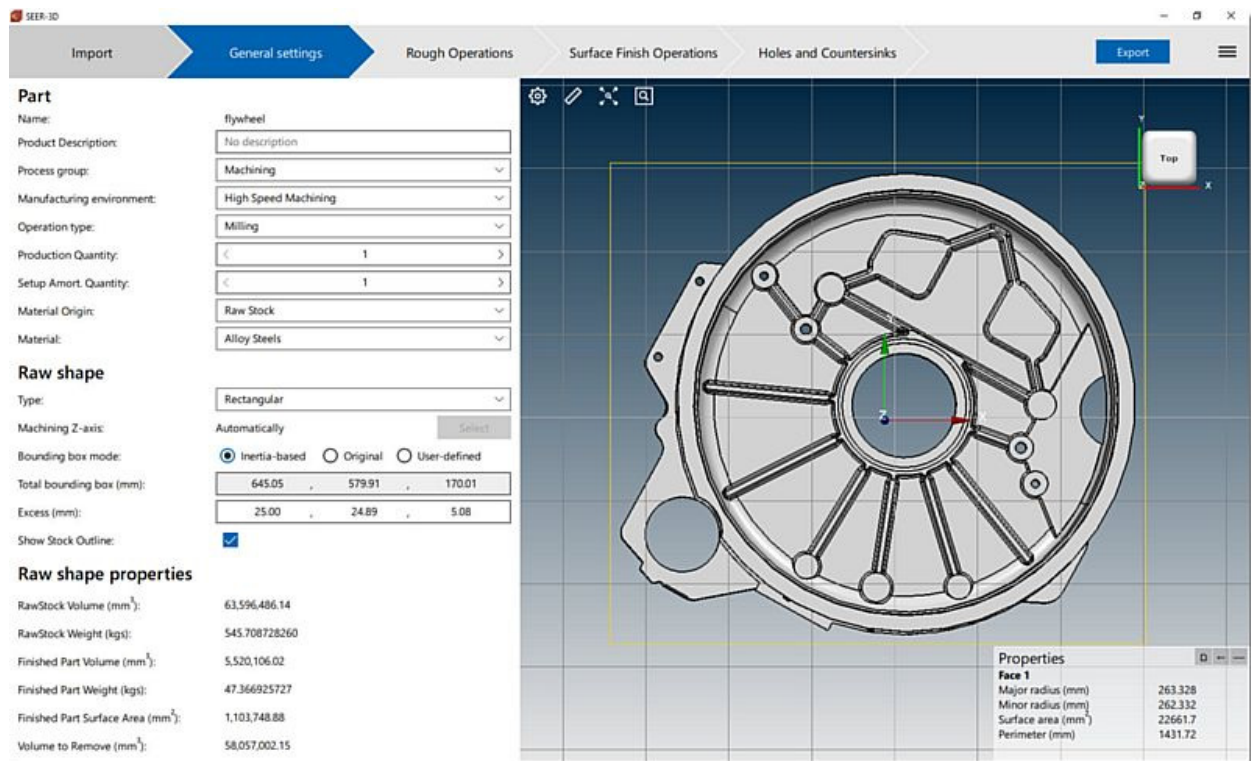


SEER-3D: An Introduction

SEER-3D

SEER-3D allows you to open and view part output from many widely-used Computer-Aided Design (CAD) applications, modify the associated data, and import it into SEER for Manufacturing for use in a cost estimate. The data to be imported must be in STEP format (ISO 10303-21, typically with the extension .stp or .step).



The SEER-3D User Interface: General Settings Tab

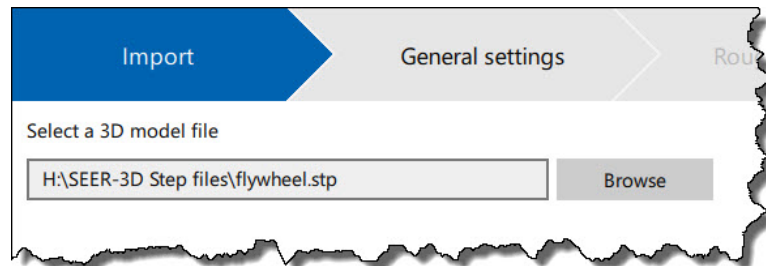
SEER-3D provides a full, 3D view of the part, with zoom magnification to the lowest level of detail, and 360° rotation on the X, Y, and Z axes. It allows you to view, set, or modify a variety of parameters describing the part, including those involving material, process specific parameters, and quantities to be made.

The settings and conditions for each of the process group categories are contained in the Manufacturing Environments, sets of files which define the defaults for a variety of materials and conditions. The settings contained in the Manufacturing Environments which ship with SEER-3D are applicable over a wide range of circumstances; you can also modify the Manufacturing Environments as needed to reflect circumstances specific to your operation.

SEER-3D has a wizard-style user interface, with separate tabs to guide you through the individual steps involved in loading, viewing, modifying, and exporting part information.

Import Tab

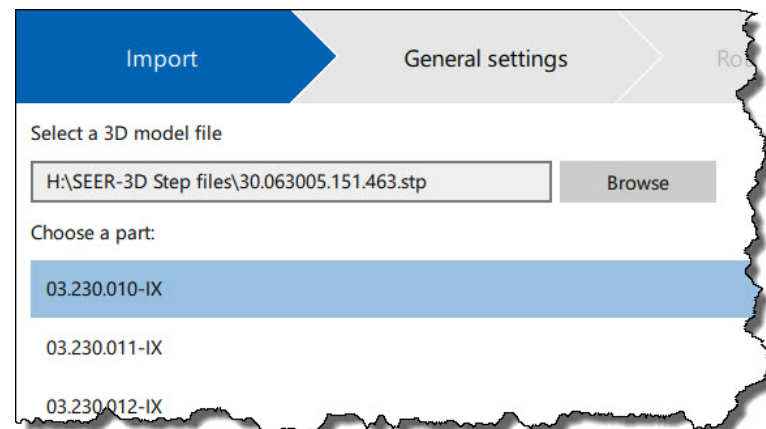
The Import tab allows you to select a 3D model file for import into SEER-3D. Click on the button to the right of the entry field to browse for a file. By default, it will look for files with the extension .stp or .step. After SEER-3D has finished loading the file, it will automatically display the second tab, General Settings.



Selecting a STEP-Format File

The Viewer (see Part Viewer, below) will be blank, showing only the background color and controls, until the part file is completely loaded. After the file has finished loading, the part will be displayed, and you will be able to view and manipulate it.

If the file contains multiple parts, the individual parts will be listed, so you can view and select the part before moving to the general settings tab.



Selecting a Part From a Multi-Part STEP File

General Settings Tab

The General Settings tab allows you to view, enter, or change several overall settings for the part:

Part Section

Part	
Name:	flywheel
Product Description:	Machined Flywheel
Process group:	Machining
Manufacturing environment:	High Speed Machining
Quantity:	< 1 >
Material Origin:	Raw Stock
Material:	Alloy Steels

General Settings Tab: Part Section

Name

The item name. It becomes the name of the Project-level work element when you export the part to SEER-MFG.

Note: The name is automatically generated from the name of the STEP file, and cannot be edited in SEER-3D. It can, however, be edited in SEER-MFG after export.

Product Description

Enter a description or descriptive name for the part. The product Description is for use within SEER-3D only, and is not exported to SEER-MFG.

Process Group

Select a Process Group from the pull-down list. For machined parts, there will be only one Process Group: Machining.

Manufacturing Environment

Select the appropriate Manufacturing Environment from the pull-down list.

Manufacturing environment:	Fully Automated CNC Machining
Operation type:	High Speed Machining
Production Quantity:	Manual Operations
Setup Amort. Quantity:	Prismatic Machining of Titanium Forging
Material Origin:	Semi Automated NC Machining
Material:	Turn Bore Machine
Raw shape	

Manufacturing Environment Menu

The Manufacturing Environment selection sets defaults for many of the inputs on the General Settings tab, and determines the Machining Operation Type in SEER-MFG. Manufacturing Environments are user-customizable.

Operation Type

Select the type of operations required for the part; either Milling, or Lathe + Milling. A default value will be set based on the manufacturing environment settings.

Select Lathe + Milling for parts that require lathe type operations. SEER-3D will determine the main turning axis of the part, and decipher which surfaces require lathe type operations, and other surfaces that require milling or drilling operations.

Select Milling if no lathe operations are required.

Production Quantity

Enter the production quantity. When you export the part to SEER-MFG, this quantity will be entered as the Production Quantity at both Rollup and Work Element level.

Setup Amortization Quantity

Enter the setup amortization quantity. A default value will be displayed based on your manufacturing environment settings, which you can override as required.

Material Origin

Select the Material Origin from the pull-down list. The Material Origin describes the stock or process used to produce the rough part to be machined. This input corresponds to the MATERIAL/Material Origin parameter on the Process Specific tab of the SEER-MFG Machining work element.

Material

Select the Material from the pull-down list. This option sets the MATERIAL/Material parameter for the Machining work element in SEER-MFG.

Raw Shape Section

Raw shape

Type: Rectangular

Machining Z-axis: Automatically Select

Bounding box mode: ☐ Inertia-based ☒ Original ☐ User-defined

Total bounding box (mm): 634.60 , 601.00 , 155.90

Excess (mm): 25.00 , 25.00 , 5.00

Show Stock Outline: ☒

General Settings Tab: Raw Shape Section (Rectangular Shape)

Type

The type of raw shape. this option sets the ENGINEERING DESCRIPTION/Raw Shape parameter for the Machining work element in SEER-MFG. Most other Raw Shape inputs vary, depending on the Type selected.

Machining Z-axis

Available with the Rectangular and Irregular, Machining Raw Shape types. The Z-axis on which the part will be machined. The Machining Z-axis is determined automatically. To change it, click on the Select button, then click on the appropriate part face in the Viewer. The Machining Z-axis will change to the face that you select.

Note: The Machining Z-axis is separate from the Z-axis in the Viewer, which is part of the coordinate system for viewing and rotating the part image, but is not involved in any machining operations.

Bounding Box Mode

A default selection is made by finding the smallest bounding box comparing the part Inertia bounding box, to the Part axis aligned bounding box. You can change the default selected value as required.

