

Visual3DPRINT® 2017 Quick Start Guide

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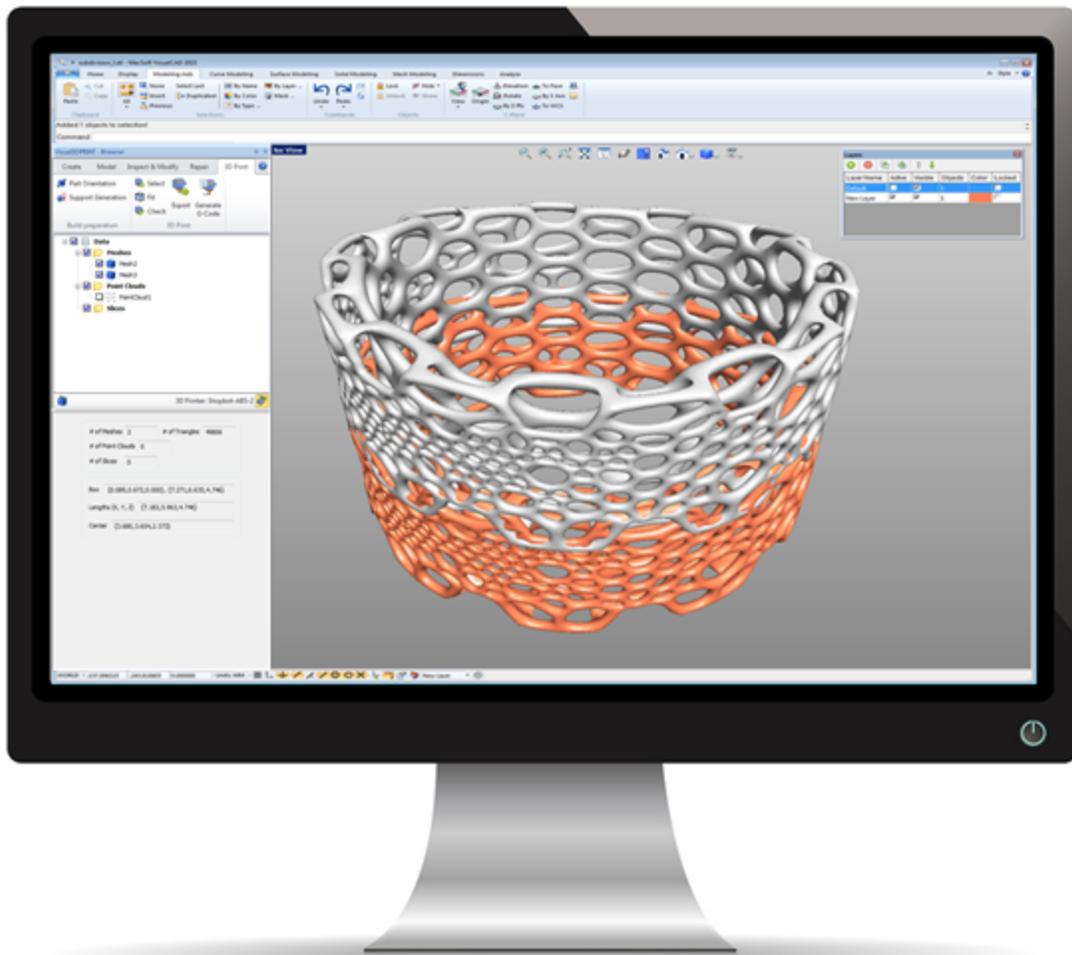


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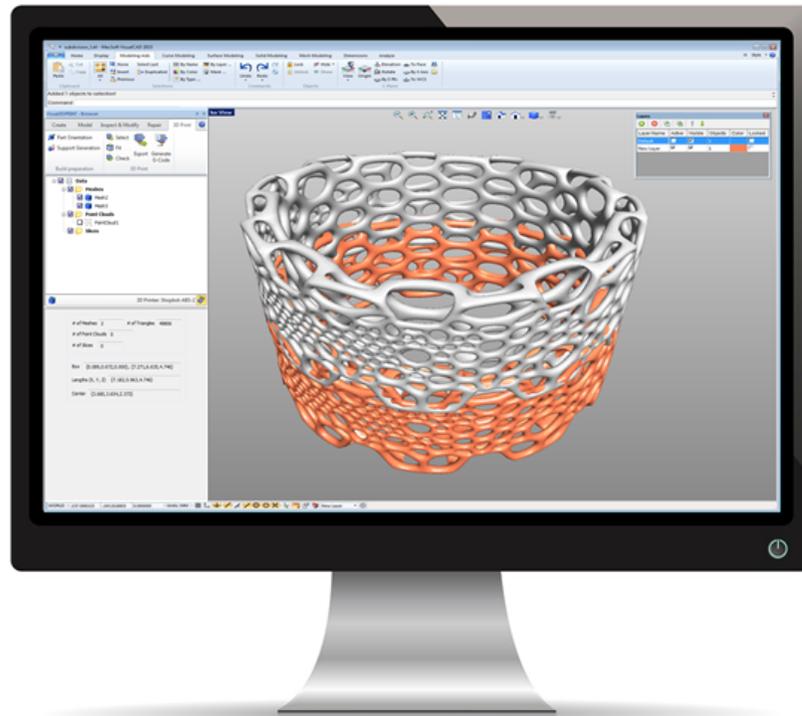
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Chapter 1: About

1.1 About Visual3DPRINT 2017

[Visual3DPRINT 2017](#) is a product from [MecSoft Corporation](#) that runs as a plug-in inside of the [MecSoft's VisualCAD](#) modeling system. This product offers efficient, easy and automatic tools for the preparation of 3D data, such as point clouds and meshes, that otherwise cannot be directly 3D printed. The combination of [VisualCAD's](#) modeling tools, extensive file import functionality and [Visual3DPRINT 2017](#) data preparation tools enables you to 3D print models from almost any input source and any major 3D format.



1.2 Why Visual3DPRINT 2017

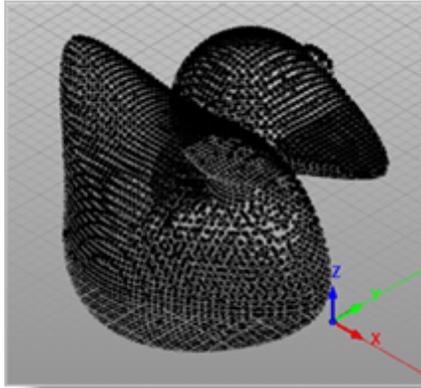
[Visual3DPRINT 2017](#) exists as a bridge between users' 3D data and the 3D printer. 3D data comes in many formats, such as CAD data, scanned data etc., that cannot simply be sent to the 3D printer. This 3D data needs to be converted to a format that the 3D printer not only understands but also can handle. [Visual3DPRINT 2017](#) serves to convert such 3D data and make it amenable for 3D printing.

1.3 Using this Guide

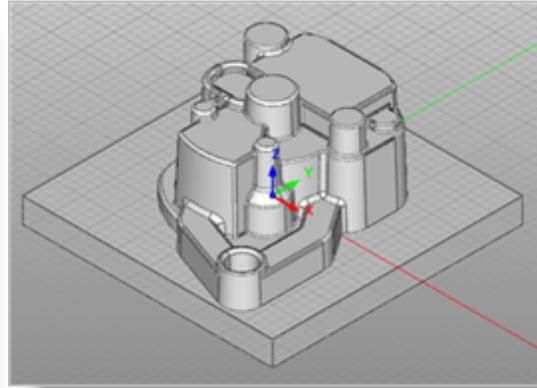
This guide will show you how to use [Visual3DPRINT 2017](#) to prepare various forms of 3D data and geometry for 3D printing. You will learn how to analyze, repair, modify and setup 3D mesh models for a variety 3D printers. You will learn how to use point cloud data to create

and refine a mesh model. You will learn how to offset, split and cap a mesh to create a uniform wall thickness as well as Boolean mesh operations to create a cavity block.

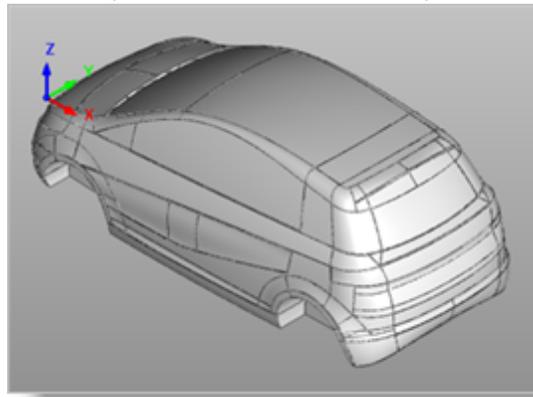
This guide has three associated [VisualCAD](#) files that you can find located in the [QuickStart](#) folder under the installation folder of [Visual3DPRINT 2017](#).



Chapter 1: Point Clouds
(File: RubberDuck.txt)



Chapter 2: Offset and Split
(File: 3DMold.vcp)



Chapter 3: Cavity Block
(File: CarModel.stl)

1.4 Useful Tips

Here are some useful tips that will help you use this guide effectively.

1. Copy the tutorial part files in a location other than the installation folder to make sure you have read/write privileges to the files.
2. Once you start working with the tutorial file, save your work periodically!
3. Don't stress out too much if you are having trouble with the tutorial. Call us or send us an email and we can help you out.
4. Most of all have fun!

Chapter 2: Getting Ready

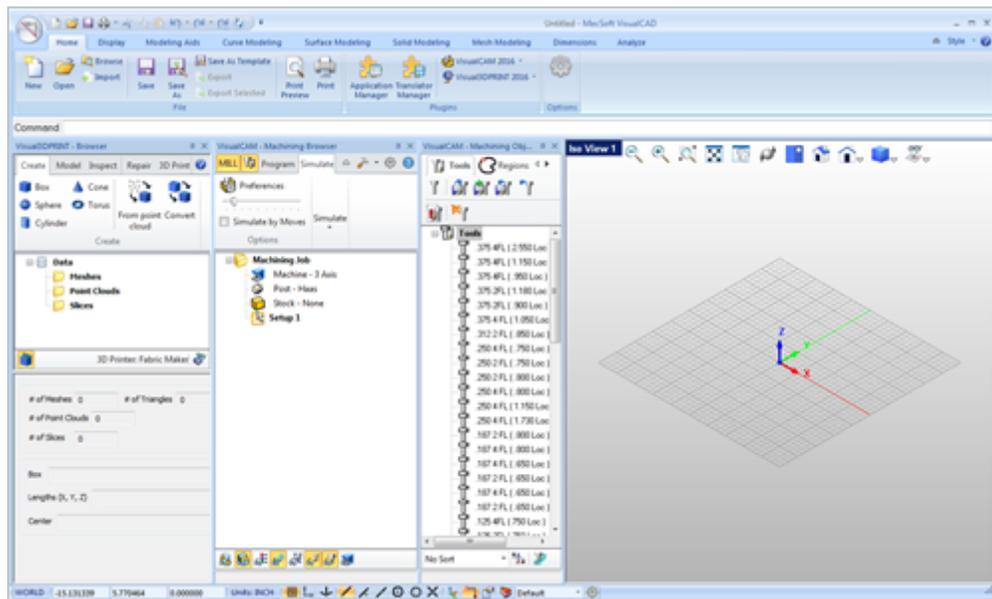
2.1 Running Visual3DPRINT 2017

Locate the [VisualCADCAM 2017](#) shortcut on your desktop and double click to launch the application. Alternatively you can also click on the [Windows Start](#) button and select [All Programs](#). Go to the program group containing [VisualCADCAM 2017](#). (The name of this program group will usually be called [VisualCADCAM 2017](#), unless you specified otherwise during setup.) Once you locate the program group, select it and then select [VisualCADCAM 2017](#) to launch the application.

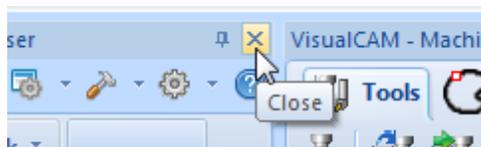
2.2 About the Display

Before we begin, let's talk a bit about the [VisualCAD](#) display.

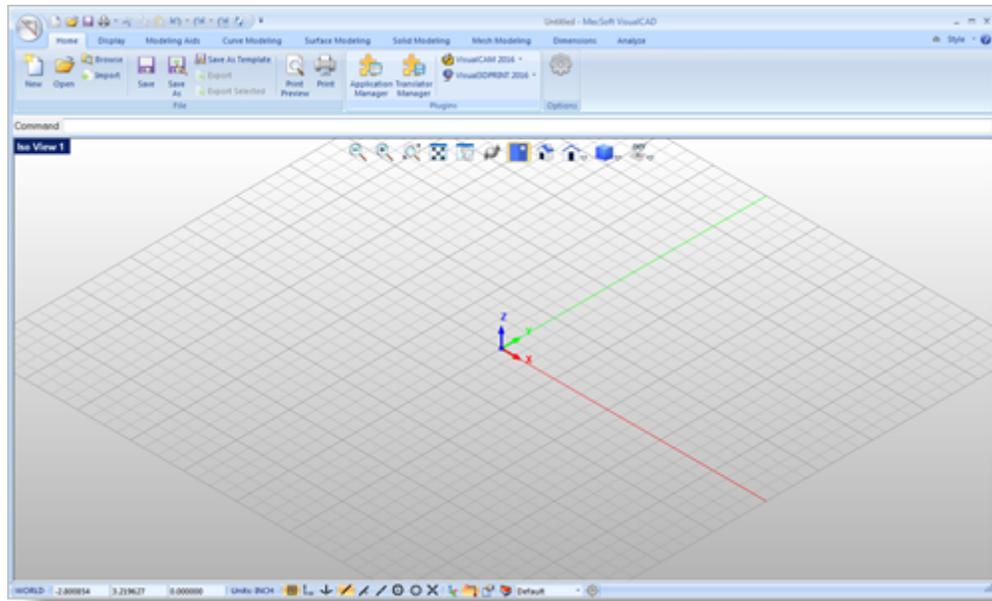
1. When you run [VisualCAD](#) for the very first time, your screen may look this.



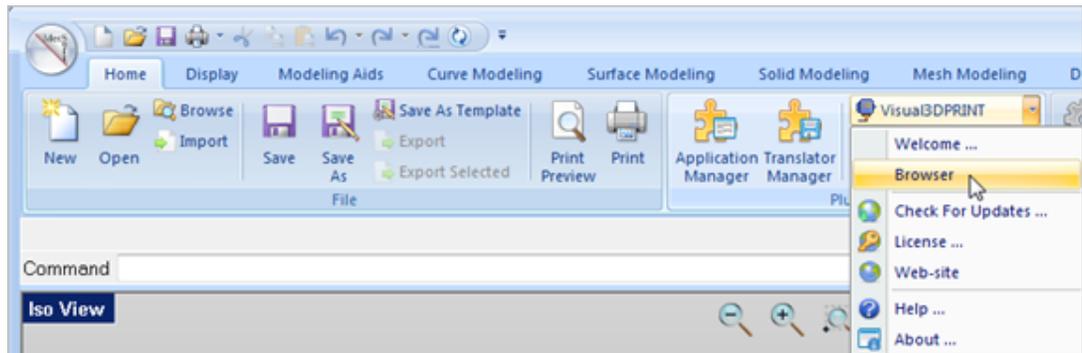
2. These windows on the left belong to plug-in modules that are currently loaded. For now, let's close all of them.

