shape and resolution of the surface. They are discussed in detail in the later sections.

Creating Control Cages

To create your first control cage, obtain a rhino mesh type either from scratch via the Mesh tools or by converting an existing polysurface to mesh via the *Mesh from surface* rhino feature. Ensure that the surface has a mesh type when selected.



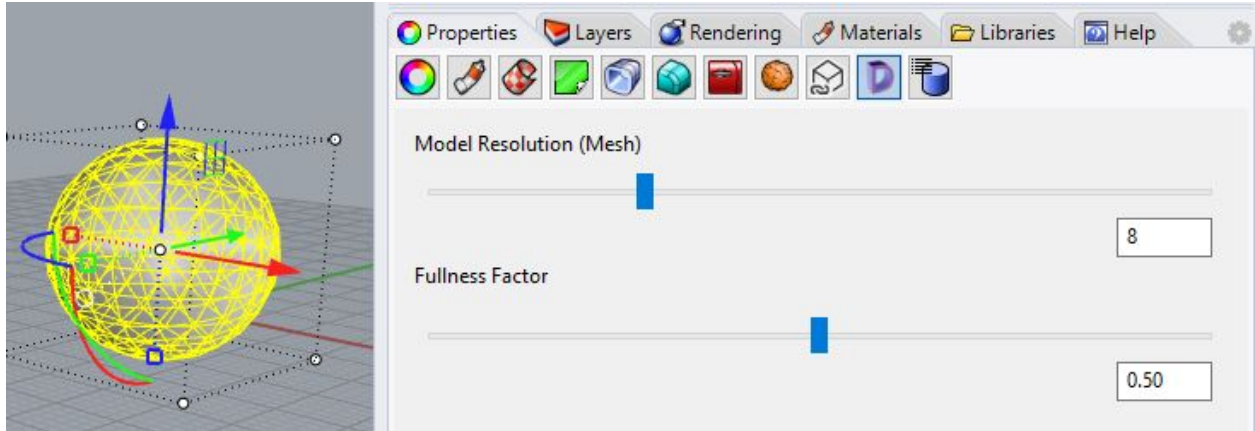
Next, select the SuperD () icon on the toolbar to create a SuperD representation of the mesh. Move the SuperD mesh and delete the source mesh object. Finally, to edit the control cage select the new SuperD mesh and then control points icon (). this will activate selected control points to edit. Congratulations, you've just created your first SuperD object!



Tips: SuperD objects look best when low-poly meshes with minimal use of triangles or non-4-sided faces are used as control cages. Feel free to experiment and try various source models until you find the workflow that works best for you!

