

POWER SURFACING HELP



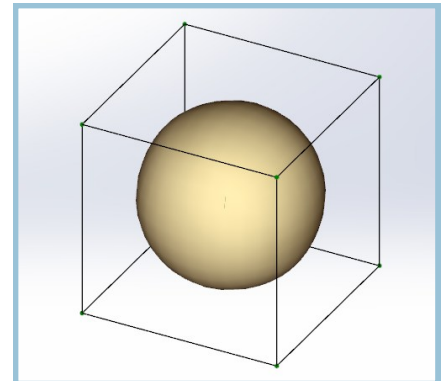
Power Surfacing Help

www.npowersoftware.com

What is a Power Surface?

It is like freeform NURBS control polygon with some of the restrictions typically associated with NURBS removed. In the graphics industry it is also known as a Subdivision Surface object or SubD for short. The guys at Pixar originally developed this technology for modeling organic forms and you can see it used in all of its animated films.

Another way to think about a SubD is that it is like a soap bubble where the edges of the control polygon pull on the soap bubble. If you put two edges close together they exert more of a pulling effect and cause the soap bubble to be more curved. You can also increase the curvature of the soap bubble by increasing the weighting on an edge and pulling the soap bubble closer to that edge. If you increase the weighting on the edge all of the way to 100% then you create a creased edge that is not smooth.

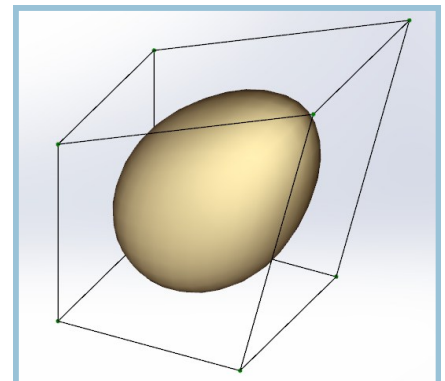


Soap Bubble With Box Control Cage

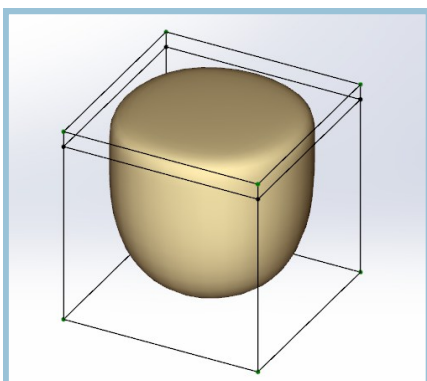
Creating SubDs

There are several ways to create SubD objects for use in SolidWorks. Power Surfacing provides several Primitive objects that can be used as starting points, you can use sketches to generate SubDs, or you can import mesh objects directly into the Power Surfacing editor.

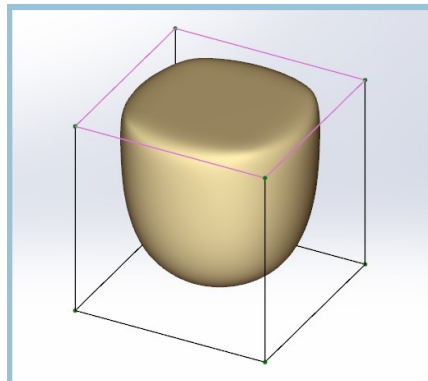
Starting in version 1.2, you can also use existing surfaces from the feature tree. As this feature is currently in Beta, please refer to the [Create From Surfaces Workflow](#) document for more information.



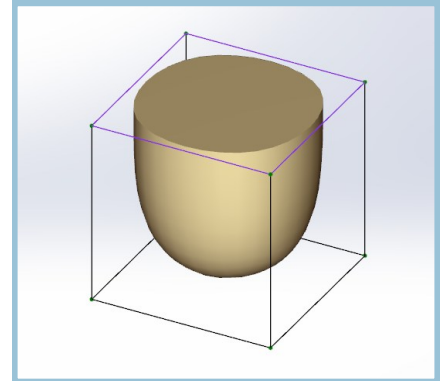
Moved Edge Changes Soap Bubble



Additional Edges More Curved



Weighted Edges Pull Harder



100% Weight Produces Creased Edges

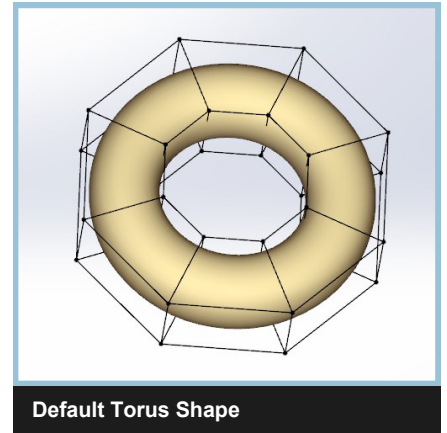
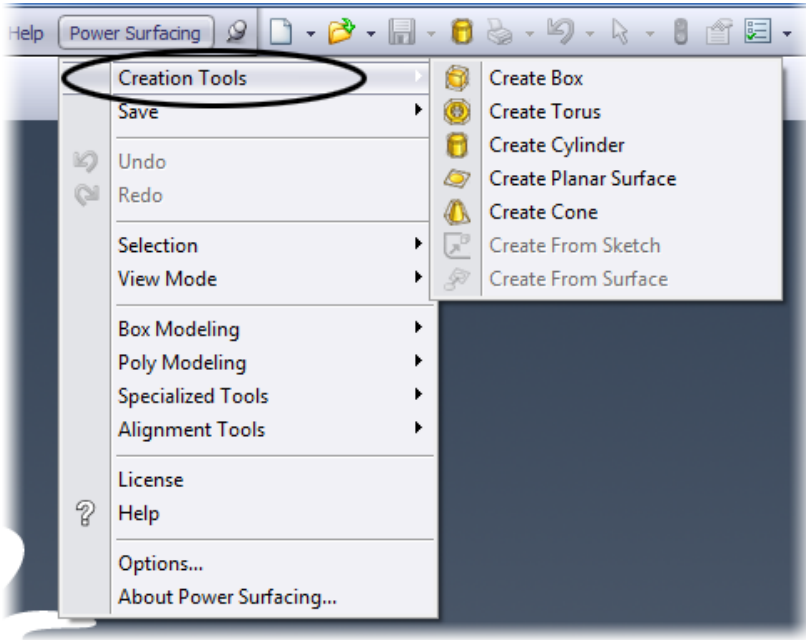
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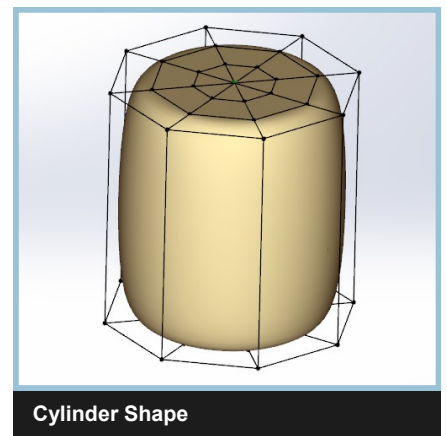
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From the Power Surfacing Menu

You can create both the Part file and the SubD model directly from the Power Surfacing menu when you select one of the Power Surfacing primitive objects.



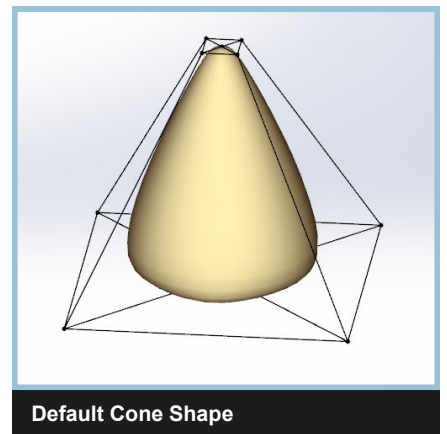
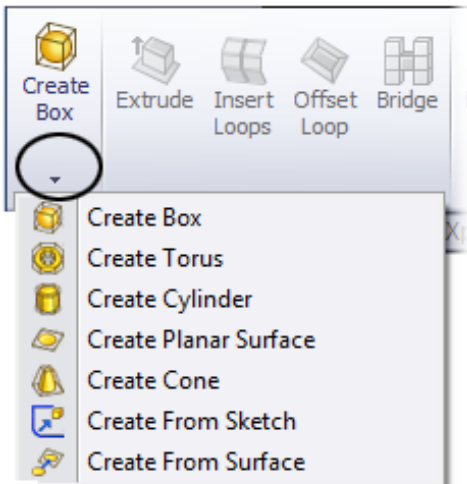
Default Torus Shape



Cylinder Shape

Creation Dropdown

With a Part file already open, in the Power Surfacing tab, at the far left, you will find the drop down that lets you create SubDs from the Primitives, a reference sketch, or an existing Surface.

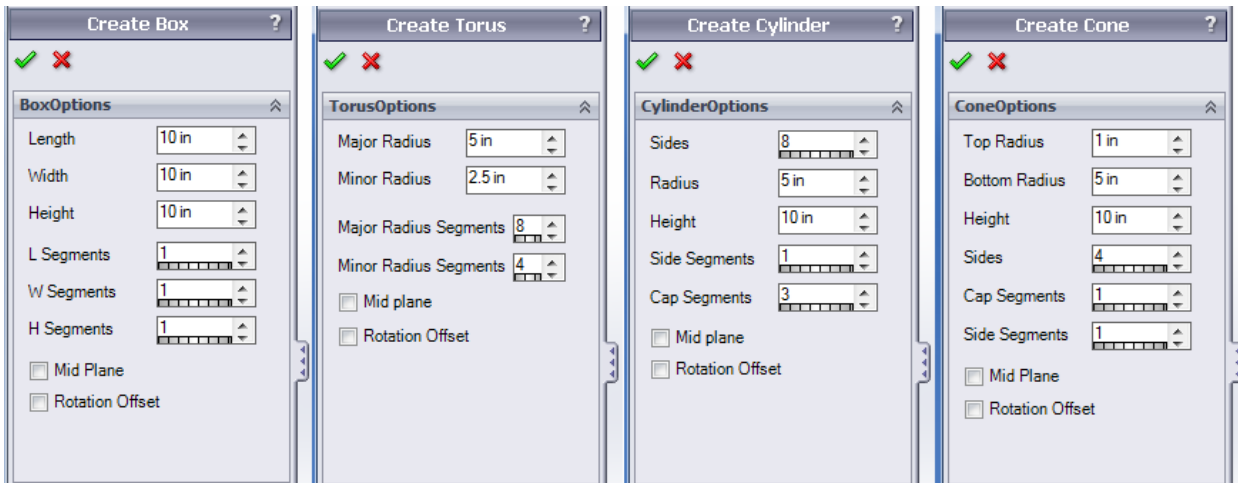


Default Cone Shape

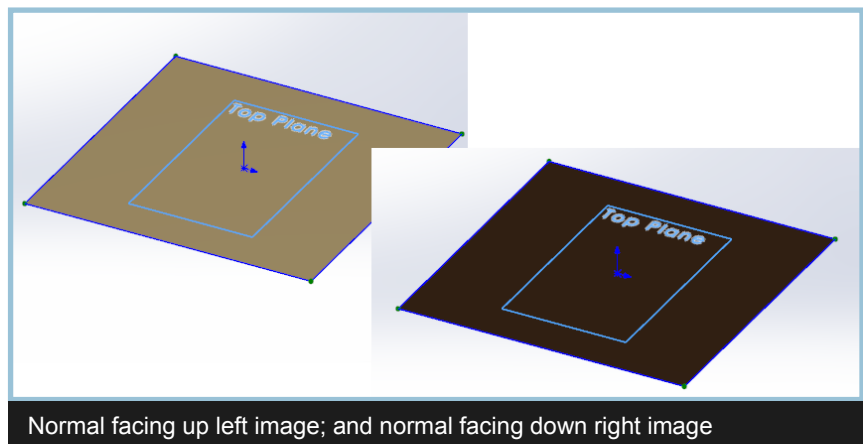
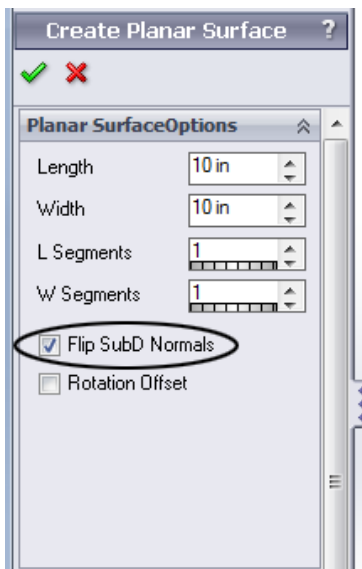
Create From Box, Torus, Cylinder, Planar Surface, Cone



Power Surfacing lets you choose between Box, Torus, Cylinder, Plane and Cone primitive objects for use as the starting Control Mesh. Each allows you to set its various parameters. You must click the Accept check mark to start editing the new SubD. You can cancel the creation by clicking the red X.



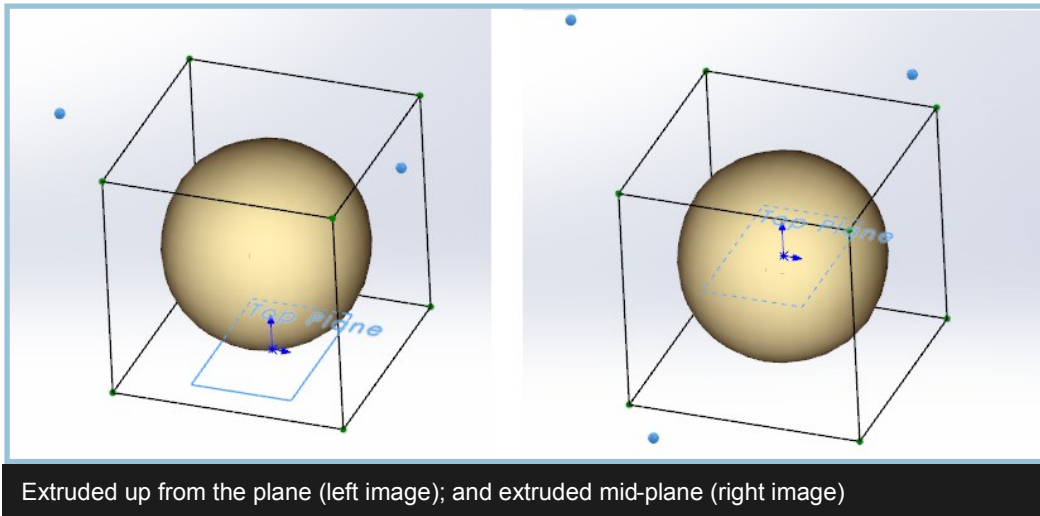
The Planar Surface is an open edged SubD object. If you are used to creating with surfaces rather than volumes you may wish to use this option to start your SubD. If you plan on extending the edges upward, you may want to use the Flip Normals option before creation.



Normal facing up left image; and normal facing down right image

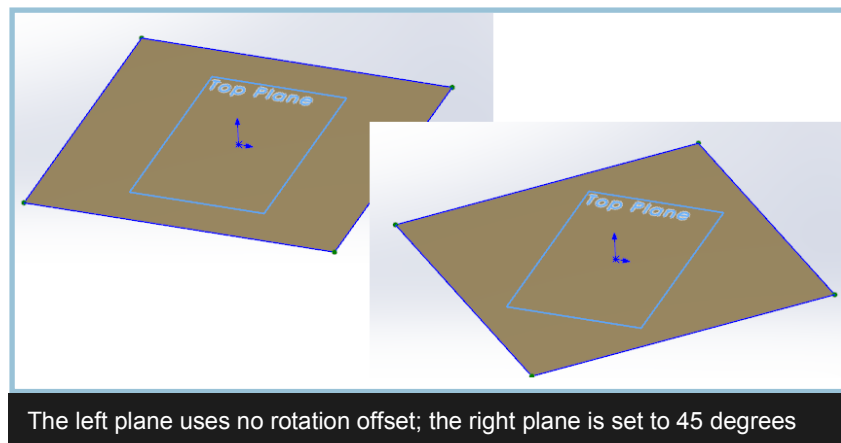
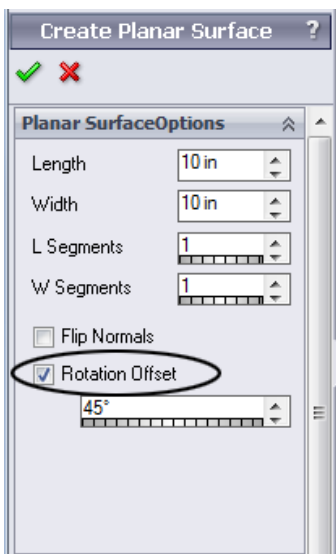
Mid Plane

All Primitives have the option to be extruded from the Create Plane upward or, if checked, from Mid Plane.