Selecting the User Defined option, allows you to select a surface to realign the bounding box to the selected surface. And reveals a set of Bounding Box inputs where you can enter your own bounding box dimensions.

Total Bounding Box

Available with the Rectangular Raw Shape type. The bounding box required to machine the part from the Raw Shape, in millimeters or inches. This is a calculated value.

Excess

Available with the "Rectangular", "Round, Solid", and "Round, Tubing" Raw Shape types.

For "Rectangular", this input has three values, representing the dimensions of excess raw material in millimeters or inches beyond the bounding box.

For "Round, Solid" and "Round, Tubing", this is a single value input, representing the excess length of the raw shape beyond the calculated Length value.

This value is calculated initially, but can be changed by the user. The Excess affects the Raw Stock Volume and Raw Stock Properties (see below), the SEER-MFG ENGINEERING DESCRIPTION/Raw Dimensions parameter and the Volume inputs for the specific Machining operations involved in the process.

Length

Available with the "Round, Solid", "Round, Tube", and "Irregular" Raw Shape types. The length of the raw shape.

For "Irregular", this value is calculated initially, but can be changed by the user; it affects the Raw Stock Volume and Raw Stock Weight (see below).

For "Round, Solid" and "Round, Tubing", this is a calculated value only.

Cross Section Area

Available with the "Irregular" Raw Shape type. The cross section of the raw shape. This input affects the Raw Stock Volume and Raw Stock Weight (see below), and the SEER-MFG ENGINEERING DESCRIPTION/Raw Dimensions parameter.

Turning Axis

Available with the "Round, Solid", "Round, Tube", and "Irregular" Raw Shape types. The axis on which the part will be turned. The Turning Axis is determined automatically. To change it, click on the Select button, then click on the appropriate part face in the Viewer.

Diameter

Available with the "Round, Solid" Raw Shape type. This is a calculated value only, representing the initial diameter of the raw shape.

Diameter Excess

Available with the "Round, Solid" Raw Shape type. This value is calculated initially, but can be changed by the user. The Excess affects the Raw Stock Volume and Raw Stock Weight (see below), the SEER-MFG ENGINEERING DESCRIPTION/Raw Dimensions parameter and the Volume inputs for the specific Machining operations involved in the process.

Outer Diameter/ Inner Diameter

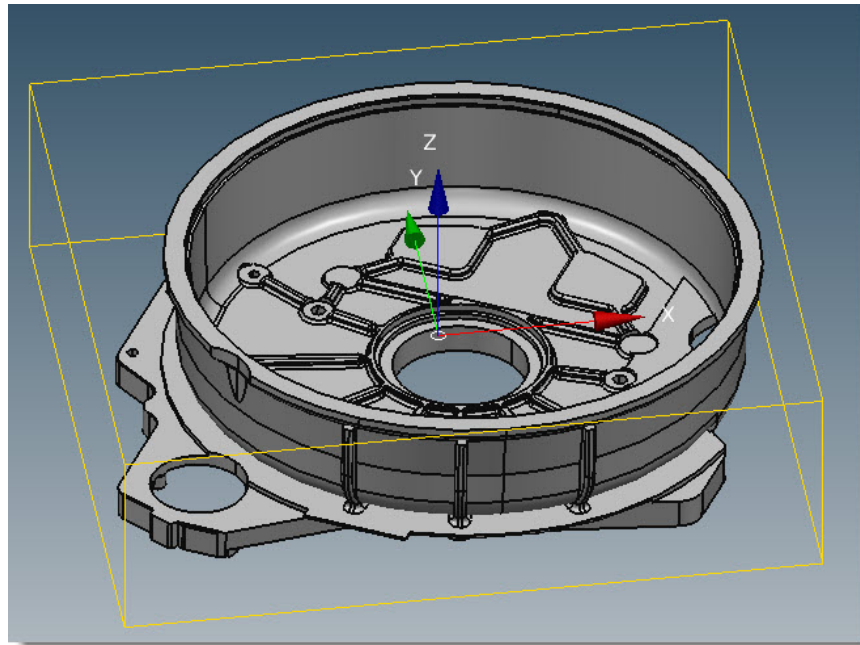
Available with the "Round, Tube" Raw Shape type. These are calculated values only, representing the initial outer and inner diameter of the raw shape.

Outer / Inner Diameter Excess

Available with the "Round, Tube" Raw Shape type. These values are calculated initially, but can be changed by the user. The Outer Diameter Excess and Inner Diameter Excess affect the Raw Stock Volume and Raw Stock Weight (see below), the SEER-MFG ENGINEERING DESCRIPTION/Raw Dimensions parameter and the Volume inputs for the specific Machining operations involved in the process.

Show Stock Outline

Available with all Raw Shape types. Displays the outline of the raw stock, as determined by the inputs in the Raw Shape section.



Part With Stock Outline Shown

Raw Shape Properties Section

Raw shape properties

RawStock Volume (mm ³):	59,459,691.88
RawStock Weight (kgs):	510.211724066
Finished Part Volume (mm ³):	5,520,106.02
Finished Part Weight (kgs):	47.366925727
Finished Part Surface Area (mm ²):	1,103,748.88
Volume to Remove (mm ³):	53,920,207.89

General Settings Tab: Raw Shape Properties Section (Rectangular Shape)

With the exceptions noted below, the Raw Shape Properties fields are the same for all Raw Shape types.

Raw Stock Volume

The volume of the raw stock, in cubic millimeters or cubic inches. For all Raw Shape types, this value is affected by the inputs which determine the dimensions of the Raw Shape.

For the "Rectangular", "Round, Solid", and "Round, Tube" Raw Shapes, this is a calculated value.

For the "Irregular" Raw Shape, This value is calculated initially, but can be changed by the user.

Changing this value affects the Cross Section Area and Raw Stock Weight.

Raw Stock Weight

The weight of the raw stock in kilograms or lbs. For all Raw Shape types, this value is affected by the inputs which determine the dimensions of the Raw Shape.

For the "Rectangular", "Round, Solid", and "Round, Tube" Raw Shapes, this is a calculated value.

For the "Irregular" Raw Shape, This value is calculated initially, but can be changed by the user. Changing this value affects the Cross Section Area and Raw Stock Volume.

Finished Part Volume

The volume of the finished part, in cubic millimeters or cubic inches. This is a calculated value; it is not affected by the Raw Shape values.

Finished Part Weight

The weight of the finished part in kilograms or lbs. This is a calculated value; it is not affected by the Raw Shape values.

Finished Part Surface Area

The surface area of the finished part, in cubic millimeters or cubic inches. This is a calculated value; it is not affected by the Raw Shape values.

Volume to Remove

The volume of raw stock to be removed, in cubic millimeters or cubic inches. This is a calculated value; it is affected by the Raw Shape values.

Additional Options Section

Additional Options	
Deburr	<input checked="" type="checkbox"/>
Deburr length (in):	<input type="text" value="83.99"/>
Tool Fab & Design	<input checked="" type="checkbox"/>
Finish & Heat Treat	<input checked="" type="checkbox"/>

General Settings Tab: Additional Options Section

The Additional Options section allows you to specify additional operations or processes involved in producing the part. Available options are:

Deburr

If this box is checked, a Deburr operation will be included in the list of Machining Operations in SEER-MFG. If it is not checked, a Deburr operation will not be included.

Deburr length

If Deburr is checked, this input sets the Length field for the SEER-MFG Deburr Machining Operation. The value is calculated initially, but can be changed by the user.

Tool Fab & Design

If this box is checked, the Initial Tool Fabrication & Design category will be set to Yes for the machining work element in SEER-MFG and values will be set for its parameters. If it is not checked, Initial Tool Fabrication & Design will be set to No.

Finish & Heat Treat

If this box is checked, a Finish & Heat Treat work element will be created in SEER-MFG and values will be set for its parameters. If it is not checked, a Finish & Heat Treat work element will not be created.

Rough Operations Tab

The Rough Operations tab lists the rough operations which are involved in machining the part. There are two sets of Rough Operations based on the Milling, and Lathe + Milling Operation Types.

The actual operations shown and the available user inputs depend on the Operation Type selection from the General Settings Tab.

Both sets of Rough Operations have much in common: the name of each operation is shown, along with the volume removed in square millimeters or square inches, and a toggle switch, allowing you to turn the operation on or off. If the operation is turned on, it will be included in the data exported to SEER-MFG. If it is turned off, it will not be exported.

Both sets of operations include individual operations for Volume and Detailed Rough Milling.

Volume Rough Milling		<input checked="" type="checkbox"/>
Operation:	High Speed Rough	
Volume (in ³):	3,200.99	
Detailed Rough Milling		<input checked="" type="checkbox"/>
Operation:	High Speed Rough	
Volume (in ³):	800.25	

Rough Operations Tab: Volume and Detailed Rough Milling Operations

Lathe + Milling Rough Operations

If the Operation Type involves turning, the Turn and Bore set of Rough Operations will be shown.

The Turn and Bore set of operations includes operations for Volume and Detailed Turning and Boring. Each of these operations can be turned on or off, but no further user settings are included.

Volume Rough Turning		<input checked="" type="checkbox"/>
Operation:	Turn Rough	
Volume (in ³):	1,334.57	
Detailed Rough Turning		<input checked="" type="checkbox"/>
Operation:	Turn Rough	
Volume (in ³):	333.64	
Volume Rough Boring		<input checked="" type="checkbox"/>
Operation:	Bore Rough	
Volume (in ³):	129.84	
Detailed Rough Boring		<input checked="" type="checkbox"/>
Operation:	Bore Rough	
Volume (in ³):	32.46	

Rough Operations Tab: Operations Specific to Turn and Bore

Milling Rough Operations

If the Operation Type is set to Milling, the Milling set of Rough Operations will be shown. The Milling set of Rough Operations includes two operations besides the standard milling operations.