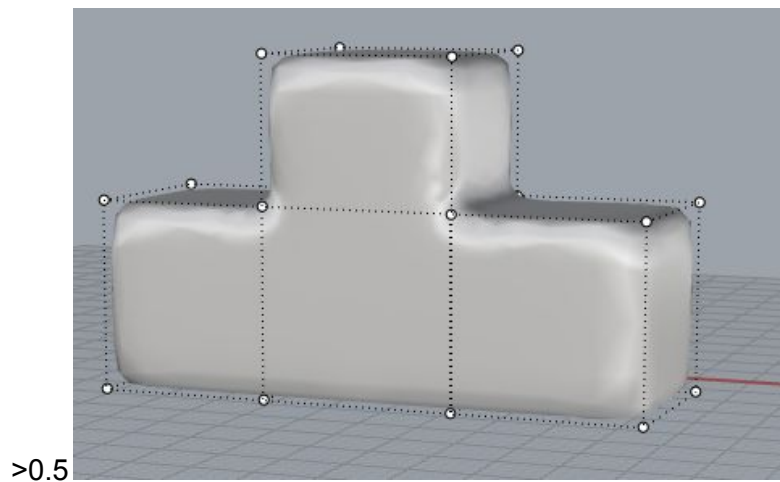
SuperD Mesh Properties

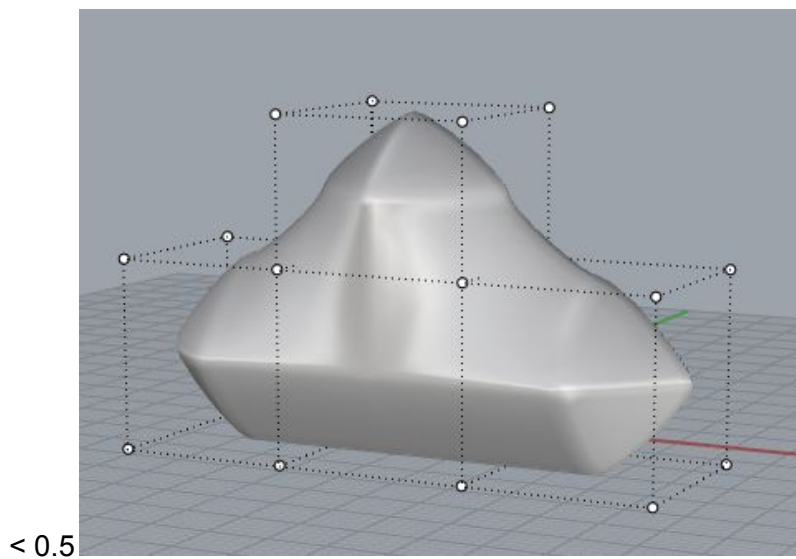
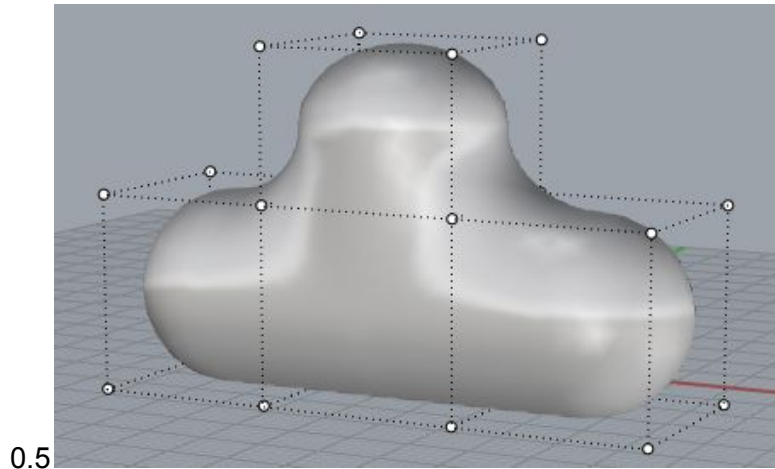
Every SuperD Mesh object has global properties that can be modified to affect its overall appearance. To see these properties, select a SuperD object and then select the SuperD icon on the right properties tab.



Model Resolution defines how many polygons are used to render the displayed surface model from the control cage. Very high values will provide nicer quality, but will also increase computation time during editing.

Fullness Factor determines how close the model is to the control cage. Higher values will “fatten” the surface and bring it closer, where lower values suck the surface in further from the cage. The default value of 0.50 provides optimal roundness for most surfaces. Shown below is the same SuperD object with different fullness factors applied.