Rotation Offset

Primitive objects can also be rotated to an offset during the create process. Checking Offset Rotation brings up a text box that allows you to type in the rotation in degrees.

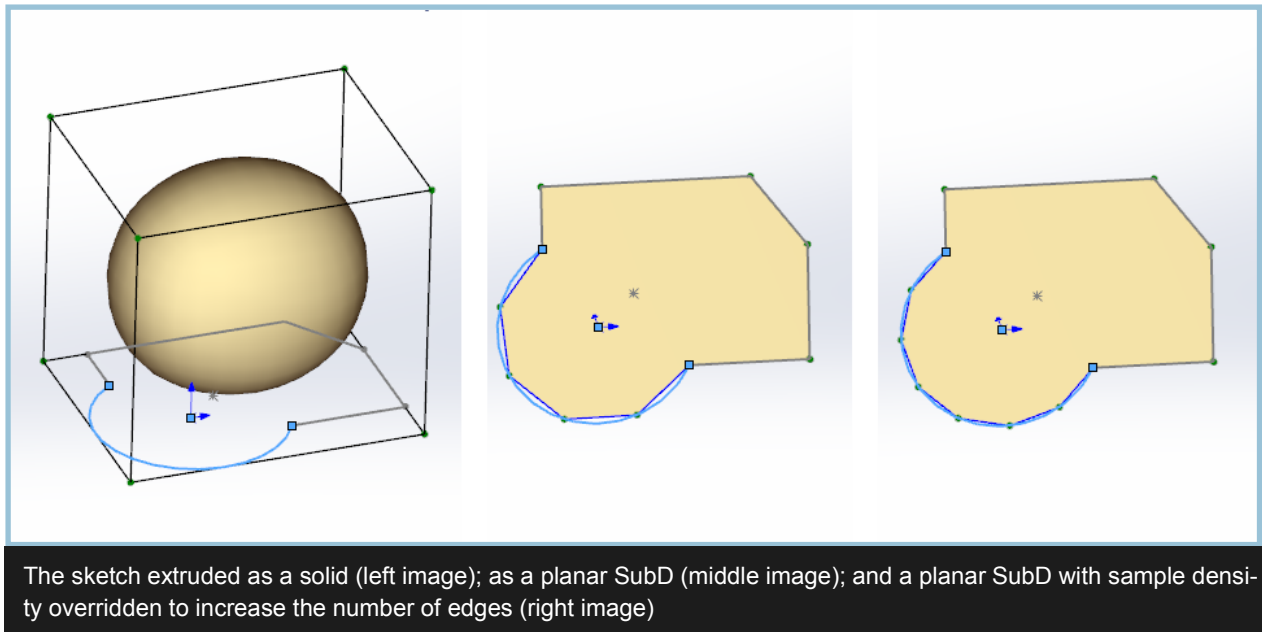
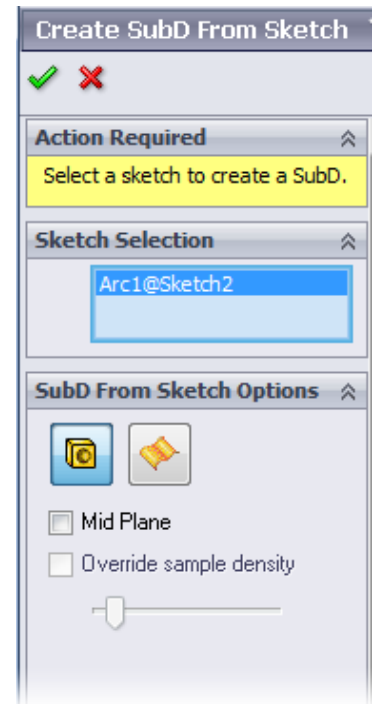


Create From Sketch

You may use sketches to create the SubD by selecting the Create From Sketch option from the creation dropdown. If the sketch was selected prior to selecting Create From Sketch, it will automatically be put into the Sketch Selection box. If it was not selected, selecting any part of the sketch is sufficient. If the sketch is not visible, you can select it from the Feature Tree in the viewport.

When you use a sketch as a base for your SubD 's control mesh, you should keep it as simple as possible. Since the optimal face configuration in SubDs is a quad or four sided face, if your sketch is over four sides, as a default, the control mesh will be created using only the sketch's bounding box. SubD From Sketch Options will allow for a sketch with more than four sides when you select Create Planar SubD From Sketch, but unless you are already familiar with SubD modeling, it is recommended that you keep your sketch simple and do your modeling in Power Surfacing.

With a sketch selected, you will need to select either Create Solid SubD From Sketch or Create Planar SubD From Sketch. With a Solid, you have the option to extrude the SubD up from the create plane or mid plane just as with the primitives. Preliminary extrusion height is calculated using the average edge length, but is easy to adjust once in Power Surface edit mode.



Create From Sketch (continued)

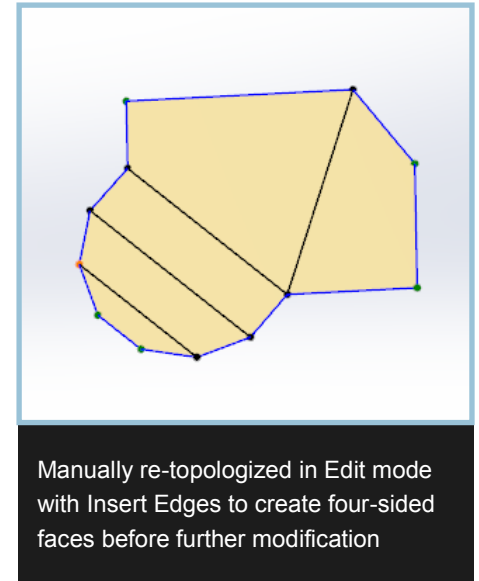
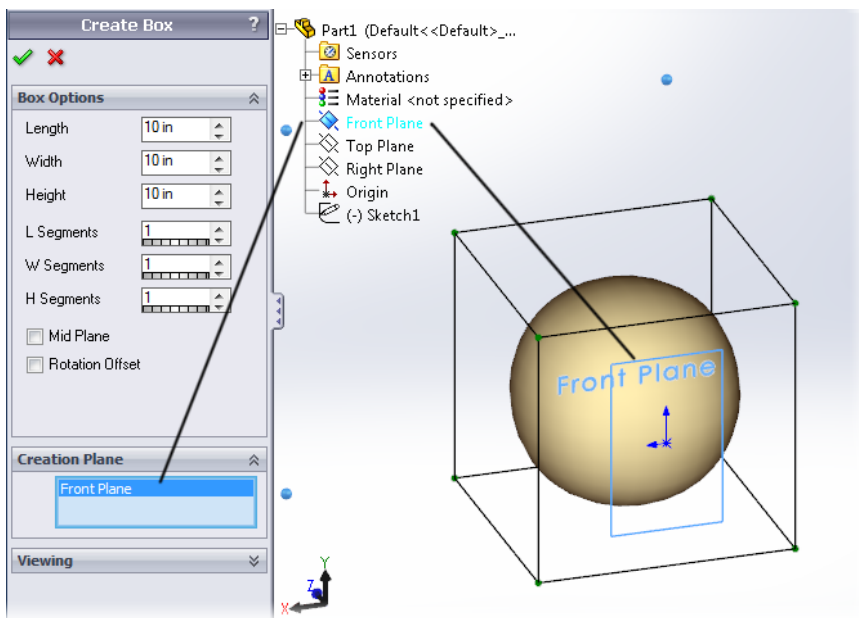
If you chose to create a surface from the sketch, you may need to manually insert edges to divide it into a meaningful SubD surface. Sketches should only contain straight sided elements whenever possible. If the sketch *does* contain curves, they will be resampled to eight segments per 360 degrees. The Override sample density slider will allow for more segments, but it is recommended that you use the default unless absolutely necessary.

Override Sample Density

If the sketch contains any non-linear sides, they will be converted to linear representations before the control mesh is created. The maximum number of sides, the far right setting on the slider, per 360 degrees is 10.

Creation Plane

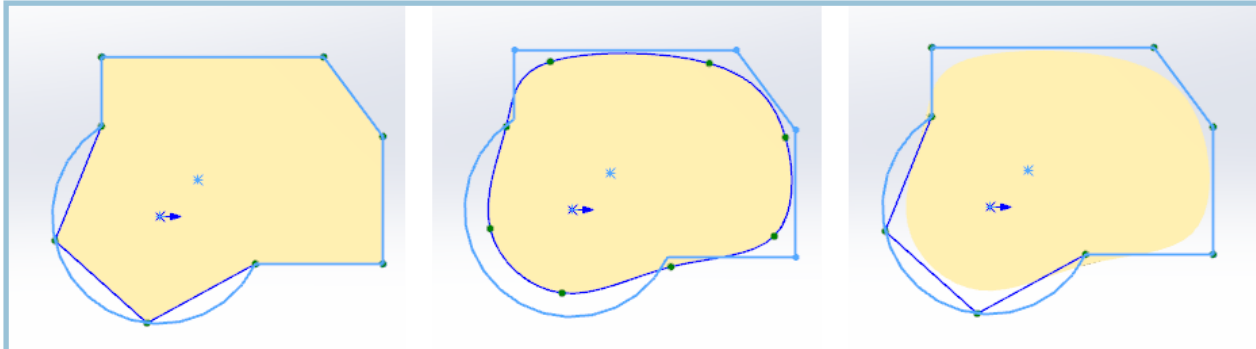
In the Creation Plane section, you can set the creation plane for the Primitive by selecting it from the Feature Tree in the viewport. The selected plane will appear in both the selection list box and in the viewport.



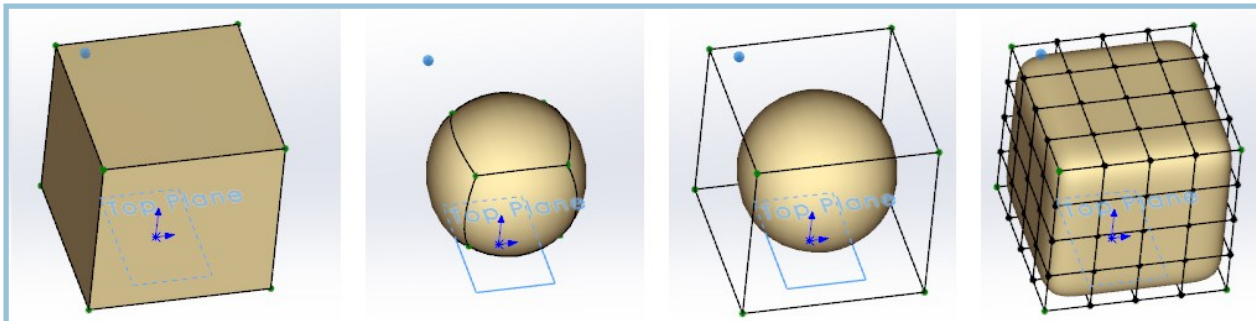
Manually re-topologized in Edit mode with Insert Edges to create four-sided faces before further modification

Viewing

While setting up the creation method for your SubD, you can also change the display mode. You can choose Control Mesh, SubD, or SubD plus Cage.



Images showing a planar SubD during the creation process where you can see the sketch it is being created from.



The bottom row shows a simple box primitive with a single segment. Note how the far right shows how the same SubD more closely resembles the control mesh as more segments are added.

Selection

Region Select

Power Surface follows the same conventions as SolidWorks for region select. Dragging from right to left selects in crossing mode where sub-objects crossed by the marquee will be selected. In windowed mode, dragging from left to right, only the sub-objects fully within the marquee will be selected.

When using the selection marquee, back-facing objects will be selected along with those on the front.

General

Faces, edges and vertices are previewed in hover mode with orange highlight. When selected, or picked, the sub-object or sub-objects will turn cyan colored.

To add to the selection, you can hold down the ctrl key. To remove sub-objects from the selection, you can hold the shift key down.

Status Bar

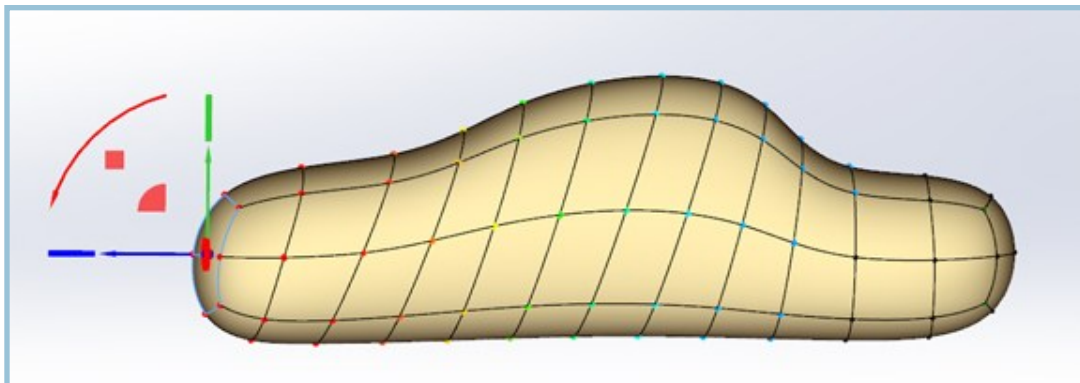
The number and type of currently selected vertices, edges or faces are shown on the status bar, lower left. Depending on the selection, it may also show location, length, weight, or other pertinent information.

Smart Selection

In Any mode, the position of the cursor over the edge will determine if an edge loop or edge ring will be selected. The outer third of the edge will select a loop, while the center third will select a ring. With faces, the edge nearest the cursor will determine the direction of the face loop. Zoom in closer for more accuracy.

Soft Selection

Selections can also be "soft." The influence of transforms can be set to expand beyond the selection, diminishing with distance. See Soft Selection in the Property Manager section. See Advanced Tools.

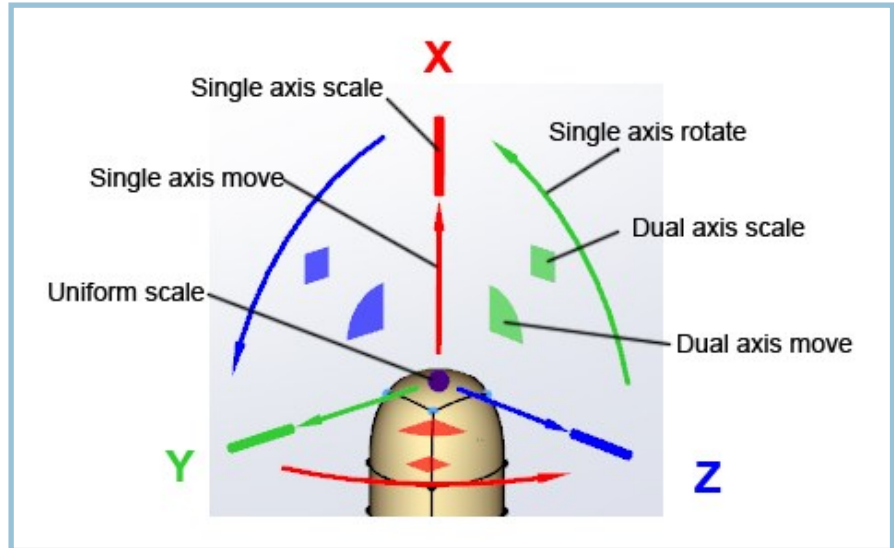


Gizmos/Triad

Power Surfacing has its own unique context aware gizmo. Besides the usual transforms, move, rotate and scale, you will be able to access many of the command's advanced parameters right in the viewport.

The Transform Triad or Gizmo

The **Transform** gizmo provides access to Move, Rotate and Scale with both single and dual axis functionality. Uniform scale is performed by using the center of the gizmo. Use the Wedge shaped portion of the gizmo for dual axis moves. Use the diamond shaped portion to perform dual axis scales.