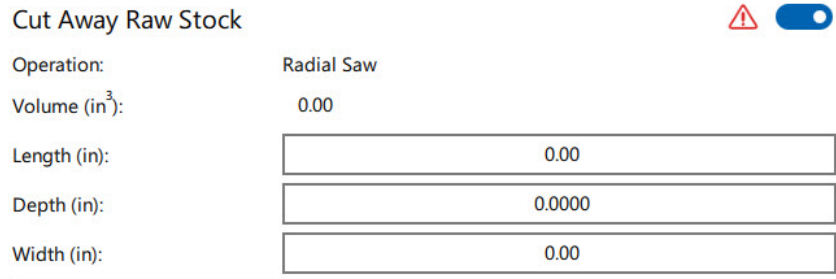
Skim Stock Excess		<input checked="" type="checkbox"/>
Operation:	High Speed Rough	
Volume (in ³):	118.19	
Size (in):	24.98 , 23.66 , 0.20	
Include Finish Pass:	<input type="checkbox"/>	
Cut Away Raw Stock		<input checked="" type="checkbox"/>
Operation:	Radial Saw	
Volume (in ³):	2,633.14	
Area (in ²):	443.22	
Area Percent:	0.75	
Length (in):	84.02	
Depth (in):	0.3937	
Width (in):	79.60	

Rough Operations Tab: Operations Specific to Operation Type = Milling

The Skim Stock excess operation includes a three-input Size, representing the dimensions of the excess being skimmed. For the "Rectangular" Raw Shape Type, the initial values are

calculated, but they can be overridden by user entry. For the "Irregular" Raw Shape Type, the initial values are zero. Also included is an Include Finish Pass option.

The Cut Away Raw Stock operation includes fields for Area, Area Percent, Length, Depth, and Width, with calculated values. For the "Rectangular" Raw Shape Type, the initial values are calculated, but they can be overridden by user entry. For the "Irregular" Raw Shape Type, the initial values are zero.



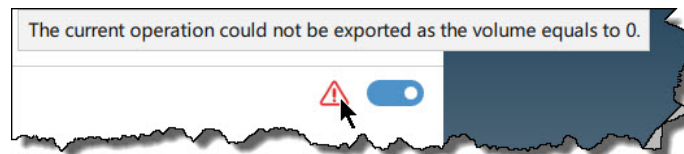
Cut Away Raw Stock	
Operation:	Radial Saw
Volume (in ³):	0.00
Length (in):	0.00
Depth (in):	0.0000
Width (in):	0.00

Rough Operations Tab: Cut Away Raw Stock Operation (Irregular)

Volume Equals Zero Warning

The red warning triangle next to the On/Off switch indicates that volume for the operation equals zero, and as a result, it will not be exported. After you enter enough dimensional data to give the volume a non-zero value, the warning will disappear.

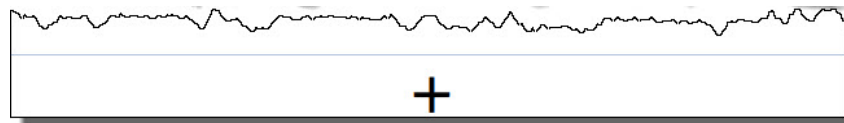
You can click on the warning icon to view the warning message.



Volume Equals Zero Warning

+ Button

The + Button at the bottom of the operations list allows users to add custom operations.



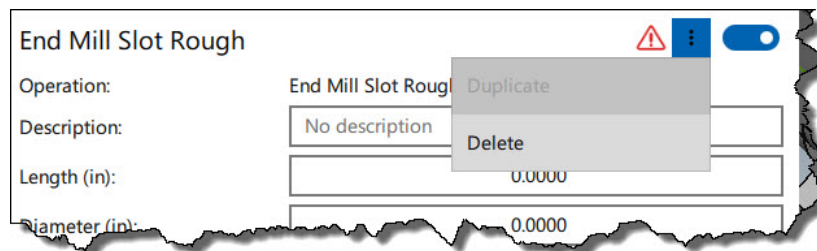
The + Button for Adding Custom Operations

When you click on the button, you will see a selection box with a pop-up menu of custom operations. When you select an operation and click on the OK button, the operation will appear at the bottom of the list of current operations.



Custom Rough Operation List For Milling Operation Type

When you select a custom rough operation, it will initially have zero input values, and will display the Volume Equals Zero warning (see above). The menu next to the On/Off switch has two options: Duplicate and Delete.



New Custom Rough Operation with Menu and Volume Equals Zero Warning

Each custom rough operation has a Description field and several dimension inputs. Some operations also allow you to select the tool or cut type from a pull-down menu.

Milling Options

For Operation Type = Milling users can select from the following options:

- Drill
- Pocket Rough Milling
- Profile Rough Milling
- Sawing
- End Mill Slot Rough

Lathe + Milling Options

For Operation Type = Lathe + Milling users can select from the following options:





























- Drill
- Pocket Rough Milling
- Profile Rough Milling
- Sawing
- End Mill Slot Rough
- Turn Rough Face
- Turn Part Off

Surface Finish Operations Tab

The Surface Finish Operations tab lists all finish operations which are involved in machining the part. To the right of the finish operations list is a list of the part's faces.

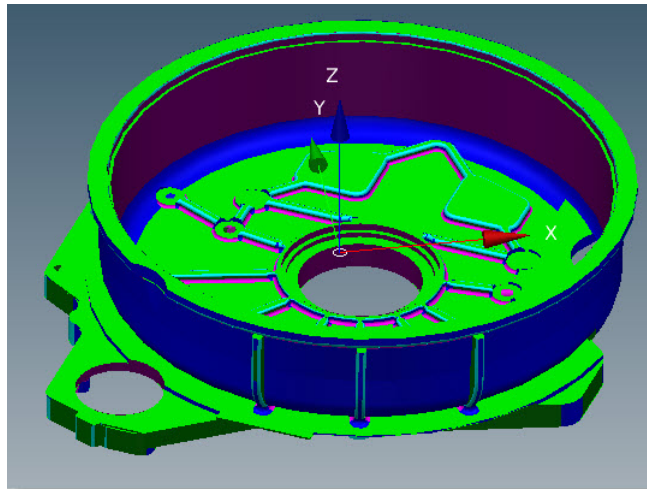
Note: Both the finish operations and faces list may be long, depending on the complexity of the part. When you hover the mouse over either list, a scrollbar will appear to the right of that list, if it is too long to be completely displayed on the screen.

Finish Operations List

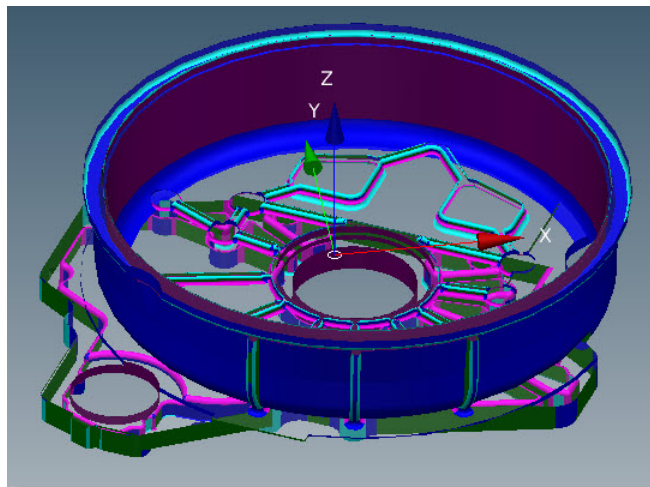
Flat Face Milled Surface	 640.30	 0.01	 High Speed Finish		
Flat Side Milled Surface	 140.48	 0.01	 High Speed Finish		
Curved Milled Surface	 398.13	 0.01	 High Speed Finish		
Circular Milled Surface	 331.15	 0.01	 High Speed Finish		
<div>  Profile Edge Milling Surface (in) [Ø 0.15748 - Ø 1.5748] </div>					
<div> <div>Ø 0.15748</div> <div>  9.19 </div> <div>  0.01 </div> <div>  High Speed Finish </div> </div>					
<div> <div>Ø 0.23622</div> </div>					

Surface Finish Tab: Partial Finish Operations List

Each operation is listed, along with a descriptive name for the operation, the area affected, the tolerance, the type of operation (corresponding to a SEER-MFG Machining operation), a color selector, allowing you to set the color representing the operation in the Viewer, and a toggle switch, allowing you to turn the operation on or off. You can change the tolerance for an operation by clicking on it and selecting a setting from the pull-down list of available tolerances.



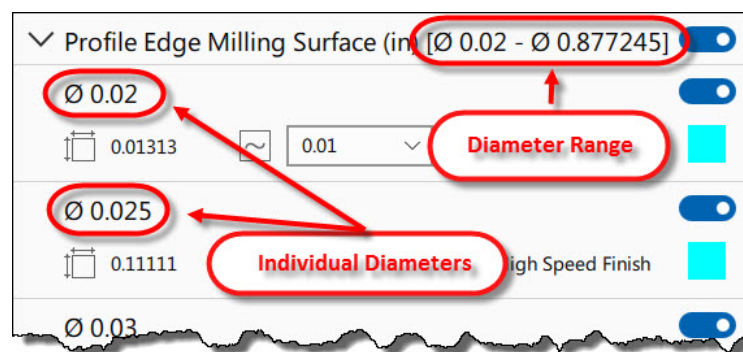
Part Image: Surface Finish Operation Turned On



Part Image: Surface Finish Operation Turned Off

Diameters and Diameter Ranges

If an operation has a diameter, the diameter will be shown above the area. If diameters are included in a list of multiple operations of the same type, the diameter range will be shown in the heading for the list, and operations will be listed in order of diameter.



Operation List With Diameters and Diameter Range

+ Button

The + Button at the bottom of the operations list allows users to add custom operations.



The + Button for Adding Custom Operations

When you click on the button, you will see a selection box with a pop-up menu of custom operations. When you select an operation and click on the OK button, the operation will appear under the appropriate heading in the operation list.