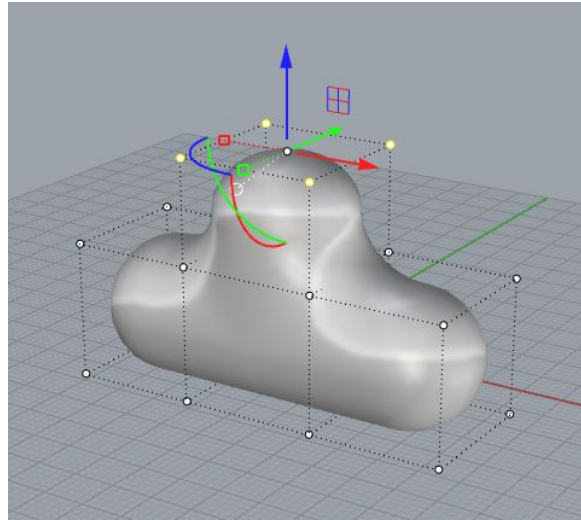


Editing


Editing SuperD objects is very similar to most polygonal modeling software, with one important caveat: all edits are performed on the control cage structure. Therefore, all the editing functions that come with SuperD are designed to work on selections of control points. Manipulating control points is the core of SuperD Editing. Furthermore, all rhino transform functions (such as the gumball) function as intended when operating on selections of SuperD control points. Some SuperD editing functions such as *Pull* or *Subdivide* operate on control faces and edges of the control cage. However, when providing inputs to these commands, all you need to do is select the control points that make up the desired edge or face selection.

Transformation

To transform control cage point selections, enable control points for a SuperD object (), then select a set of control points, which enables the Gumball. At this point, Rhino editing practices apply, and changes to control points will be used to modify the underlying surface by SuperD. Similarly, when selecting the SuperD surface itself, all transforms to it will be reflected to its entire set of control points.





Duplication

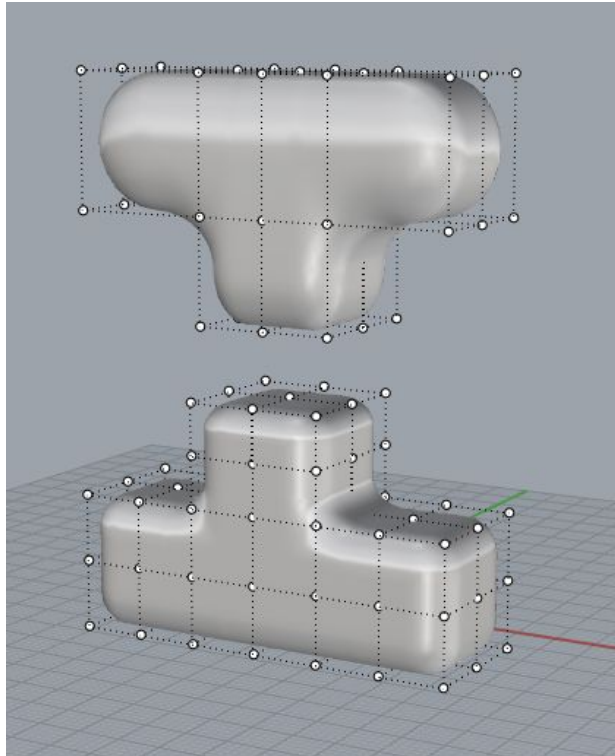
All-or-part of a SuperD control cage can be duplicated by clicking on the duplicate button (). Only completely closed control cage selections will retain their closed properties when being duplicated; otherwise selections may appear open when duplicated. Additionally, one can copy an entire SuperD mesh object to the clipboard and paste it into the same document. This will result in an entirely separate control cage for the second object.

Deleting


Control points (and their associated control faces) can be deleted by simply pressing Delete (*Edit -> Delete*) on selected control points. Note that deleting a partial control point selection may cause a previously closed surface to become open.