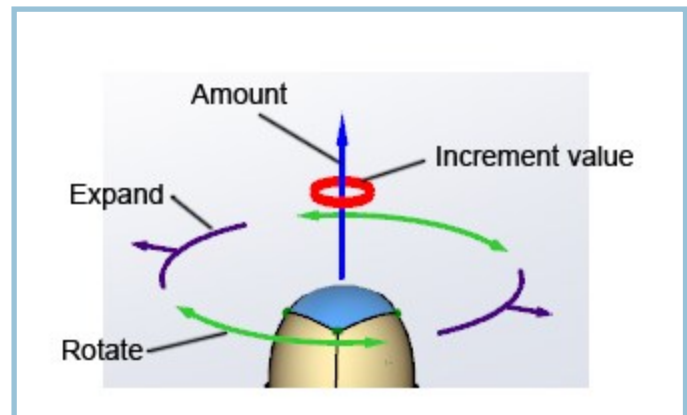
Specialty Gizmos

The **Expand** gizmo allows you to increase or decrease the size of a face or sub-object selection during extrudes or bevels.

The **Rotation** gizmo allows you to rotate the selected sub-objects while the command using it is active.

The **Increment Value** gizmo allows you to increase segments in Extrude, Bridge and Insert Loops commands. With Partial Crease activated, it lets you change the crease amount on selected edges.

The **Value Adjustment** gizmo allows you to adjust float values pertaining to the current command while active. Commands such as Bridge allow the tension at either end to be adjusted. Commands such as Insert Loops allow you to Slide or Pinch the previewed edge loops.



Property Manager

Accept, Cancel, Undo, Redo

Accept and Cancel are context sensitive commands. When you are in the middle of an operation that needs to be ended, such as Extrude or Insert Loops, the Accept command will finish or end the operation.

When no operation is in progress, the commands will act as follows:



The OK ,or Accept button, represented by the green check mark, will convert the Power Surfacing model to a BRep or NURBS model that can then be modified with the usual SolidWorks features.



The Cancel button, represented by the red check mark, will abandon any edits done to the Power Surfacing model since the last conversion.



Undo , Ctrl + Z

Undoes the last action performed on the SubD. This includes selections, but stays separate from SolidWorks commands. The SubD's construction stack remains independent of conversions allowing you to be able to undo previous actions after returning to edit the SubD after a conversion.



Redo, Ctrl + X

Reverses the last undo command.

Feature Creation Settings

Quality-> Coarse, Medium, Fine, Very Fine

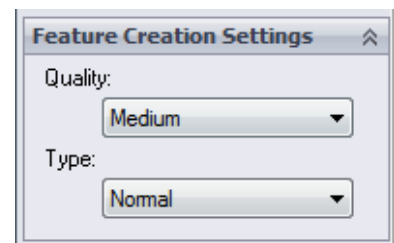
This is where you can increase the quality of the converted SubD model. Power Surfacing automatically calculates the quality based on both the setting and the partial creases used. Increase quality only if you see tears in the converted BRep and re-convert.

Type-> Normal, 1 to 1 Planar, 1 to 1 NURBS

Normal converts the SubD to a minimal number of NURBS surfaces.

1 to 1 Planar converts the control mesh to a NURBS body with only planar surfaces. Use this option for a quick way to save the part file without waiting for a full convert.

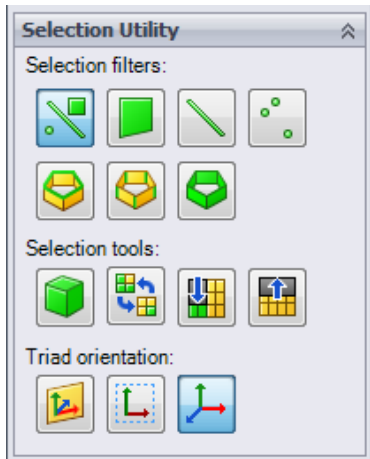
1 to 1 NURBS converts the SubD creating one NURBS surface for each face in the control mesh. Use this option when you need to register features from particular SubD edges. Some Features, such as Fillet may need the edges reselected after edits to the SubD.



Command Options

This context sensitive panel contains the parameters associated with the currently active command. When no command is being used, the rollout will be empty. See the individual features for information on their parameters and usage. When an operation is in progress, the Accept and Cancel buttons above the rollout will be associated with the current operation.

Selection Utility Panel



The Selection Utility rollout contains options pertaining to SubD selection and manipulation that are available at any time during the edit session.

Selection Type

Select Any

Allows for selection of any of the three sub-object types, Vertex, Edge, and Face. Once a sub-object is selected, Add (Shift Key) and Remove (Ctrl Key) acts only on that selection type. With nothing selected, dragging a region will select vertices. With something selected, dragging a region will select the current sub-object type only. An Edge Ring smart selection is available by double clicking in the middle half of an edge. Edge Loop smart selection is available by double clicking nearer the ends of the edge. Face Ring smart selection is available by double clicking the face near the edge in the direction of the desired ring.

Face

Allows the selection of faces only.

Edge

Allows the selection of edges only.

Vertex

Allows the selection of vertices only.

Selection Utility Panel (continued)



Edge Loop

Selects a connected set of continuous edges that may form a closed loop. Interior loops stop and start at vertices that don't have exactly four edges. Exterior loops will continue around the boundary until they reach their starting point regardless of the edge count of their vertices.



Edge Ring

A set of edges between connected four sided faces, where the two edges on a given face do not share vertices. In other words, edges not connected to each other.



Face Ring

A connected set of four sided faces where opposite edges of each face form the connections. Face mode direction is determined by the location the face is picked.

Selection Tools



Select All

Selects the entire object in the current mode. If you are in Any mode, the last used selection type will be used.



Invert

Inverts the selection in whatever sub-object mode you are in.



Hide Selected

Hides selected faces. When used with vertex or edge mode, all faces associated with the vertex or edge will be hidden as well.



Unhide

Makes all hidden faces and their corresponding edges and vertices visible.

Selection Utility Panel (continued)

Triad Orientation

These options allow you to change the coordinate system used by the transform gizmo or triad. As a default, the triad uses local or "Geometry" coordinates.



Geometry

With Faces, Z is aligned with the face's normal or perpendicular. With a single edge, an axis is aligned with the edge. With a single vertex, the average of the faces connected to the vertex is used to orient the triad. With two adjacent vertices selected, the triad is oriented to the connecting edge. When the selection no longer has relevance to any of these scenarios, the triad reverts to world coordinates.



Screen

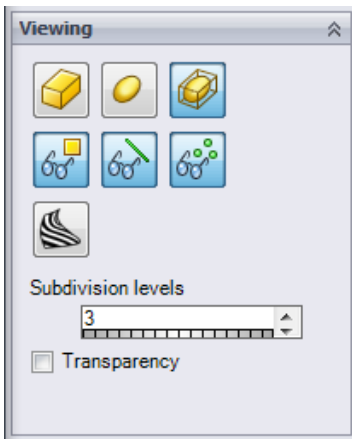
Y is vertical on the screen and X is horizontal.



World

Uses the coordinate system as seen with the triad in the lower left hand corner of the viewport.

Viewing Panel



Display Modes



Control

The polygonal mesh the SubD is based upon. Sub-Object selections are generally easier in this mode, but the final SubD representation may look vastly different depending on the mesh. The more faces the control mesh has, the closer the SubD resembles the control mesh, but the harder it is to edit the overall shape of the object.



SubD

Subdivision representation of the control mesh. The levels of subdivision can be adjusted for a smoother visual representation in Edit mode. This will not affect the NURBS conversion in any way.



SubD Cage

Displays both control mesh and subdivision surface. In this mode, you have the benefits of both an accurate representation of the model plus the ease of selection of the control mesh.



Toggle Zebra

Toggles the Zebra shader to allow you to check surface curvature in SubD Edit mode. Settings for the shader may be changed in Power Surfacing > Options > Global Settings. For best results, you may need to increase the SubD Display Levels

Viewing Panel (continued)

Visibility

When checked, the Faces, Edges and Vertices will be shown in the viewport. Choosing a selection mode that is currently hidden or suppressed automatically makes that element type visible again.



Shows faces in the viewport.



Shows edges in the viewport.



Shows vertices in the viewport.

Subdivision Levels

This option lets you set the subdivision levels used on the SubD representation of the model in the viewport. Three or four levels are suggested for simple models. Dense models may be better viewed in two or three levels.

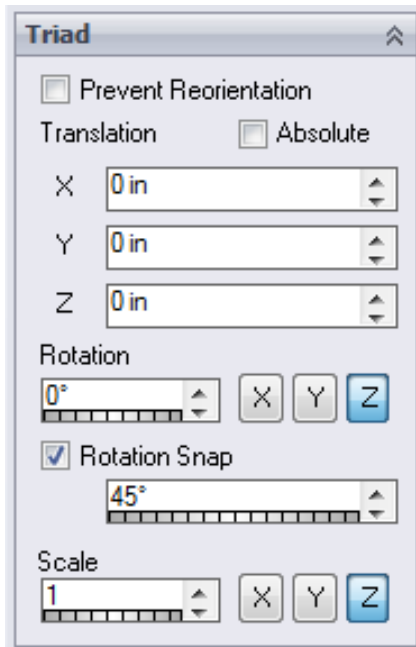


Transparency

This setting allows transparency to be toggled off and on. When active, you may set the amount of transparency. Use this option when working with image planes or sketches as templates.

Triad Panel

The Triad utility rollout is where you can type in specific transform values. It also contains other transform options.



Prevent Reorientation

As a default, the triad reorients itself to give clear access to its individual components. When checked, Prevent Reorientation will prevent the triad from changing orientation so that it always represents the currently selected coordinate system. It is recommended that you turn on this option while typing in transform values in this section.

Translation

As a default, translation is relative. When checked, **Absolute** will position the selected sub-object or sub-objects' center point to that location in world space.

Rotation

With Rotation, you may choose the axis you wish to affect with the X,Y, and Z buttons. Rotation is always relative.

Rotation Snap

Rotation Snap can be toggled off and on here. The snap value will show as 0 when the option is off, but the previous snap value will be retained for the next time Rotation Snap is turned on in this session.

Scale

For Scale, you may choose the axis or axes you wish to affect with the X,Y, and Z buttons.

General

Units are derived from the Document Settings, but can be overridden during type-in.

If you are using the Geometry, or local, coordinate system, multiple selections work as per the viewport triad. The World coordinate system will be used if a meaningful average cannot be found. If you are not in Absolute mode, the local coordinate system should be respected for all three transform types. Absolute translation will always use World coordinates.

In Relative mode, until you select a different *axis*, *transform* or *sub-object*, the changes will be relative to the starting value since the last selection change was made.

Example:

Scale 2 units on the Z axis. The 2 remains.

Change the 2 to 3. The scale is now three times its original value.

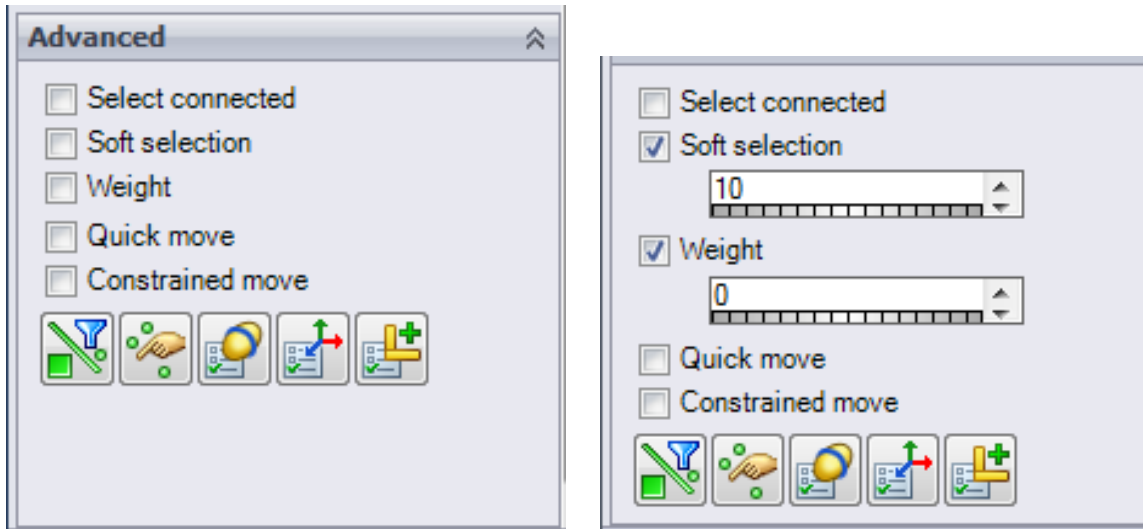
Change the 3 back to 1. The selected sub-objects are returned to their original configuration.

Change the scale value to 2 again.

Now translate, move, the selection in the Y direction a couple of units. The scale value is updated to 1.

To return the scaled sub-objects to their *first* configuration, you would now need to type in 0.5.

Advanced Panel

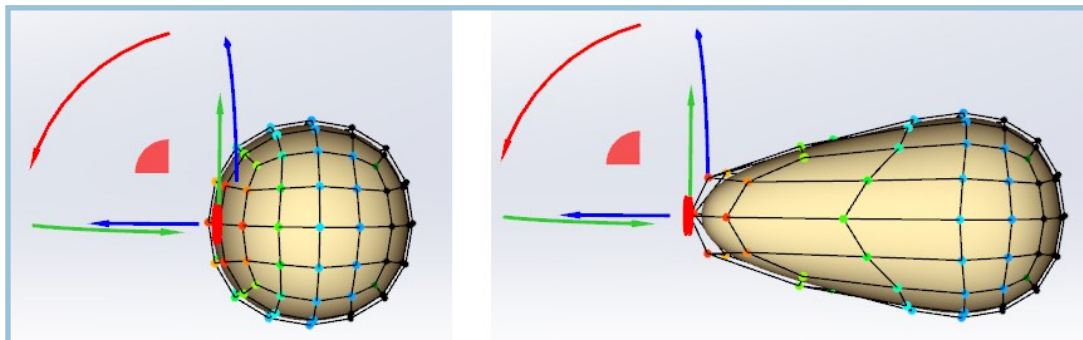


Select Connected

Select connected selects all of the sub-objects that share edges. A typical workflow when replacing or retopologizing geometry is to select a face ring, delete it, then switch to Select Connected. Picking a single face will select the entire isolated group of sub-objects.

Soft Selection

Soft selection allows for a diminishing effect on the vertices surrounding the current selection of sub-objects. The value represents a distance based on screen space between 0 and 100. When checked, soft selection can be adjusted from both the Property Manager and by using the increment value gizmo in the viewport. The vertices are colored such that those with the highest weight are red, grading to orange, yellow, green and then blue for those least affected. The colored vertices will be visible regardless of which sub-object mode is currently being used.



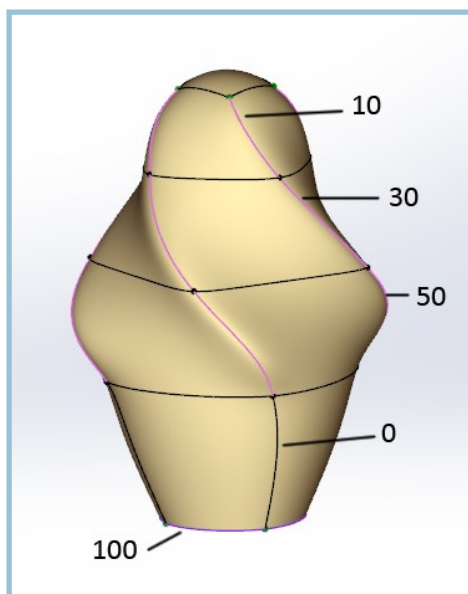
The red vertices selected and falloff vertices showing weight color (left image); pulling the vertices showing decreasing influence (right image).