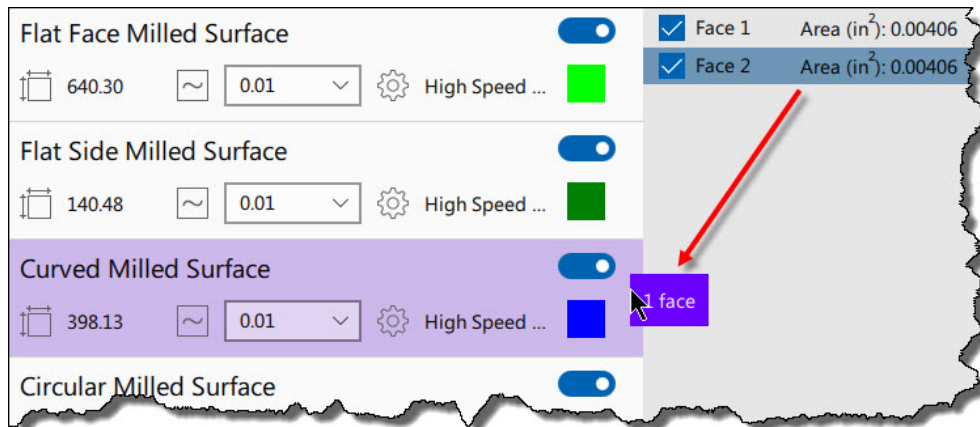
This is useful if you need to specify surfaces with different tolerance levels.

If the operation type includes a diameter value, you will be able to enter the diameter in the diameter input box. If the operation type does not include a diameter, the diameter input box will be grayed-out.



Custom Finish Operation With Diameter Input

Note: After adding a custom group, you need to move surfaces into the group for it to be include in the estimate.



Moving a Face

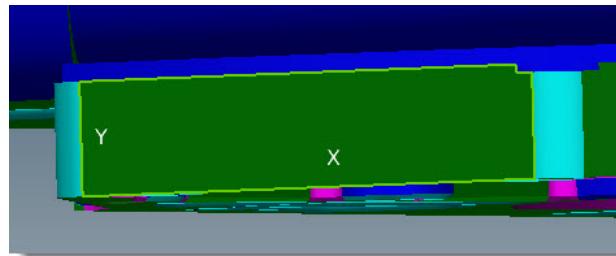
Face List

Each face affected by a finish operation is listed, along with an identification number, the area of the face in square millimeters or square inches, and checkbox, allowing you to include (checked) or exclude (unchecked) the face.

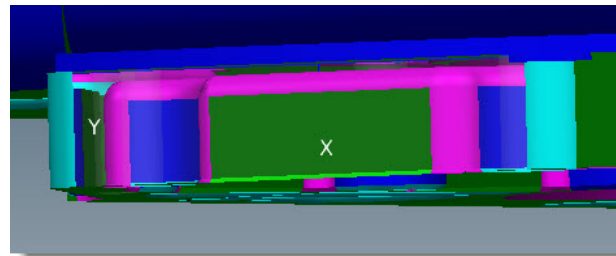
<input checked="" type="checkbox"/>	Face 1	Area (mm ²): 50,137.74
<input checked="" type="checkbox"/>	Face 2	Area (mm ²): 38,689.96
<input checked="" type="checkbox"/>	Face 3	Area (mm ²): 33,318.06
<input checked="" type="checkbox"/>	Face 4	Area (mm ²): 32,024.32
<input checked="" type="checkbox"/>	Face 5	Area (mm ²): 31,238.82
<input checked="" type="checkbox"/>	Face 6	Area (mm ²): 18,150.89
<input checked="" type="checkbox"/>	Face 7	Area (mm ²): 14,797.52
<input checked="" type="checkbox"/>	Face 8	Area (mm ²): 14,129.23
<input checked="" type="checkbox"/>	Face 9	Area (mm ²): 12,924.14
<input checked="" type="checkbox"/>	Face 10	Area (mm ²): 12,924.14

Surface Finish Tab: Partial Face List

Any change that you make to either the finish operations or the face selection will be reflected in the exported SEER-MFG project.



Part Image: Face Turned On (Closeup)



Part Image: Face Turned Off (Closeup)

Assigning Faces to Finish Operations

Faces are automatically assigned to finish operations by SEER-3D when a part is imported, but the user can override the automated classification manually.

If you create any custom finish operations, you will need to assign face to them in order for those operations to be included in the estimate.

To do this, either:

Right-click on the face that you want to reassign (either in the face list, or in the Part Viewer) and select the appropriate operation from the right-click menu (see Face Context Menu, below), or

1. Left-click on the face so that its outline is visible (indicating that it is currently selected),

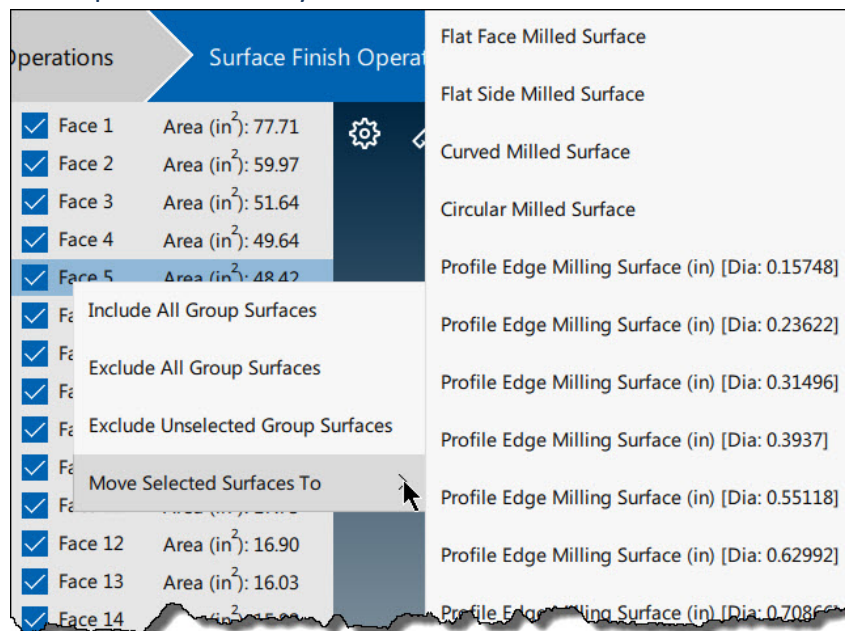
2. Find the face in the Face list (selected faces will be highlighted),
3. Click on the face's name or area in the Face list (not its checkmark) and drag it to the appropriate operation in the Finish Operations list.

The Face will now be listed as the last entry for the operation to which you assigned it, and it will be displayed in the Part Viewer with the color assigned to that operation.

Face Context Menu

When you right-click on a face (either in the face list or the Part Viewer), you will seed a context menu with four options:

- **Include All Group Surfaces** - All faces associated with the currently selected operation (and thus listed in the face list) will be highlighted in the Part Viewer, and their checkboxes will be checked in the face list.
- **Exclude All Group Surfaces** - All faces associated with the currently selected operation (and thus listed in the face list) will be un-highlighted in the Part Viewer, and their checkboxes will be un-checked in the face list.
- **Exclude Unselected Group Surfaces** - All faces not currently selected (using the right-mouse button) will be un-highlighted in the Part Viewer, and their checkboxes will be un-checked in the face list.
- **Move Selected Surfaces To** - Move all faces currently selected (using the right-mouse button) to the operation which you select from the surface sub-menu.



Face Context Menu

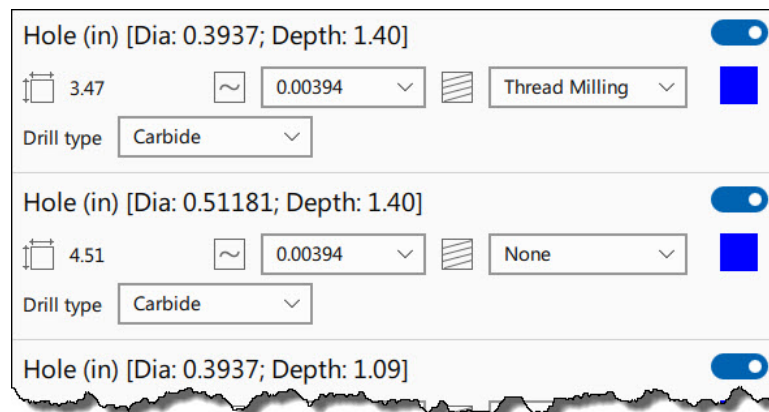
Holes and Countersinks Tab

The Holes and Countersinks tab lists all holes and countersinks which are included in the part. To the right of the hole and countersink list is a list of the part's faces.

Note: As is the case with the Surface Finish Operations tab, both lists may scroll.

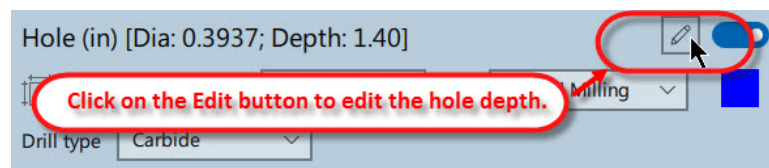
Hole and Countersink List

Each hole and countersink is listed, along with a descriptive name for the item, the area affected in square millimeters or square inches, the tolerance in millimeters or inches, the type of operation (corresponding to a SEER-MFG Machining operation), a color selector, allowing you to set the color representing the item in the Viewer, and a toggle switch, allowing you to turn the item on or off.

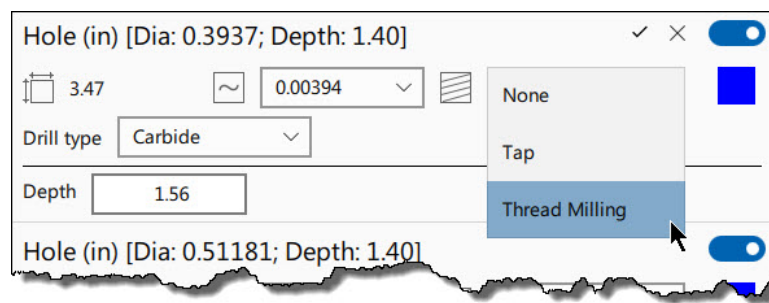


Holes and Countersinks Tab: Partial Holes and Countersinks List

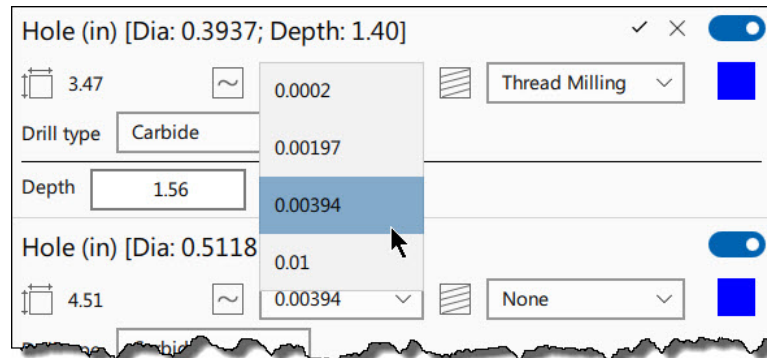
You can change the tolerance for an item by clicking on it and selecting a setting from the pull-down list of available tolerances. You can edit the drill type, depth, and add threading if required.