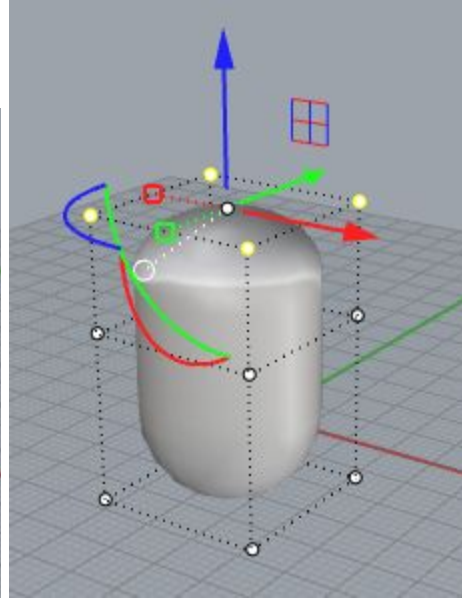
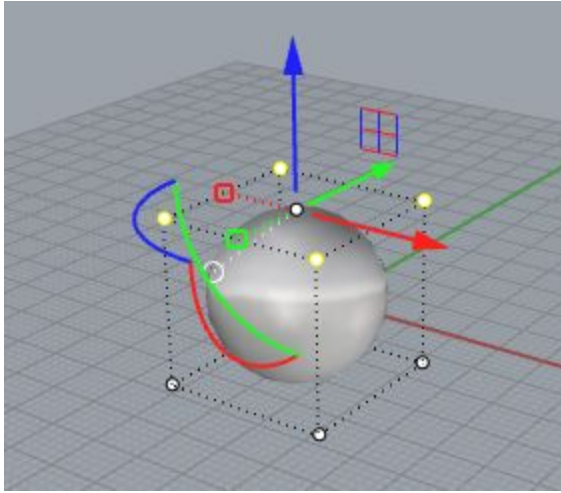
Subdivision

Subdivision is a common editing practice polygonal structures to increase modeling complexity, including SuperD. Subdivide can be a great starting point for turning simple primitives into artistic models. To perform a subdivide, select all or part of the control cage, and then select one of the subdivide functions ( | ). Note that subsequent subdivides on a control cage will cause the surface to become less rounded as the control cage resolution increases.

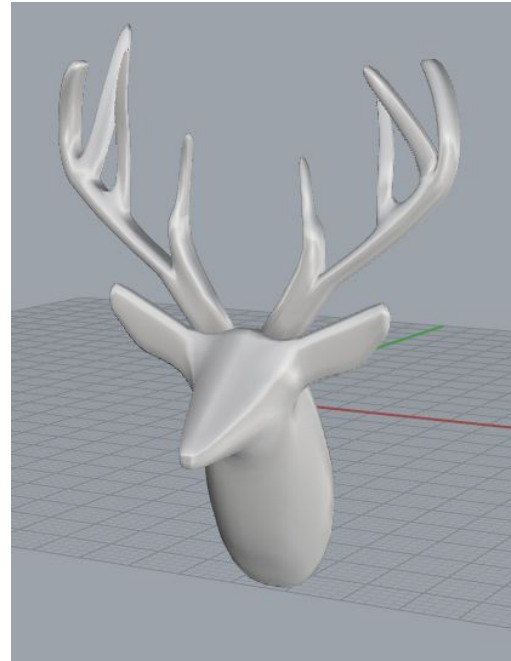
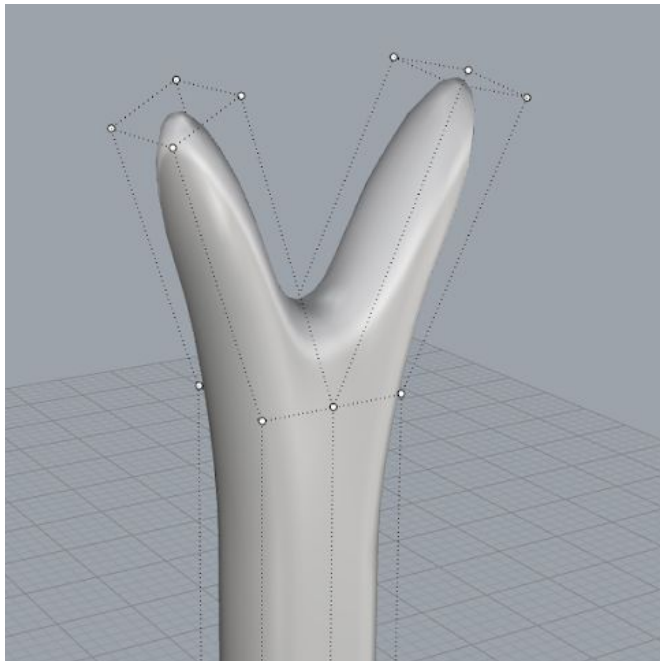