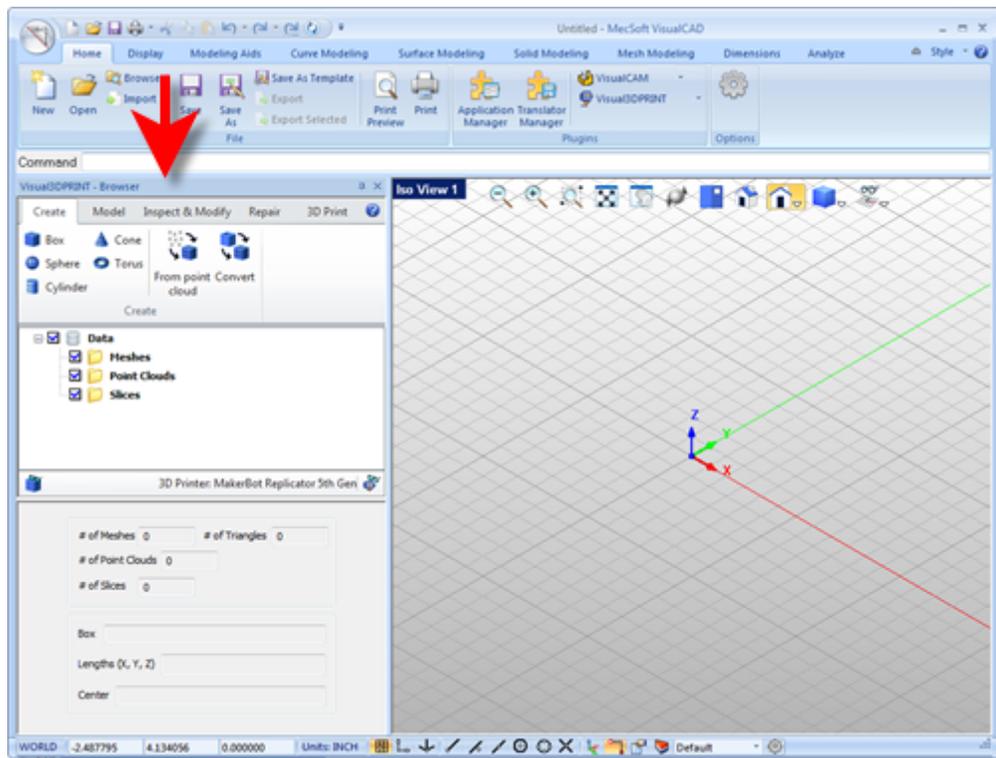


3. With all plug-in modules closed your screen will look like this:

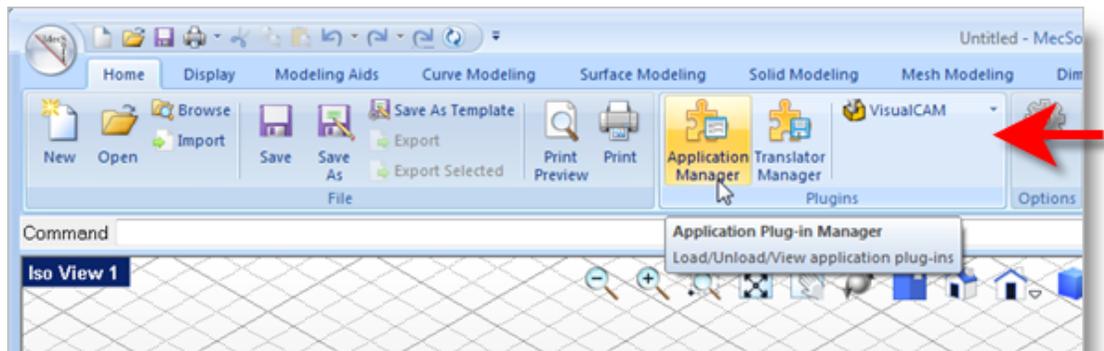


4. Now go to the Home Tab on the VisualCAD Ribbon Bar and find the Visual3DPRINT 2017 menu. Dropdown the menu and then select Browser. This will display the Visual3DPRINT 2017 Browser.

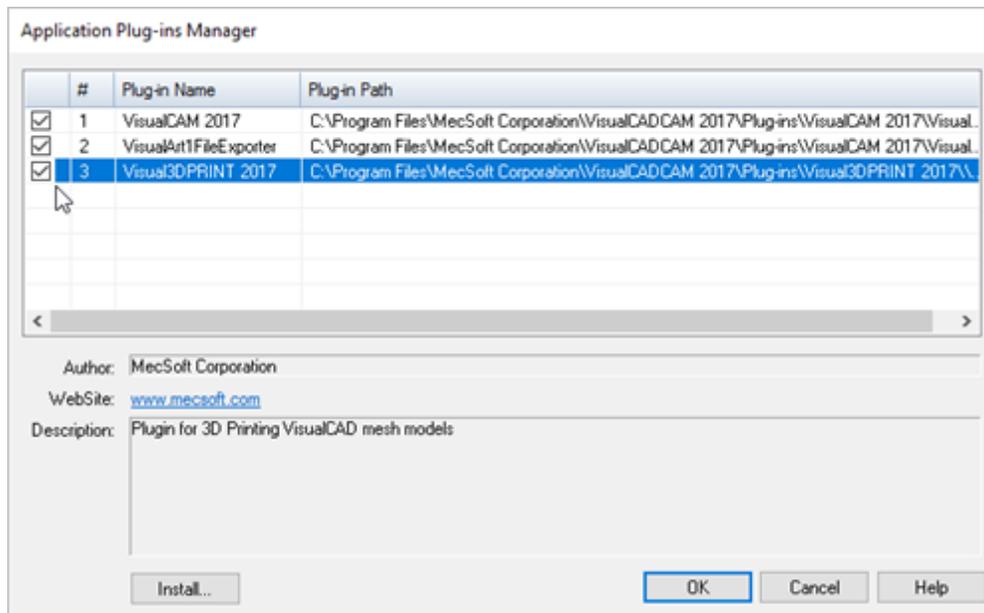




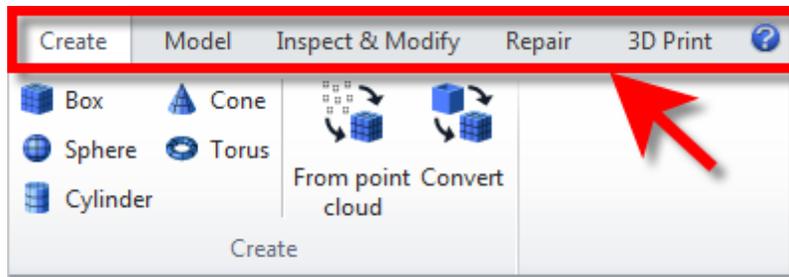
5. If the Visual3DPRINT 2017 menu does not appear on the Home Tab on the VisualCAD Ribbon Bar, select the Application Manager icon.



6. Check the box next to Visual3DPRINT 2017 and then pick OK.



7. You will see the **Visual3DPRINT 2017** menu appear on the Home Ribbon Bar. Dropdown the menu and then select **Browser**.
8. There is a ribbon bar at the top of the **Browser** with 5 tabs, **Create**, **Model**, **Inspect & Modify**, **Repair** and **3D Print**.



The **Create** pane contains mesh creation tools.

The **Model** pane contains mesh editing tools.

The **Inspect & Modify** pane contains analysis and additional editing tools.

The **Repair** pane contains various tools for fixing your mesh.

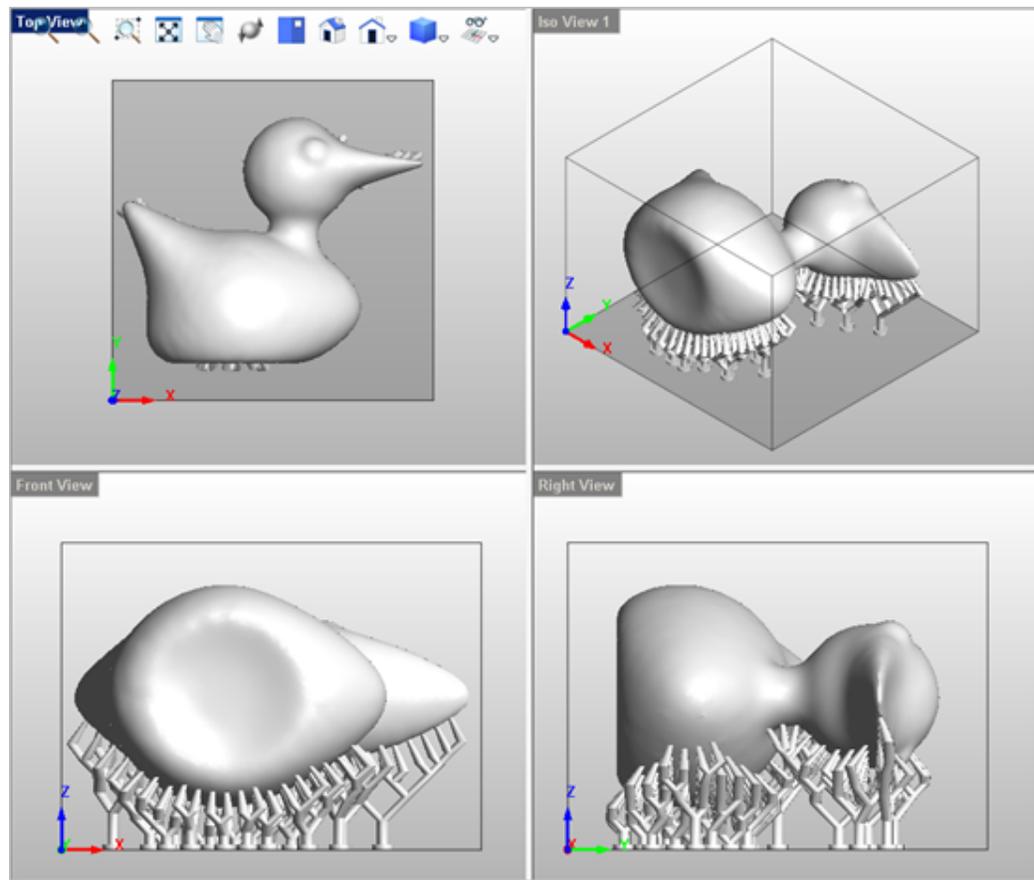
The **3D Print** pane contains tools for **Preparing**, **Checking** and **Printing** your mesh to a 3D printer.

Chapter 3: Point Clouds

In this chapter we will work with [Point Cloud](#) data to create and prepare a [Mesh](#) model for 3D Printing. We will perform the following basic steps to complete this chapter:

1. [Load the Point Cloud Data file.](#)
2. [Create a Mesh model from the Point Cloud.](#)
3. [Auto Fix](#) the mesh.
4. [Re-Mesh](#) the part.
5. [Smooth](#) the mesh.
6. [Analyze](#) the mesh.
7. [Slice](#) the mesh.
8. [Select](#) a 3D Printer.
9. [Rotate](#) and [Fit](#) the mesh to the printer.
10. [Check](#) for Printing
11. [Generate a Support Structure](#)
12. [Export](#) to an [STL](#) file.
13. [Generate a G-Code](#) file for 3D Printing

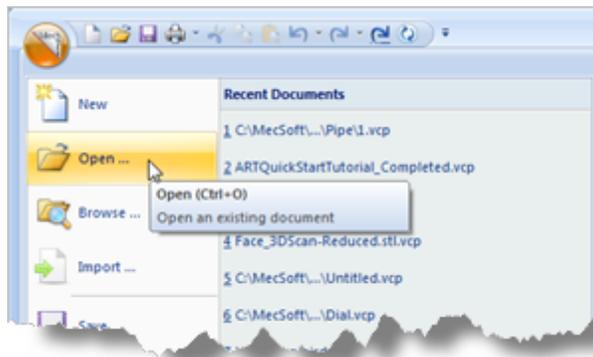
Our completed part will look like this:



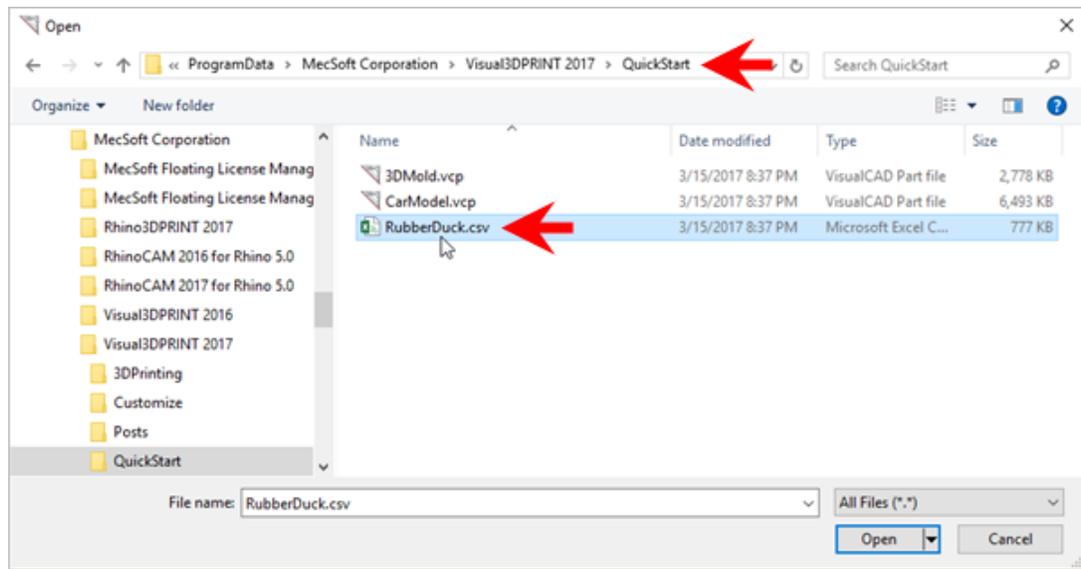
3.1 Load the Part File

Now, let's load the point cloud data for this tutorial.

1. From the [VisualCAD](#) menu, select [Open](#).

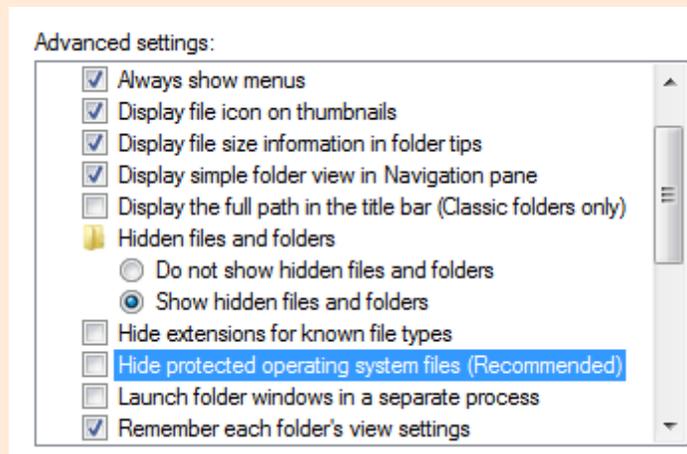


2. Now, let's load the point cloud data for this tutorial.
3. Find the part file named *RubberDuck.csv* located in the [QuickStart](#) folder and then pick [Open](#).



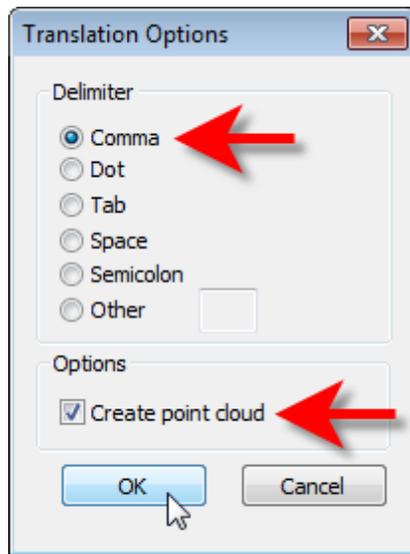
! By default, the **ProgramData** folder is "hidden" from view. Here are the steps to Show hidden files and folders:

1. For **Windows 7/8/10** users: Go to **Control Panel > Appearance and Personalization > Folder Options** (**Windows XP** users can locate folder options under **Control Panel**).
2. Select **View** tab and under advanced settings select **Show Hidden files and folders**, clear the check boxes for:
 - **Hide extensions for known file types**
 - **Hide protected operating system files (Recommended)**



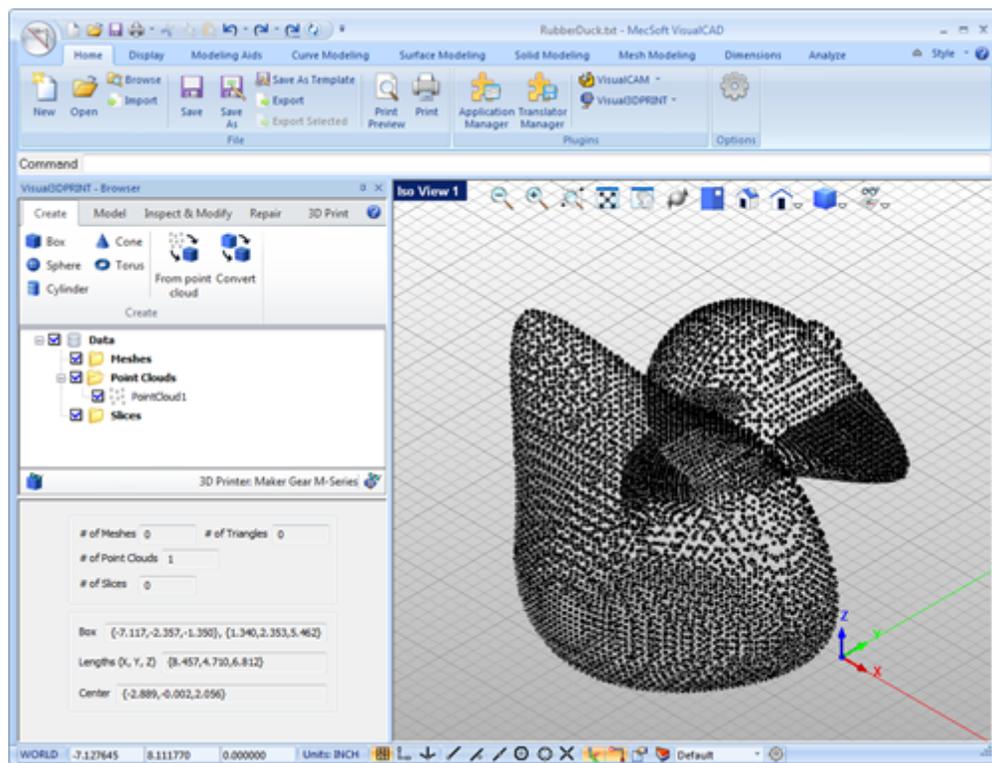
3. Click **Apply** and **OK**.