Advanced Panel, (continued)

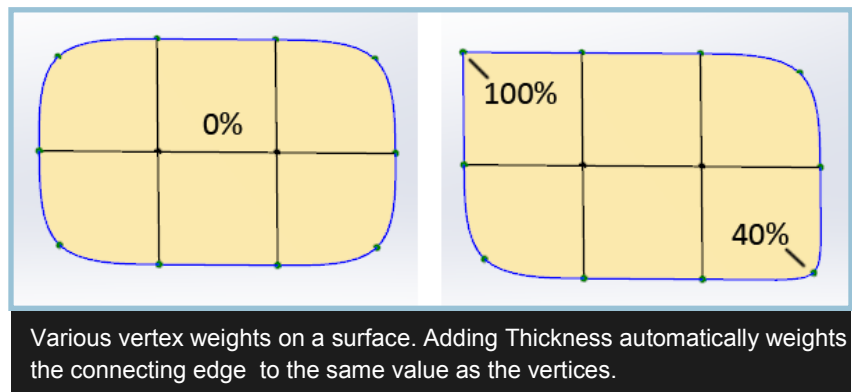
Weight

Weight allows you to adjust the weight amount on edges and vertices between 0, no weight, and 100, full hard edge or vertex. If a single edge or vertex is selected, its current value will be shown. If consecutive connected edges have weights the value is averaged across the edge to blend with the values of connecting edges. This produces a result similar in nature to a variable radius fillet.

Internal edges are added to smooth the weighting as follows: Normal conversion is two to three, between 40 and 60 crease amount, four levels are used, between 60 and 80, five levels are used, between 80 and 100, a fully hard edge, the levels drop back to the normal two or three. To improve fidelity for the conversion, you may want to increase the Quality setting.



Various edge weights, SubD display levels set to 5 for smoother display



Various vertex weights on a surface. Adding Thickness automatically weights the connecting edge to the same value as the vertices.

Vertices can now be weighted individually. This ability is extremely useful when surface modeling. Weighting is retained after the application of Thickness. As with edges, vertices can also quickly be set to 0 or 100 using the Hard Edge and Soft Edge tools from the tool bar or right click menu.

Tip: When using edge weighting, you may want to increase the SubD levels in the viewport if the SubD model doesn't look smooth around the partial crease edges.

Quick Move

This option lets you move vertices without using the triad. It operates using the last triad setting. Move a vertex with the triad before toggling Quick Move on for the first time.

Constrained Mode

When checked, this option constrains sub-objects to move along existing edges. This is especially useful for rearranging topology when the elements are not in orthographic alignment. Be aware that the selected sub-objects will not be able to cross over to overlap existing faces. The constraints also work off of the control mesh rather than the SubD's representation of where the edges currently show.

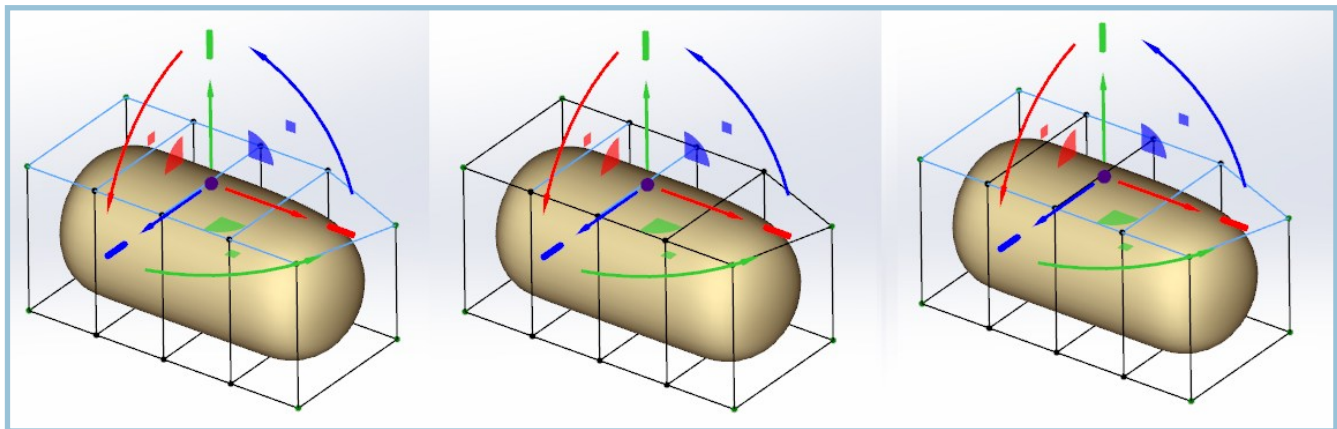
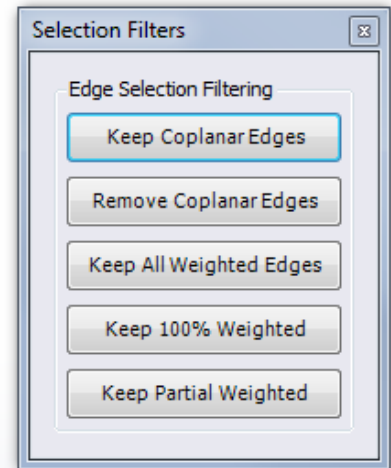


Selection Filters

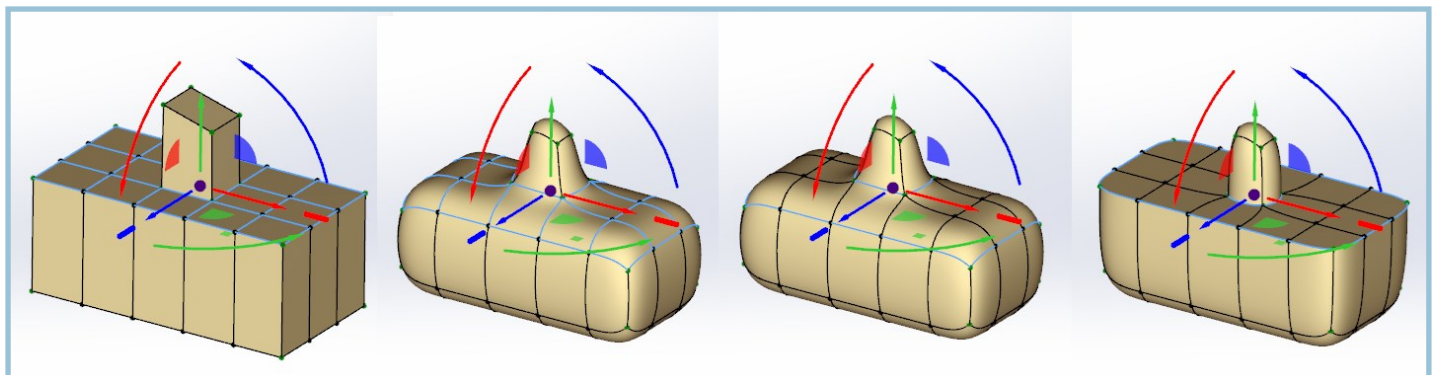
This option shows the Selection Filters dialog. This is helpful for complicated crease and other edge-based operations where a large number of sub-objects are involved. The choices are as follows:

Keep Co-planar Edges: keep only edges in selection list which are between two control mesh faces which lie on the same plane.

Remove Co-planar Edges: keep only edges in selection list which are NOT between two control mesh faces that lie on the same plane.



Edges in Selection Set (left image); Filtered to keep co-planar interior Edges (middle image); filtered to keep edges which are not co-planar (right image)



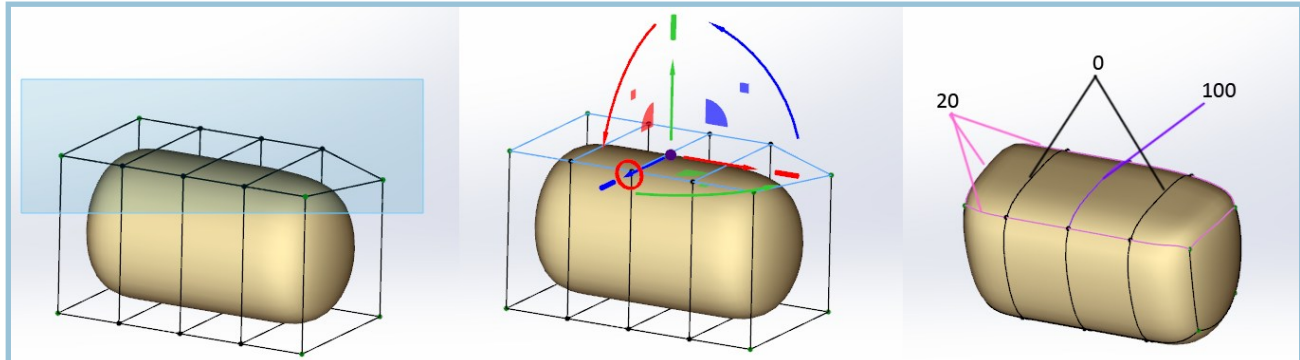
Original Edge Selection in control mesh display mode (first image), original selection in Sub-D mode (second image); remove co-planar edges filter applied (third image); after applying hard edge command to the filtered selection (fourth image).

Selection Filters (continued)

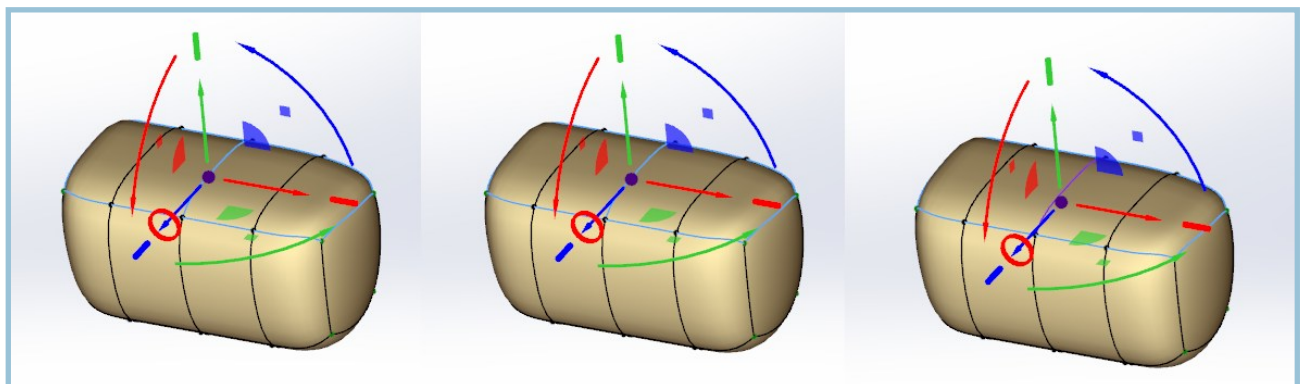
Keep All Weighted Edges: removes all edges from selection set which have edge weight of zero value

Keep 100% Weighted: removes all edges from selection set which have edge weight less than 100%

Keep Partial Weighted: removes all edges from the selection set which have an edge weight of zero or 100%.

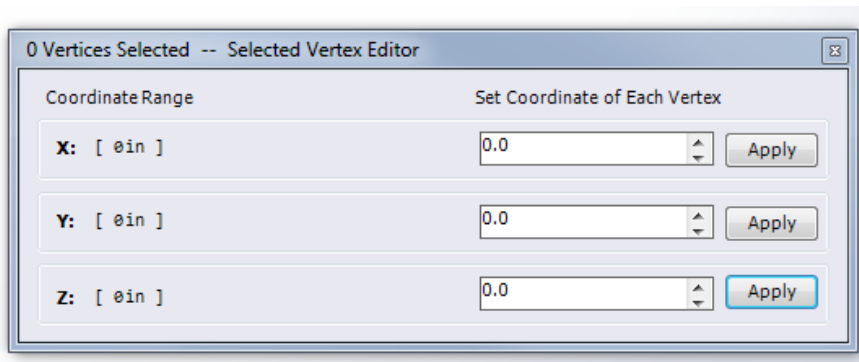


Selecting the top edges, (left image), the edge selection used in the following examples, (center image). Note the corner vertex dropped lower. The top outer edge weights set at 20, the top center edge set to 100 and the other two top edges set to 0, (right image).



The selection with non-zero weighted edges remaining, (left image), only edges with a weight of 100% remaining, (center image), and only partial weighted edges, e.g., between 0 and 100, (right image).

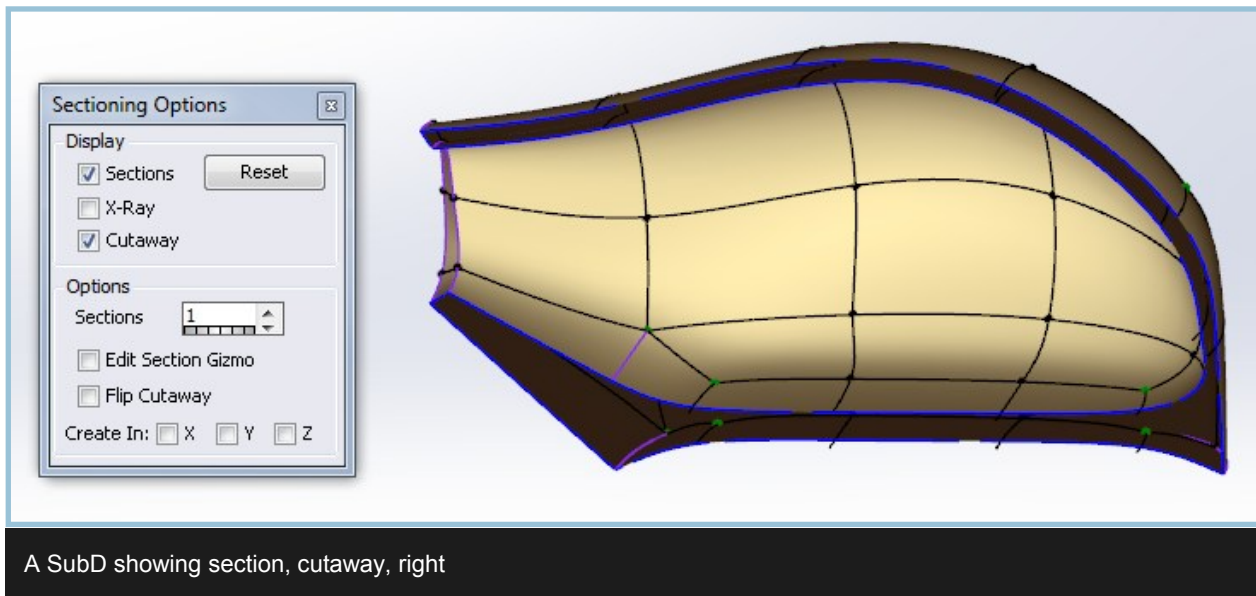
Selected Vertex Editor



This editor allows you to manually set the location in the world coordinate system on a per vertex basis. Note that you may choose one or more vertices.



Sectioning Options



A SubD showing section, cutaway, right

You can use Section View to help you get a feel for your SubD's shape regardless of topology. Note that sections are display mode helpers only and do not refine or change your mesh in any way.

Display

Sections- Checking Sections shows the section or sections in the viewport.

X-Ray- Shows the full section through the model even when the SubD is fully opaque.

Cutaway- This option hides the faces, but leaves the edges showing on the mesh on one side of the section through the SubD model.

Options

In this area, you can adjust the number of sections and how and where they are drawn through the model.

Sections- You may adjust the number of sections drawn on the model. If you set this value to more than one, Cutaway is automatically disabled.

Edit Section Gizmo- When checked, a triad/gizmo appears to allow you to manually position and orient the section plane. If you are using more than one section, all sections will be parallel to the transformed section.

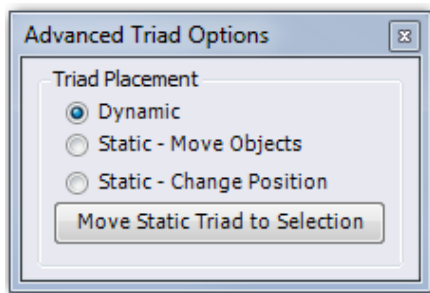
Flip Cutaway- This check box toggles the side of the model that is cutaway.

Create-In: - This option lets you turn on sections for any or all of the section plane's X, Y and Z directions.



Advanced Triad Options

These settings give you control over where and how transforms are performed on the SubD.



Triad Placement

The options in this section allow you to transform selections using different pivot points. Power Surfacing will keep a static transform location that you can adjust and use any time you need it.

Dynamic

With Dynamic, the default setting, the triad is on the selected sub-object or at the center of multiple sub-objects. It changes as your selections change.

Static- Move Objects

With this setting chosen, you can transform the selection relative to the static triad or gizmo.

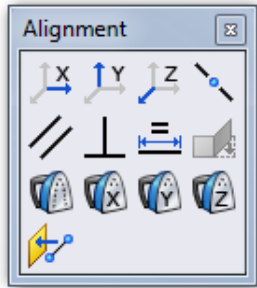
Static- Change Position

With this setting checked, you can manually position the triad to a custom location.