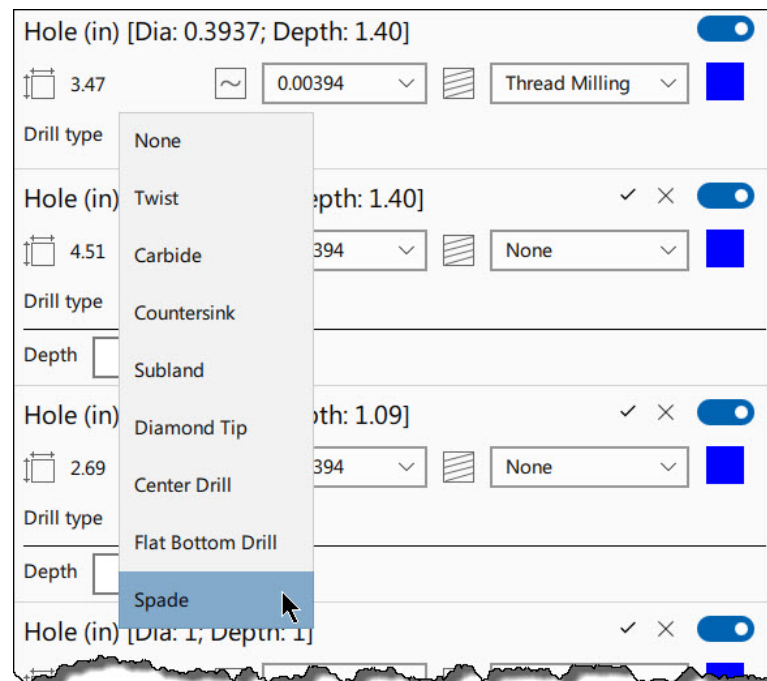
Editing the Depth



Selecting the Threading



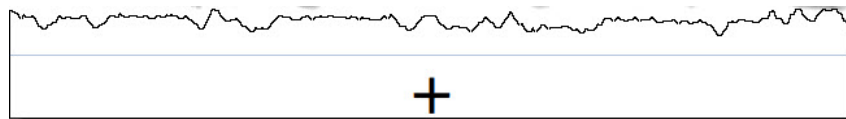
Selecting the Tolerance



Selecting the Drill Type

+ Button

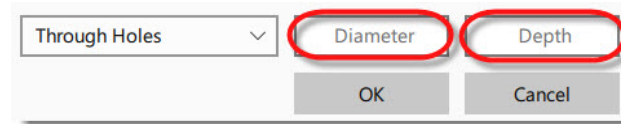
The + Button at the bottom of the operations list allows users to add custom Holes and Countersinks to the operations list.



The + Button for Adding Custom Holes and Countersinks

When you click on the button, you will see a selection box with a pop-up menu of custom Holes and Countersinks. When you select a Hole or Countersink, enter a Diameter and Depth, and click on the OK button, the Hole or Countersink will appear in the list.

This is useful if you need to specify surfaces with different tolerance levels or hole conditions.



Custom Hole Operations with Diameter and Depth Inputs

Note: After adding a custom group, you need to move surfaces into the group for it to be include in the estimate.

Moving a Face

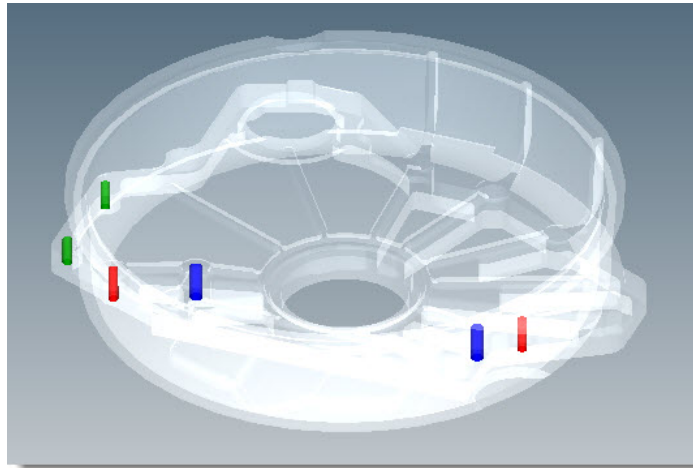
Users can select from the following options:

- Through Holes
- Flat Bottom Holes
- Blind Holes
- Countersinks

Face List

Each face involved in a hole or countersink operation is listed, along with an identification number, the area of the face in square millimeters or square inches, and checkbox, allowing you to include (checked) or exclude (unchecked) the face.

Any change that you make to either the holes/countersinks or the face selection will be reflected in the exported SEER-MFG project.



Part Image Showing Holes and Countersinks

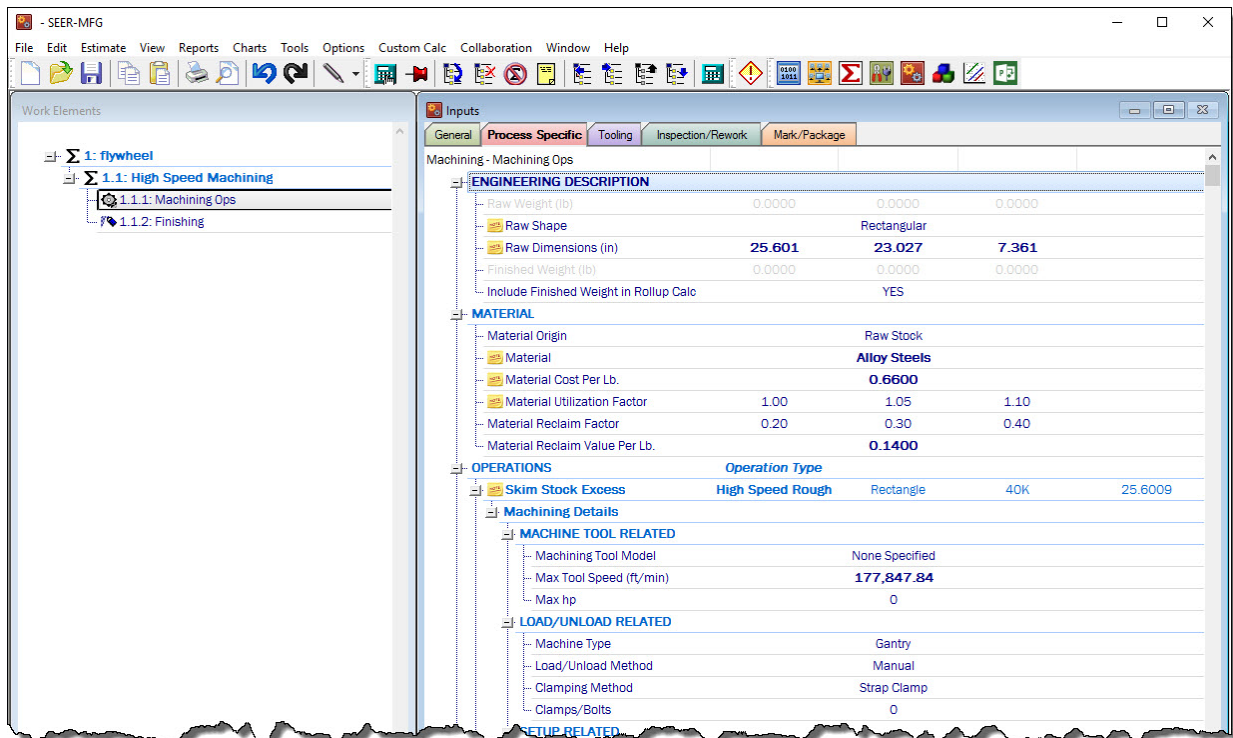
Export Button

Click on the Export button to send the part to SEER-MFG. A new instance of SEER-MFG will open, with a project consisting of a cost estimate for the part. For a Machining part, the project will be made up of the following elements:

- A Project-level rollup, with a name taken from the Part Name on the SEER-3D General Settings tab (which is itself taken from the original STEP file name).
- A rollup (just below and subordinate to the Project-level rollup) with the name of the Manufacturing Environment from the SEER-3D General Settings tab.
- A Machining work element (named Machining Ops), immediately subordinate to the Manufacturing Environment rollup.
- A Finish & Heat Treat work element (named Finish), directly below the Machining work element. (This work element will be included only if the Finish & Heat Treat option is checked on the SEER-3D General Settings tab.)

In addition, many of the parameters for the work elements will have values based on the SEER-3D settings.

These computed values will include Machining operations corresponding to the Rough and Surface Finish Operations settings, Finish & Heat Treat operations (if applicable), Initial Tool Fabrication & Design settings (if Tool Fab & Design on the SEER-3D General Settings tab is checked), Mark/Package operations, and a variety of settings on the SEER-MFG General and Inspection/Rework tabs.



Exported Part in SEER-MFG

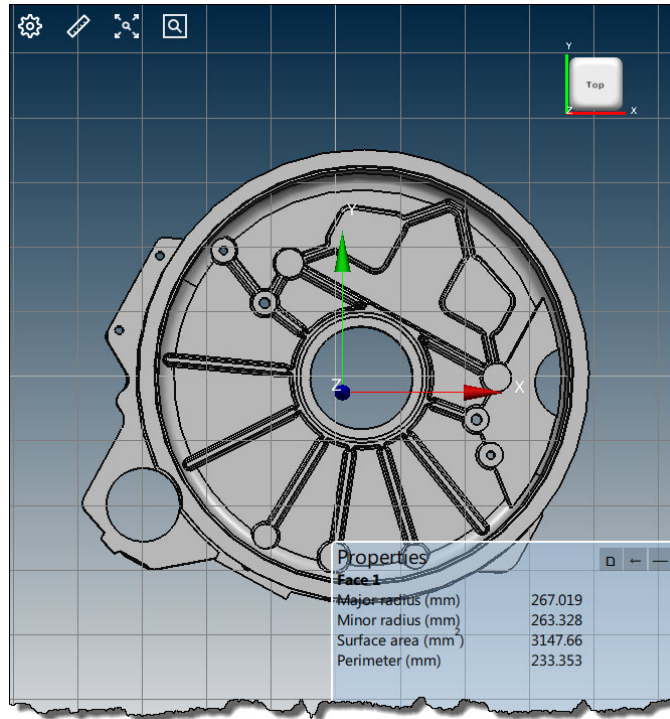
Note: Each time you click on Export, the exported part data will appear in a new instance of SEER-MFG, even if there is an instance of SEER-MFG already open. If you want to add the part to an existing SEER-MFG project, you can use SEER-MFG's built-in export features, or its Server Mode API.