Extrude

The main tool for developing a model is the *Extrude* or *Pull* (). It allows you to grab control cage faces and extrude them out from the surface. It is a two-step process: first you initiate the pull via the toolbar icon, then you extend the selection in a given direction to actually perform the extrusion. After a pull, you have added at least 5 new faces to the control cage.




Combined with subdivision, Pull allows you to locally add complexity and character to your models by extending the control cage. Experiment with both tools to see what kinds of structures you can create!

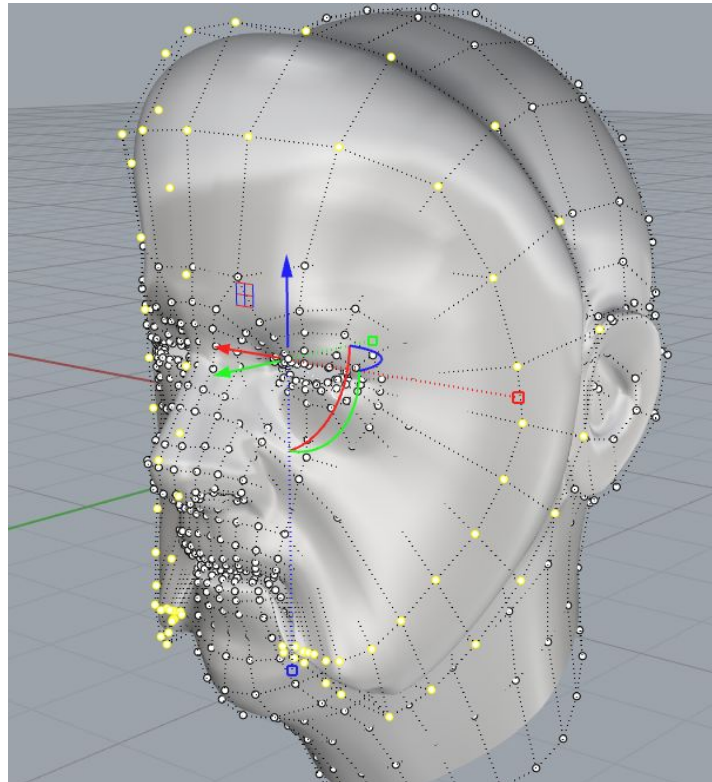


Ring Selection

When editing, it is sometimes useful to select a propagating edge ring that wraps around a band across the entire control cage surface. Ring selection allows you to easily perform this task.


Simply select two control points that form a single edge, and then select .