Move Static to Current Selection

This option provides a quick and accurate way to position and align the static triad or gizmo. It may be used in any mode. Select the desired sub-object or sub-objects and click the button to move the static gizmo to the desired location.

Alignment Options



With the alignment tools, the first sub-object selected becomes the target for the alignment.



Creates a linear alignment along the world coordinate system X axis.



Creates a linear alignment along the world coordinate system Y axis.



Creates a linear alignment along the world coordinate system Z axis.



Makes the selected vertices or edges collinear. If vertices are used, the first two selected define the line. If edges are used, the first edge defines the line.



Makes the selected edges or faces parallel to the first one selected.



Makes the selected edges or faces perpendicular to the first one selected.



Makes the selected edges the same length as the first one selected.



Make faces coplanar to the first face selected.

Alignment Options (continued)



Makes the selected sub-objects planar on the control mesh by averaging the positions of the vertices involved. The SubD representation will not appear flat unless the faces are also bounded by a creased edge.



Creates a planar alignment on the world coordinate system perpendicular to the X axis. The SubD representation will not appear flat unless the faces are also bounded by a creased edge.



Creates a planar alignment on the world coordinate system perpendicular to the Y axis. The SubD representation will not appear flat unless the faces are also bounded by a creased edge.



Creates a planar alignment on the world coordinate system perpendicular to the Z axis. The SubD representation will not appear flat unless the faces are also bounded by a creased edge.



Snaps the selected sub-objects to the specified plane.

Tools/Features

General

Tools and commands can be accessed either from the tool bar or from the right-click menu. Once in a command you will be able to use the specialized Gizmos to take advantage of the command's advanced features. The advanced features window can be opened from the bottom section of the Property Manager.

The Power Surfacing toolbar can be customized just like any other SolidWorks toolbar.

Edit Tools

The Edit Tools are tools which modify an existing Sub-D but don't create any new topology directly. The edit tools allow you to delete, erase, insert new edges and merge existing vertices.

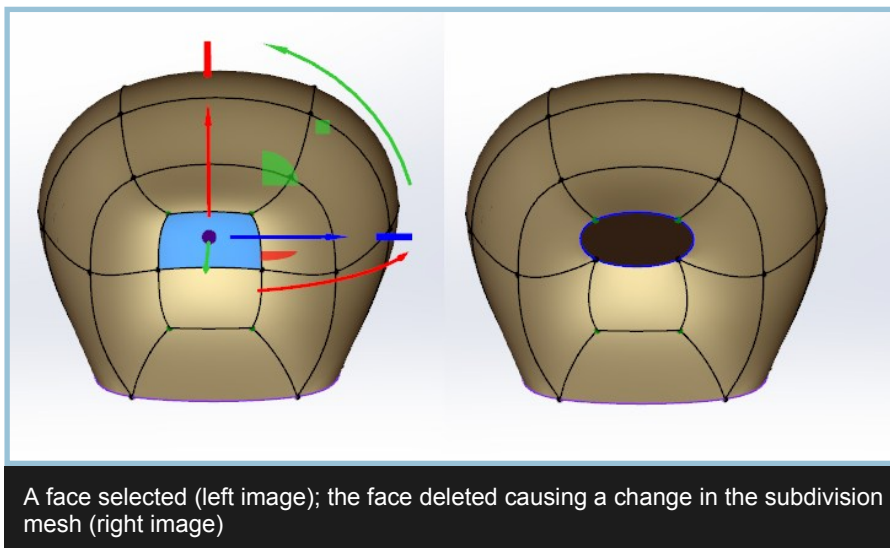
Delete

Deletes the selected sub-object. If the selection is a face, the face will be deleted. If the selection is an edge, the two faces sharing the edge will be deleted. If the selection is a vertex, all faces sharing the vertex will be deleted.

The resulting geometry will be a hole with open edges. These edges can be extruded as is, or the hole can be refilled by first selecting the edges, then using the Fill Face tool.

Gizmo: None

Available for Edges, Vertices and Faces

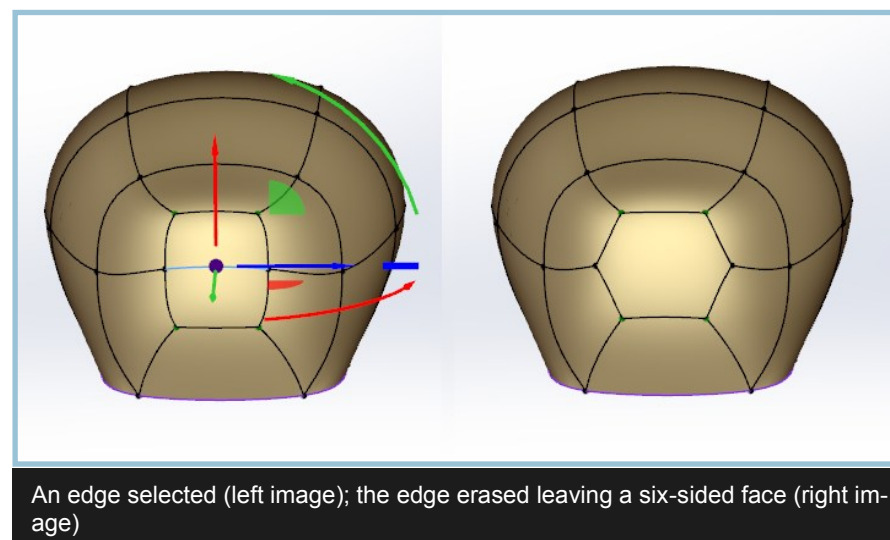


Erase

The erase tool removes selected edges and any isolated vertices.

Gizmo: None.

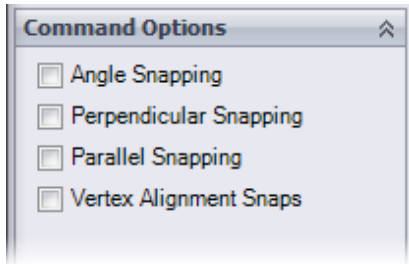
Available for edges, vertices.



Edit Tools (continued)

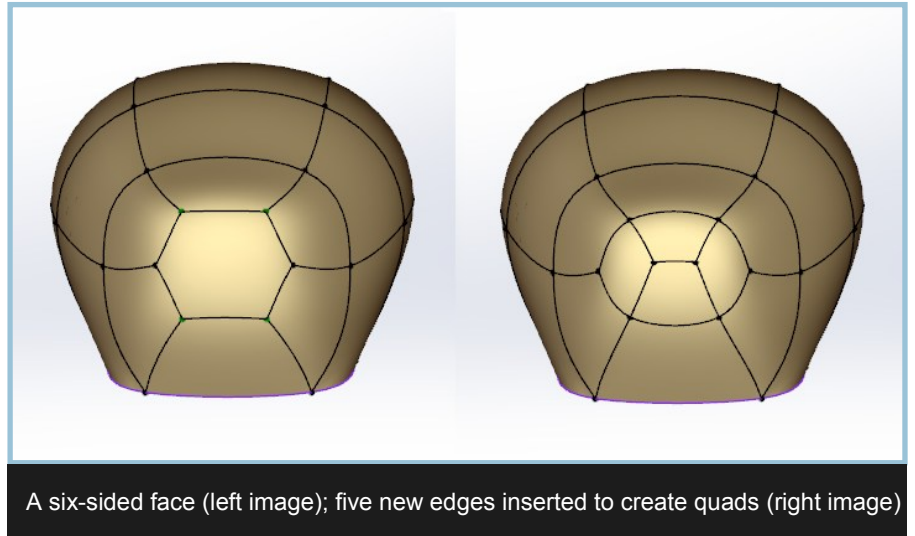


Insert Edges



Insert Edges allows you to create new edges by clicking on existing edges, faces and vertices. This mode is active until you right click. It will create vertices anywhere it crosses an existing edge and will automatically snap to vertices and edge centers. Zoom in if the snapping is to strong. Right click or Escape ends the command.

Gizmo: Shows red preview line.



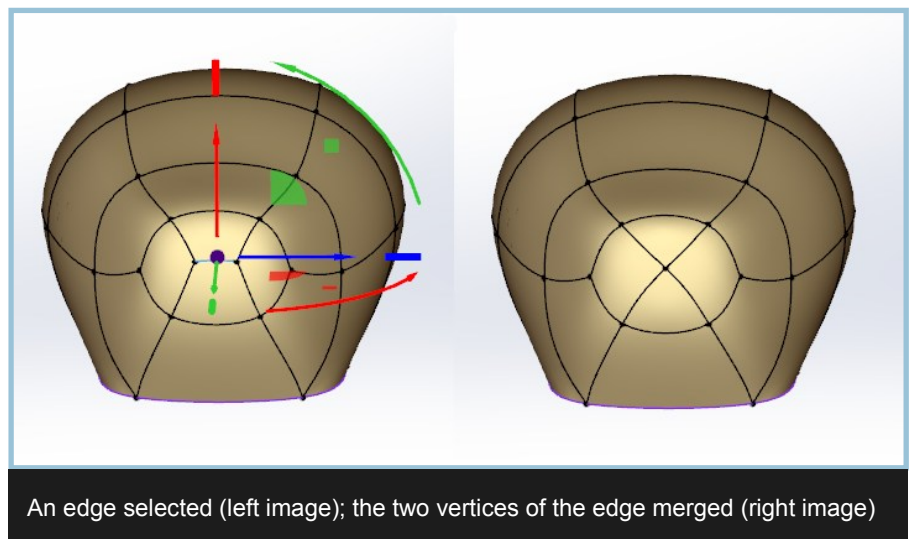
Merge Vertices

Collapses two or more vertices into one. If Edge mode is used, the vertices that define the selected edge or edges are collapsed or merged. In Face mode, the vertices defining the face or faces are merged into one.

When sub-objects are region selected all at once, their average position is used as the merge point. If one is selected first, then the others added to the selection, the first selection's location is used as the merge point.

Gizmo: None

Available in Face, Edge and Vertex mode.

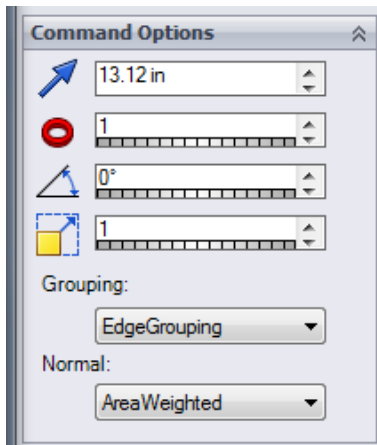


Creation Tools

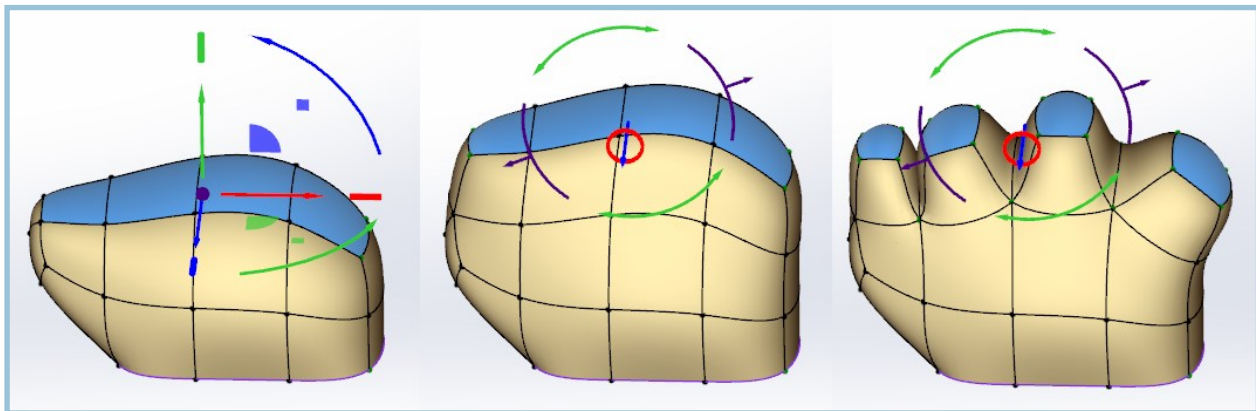
The creation tools allow you to change the shape of the object by adding geometry in some way to the existing SubD control polygon.



Extrude:



Most common use is to extrude face or faces from a selected face or faces. If Grouping Type is set to NoGrouping, a face will be extruded from each of the selected faces.



The selected faces (left image); a simple extrude (center image); no grouping (right image)

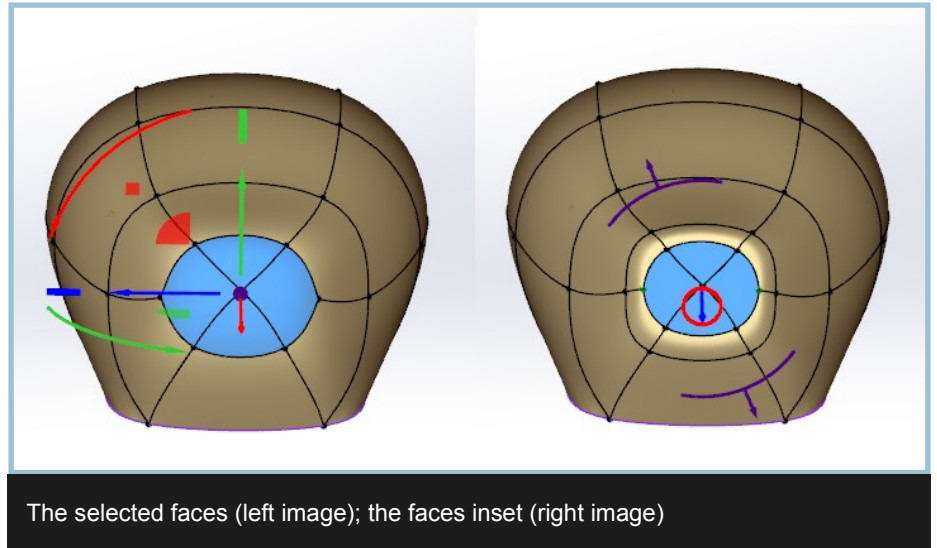
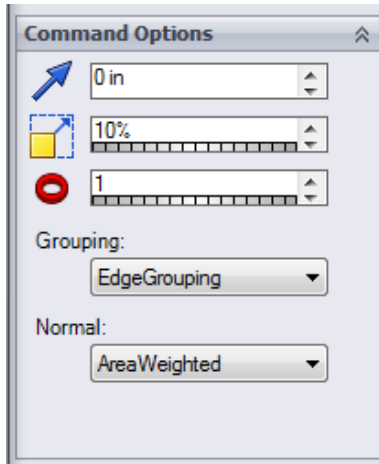
Gizmo: The extrude distance and bevel amount can be adjusted once the inset has been initialized. The number of segments can be increased and there is an option to rotate the selection that works as a soft selection. Right clicking or picking the Accept check mark ends the command.

Available in Face and Edge mode.

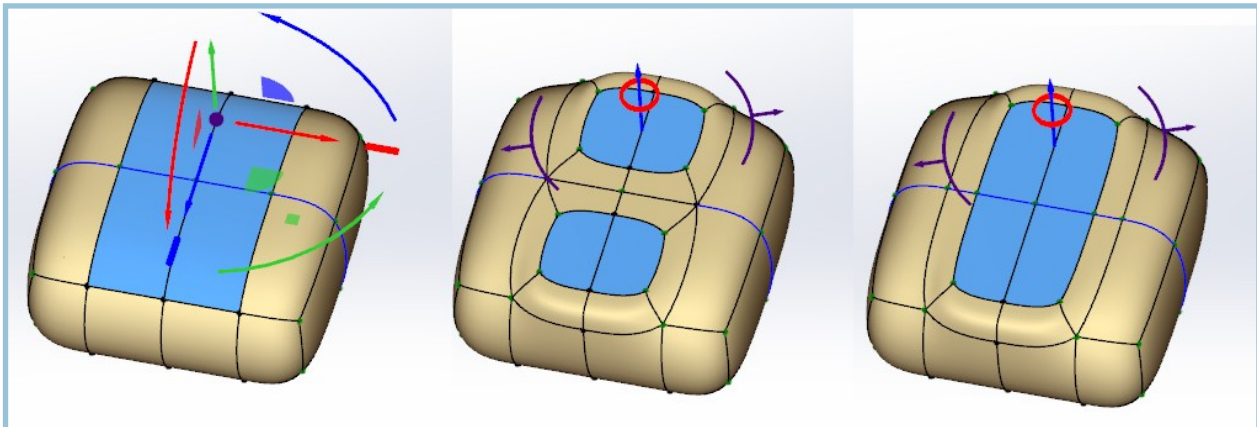
Creation Tools (continued)



Offset Loop:



The selected faces (left image); the faces inset (right image)



With Mirror, the selected face[s] (left image); offset with Grouping type set to EdgeGrouping (middle image); and set to MirrorCrossing (right image)

Creates an offset loop from a selected face or faces. If Grouping Type is set to NoGrouping in the Command Parameters window, a loop will be offset on each of the selected faces. Edges can have Offset Loop applied to them to create new faces on either side of the selected edge with additional faces on each end of the edge.