SEER-3D Menu

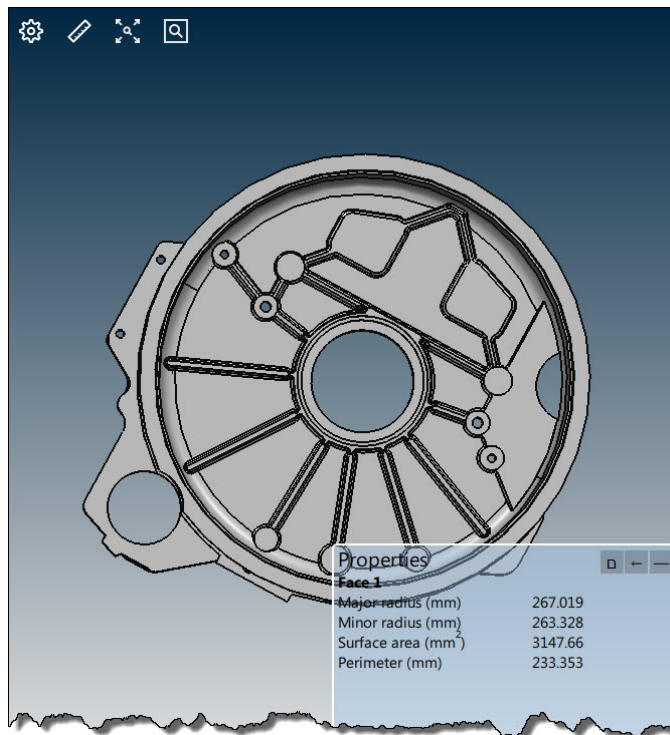
The SEER-3D menu is to the right of the Export button. It includes these items:

Item	Description
Load Session	Loads a saved SEER-3D session.
Save Session	Saves the current SEER-3D session. Session data is saved in XML format.
Options	Brings up the Options dialog box, with the following options: <ul style="list-style-type: none"> • SEER3D Settings Directory displays the path of the directory containing the SEER-3D Manufacturing Environments settings. • Enable Analytical Surface Recognition option. This option is checked by default and recommended. When checked, Nurb (BRep) surfaces are analyzed to classify them as machining type surfaces. • Viewer background colors allows you to set the color gradients (top and bottom colors) for the Viewer. • Units lets you switch between Metric and Imperial measurement units.
About	Brings up the About dialog box, which displays the SEER-3D version number and release date, along with contact information for Galorath, Incorporated.
Help	Brings up the help system.

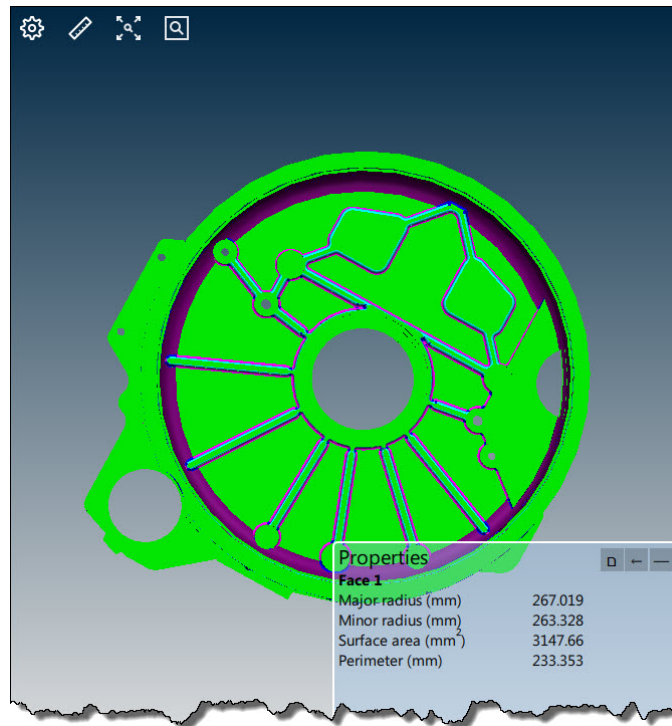
The Part Viewer



Part Viewer: General Settings Tab With All Display Menu Settings Turned On



Part Viewer: General Settings Tab With All Display Menu Settings Turned Off



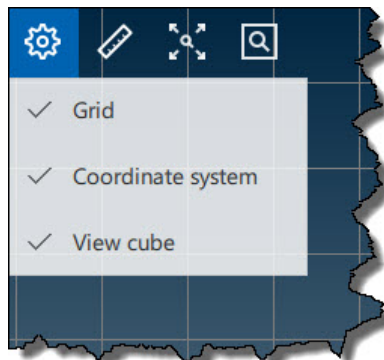
Part Viewer: Surface Finish Operations Tab (Color-Coded by Operation)

The Viewer displays a three-dimensional image of the part, based on the specifications in the STEP file. The image can be rotated using the mouse and resized using the magnification controls (see below), and specific faces and surfaces can be turned on (shown) or off (hidden) in the Surface Finish Operations and Holes and Countersinks tabs. The Stock Outline (based on raw shape dimensions and excess) can be turned on or off in the General Settings tab.

Viewer Controls

The Viewer includes the following controls:

Display Settings Menu



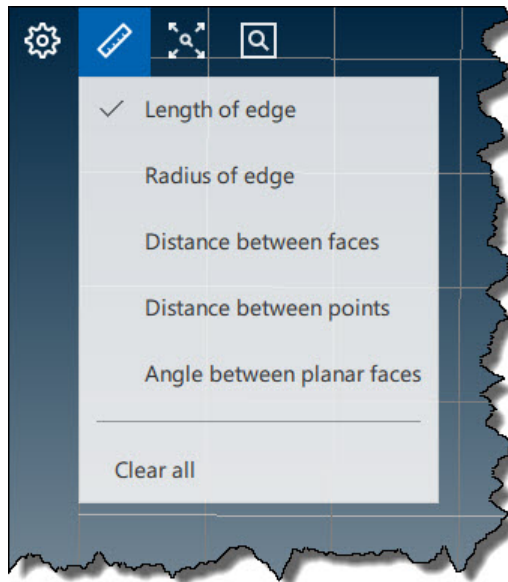
Part Viewer Display Settings Menu

The display settings menu (indicated by the gear-shaped icon in the upper left corner of the Viewer) allows you to turn the following display options on or off:

Option	Description
Grid	When Grid is checked, a grid parallel to the X-Y plane of the coordinate system will be visible.
Coordinate System	When Coordinate System is checked, labeled arrows indicating the X, Y, and Z coordinates will be visible.
View Cube	When this option is checked, a cube with labeled X, Y, and Z coordinates will be visible in the upper right corner. See Cube Control, below.

Measurement Menu and Properties Window

The Measurement menu allows you to select the type of measurement that will be displayed when you click on the appropriate elements of the part.



Measurement Menu

You can display multiple measurement types and measurements for multiple elements in the part Viewer window. Measurement information for all selected elements will also be shown in the Properties window.

Properties	
Face 1	
Surface area (in ²)	11.4667
Perimeter (in)	15.189
Face 2	
Surface area (in ²)	9.73327
Perimeter (in)	14.6949
Face 3	
Surface area (in ²)	15.0135
Perimeter (in)	24.647
Edge 1	
Length (in)	2.89802
General	

Properties Window

To clear all measurement information from the Part Viewer and Properties windows, select Clear All from the Measurement menu, or the Clear All button in the Properties window.

For a detailed description of the Measurement Menu and the Properties window, see Properties and Measurements, below.

Magnification Controls

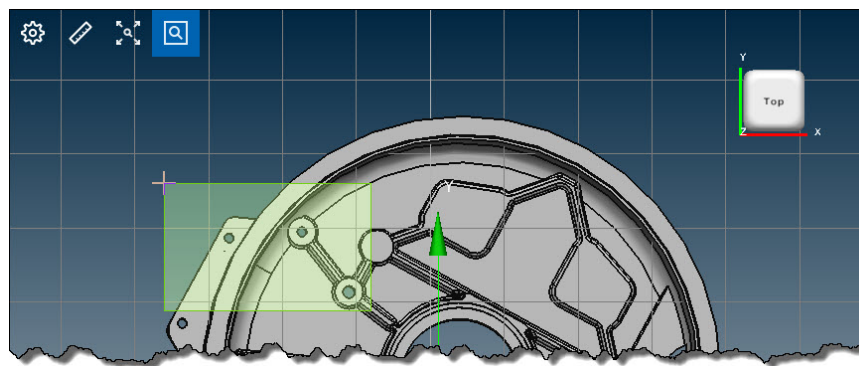
To the right of the display setting icon are the magnification controls.