4. From the **Translation Options** dialog:



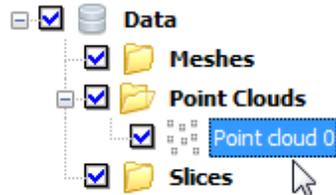
Select **Comma** under **Delimiters**
Check **Create point cloud** under options
Pick **OK** to import the point file

5. Once imported, select **Iso View 1** view to work in.

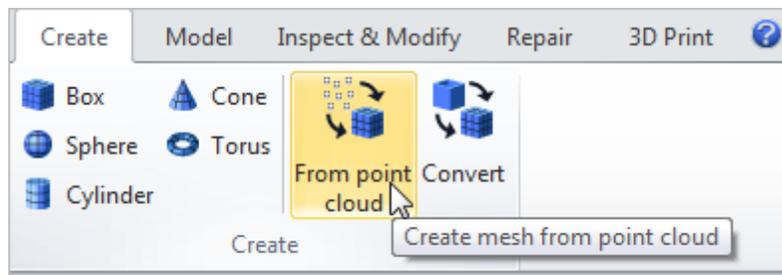


3.2 Mesh from Point Cloud

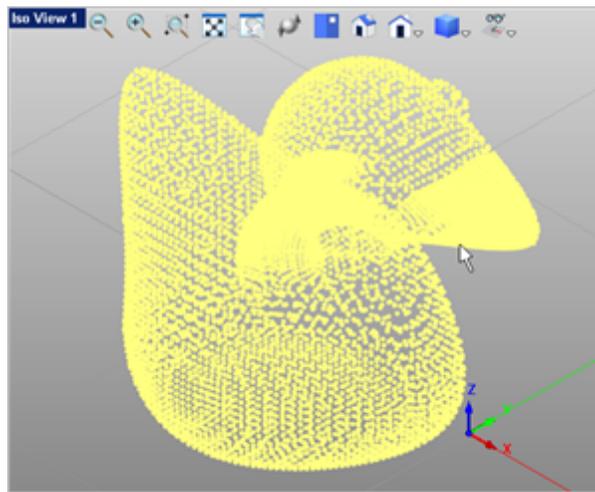
First, let's create a mesh from the point cloud. In the [Visual3DPRINT 2017 Browser](#) we see that we have one point cloud.



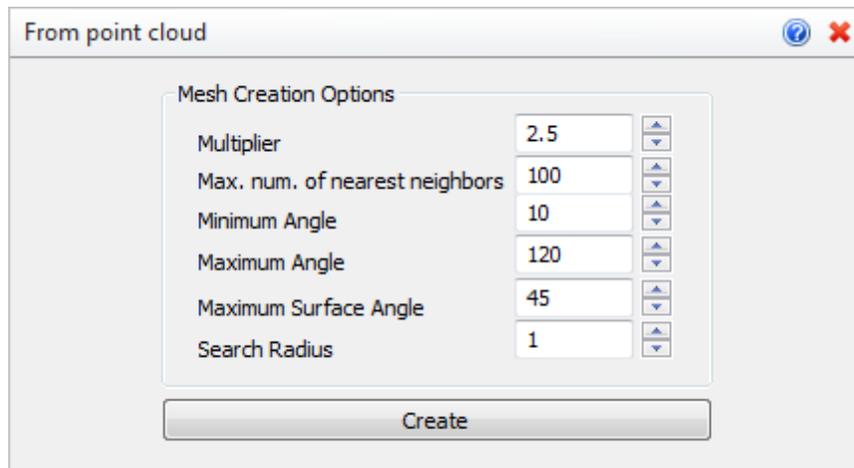
1. From the [Create](#) tab of the [Visual3DPRINT 2017 Browser](#), select [From Point Cloud](#) to create a Mesh model from the point cloud.



2. Select the point cloud and then [right-click](#) or press [Enter](#).
Note: If the [Point Cloud](#) is already selected from the [Visual3DPRINT 2017 Browser](#) in the previous step, just press [Enter](#).

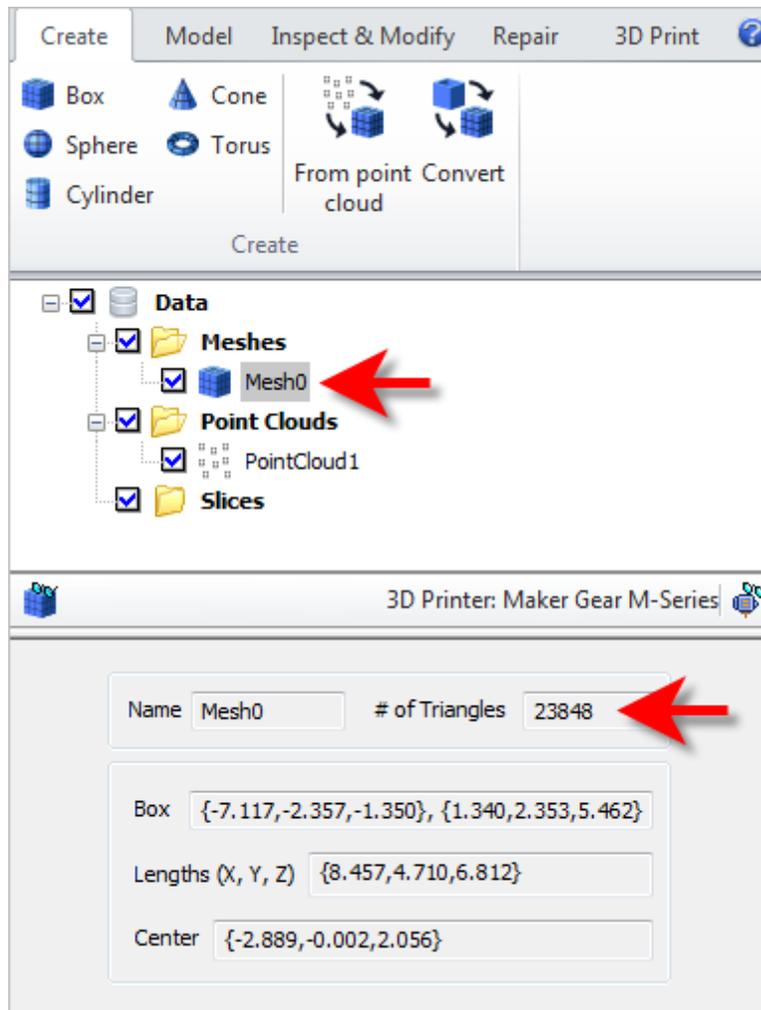


Notice that an options dialog appears below the [Browser](#).

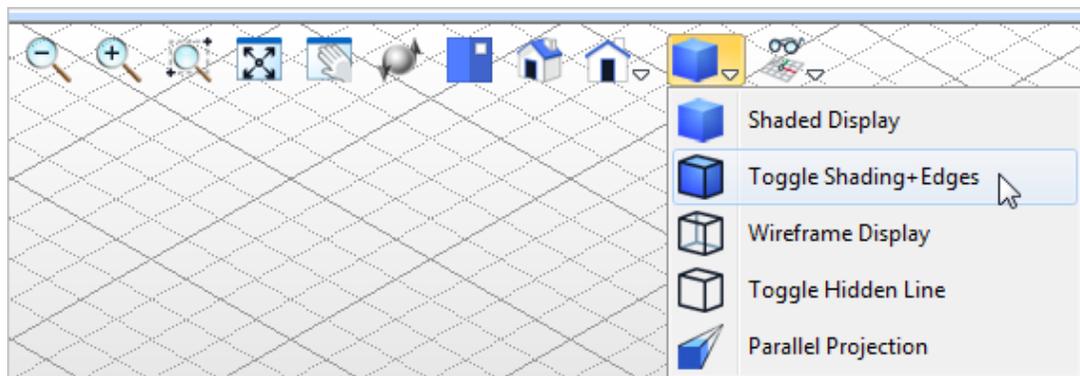


3. Accept the default options and then pick [Create](#).

From the [Visual3DPRINT 2017 Browser](#) we see that we now have 1 [Point Cloud](#) and 1 [Mesh](#) with over 23,000 [Triangles](#).

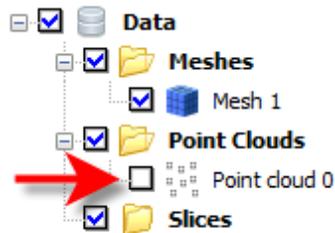
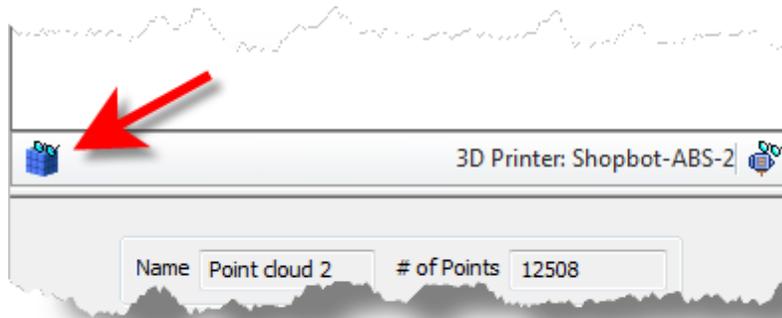


4. From the heads-up View Toolbar of Iso View 1, select Toggle Shading + Edges so we can see the model more clearly.

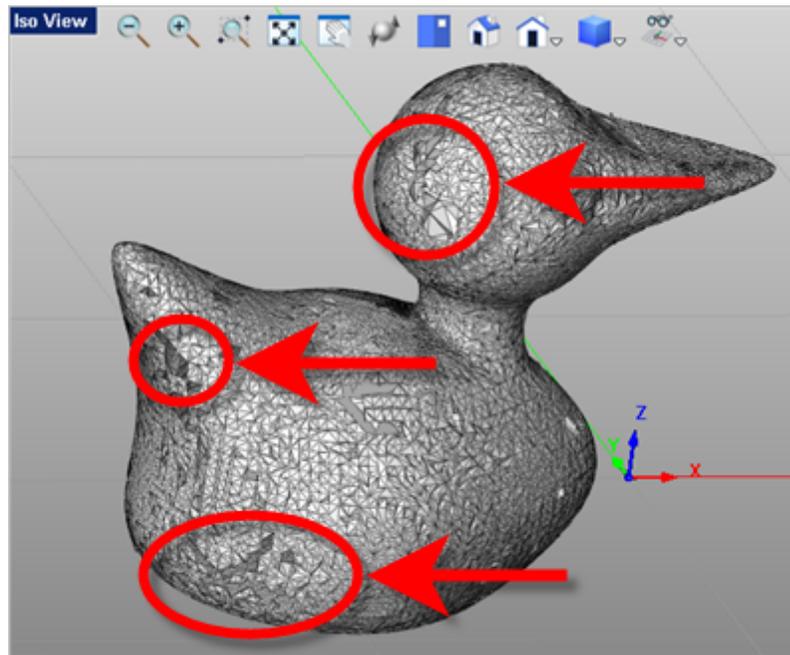


5. Then from the Visual3DPRINT 2017 Browser we'll first make sure that the icon for Toggle Hidden Objects in Tree is turned Off, then we will hide the point cloud (by

unchecking it) and take a look at the mesh that was created.



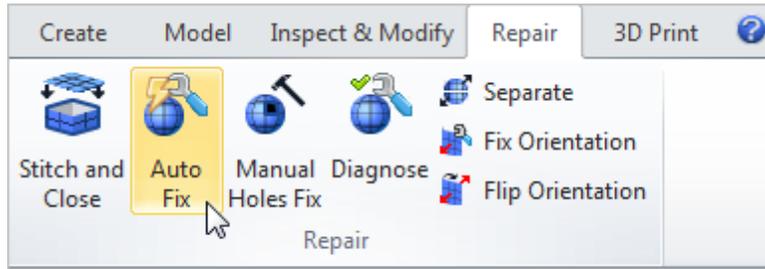
We notice that the point cloud data is incomplete, leaving the model incompatible for 3D printing.



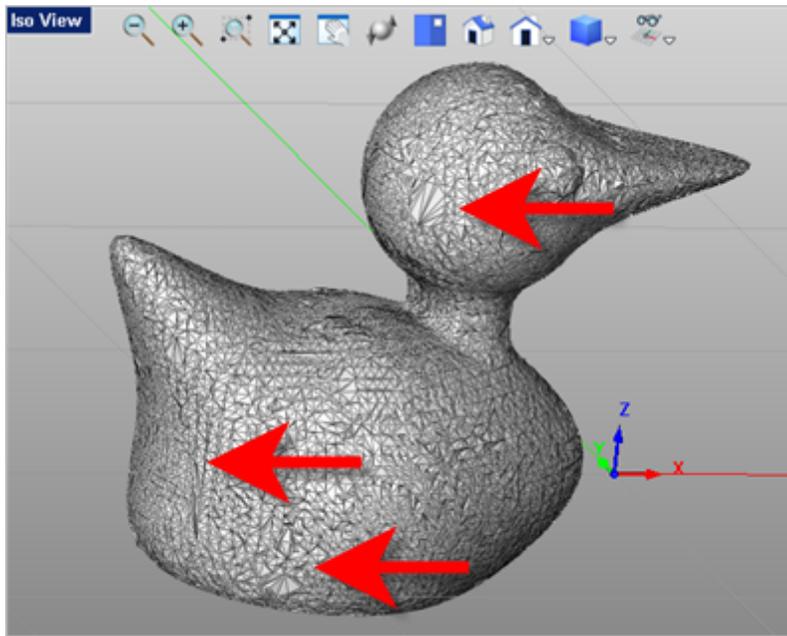
3.3 Auto Fix

We can repair the mesh automatically.

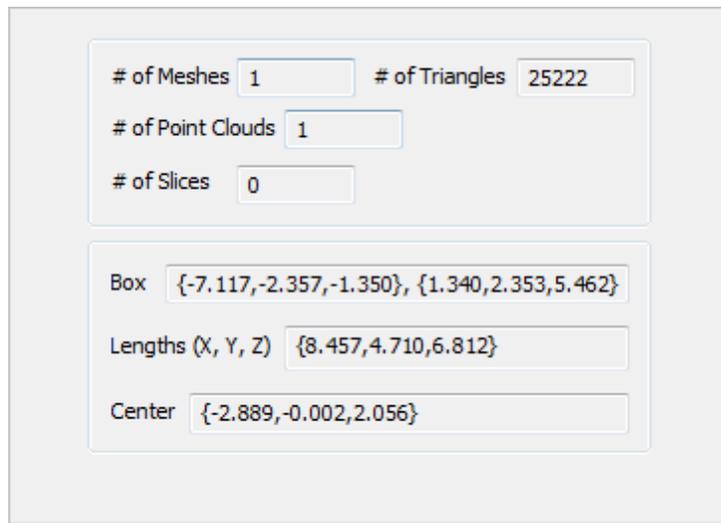
1. From the [Visual3DPRINT 2017 Browser](#) select the [Repair](#) tab and then select [Auto Fix](#). This will automatically fix holes, self-intersecting facets and more.



2. Select the mesh model and then right-click or press [Enter](#). We see now that all of the gaps are closed.



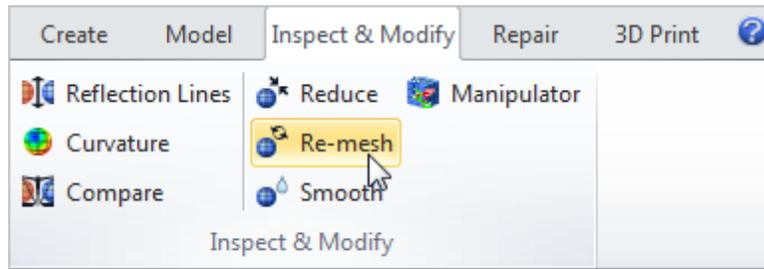
The browser now reports that the mesh has over 25,000 triangles. The exact # of [Triangles](#) reported may differ slightly depending on the exact build version of [Visual3DPRINT 2017](#) you are running.