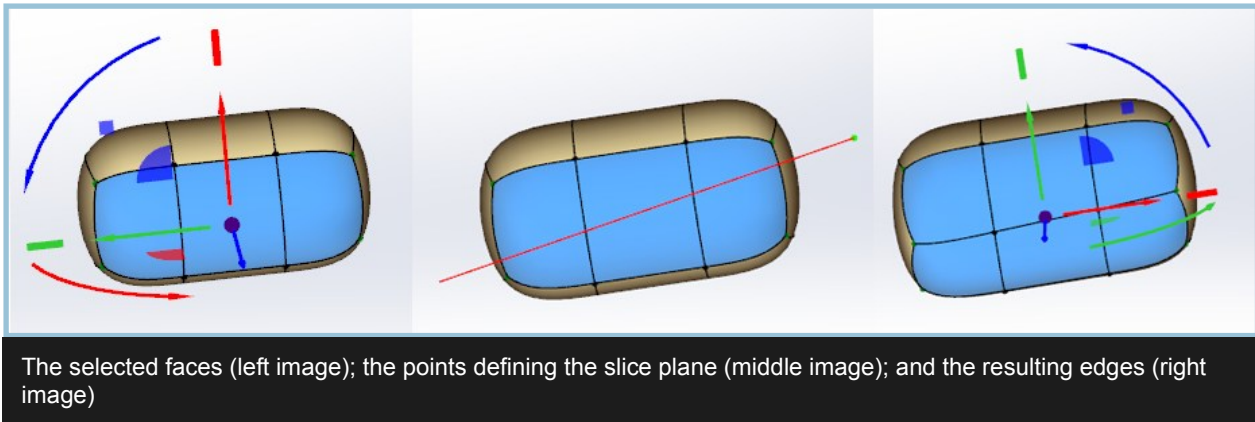
Gizmo: The inset size can be adjusted once the inset has been initialized.

Available from Face and Edge mode.

Creation Tools (continued)



Slice

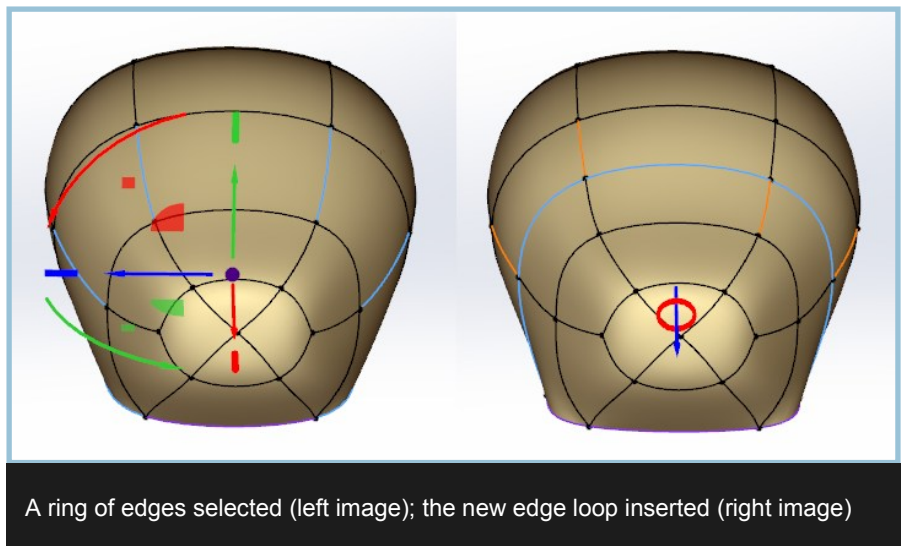
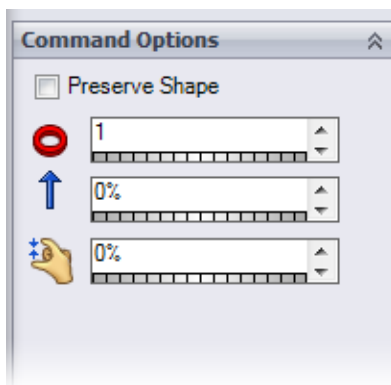


Slices through the mesh or selected faces creating new edges using a plane defined by two points in screen space, perpendicular to the current view.

Gizmo: None



Insert Loops



Insert Loops adds one or more edge loops to the selected edge ring. After initializing the tool, you can set the number of segments or loops, slide them to one side or the other, or pinch them closer or farther apart. Right clicking or picking the Accept check mark ends the command.

Requires at least two edges selected, but works best when selecting with Edge Ring.

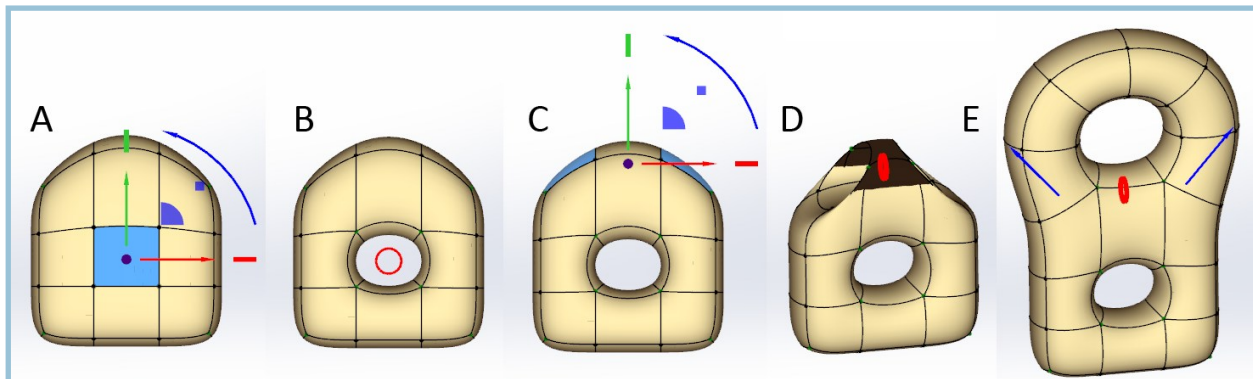
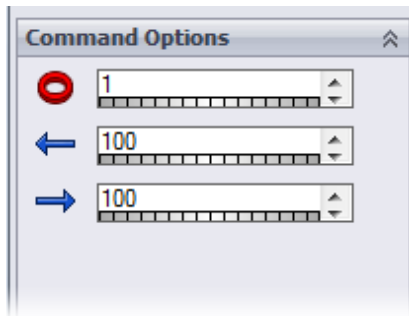
Gizmo: Allows for more segments, pinching and sliding of the new loops

Available from Edge or Edge Loop mode.

Creation Tools (continued)



Bridge:



- A - Two faces selected, back and front
- B - Bridging through the model
- C - Two top faces selected, either side
- D - Bridging straight through
- E - Increasing the number of segments to push bridge orientation up above the original selected faces

Connects two faces or two groups of faces in face mode, or connects two open edges. After the initial Bridge, you can adjust the number of segments and adjust the tension on either end to affect the bridge's curvature. Right clicking or picking the Accept check mark ends the command.

Gizmo: Allows for more segments, adjusting of tension from either end

Available from Face or Edge Mode.

Edit Topology



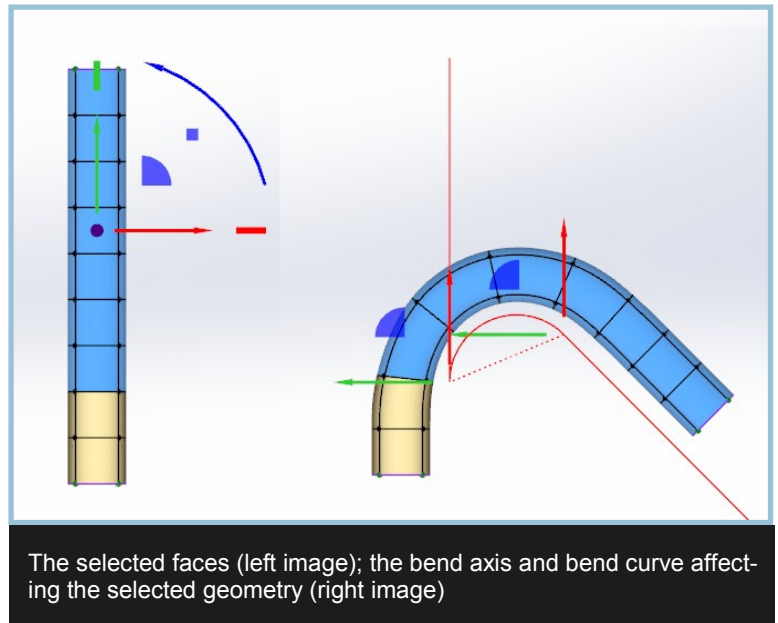
Bend

Bends the selected sub-objects using screen space as the defining Plane.

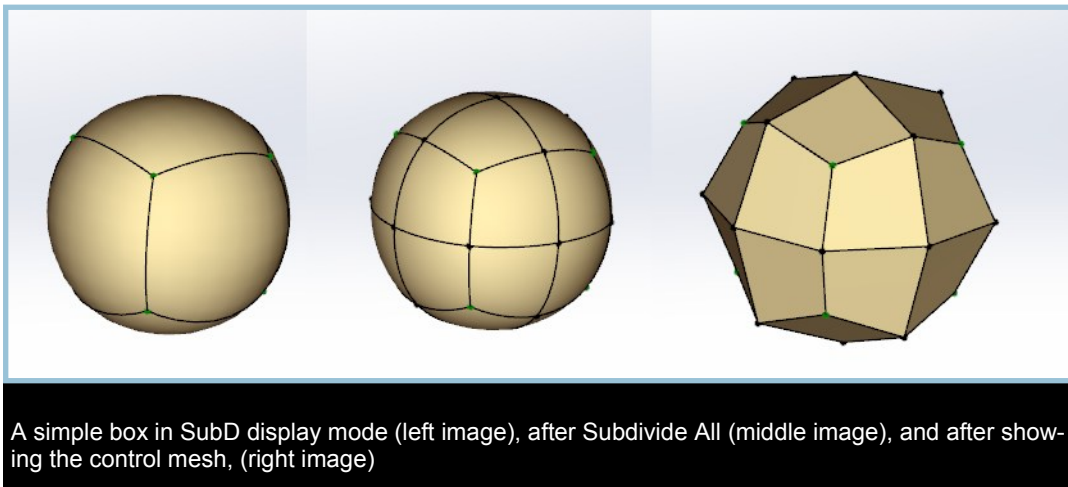
To use, select the sub-objects you wish to affect. Click the Bend tool icon. Now click in the viewport to define the start of the bend axis, then click again to define the end of the axis. As soon as the axis is defined, move the mouse to bend the selection. Click to finalize and accept the bend.

Gizmo: Bend axis and Bend Curve.

Available from Vertex, Edge and Face modes.



Subdivide All



Subdivides the entire object regardless of current sub-object mode.

Gizmo: None

Available from Vertex, Edge and Face modes.

Edit Topology (continued)

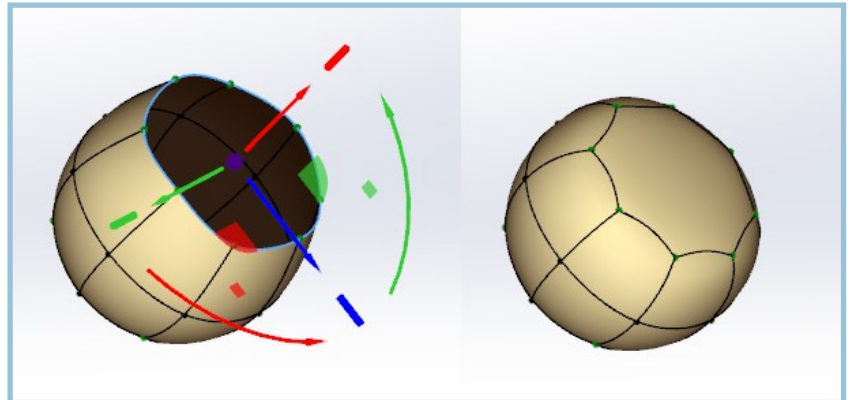


Fill Face

Creates a face to fill an opening. Only one of the open edges need be selected to fill the hole. The resulting multi-sided face may need further editing to produce quads.

Gizmo: None

Available from Edge or Edge Loop mode.



An object with open edges selected (left image); and the face filled (right image)

Edge Attributes

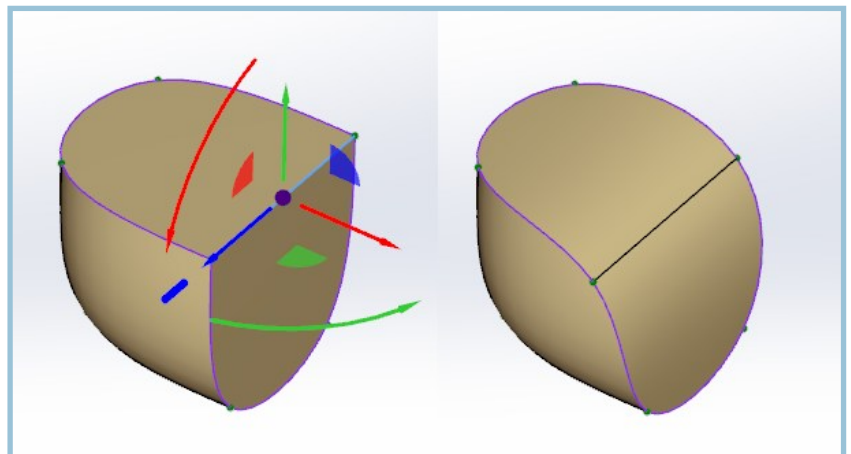


Smooth Edge

Sets the selected edges or vertices to a crease value of 0. Partial creasing can be set through the Property Manager. When faces are selected, only the boundary edges between the selected faces and unselected faces are affected. When faces are selected, only the boundary edges between the selected faces and unselected faces are affected.

Gizmo: None

Available from Vertex, Edge or Face mode.

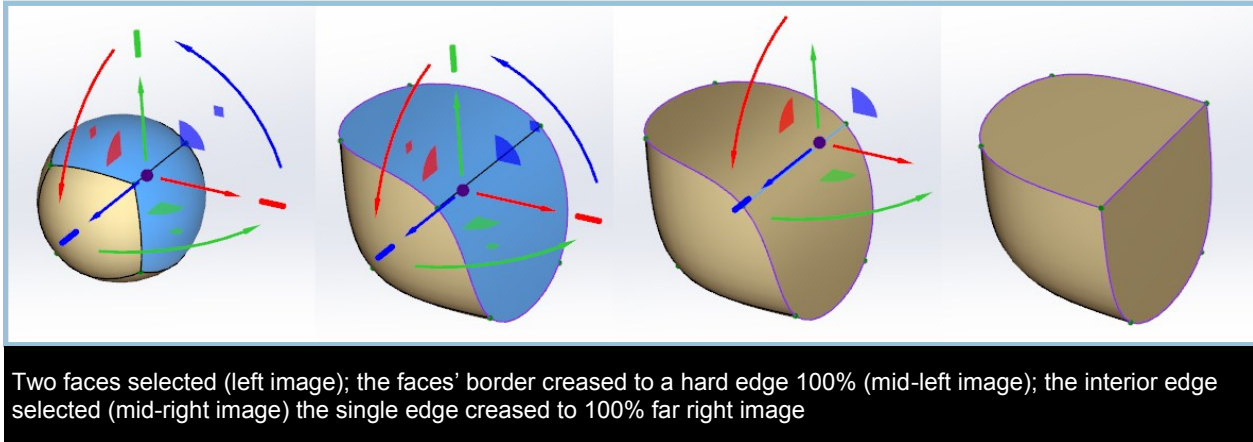


A hard edge selected, weight 100, (left image); the edge smoothed- a weight of 0 (right image)

Edge Attributes (continued)



Hard Edge



Sets the selected edges or vertices to a weight value of 100 for a fully hard edge or a sharp vertex. Use a hard edge before conversion to be able to use the standard SolidWorks's Fillet Feature. Partial weighting can be set through the Property Manager. When faces are selected, only the boundary edges between the selected faces and unselected faces are affected.