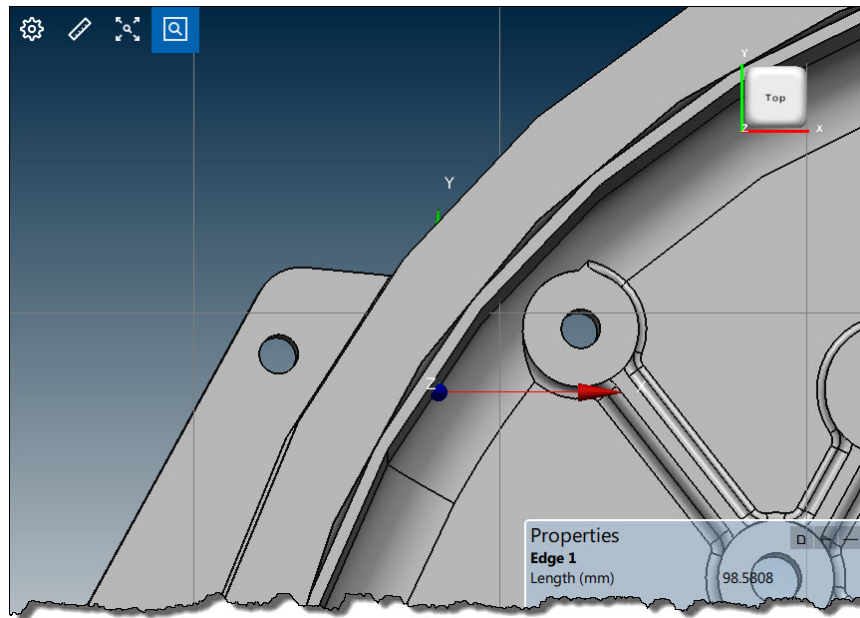
Part Viewer Magnification Controls

The restore size control (immediately to the right of the display settings icon) returns the part image to its standard size after it has been magnified.

The zoom magnification control (to the right of the restore size control) allows you to select a region of the part image using the mouse; the viewer will automatically zoom in to the region that you select.



Part Viewer: Area Selected for Magnification

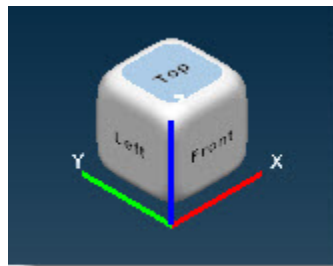


Part Viewer: Magnified Area

Note: The mouse will continue to operate in zoom magnification mode until you click on the zoom magnification control again to deactivate it.

Cube Control

When View Cube is turned on in the Display Settings Menu, a cube with labeled X, Y, and Z coordinates will be visible in the upper right corner. The cube always displays coordinates, even if the Coordinate System setting is not selected. The cube rotates along with the image of the part. If you click on a face, edge, or corner of the cube, the part will automatically rotate so that the specified region is facing you.



Part Viewer: Cube Control With Top Face Selected

Properties and Measurements

The SEER-3D Properties window and Measurement menu serve (both together and separately) as a flexible system for displaying detailed information about the dimensions and geometric relationships of individual part elements.

There are two basic modes of measurement and dimension display:

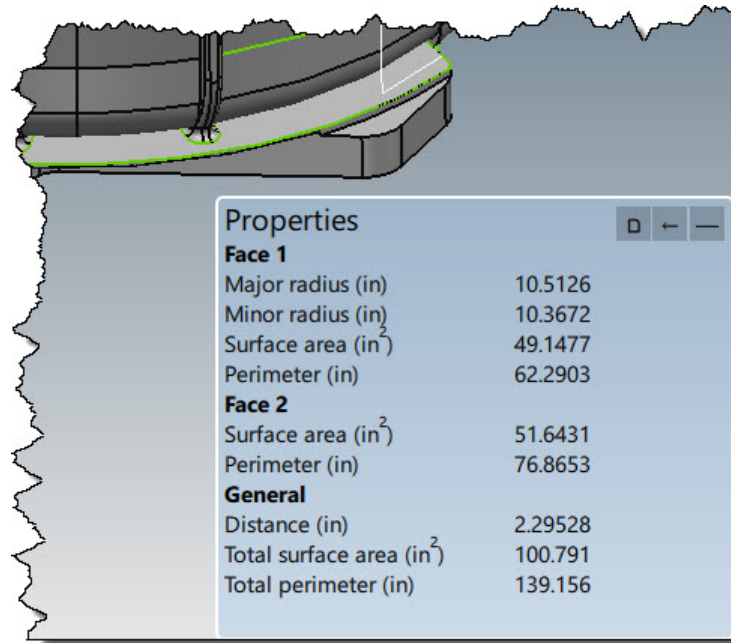
- With no option selected in the Measurements menu, and

- With a Measurements menu option turned on (selected).

The default is for no Measurements menu option to be selected.

The Properties Window

The Properties window is a semi-transparent overlay window which is located in the lower-right corner of the Viewer window by default. It displays the dimensions of individual selected part elements, as well as total measurements and distance (and sometimes angle) for multiple elements.

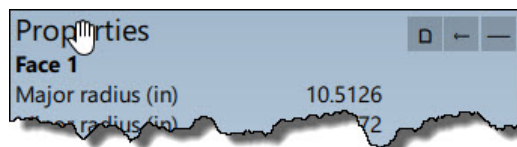


The Properties Window

Individual part elements are labeled by name and number in the order selected: Face 1, Face 2, or Face 1, Edge 1, Face 2, etc. measurements applying to more than one element (totals, distance, angle, etc.) are displayed under the General heading, after all individual elements are displayed.

The Properties window has three buttons in the upper right corner. They allow you to:

- Copy the displayed properties information to the clipboard.
- Clear the Properties window; this also clears any distance or angle measurements from the Part Viewer.
- Minimize the Properties window, so it becomes a simple toolbar.



Moving the Properties Window

You can move the properties window by selecting the title area ("Properties") and dragging it with the mouse; you can also expand or shrink the window by selecting and dragging the edges.

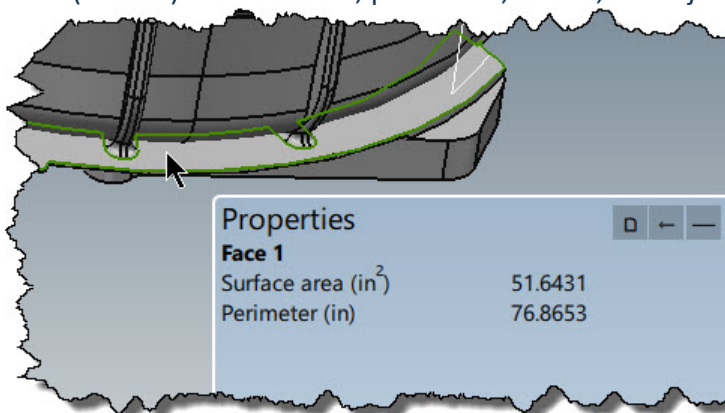
Default Properties Window Display

The default information displayed in the Properties window (with no Measurements menu options selected) is displayed below:

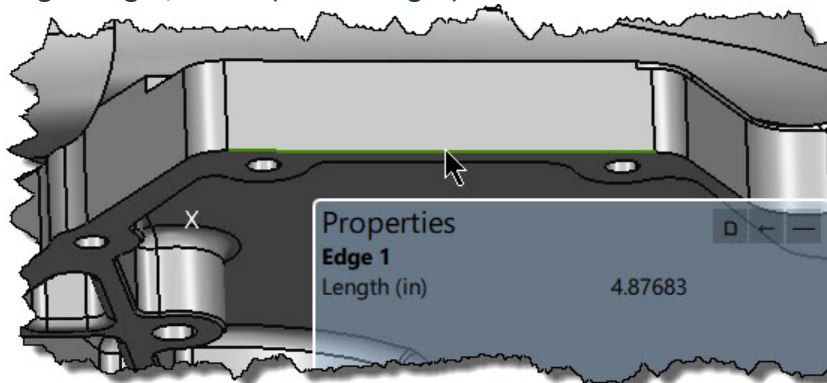
Individual Item Properties

For individual items of the types listed below, the following properties are displayed:

- Face (flat): surface area, perimeter.
- Face (curved): surface area, perimeter, radius, or major radius, minor radius.



- Vertex: three coordinates, in inches or mm.
- Edge: length, radius (curved edges).



- Hole (on hole page, including countersinks): diameter, depth, surface area, cut volume (on non-hole page, radius instead of diameter).

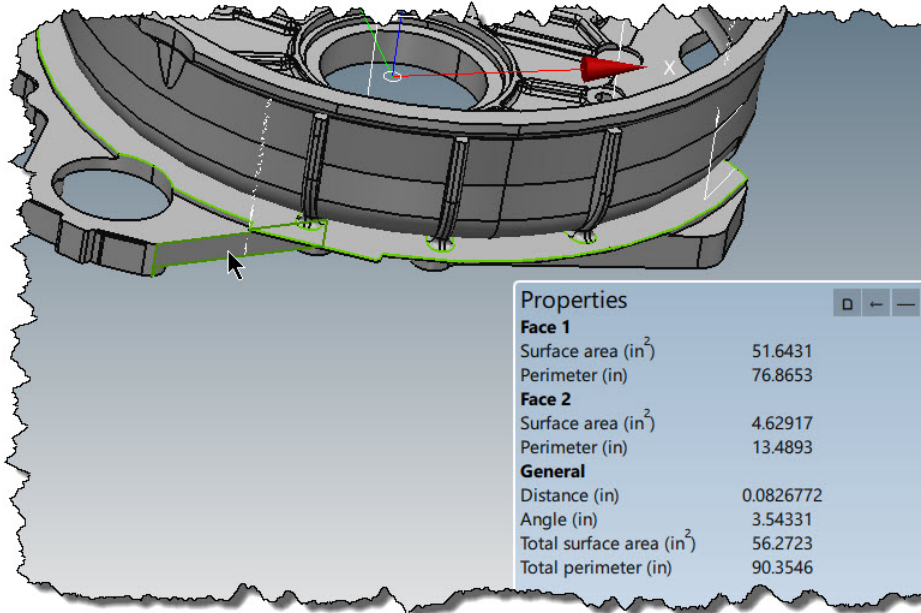
General Properties

When more than one part element is selected, the General heading will appear below the properties listings for the individual elements. The information under the General heading depends on the individual elements selected.