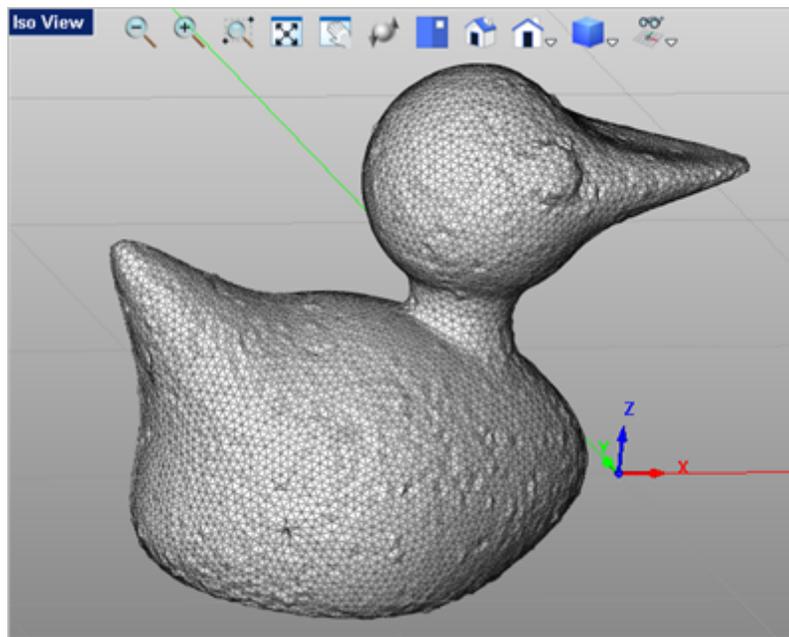
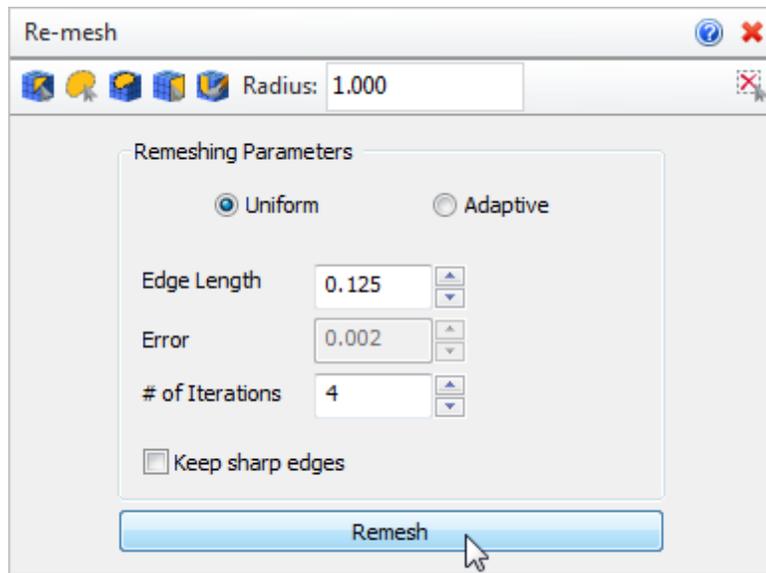
3.4 Re-Mesh

Next we'll re-mesh the model creating a more uniform mesh.

1. From the **Inspect & Modify** tab, select **Re-mesh**.

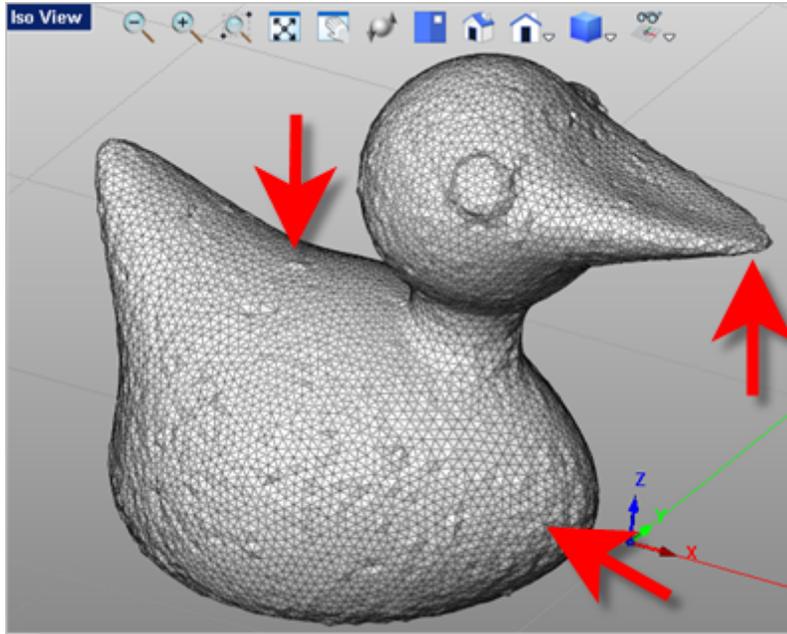


2. Now we select the mesh model and then right-click or press **Enter** to display the **Re-mesh** dialog.
3. Selecting the **Uniform** method will re-mesh the model based on a fixed **Edge Length**.
4. Then set the **Edge Length** to 0.125 and the **# of Iterations** to 4.
5. Then uncheck **Keep sharp edges** and then pick **Remesh**.

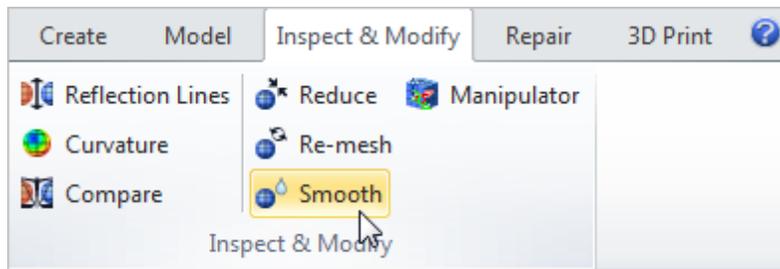


3.5 Smooth

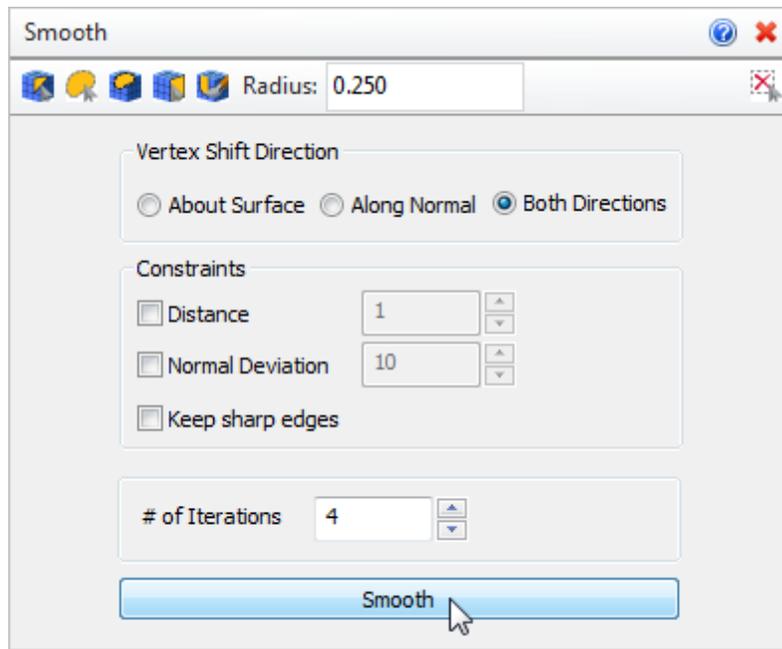
Although uniform, we still see areas in the mesh that are rough. Let's smooth these out a bit.



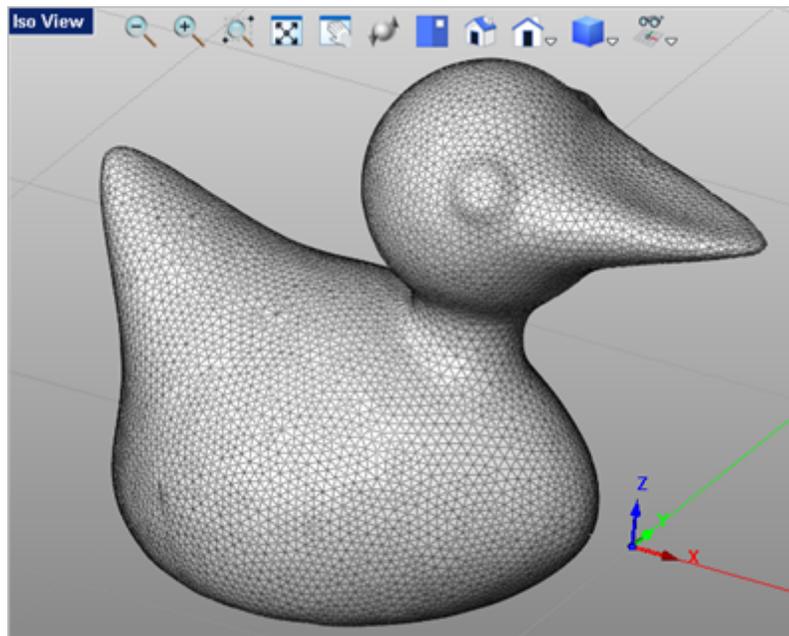
1. From the **Inspect & Modify** tab, select **Smooth**.



2. Now we select the mesh model and then right-click or press **Enter** to display the **Smooth** dialog.
3. Next, we'll allow the **Vertex** of each facet to shift in **Both Directions** (inward and outward). This means that any smoothing will both add and remove facets as needed.
4. We'll set the **# of Iterations** to **4**. This means that the second iteration will **Smooth** the results of the first and so on.



5. Now we'll pick the [Smooth](#) button and review the results. We see that the mesh looks much smoother now.

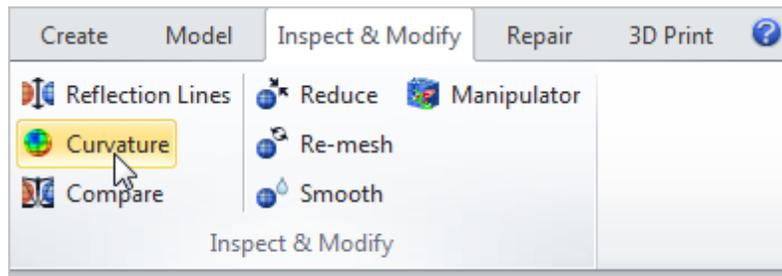


3.6 Analyze

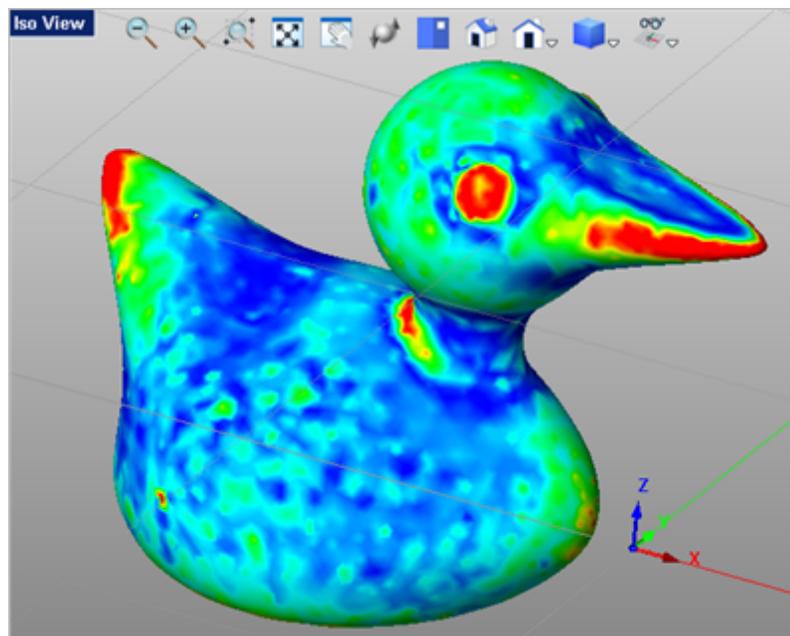
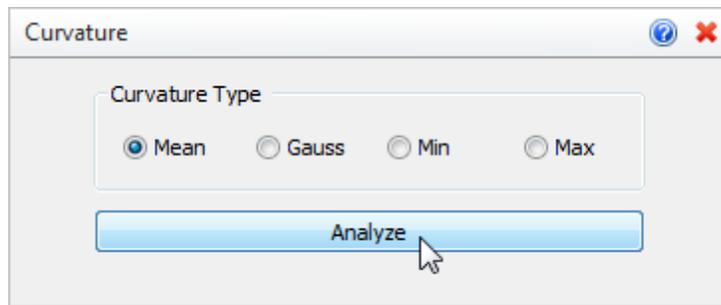
Next we'll analyze the mesh model using a couple of different methods.

1. From the [Inspect & Modify](#) tab, select [Curvature](#). This will highlight areas of curvature

across the model.

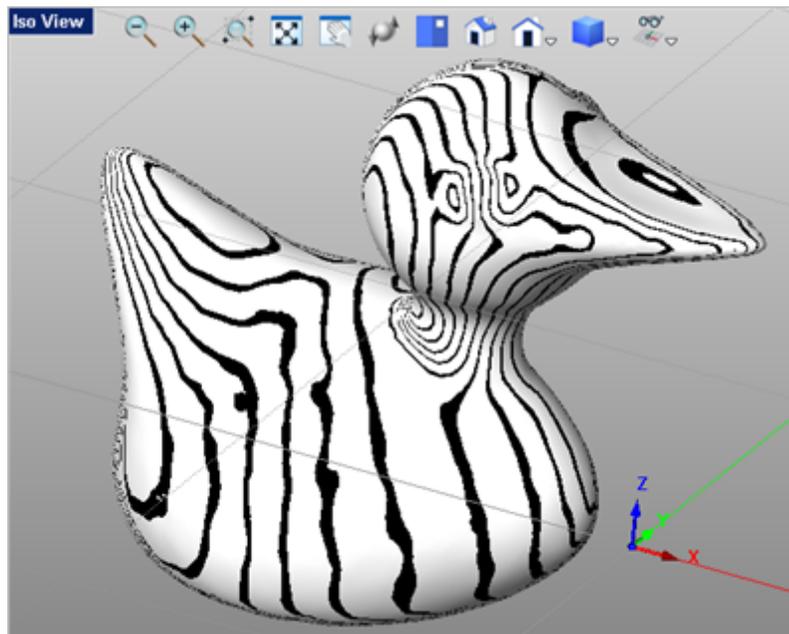
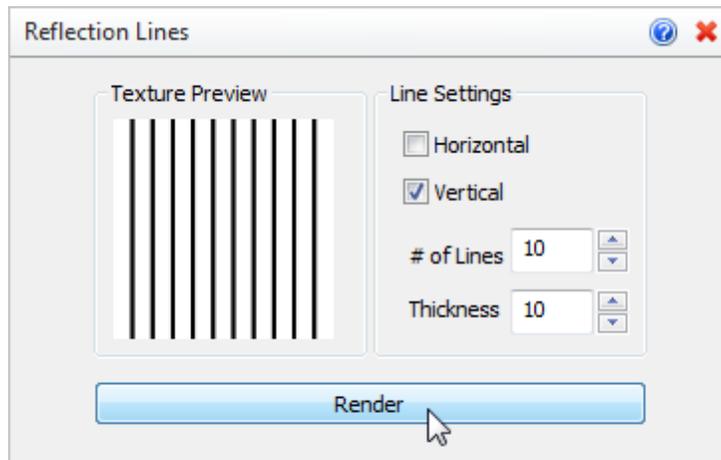


2. Now we select the mesh model and the **Curvature** dialog is displayed automatically.
3. We'll leave the **Curvature Type** set to **Mean** and then pick **Analyze** to see the results.



4. You can pick the **Cancel** icon **✖** to close the command dialog leaving the mesh selected.
5. Now, from the **Inspect & Modify** tab, select **Reflection Lines**. This method will indicate any irregularities or tangent discontinuities.

- Just right-click or press **Enter** since we left the mesh selected from the previous command.

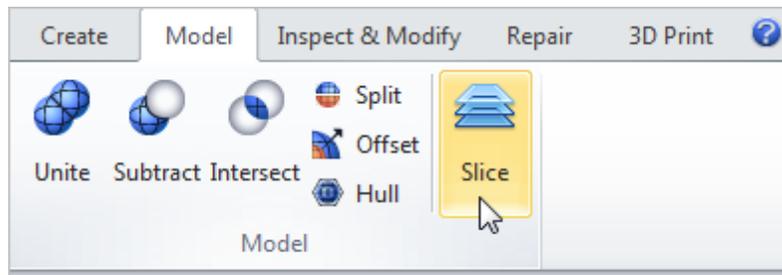


- Again, you can pick the **Cancel** icon **✖** to close the command dialog leaving the mesh selected.

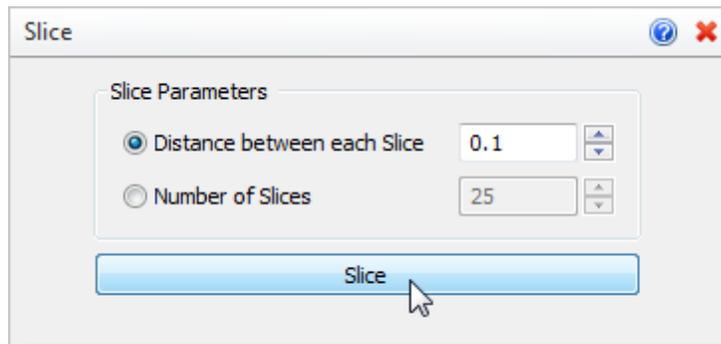
3.7 Slice

Next, we'll visually **Slice** the mesh model to simulate levels of 3D printing that will occur.