Gizmo: None

Available from Vertex, Edge or Face mode.

Face Grouping

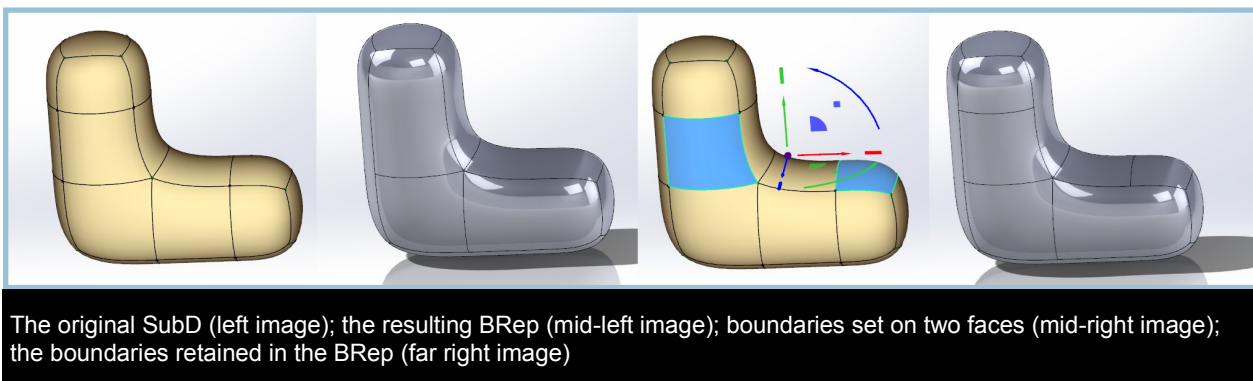


Define Boundary

Defines an edge boundary that will be retained in the SolidWorks BRep. This can be helpful in retaining SolidWorks features during repeated editing of the SubD.

Gizmo: None

Available from Face or Face Ring modes.



Face Grouping (continued)



Clear Boundary

Clears the boundary assigned to the selected face or faces.

Gizmo: None

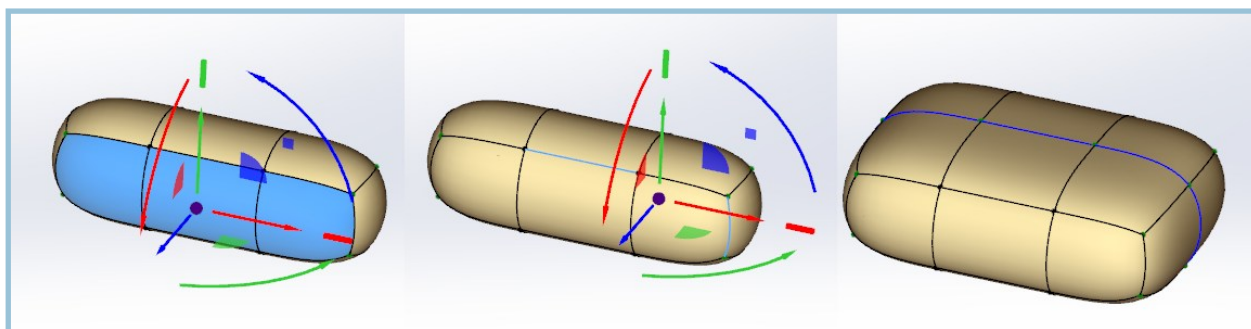
Available from All Modes.

Mirror Tools



Mirror

Creates a mirror image of the model using the average of the selected faces and the closest orthographic plane (x, y, or z) for its orientation.



Selecting faces (left image) or two edges (center image) to define the mirror plane, the object mirrored on the specified plane (right image)

Gizmo: None

Available from Edge and Face modes.

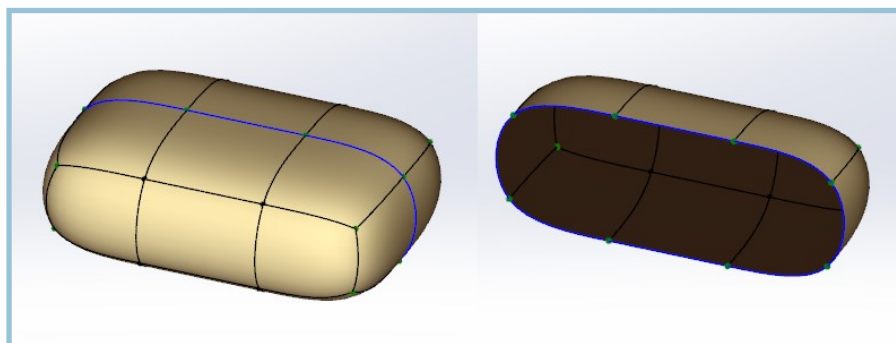


Toggle Mirror

Toggles the visibility of the mirrored side of the model on and off. Editing done while the mirrored side is hidden will be seen once the hidden side is toggled back to visible.

Gizmo: None

Available from all modes.

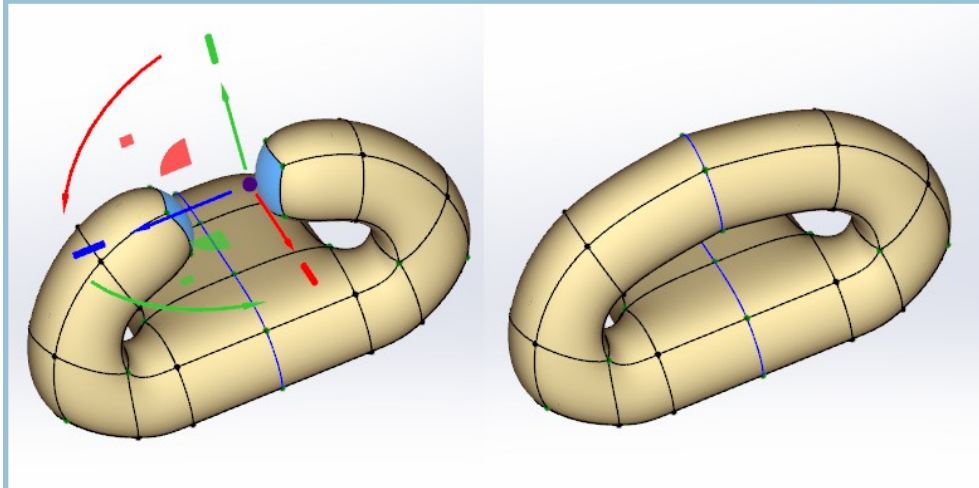


The mirrored object (left image); the mirror side visibility toggled off (right image)

Mirror Tools (continued)



Add To Mirror



The face[s] selected (left image); extended out to the mirror plane and added to it (right image)

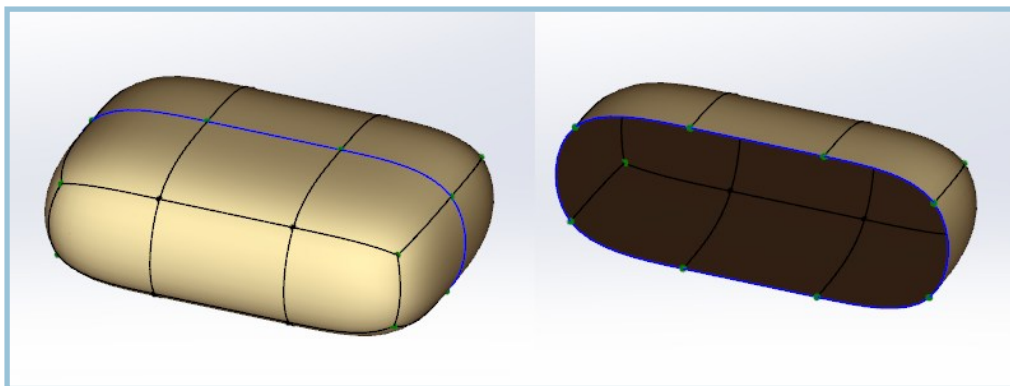
Adds more faces to the mirror plane.

Gizmo: None

Available from all modes.



Remove



The mirrored object (left image); the mirror side removed (right image)
Note the remaining hard, open edge after the operation

side when Mirror is active.

Removes the mirrored

Gizmo: None

Export Options



Save Control

Exports the control mesh only from the Power Surface model.

Formats: Autodesk .fbx, or Wavefront .obj

Available during editing only.



Save SubD

Exports the Power Surface model with the current SubD level.

Formats: Autodesk .fbx, or Wavefront .obj

Available during editing only.



Save Scene

Exports the Power Surface model and all of its attributes.

Format: nPower's Internal Power Model Format .pmodel

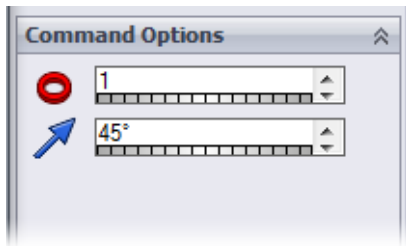
Available during editing only.

Specialized Tools

These tools can only be accessed through the Power Surfacing menu > Specialized Tools. Note that it is possible to create less than optimal geometry that may require extra editing to achieve the desired result.



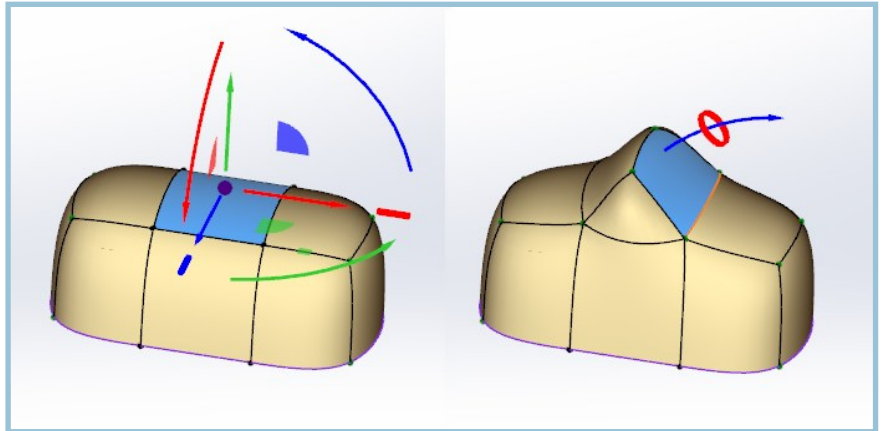
Hinge



Extrudes a face or faces hinging from the specified edge. After initializing the tool, you can set the number of segments and affect the angle of the final face. You must select the hinge edge to initialize the tool. The hinge axis does not have to be on the selected face or faces. Right click or Escape ends the command.

Gizmo:

Available from Face mode.



The face selected (left image); the hinge edge selected (orange) and the face 'hinged' from that edge (right image)



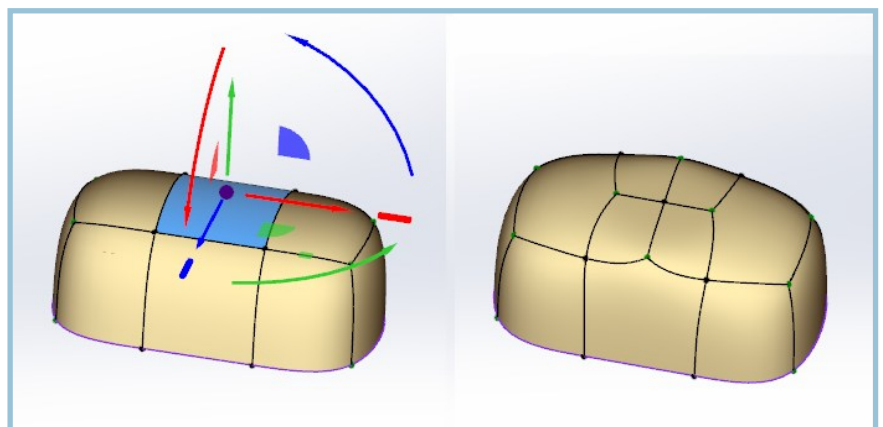
Subdivide Selected

The face selected, left, the face sub-divided right - note the five-sided faces created as a result

Subdivides the selected face or faces.

Gizmo: None

Available from Face mode.

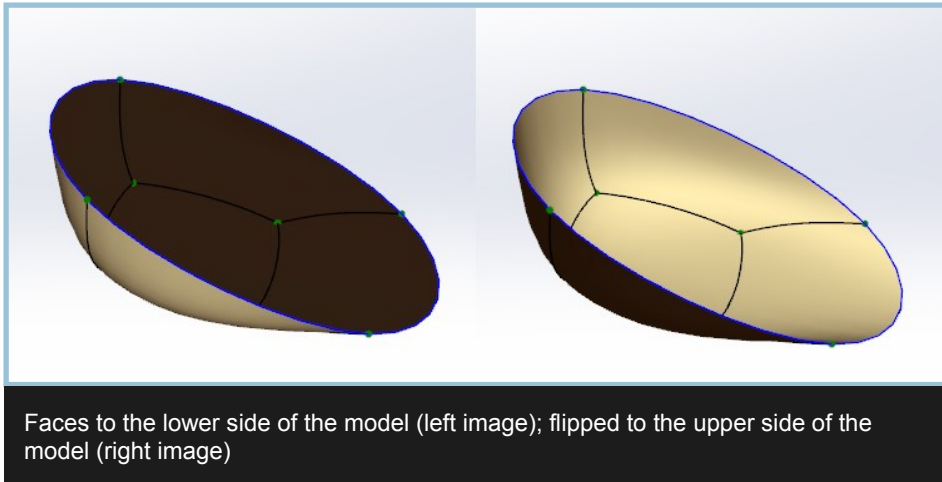


The face selected (left image); the face sub-divided right- note the five-sided faces created as a result (right image)

Specialized Tools (continued)



Flip Faces



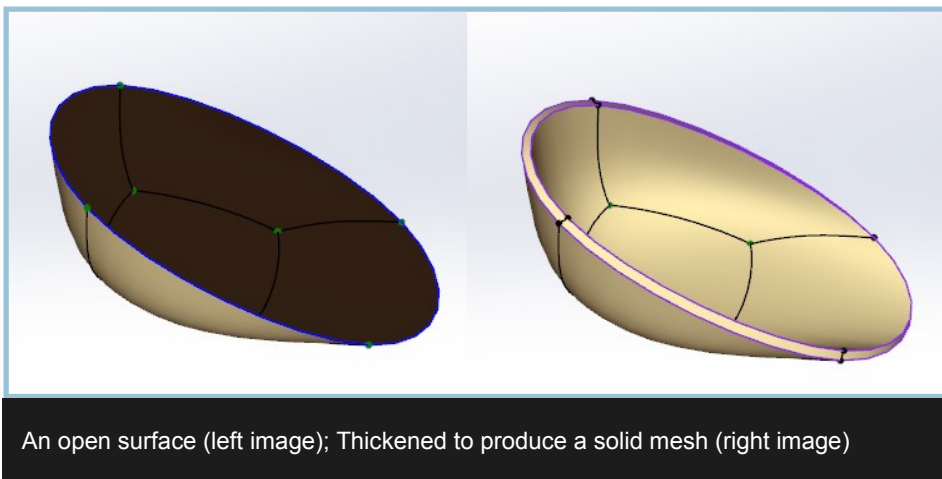
Flips the selected face or faces' normals.

Gizmo: None

Available from Face mode.



Thicken



Extrudes open edges and caps the resulting hole with a matching surface. Note the creased edges.