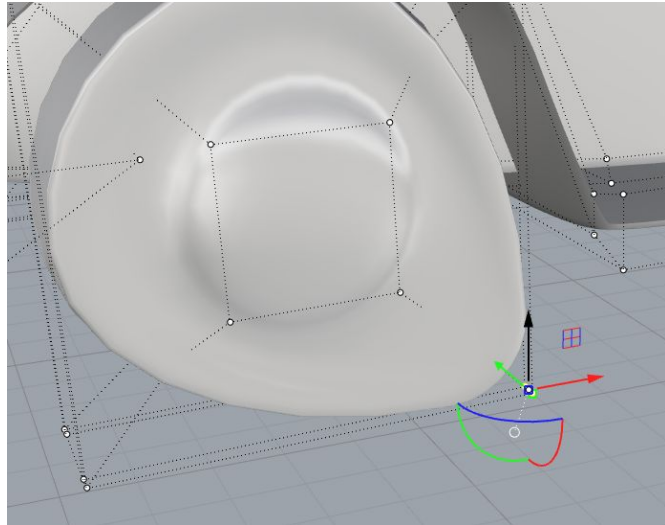
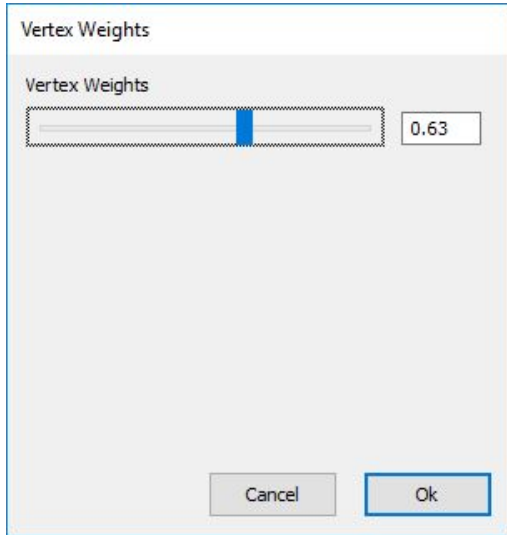
Combining the results of a ring selection and the scale feature surprisingly produces interesting results.



Control Point Weighting/Sharpening


SuperD allows you to define non-uniform weighting across the control cage by assigning weights to each control point. Surface regions corresponding to control points with higher weights will pull close to their respective control points. To alter weights, select control points

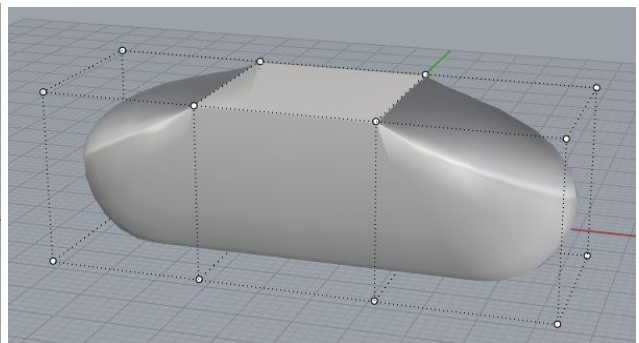
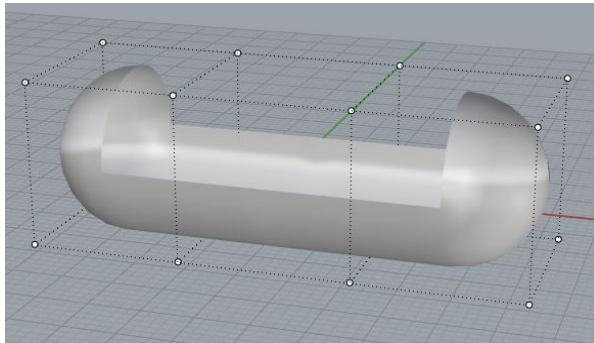
and then select . Control points have a default weight of 0.0. Setting higher values pulls that area closer to the cage. A weighting value of 1.0 will cause the surface to touch the control point, i.e. become sharp.




Experiment with both global SuperD fullness factor and control point weights to get the desired shape for your models.


Outside Edge Extension

In cases where your control cage is not closed, you may want to extend the outside edges of your generated surface to match the edges of the control cage. To accomplish this, select the SuperD object (not the control points) and select . This feature modifies the weights of the outside control points



Polysurface Conversion

Any SuperD Mesh object can be copy-converted into a Polysurface or Surface with the NURBS conversion feature. Simply select a SuperD object, and then select . After computing, the resulting surface will appear on top of the original surface. Upon completion, use selection

filters to select the original object and move it out of the way or delete it. Alternatively, you can use the `RetainOriginal=Off` option of the `SuperD2NURBS` command. To join to another surface, select all surfaces generated by the conversion, and perform a Rhino join ()