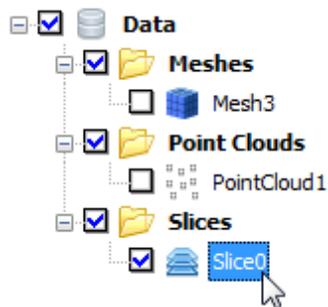
- With the mesh still selected from the previous step, from the **Model** tab, select **Slice**.

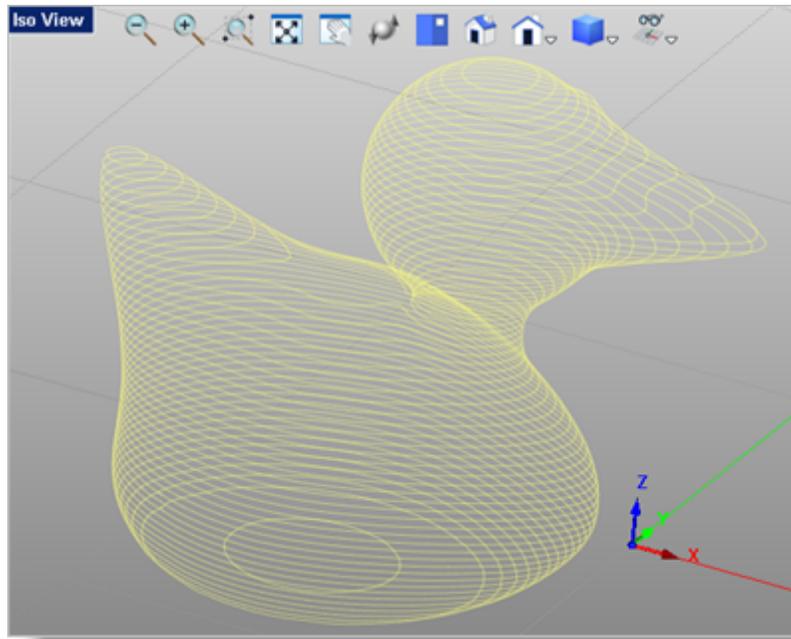


- From the **Slice** dialog, we'll set the **Distance between each slice** to 0.1 and then pick **Slice**.



- From the **Browser**, first check the **Slice** object and then uncheck the **Mesh** object. The **Slice** will be isolated and clearly highlighted on the screen.

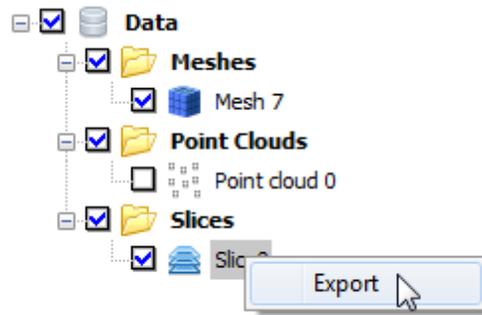




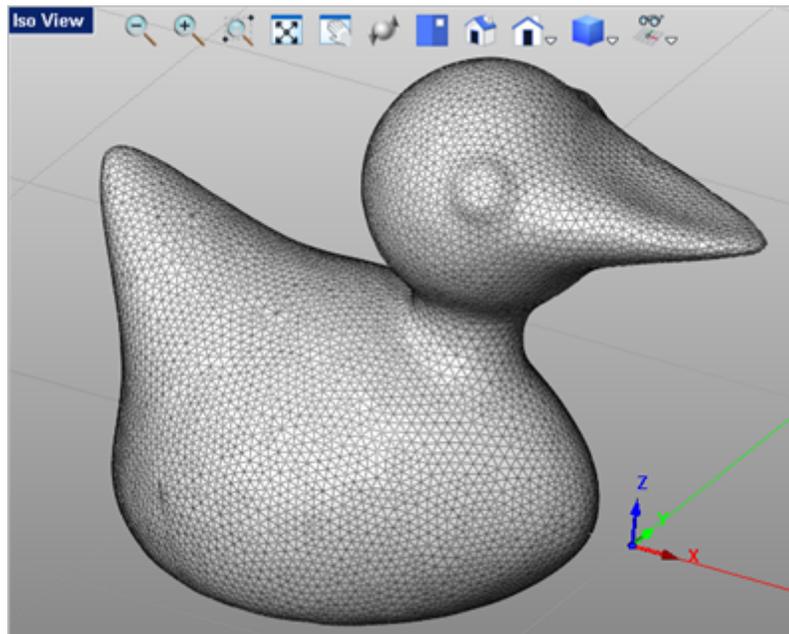
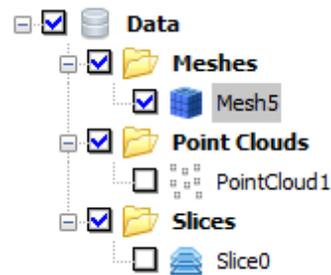
The **Browser** displays information about the **Slice**. Notice that the  icon is displayed indicating that **NO** open curves are present.

Name	<input type="text" value="Slice0"/>
# of Levels	<input type="text" value="68"/>
# of Open Curves	<input type="text" value="0"/> 
Box	<input data-bbox="479 1249 933 1291" type="text" value="{-7.086,-2.354,-1.339}, {1.218,2.346,5.361}"/>
Lengths (X, Y, Z)	<input data-bbox="479 1312 933 1354" type="text" value="{8.305,4.700,6.700}"/>
Center	<input data-bbox="479 1375 933 1417" type="text" value="{-2.934,-0.004,2.011}"/>

4. If you right-click on the **Slice** object from the **Browser** you can **Export** it to actual curve geometry later if needed.



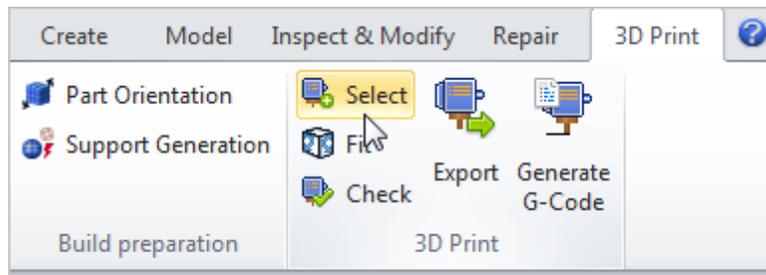
5. For now, we'll hide the **Slice** from view by unchecking it and display the mesh again by checking it.



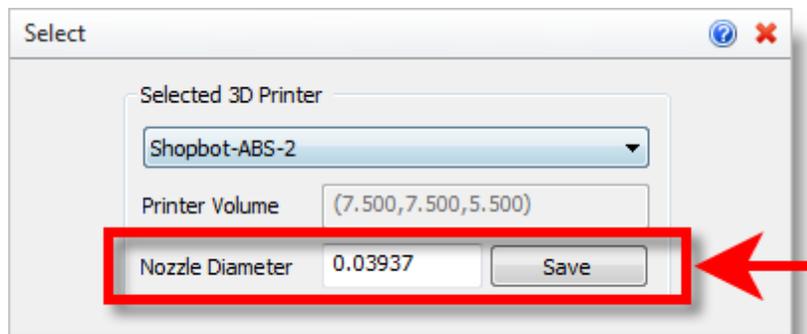
3.8 Select Printer

Now, we'll setup the model for 3D printing.

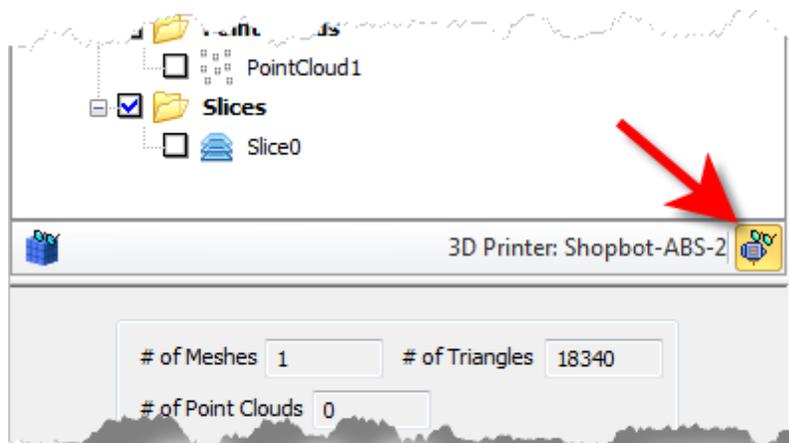
1. From the **3D Print** tab, pick **Select**.



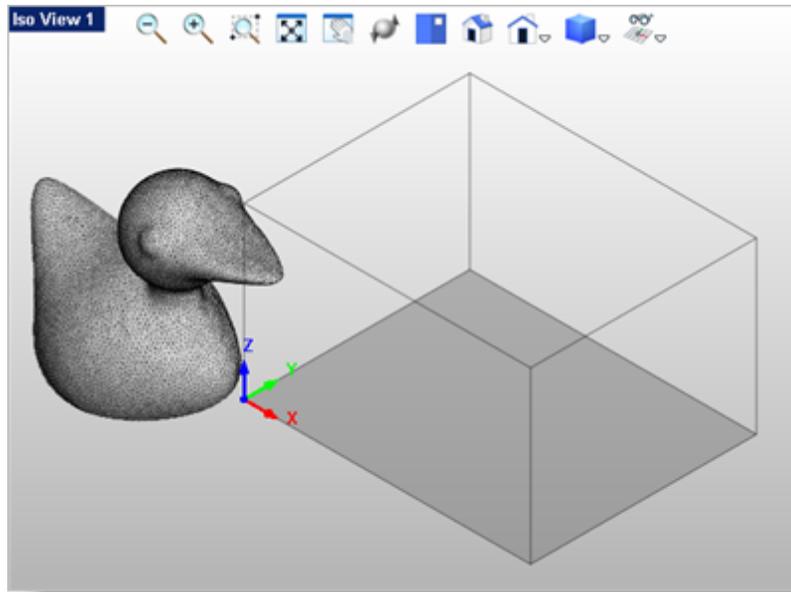
2. From the list of 3D printers we select our target printer to be [ShopBot-ABS-2](#). It has a printer volume of 7.5" x 7.5" x 5.5" inches, just perfect for our rubber duck.
3. Make sure to set the [Nozzle Diameter](#) value to match the actual nozzle currently installed on your 3D printer.



4. From the [Browser](#) toolbar, select the icon to [Toggle the visibility](#) of the 3D printer's volume **ON**.



We now see it on the screen but notice that the mesh is positioned outside of the 3D printer's volume!



5. Pick the **Cancel** icon  to close the **Select** command dialog.

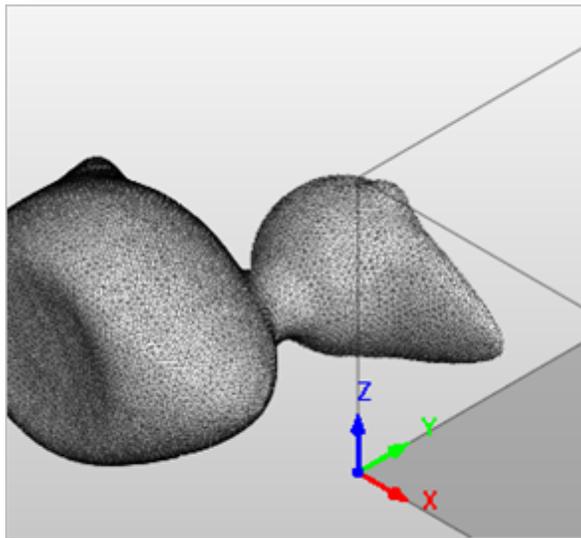
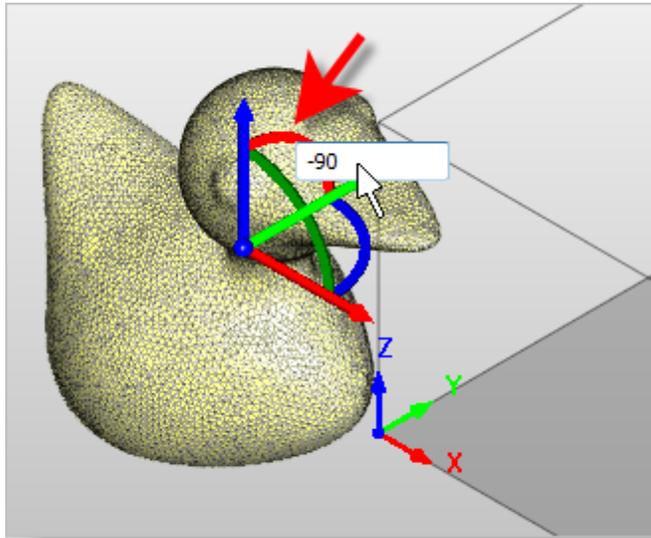
3.9 Rotate and Fit

For this print we want to **Rotate** the rubber duck so that it lies on its side. Then we will **Fit** it to the 3D Printer's volume automatically.

1. From the **VisualCAD Status Bar**, toggle **ON** the **Manipulator**.



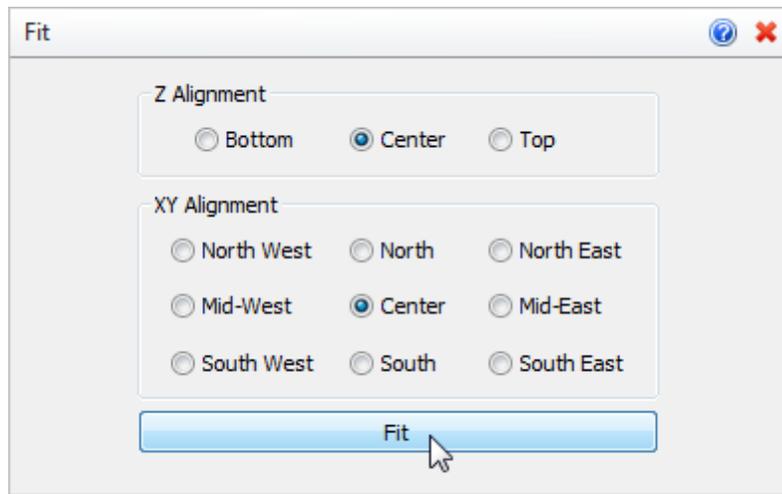
2. Now select the mesh and the **Manipulator** will display. Select the **X Rotation** arc and enter **-90** and press **Enter**. The mesh will rotated about the X axis by **-90** degrees.



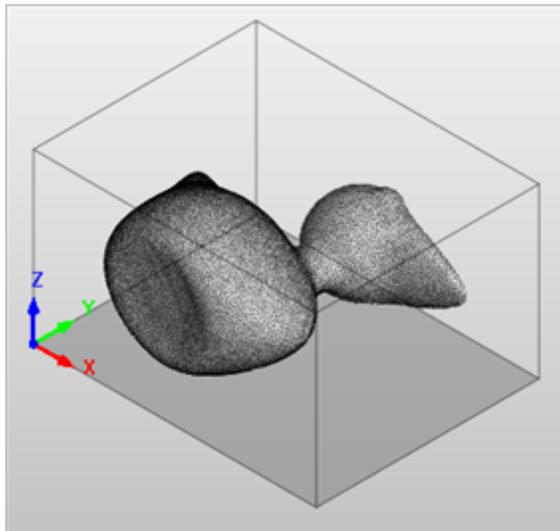
3. Now we will **Fit** the mesh to the printer. Select the **3D Print** tab and then pick **Fit**.



4. We will be generating a support structure for the rubber duck so we don't want it to lay at the bottom of the printer. So for the **Z Alignment** we select **Center** and for **XY Alignment** we'll select **Center** and then pick **Fit**.



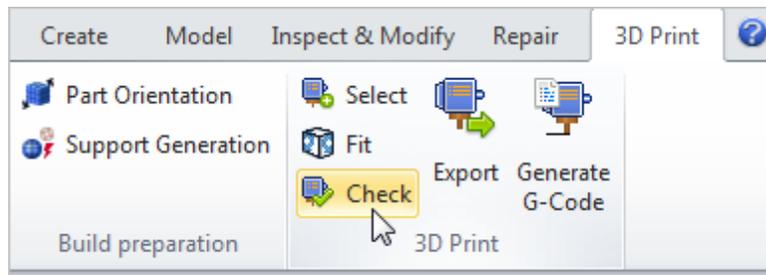
The rubber duck is automatically placed at the center of the printer's volume.