Gizmo: None

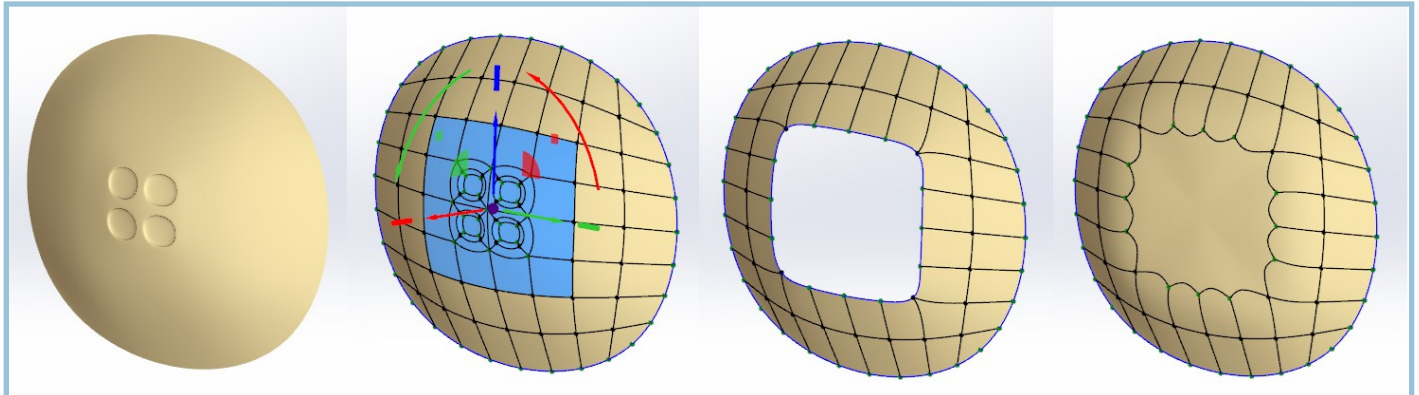
Available from Face mode.



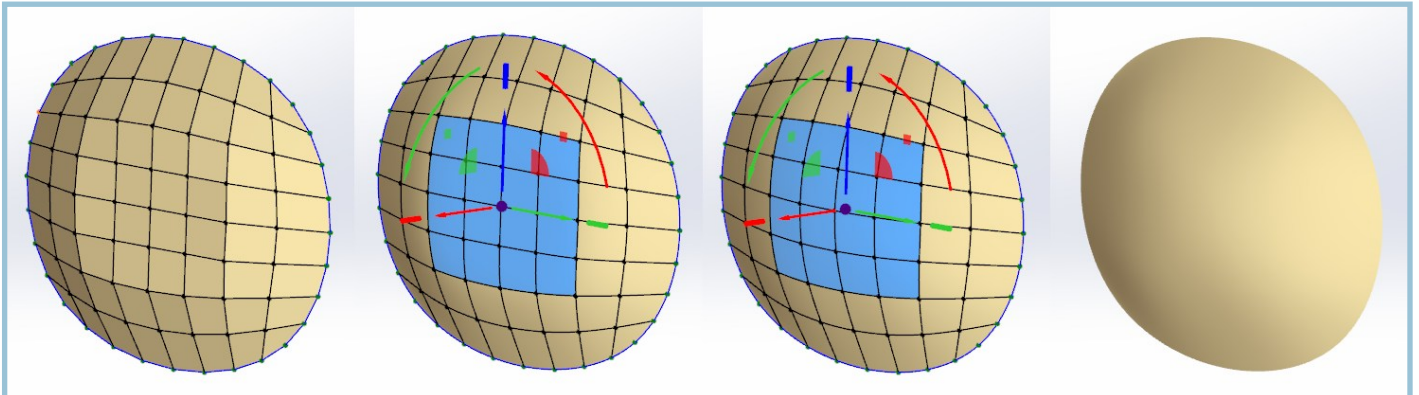
Curve Selected

Curve Selected uses the curvature of the selected faces' boundary and attempts to create tangency. This workflow is particularly useful for removing detail from existing surfaces.

The following images outline a typical workflow:



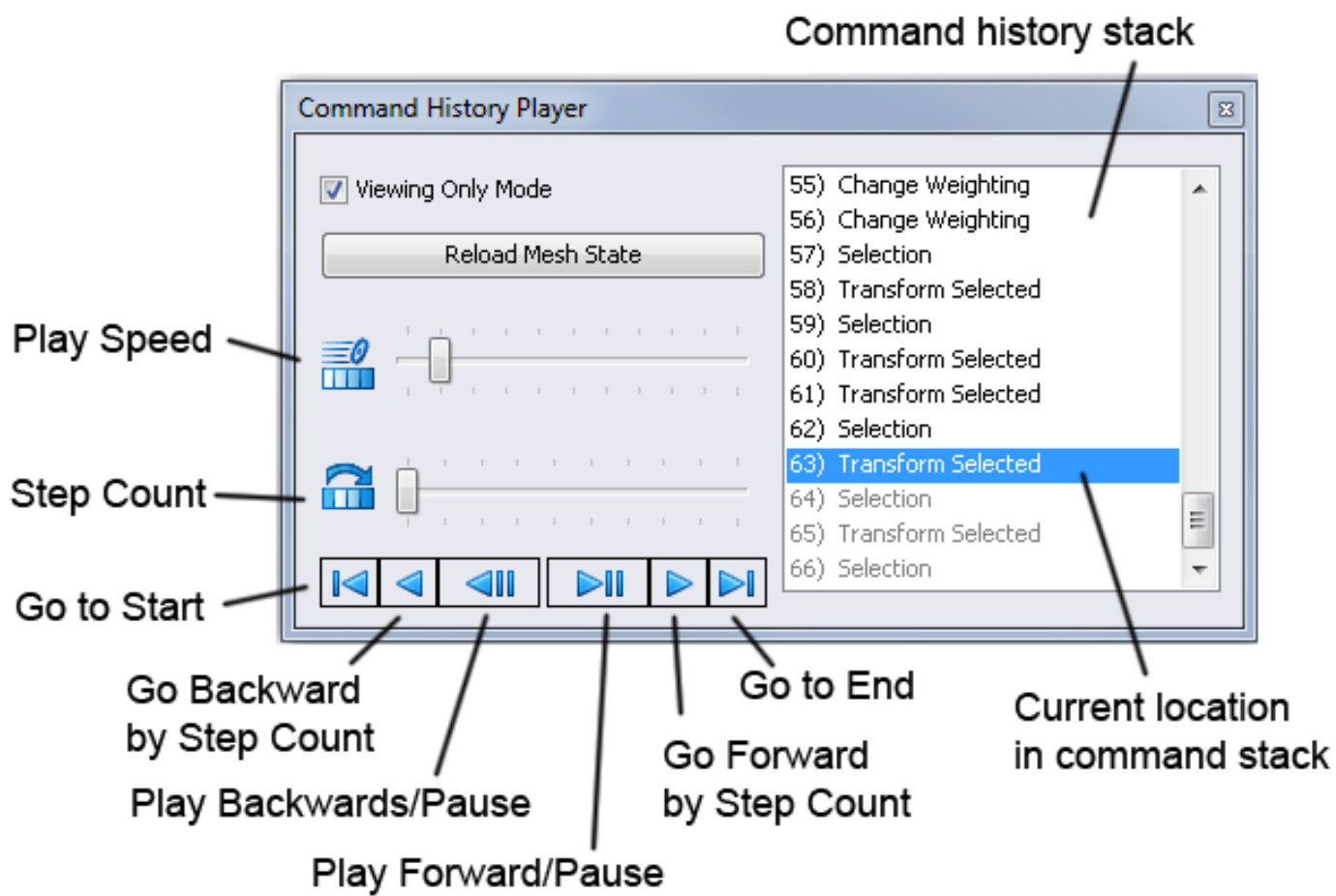
Existing area of high detail (left image)
The detail faces to remove selected (mid-left image)
The faces deleted (mid-right image)
The hole after using the Fill Face command (right image)



Re-topologized with Insert Edges (left image)
The new faces selected (mid-left image)
The new faces after using Curve Selected (mid-right image)
The surface with vertices and edges turned off (right image)

Command History Player

The Command History Player gives access to the Power Surfacing undo stack where you can use several different options to review the command history of a subD model. You can play through the command stack manually or automatically, forward or backward, from any position. You can select any command in the list to see what the model looks like at that particular point in its creation process.



Because Power Surfacing is undergoing regular changes, you will be able to step back through older models, but may not be able to read or play through the stack forward.

Viewing Only Mode allows you to investigate creation workflows of existing models without being able to actively alter the mesh. When unchecked, you can continue editing the mesh from any point in the stack.

Reload Mesh State will reload the mesh into the state it was in when you last opened the player. If you are experimenting with different solutions to your model, you may save them through the Power Surfacing menu > Save > Save Scene. This will save the model in the native .pModel format.

The **Speed** slider lets you adjust playback speed when using Play Forward/Pause or Play Backward/Pause.

The **Step Count** slider allows you to specify how many steps to skip when using step forwards or backwards by step count and also when using the regular Play/Pause or Play Backward/Pause. A maximum of nine steps can be skipped at a time.

Go to start sets the stack to the Initial state.

Command History Player (Continued)

Go to start sets the stack to the Initial state.

Step backward by step count allows you to step backward through the stack manually one command at a time or by multiples if Step Count is more than 1.

Play Backward/Pause will automatically play back through the command stack one command at a time or by multiples if Step Count is more than 1. You may pause playback and continue by pressing the same button.

Step forward by step count allows you to step forward through the stack manually one command at a time or by multiples if Step Count is more than 1.

Go to End sets the current command to the final command.

Hot Keys:

Shift

When held down while picking, sub-objects will be added to the current selection.

Ctrl

When held down while picking, sub-objects will be added to the current selection or removed if they are already selected.

A

The **A** key adds geometry depending on the mode and when the key is pressed. Additive mode can also be turned on in the Property Manager.

In **Face** mode, with a face selected, if the A key is held down, when you click and drag on the move arrows, a face is extruded.

In **Edge** mode, if the A key is held down and you hover over an edge, a preview of a new edge loop at that location is shown in red. When the edge is picked, the loop will be inserted at that point.

In **Edge** mode, if an *open* edge is selected and the A key held down, the edge or edges will be extruded as a surface only.

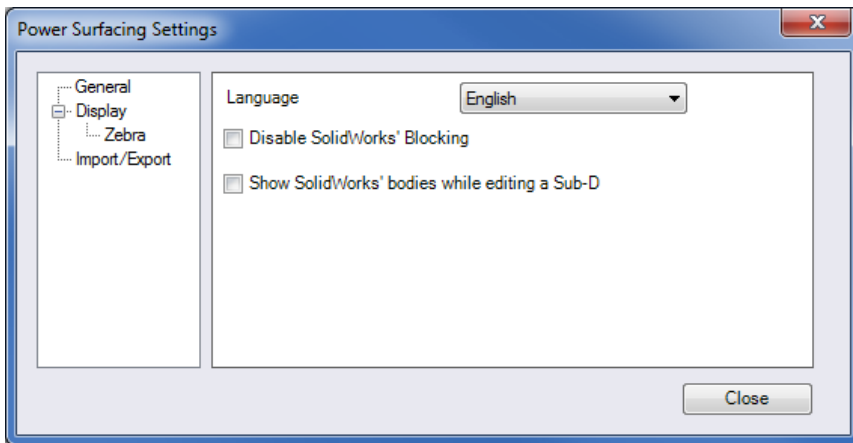
S

The **S** key will toggle the right-click menu on.

Options

From the Power Surfacing menu, Options, you can change several of the default settings.

General

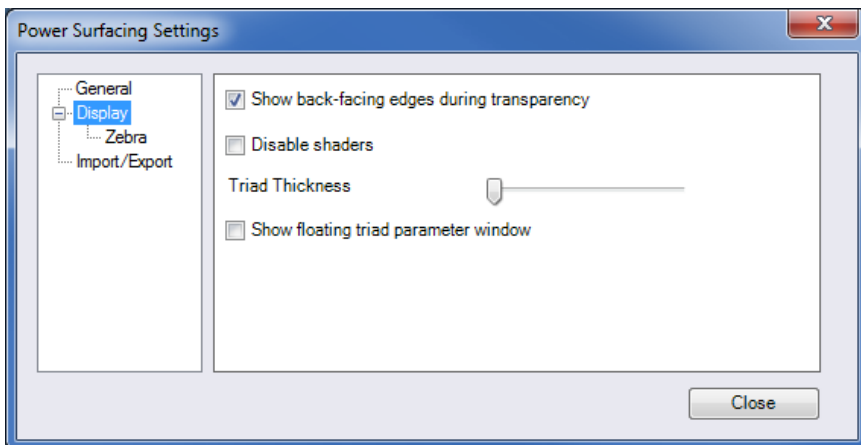


Power Surfacing lets you select from three language options. English, Spanish and XXX.

Disable SolidWorks' Blocking will allow you access to many options generally blocked when you are actively setting up or editing a feature. You will be able to save the part file, XXX

Show SolidWorks' bodies while editing a SubD allows you to keep other SolidWorks bodies visible while creating and editing your SubD model.

Display



From Display, you have an option to show or hide back-facing edges when using transparency.

Disable Shaders will disable shaders in SubD edit mode only. This is useful for investigating graphics card compatibility issues. With shaders disabled, you will no longer have access to transparency options.

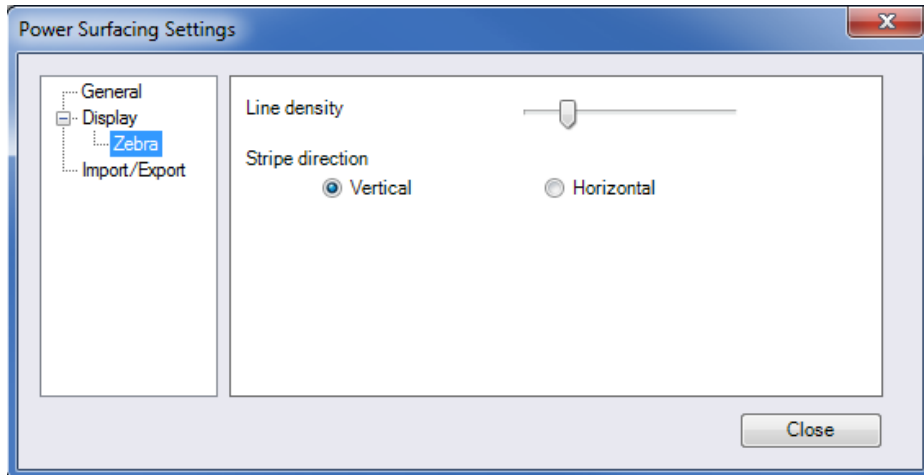
Triad Thickness allows you to adjust the thickness of the triad gizmo. Note that changing the thickness will affect the pick zone.

Show floating triad parameter window will show or hide the instant, in viewport, value feedback widget when using the triad

Options, (continued)

Zebra

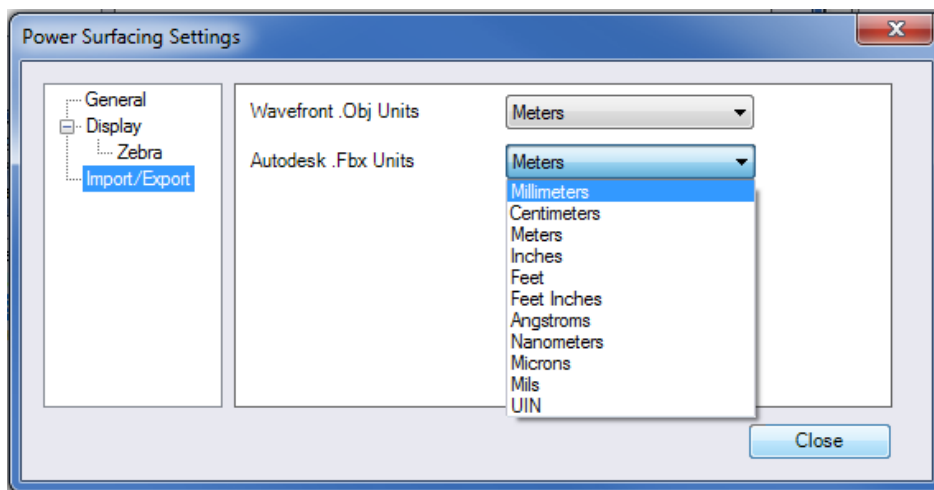
The Zebra shader option in the Viewing tools section allows you to edit your SubD while observing the reflection pattern as you work.



Line Density allows you to control the overall scale of the stripes.

Stripe direction you can select either Vertical or Horizontal for the stripe orientation.

Import/Export



Import/Export options allow you to choose the units associated with .Obj and .Fbx file types.