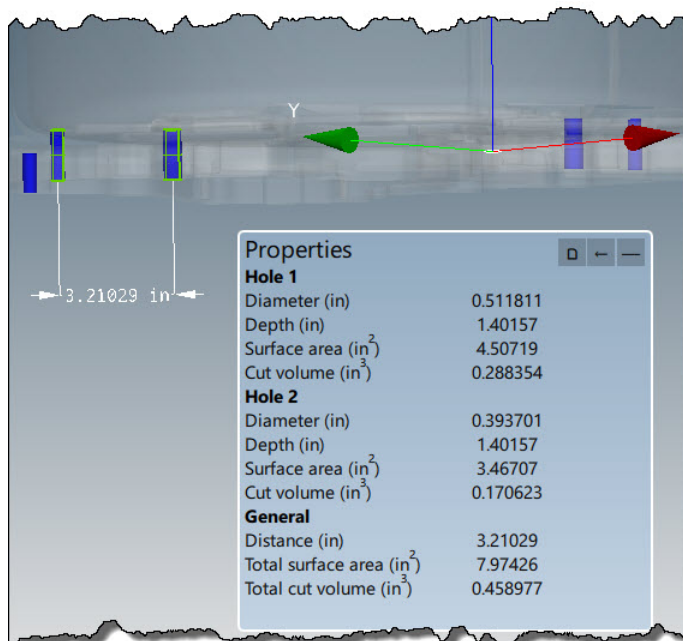
Two Elements of the Same Type

For two elements of the same type, the General heading displays the following properties:

- Two faces: distance, total surface area, total perimeter; if both faces are flat, the angle between them (in inches or millimeters) will also be displayed.



- Two edges: distance, length.
- Two vertices: distance.
- Two holes (on hole page, including countersinks): distance, total surface area, total cut volume.



Two Elements of Different Types

For two elements of different types (face/edge, face/vertex, edge/vertex), only the distance is between the elements is displayed. In all cases involving two elements, the distance is also shown in the Part Viewer itself.

Three or More Elements of the Same Type

When three or more elements of the same type are selected, the following information will be displayed:

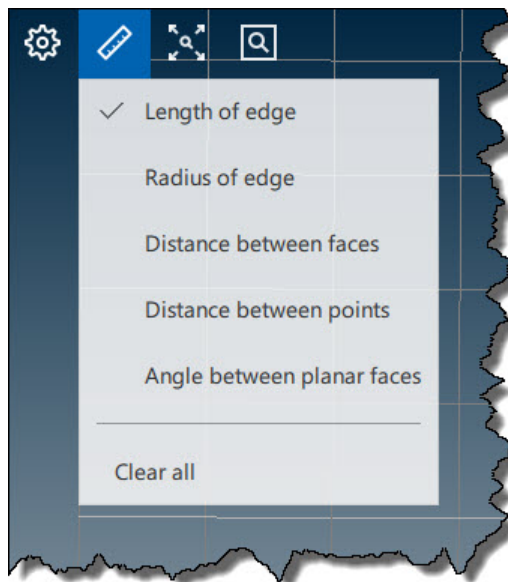
- Three or more faces: total surface area, total perimeter.
- Three or more edges: length.
- Three or more vertices: angle (in inches or millimeters).
- Three or more Holes: total surface area, total cut volume.

Three or More Elements of Different Types

When three or more elements of different types (face, edge, vertex) are selected, the General heading will appear, with no properties listed.

The Measurements Menu

The Measurements Menu (in the upper left-hand corner of the Part Viewer, to the right of the Display Settings menu) allows you to select specific types of measurement for display in the Properties window and in the Part Viewer. When you select an option from the Measurement menu, only the part elements indicated by the option can be selected in the part image. To return element selection and Properties window display to the default state, deselect all Measurement menu options, so that they are not checked.

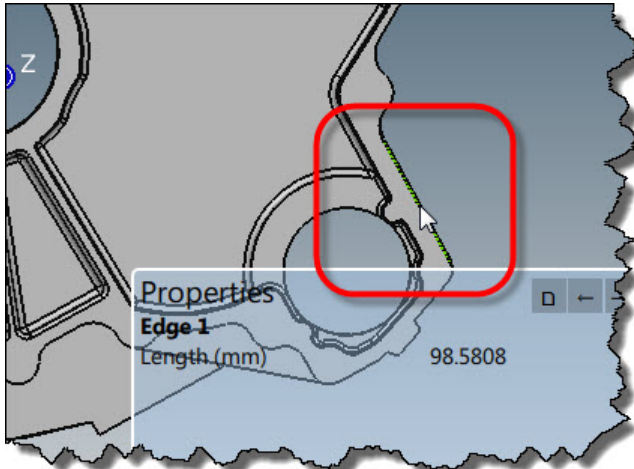


The Measurements Menu

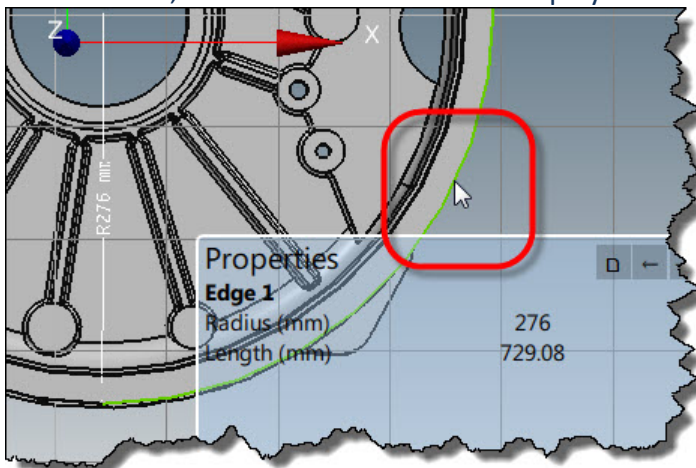
Measurement Menu Options

The Measurement menu options are as follows:

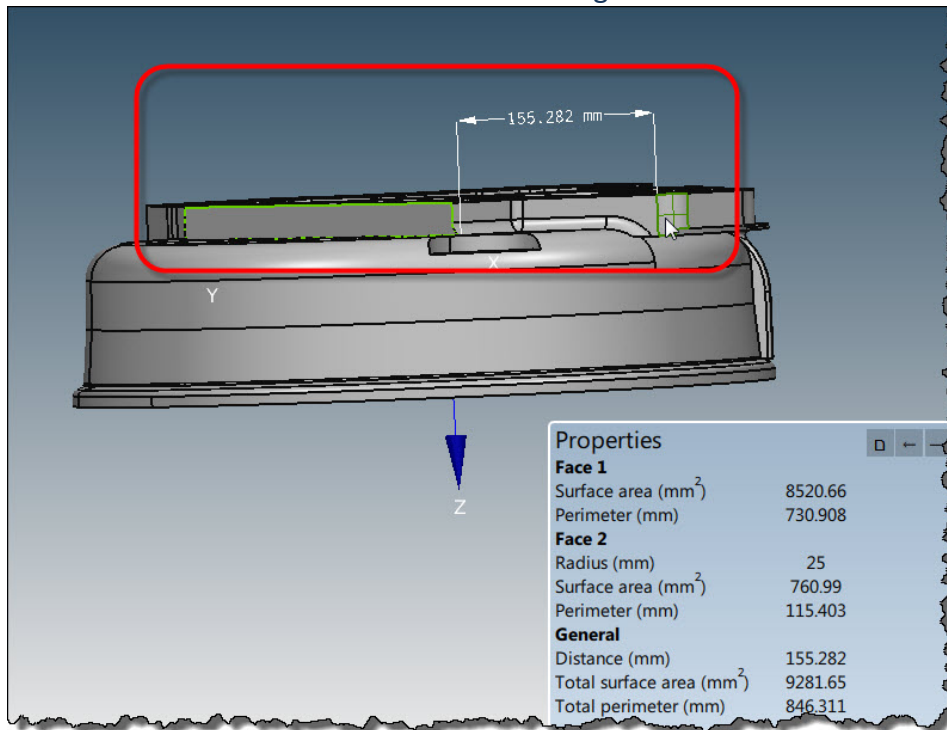
- Length of edge: for straight edges, just length; for curved edges, length, radius, or major radius and minor radius.



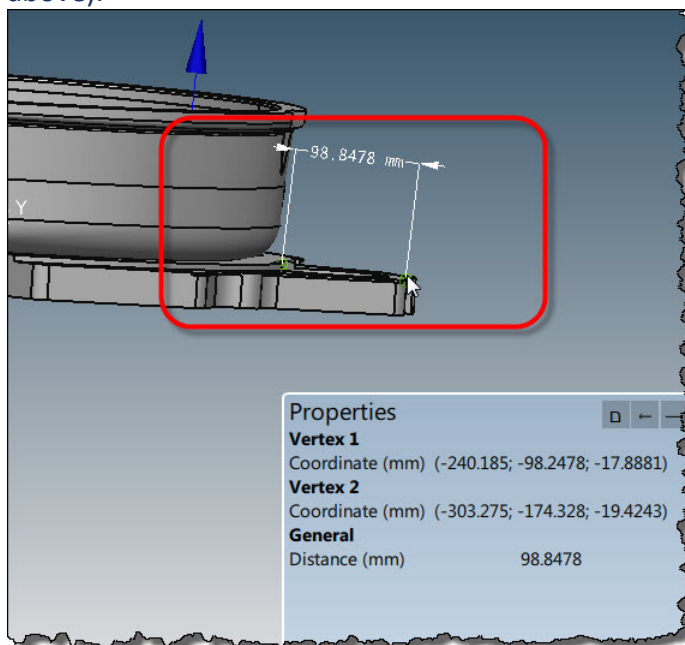
- Radius of edge: curved edges only, with length and simple radius, but not major and minor radius; the radius information is displayed in the Part Viewer window, as well.



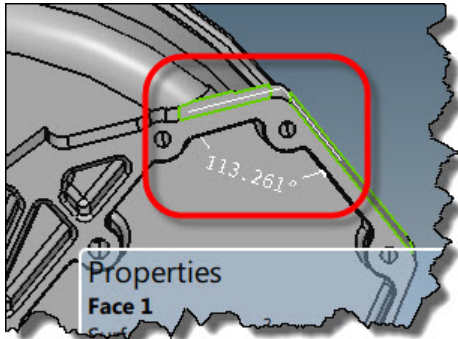
- Distance between faces: the same as selecting two faces in default mode (see above).



- Distance between points: the same as selecting two vertices in default mode (see above).



- Angle between planar faces: the same as selecting two faces in default mode, but without distance; the angle (in degrees) is displayed in the Part Viewer.



- Clear all: The same as the Clear button in the Properties window.