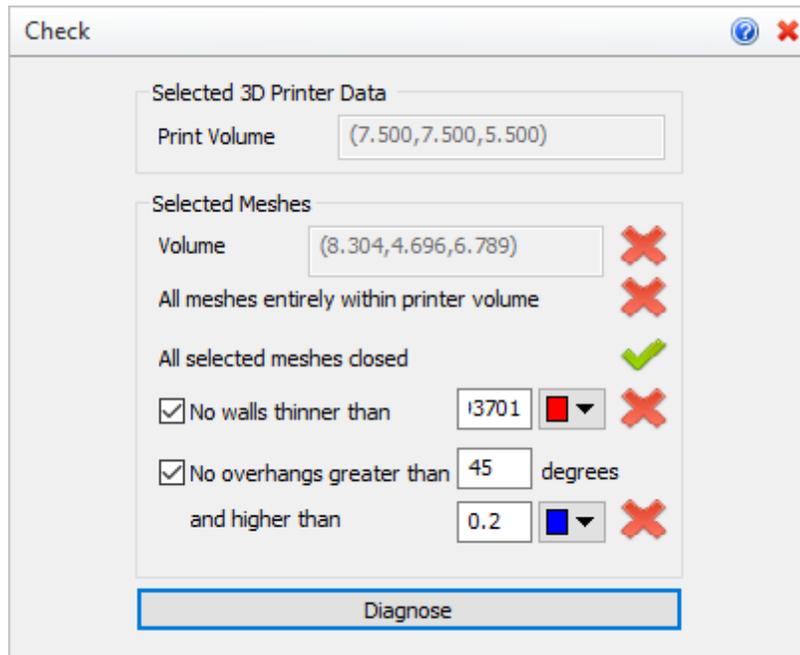
3.10 Check

Now let's check the mesh model to see if it's truly ready for printing.

1. From the **3D Print** tab, pick **Check**. Select the mesh and then right-click or press **Enter** to display the dialog.



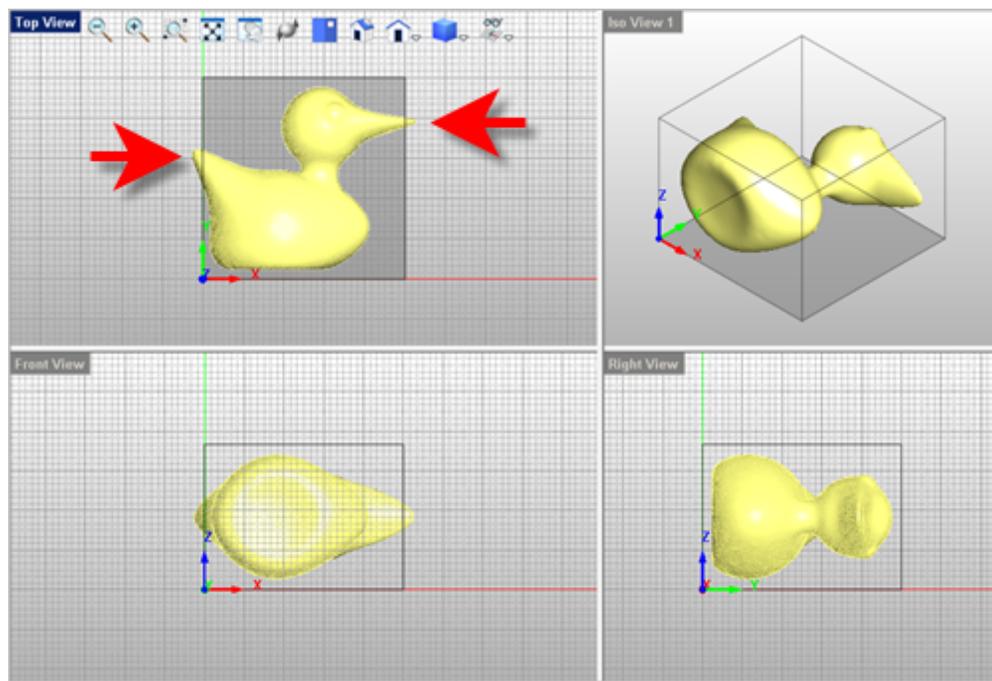
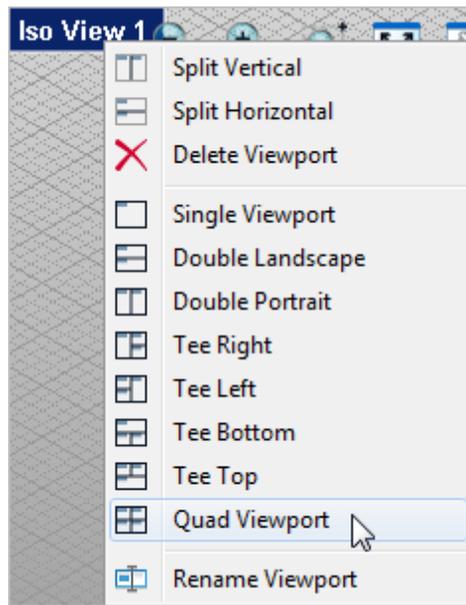
2. Notice that the **✗** icons tell us the following:



Check		Comment
✗	The mesh volume exceeds the printer's volume.	We need to fix this
✗	Mesh is outside the printer's volume.	We need to fix this
✗	There are walls thinner than 0.1.	This is acceptable
✗	There are overhangs greater than 45 degrees and higher than 0.2.	We will add supports

3. Pick the **Cancel** icon **✗** to close the dialog.
4. Now let's have a look to see what the problem is. In **VisualCAD**, right-click on **Iso View 1** and select the **Quad Viewport** option. We see that the mesh extends past the

printer's volume on two sides. We can easily fix this.

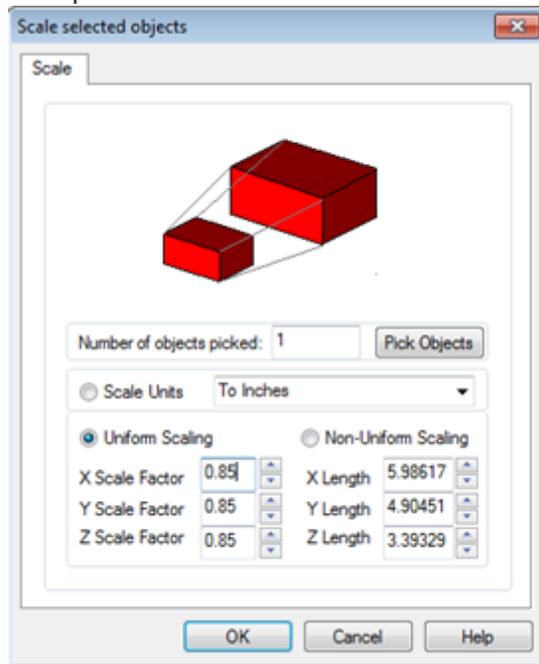


3.11 Scale

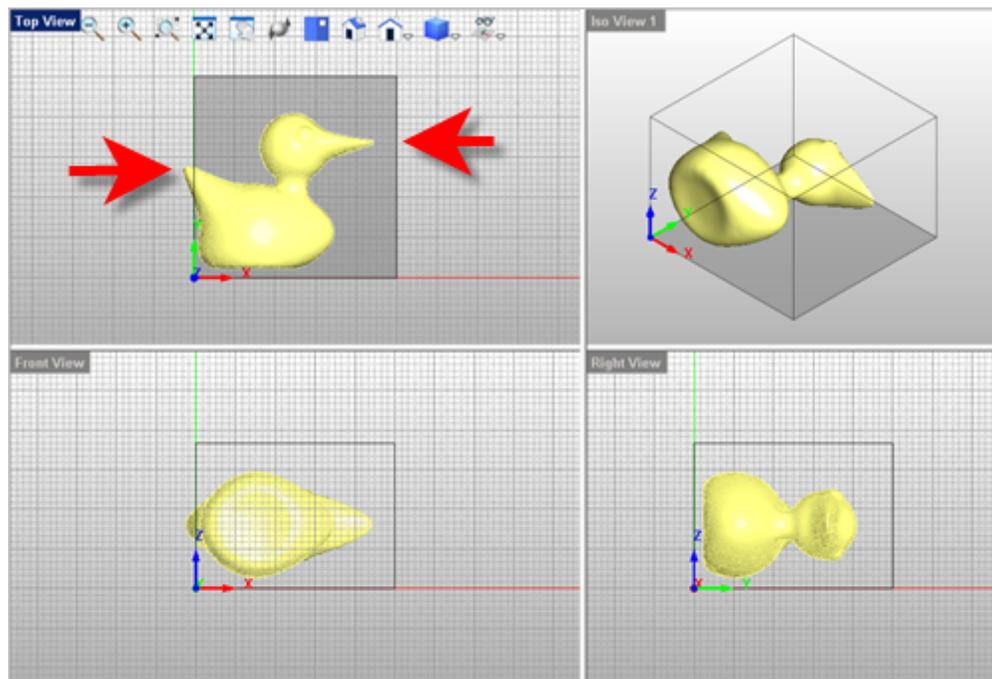
We need to scale the part to fit into our 3D Printer.

1. First select the mesh, then right-click on the mesh and select [Scale](#) from the popup menu. This will display the [Scale selected objects](#) dialog.

Set Scale Units: To Inches
Pick Uniform Scaling
For X Scale Factor enter 0.85
Now pick OK and the mesh is scaled.



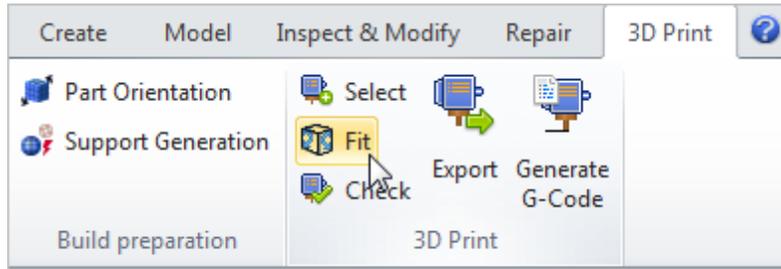
2. Your part should now look like this:



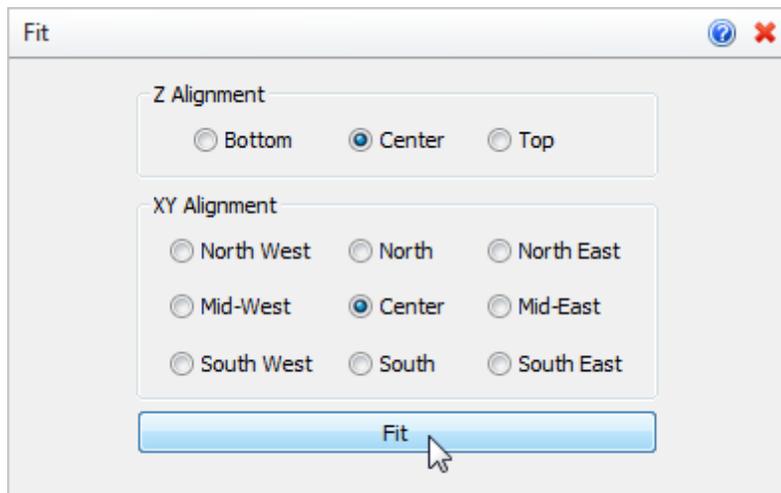
3.12 Re-Check

Now let's check the mesh model again to see if it passes the 3D Printer [Check](#). First we need to again Fit the mesh to the 3D Printer's volume.

1. Select the [3D Print](#) tab and then pick [Fit](#).



2. Both the [Z Alignment](#) and the [XY Alignment](#) should default to [Center](#). Make sure they are set and then pick [Fit](#).



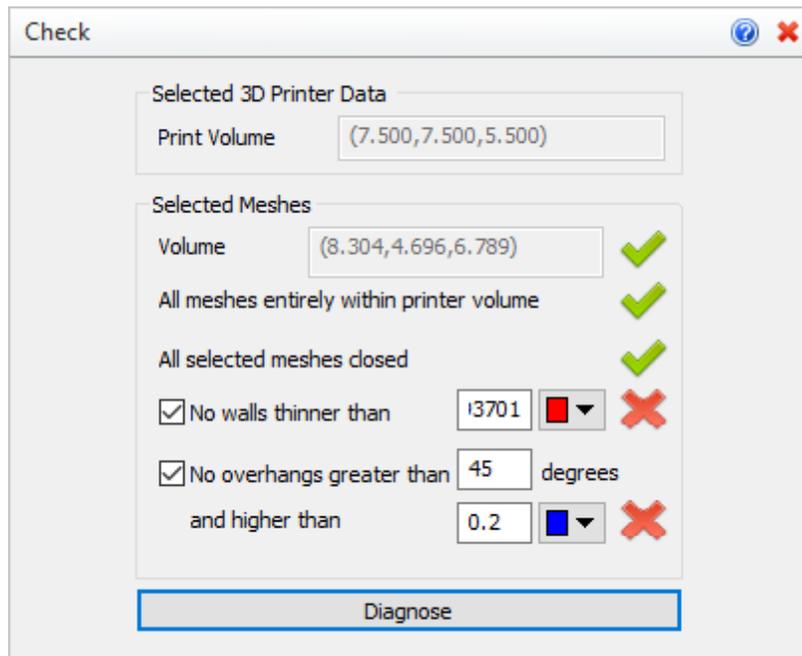
The rubber duck is again automatically placed at the center of the printer's volume.

3. Now let's [Check](#) again. From the [3D Print](#) tab, pick [Check](#). Select the mesh and then right-click or press [Enter](#) to display the dialog.



4. Notice that the  icons tell us that the mesh is now ready to generate a support

structure.



5. Pick the **Cancel** icon  to close the dialog.

3.13 Support Structure

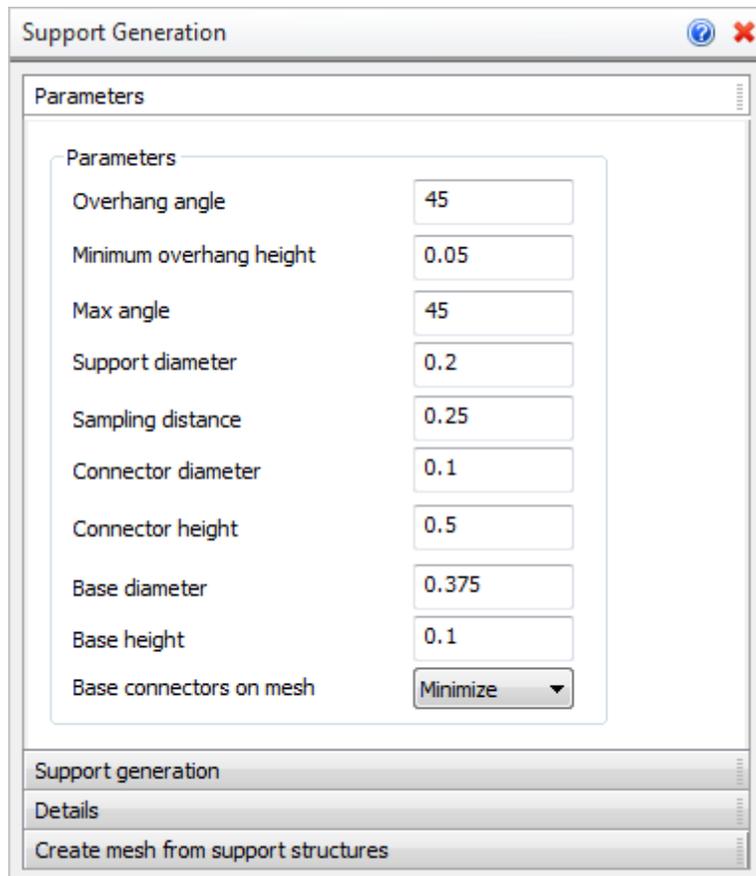
A cool new feature in **Visual3DPRINT 2017** is the ability to organically *grow* a support structure under the part to support it during 3D printing. Using a support structure may eliminate the need to split your part into separate pieces for printing. The command has many options but we will only discuss the basics here. To learn more, select the help icon  at the top of the command dialog.

 **Always use Fit & Check before adding Supports:** Using this command "grows" a support structure from the base of your printer volume up to the part. This is why it is important to make sure your part is properly positioned (using the **Fit** command) and also passes the **Check** command.

1. Since the mesh has been **Fit** and **Checked** in a previous step, we can toggle the printer volume visibility **Off** to work on the support structure.

Select  from the **Visual3DPRINT 2017 Browser** toolbar to hide the printer volume.

2. From the **3D Print** tab, select the **Support Generation** icon.
3. Now we select the mesh model and the **Support Generation** dialog will display.

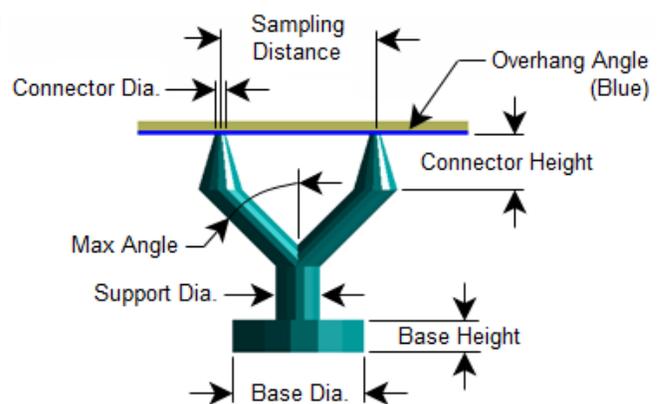


4. This dialog has 4 tabs called [Parameters](#), [Support generation](#), [Details](#) and [Create mesh from support structures](#). We will work from top to bottom beginning with the [Parameters](#) tab.

For [Parameters](#), enter the following values.

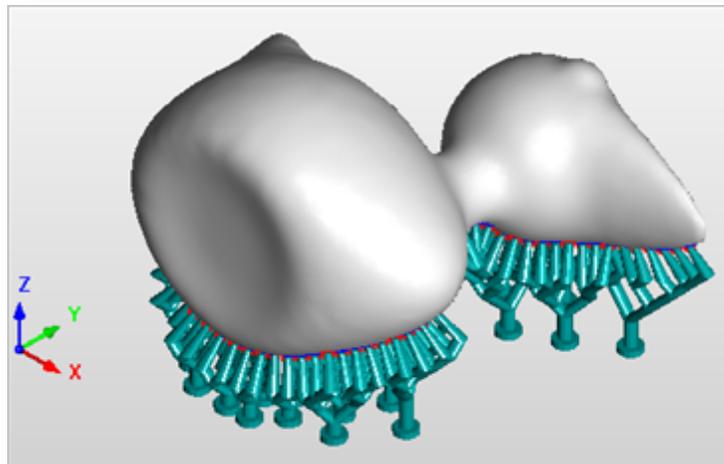
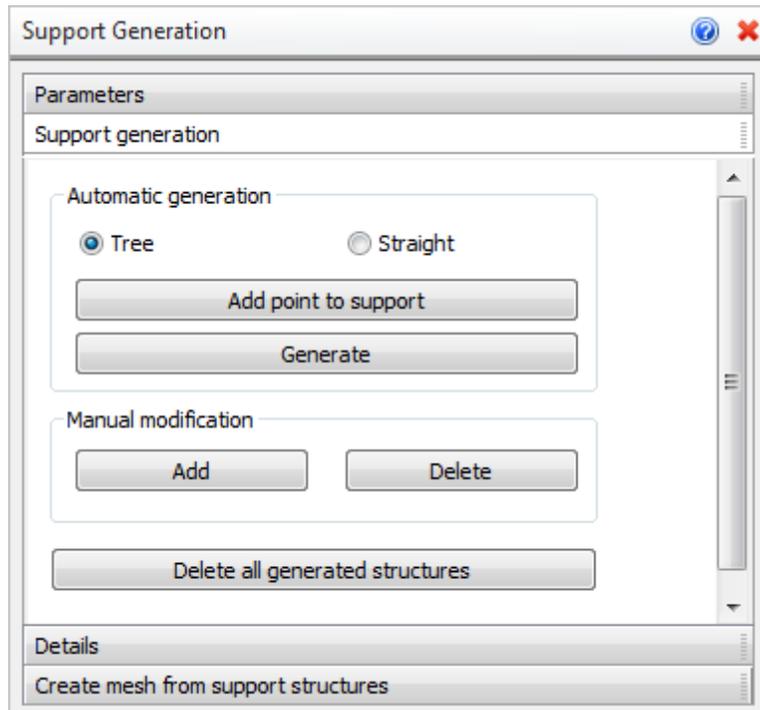
Refer to the image to the right:

Overhang angle: 45
 Minimum Overhang Height: 0.05
 Max angle: 45
 Min Overhang Height: 0.2
 Support diameter: 0.2
 Sampling distance: 0.25
 Connector diameter: 0.1
 Connector height: 0.5
 Base diameter: 0.375
 Base height: 0.1
 Base connectors on mesh:
 Minimize

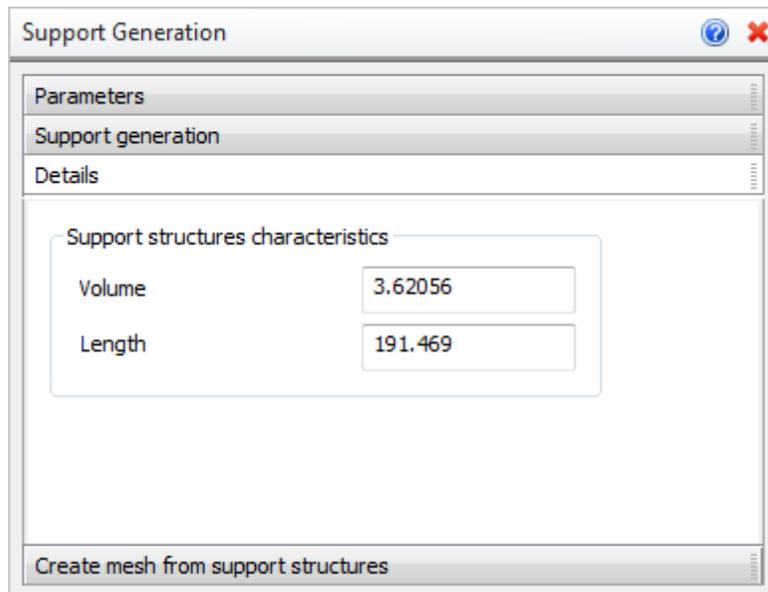


- Now select the [Support generation](#) tab. Under the [Automatic generation](#) section, select [Tree](#) and then pick [Generate](#).

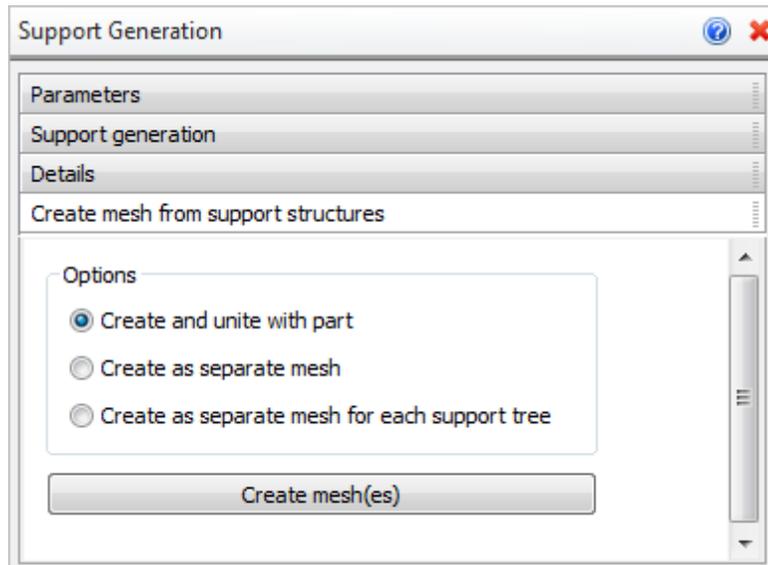
The support structure is calculated and displayed on the part. As you see in the image below, the structure is *grown* from the base of the 3D printer volume up to the part. The [Overhand angle](#) and [Sampling distance](#) will determine how many [Connectors](#) are generated.



- Now select the [Details](#) tab to calculate and review characteristics about the support structure.



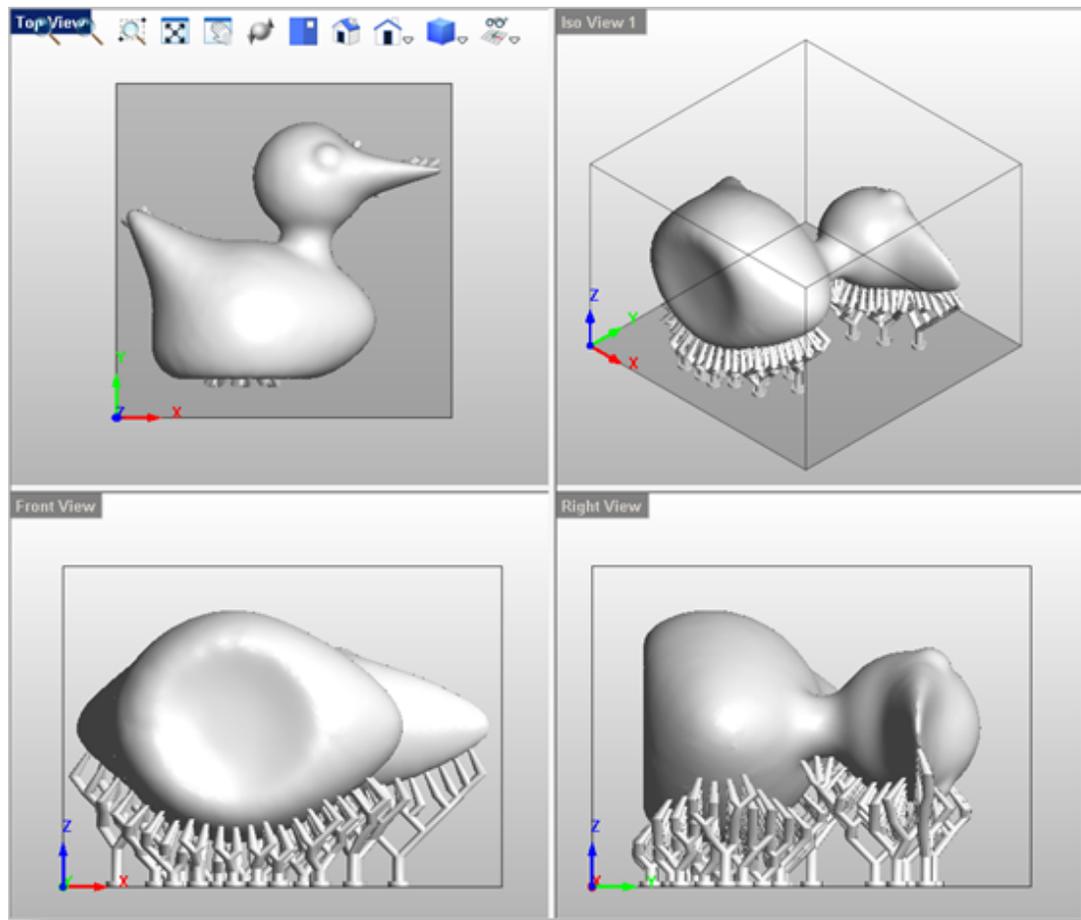
7. Now select the **Create mesh from support structures** tab to see additional options before creating the support structure mesh. Here we will select **Create and unite with part** and then pick the **Create mesh(es)** button.



Now pick the **Cancel** icon **✖** to close the **Support generation** dialog

8. Now let's view the view the support structure.

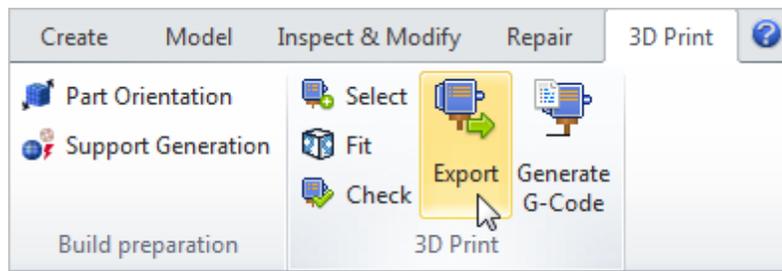
First, pick  from the **Visual3DPRINT 2017 Browser** toolbar again to show the 3D printer volume. Then changed to the **Quad Viewport** display. Your part should look like this. Notice the organic support structure created between your part and the 3D Printer's bed:



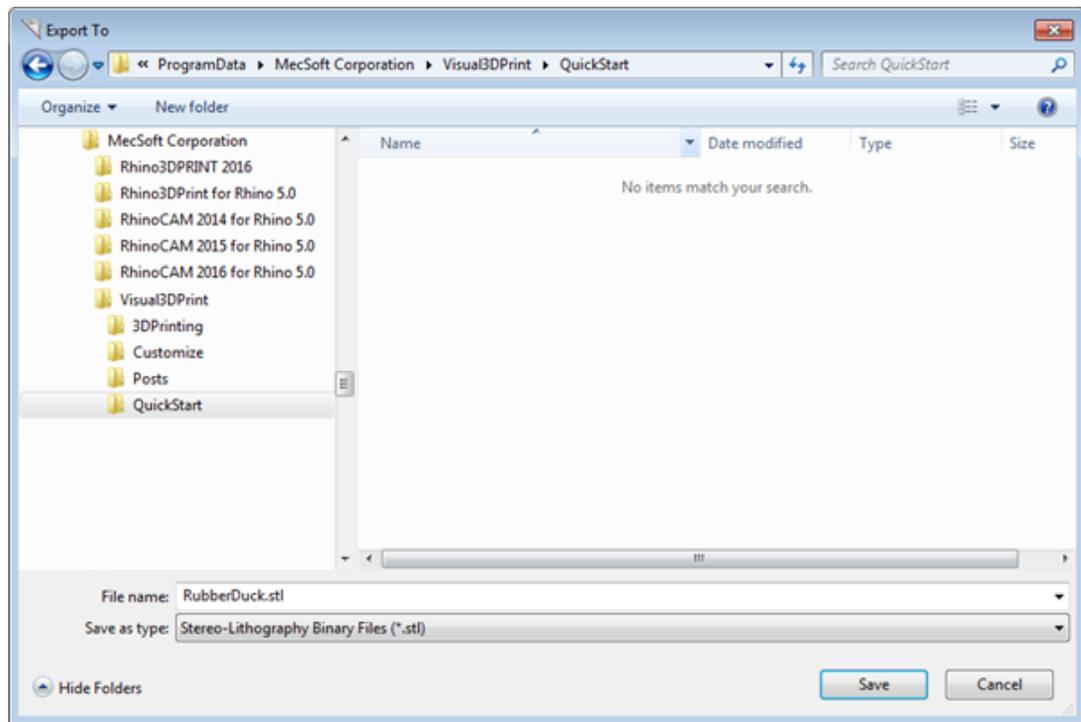
3.14 Export

Now, we're ready to create an STL file that you can send your 3D Printer or service.

1. Select the mesh model if its not already selected.
2. From the **3D Print** tab, pick **Export**.



3. From the **Save As** dialog, select a folder to save the file to, set the **Save as Type** to: **Stereo-Lithography Binary (*.stl) files** and then pick **Save**.

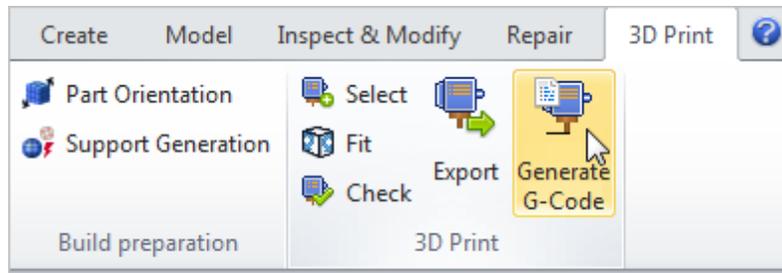


This file can now be sent to your 3D printer or service center for printing!

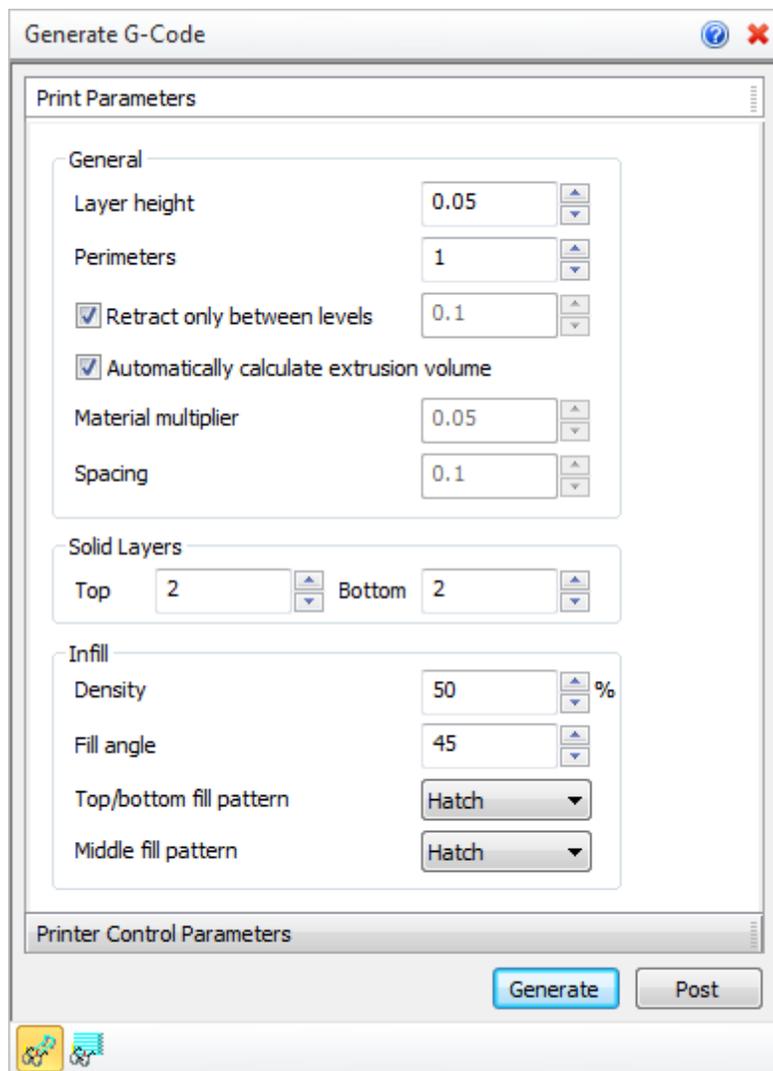
3.15 G-Code

Optionally, you can [Generate G-Code](#) that is compatible with some printers.

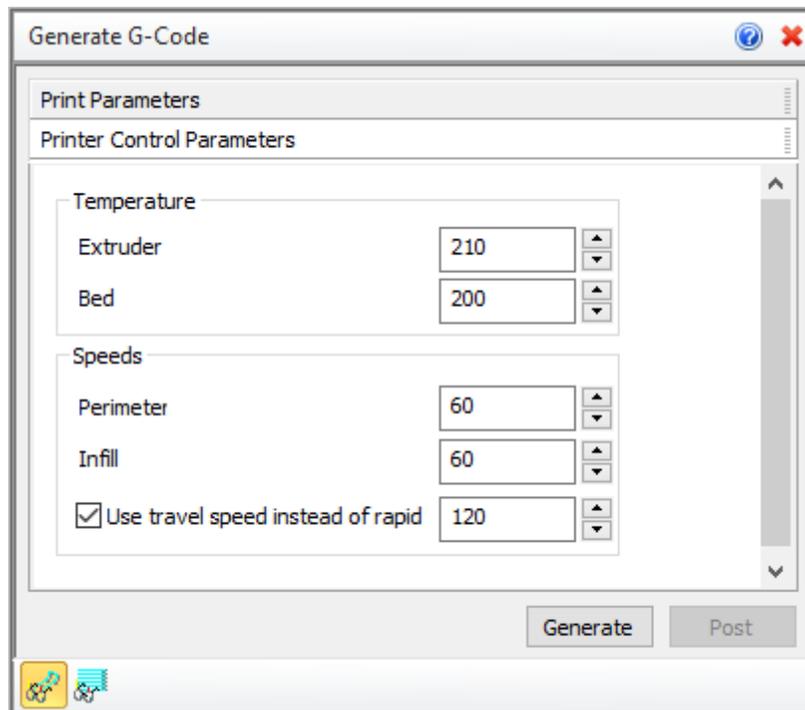
1. From the **3D Print** tab, pick [Generate G-Code](#).



2. Select both meshes (the part mesh and the support structure mesh) and then right-click or press **Enter**. The [Generate G-Code](#) dialog will display. Set your parameters to those shown in the dialog below.



3. Now select the **Printer Control Parameters** tab. Set your parameters to those shown in the dialog below.

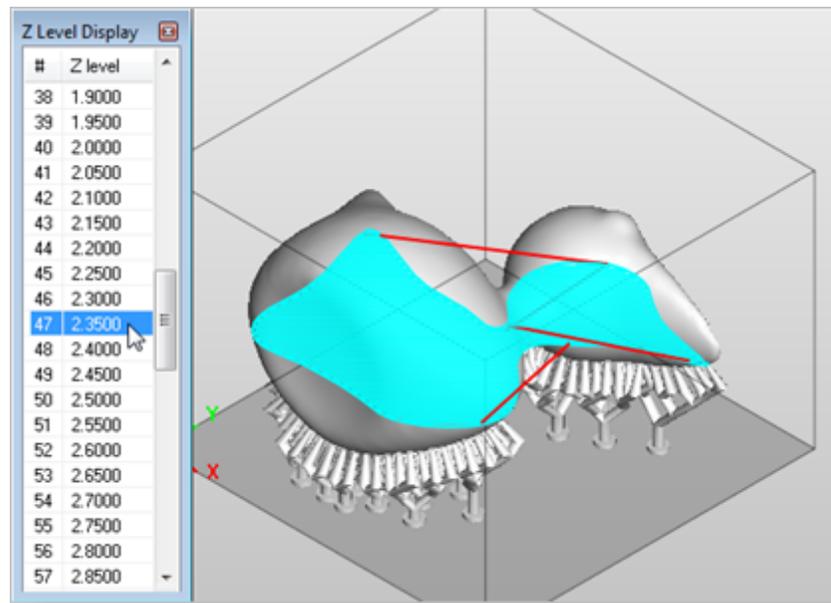


Printer Control Parameters tab

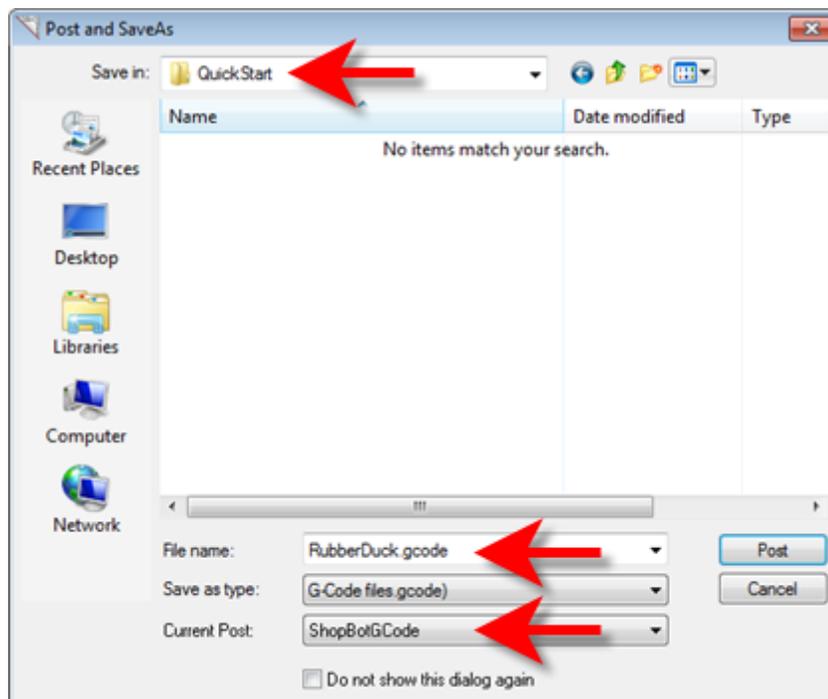
 **Check your 3D Printed before Generating G-Code:** Before generating G-Code it is always a good practice to check to make sure you have the correct **3D Printer** selected and that the **Nozzle Diameter** is set correctly to match the nozzle currently installed on your printer. See [Select Printer](#) for more information.

4. Now pick the **Generate** button. The **G-Code** is calculated and displayed on the part. Once completed you can use the following icons located at the bottom of the dialog to view your 3D Print paths and levels.

-  Toggle Path Visibility
-  Display Path Levels



5. When you are satisfied with your 3D Printer paths, select the **Post** button to create your **G-Code** file.
6. From the **Post and Save As** dialog select the following:



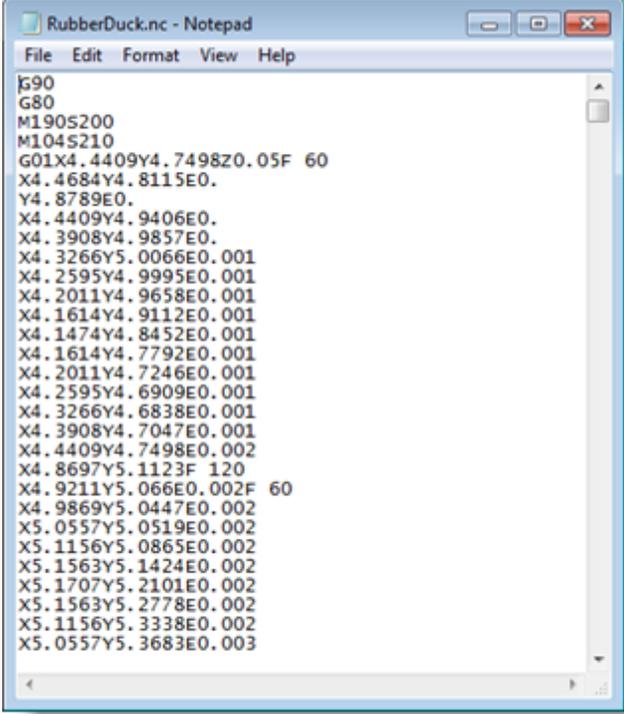
Save in: The program defaults to the same folder where your part is located.

File name: The program defaults to the name of the current file. Then enter **.nc** for the file extension for the G-Code file (ex: *RubberDuck.nc*). Note that in the future you can

change the file extension to match what your printer supports (i.e., *.txt*, *.nc*, etc.).

Current Post: Select **ShopBotGCode** for the post processor.

7. Now select **Post** to generate and save the G-Code file. It will be displayed in **Notepad**.



```
RubberDuck.nc - Notepad
File Edit Format View Help
G90
G80
M190S200
M104S210
G01X4.4409Y4.7498Z0.05F 60
X4.4684Y4.8115E0.
Y4.8789E0.
X4.4409Y4.9406E0.
X4.3908Y4.9857E0.
X4.3266Y5.0066E0.001
X4.2595Y4.9995E0.001
X4.2011Y4.9658E0.001
X4.1614Y4.9112E0.001
X4.1474Y4.8452E0.001
X4.1614Y4.7792E0.001
X4.2011Y4.7246E0.001
X4.2595Y4.6909E0.001
X4.3266Y4.6838E0.001
X4.3908Y4.7047E0.001
X4.4409Y4.7498E0.002
X4.8697Y5.1123F 120
X4.9211Y5.066E0.002F 60
X4.9869Y5.0447E0.002
X5.0557Y5.0519E0.002
X5.1156Y5.0865E0.002
X5.1563Y5.1424E0.002
X5.1707Y5.2101E0.002
X5.1563Y5.2778E0.002
X5.1156Y5.3338E0.002
X5.0557Y5.3683E0.003
```

8. If the G-Code text file does not display automatically then your **Notepad** is not recognizing the *.nc* text file extension. Select **Post** again from the **Generate G-Code** dialog to display the **Post and Save As** dialog again. Right-click on your G-Code file and select **Open**. Windows will ask you what program to use for opening *.nc* files.

This file can then be sent to your 3D Printer for printing.

This completes **Chapter 3** of the **Quick Start Guide** for **Visual3DPRINT 2017**.

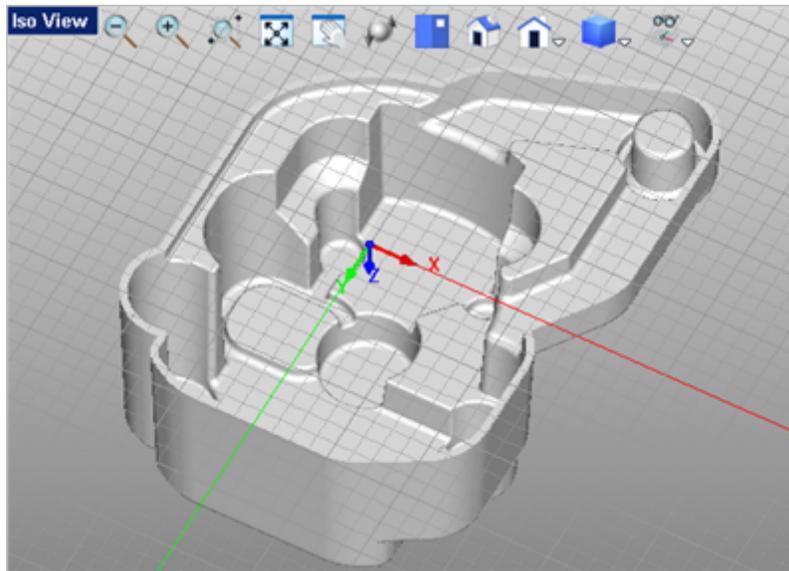
For further assistance you can visit the **Online Help** supplied with the program or visit www.mecsoft.com for additional tutorials.

Chapter 4: Offset & Split

In this chapter we will use the [Offset](#) and [Split](#) tools to create a part with a uniform wall thickness.

We will perform the following basic steps to complete this chapter:

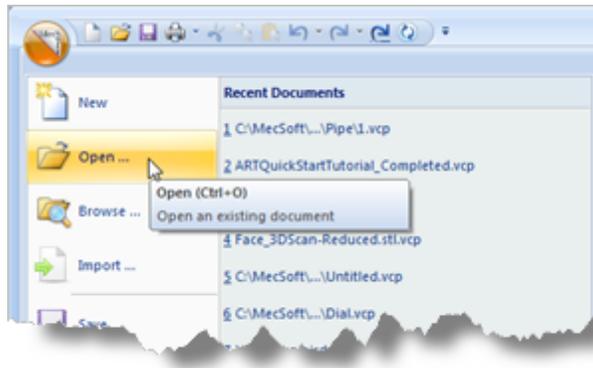
1. [Load](#) the part file.
2. [Diagnose](#) the mesh for possible problems.
3. Use [Stitch & Close](#) to combine and fix the mesh.
4. Use [Offset](#) to create a uniform wall thickness.
5. Use [Split](#) and review the final mesh.
6. Our completed part will look like this:



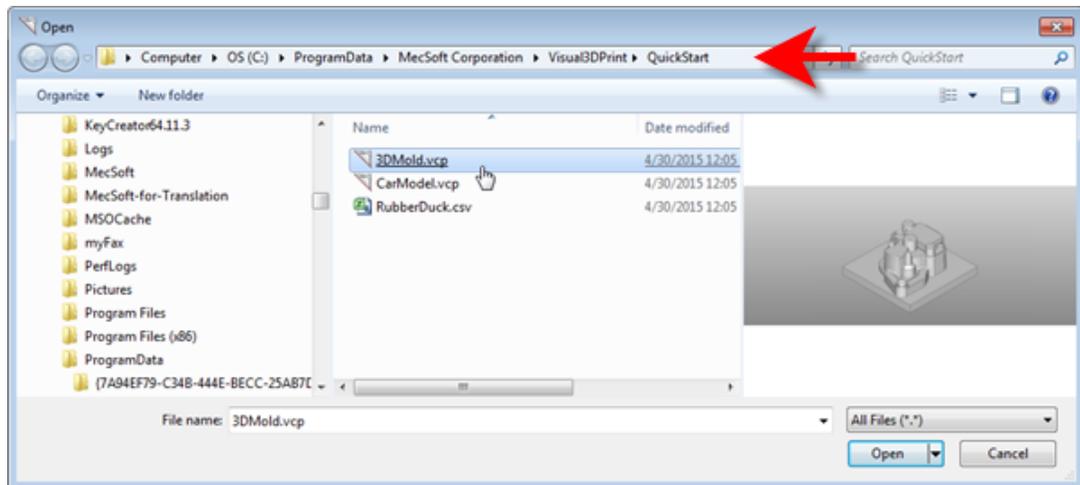
4.1 Load the Part File

Now, let's load the part file for this tutorial.

1. From the [VisualCAD](#) menu, select [Open](#).

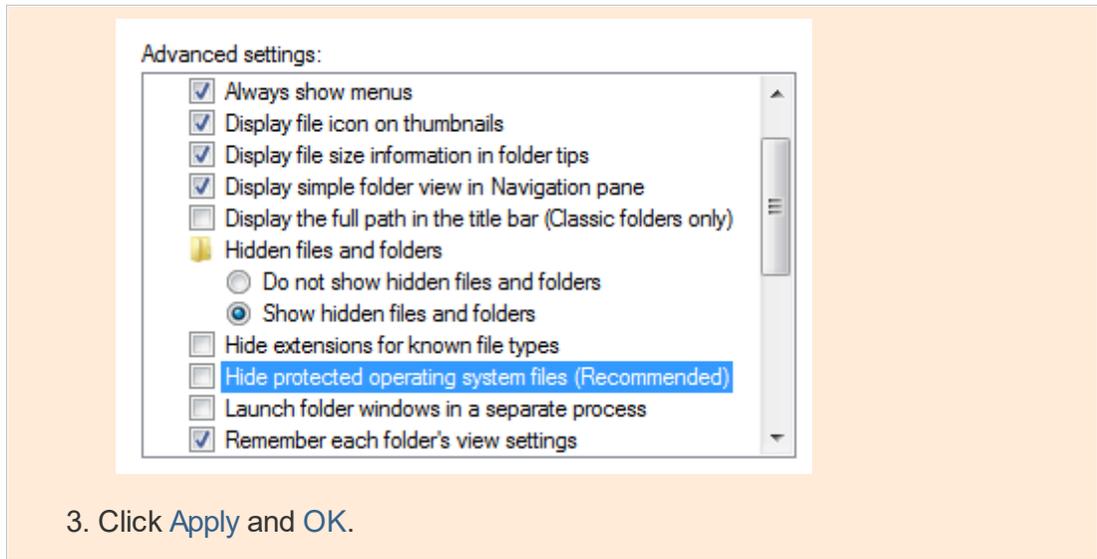


2. Find the part file named *RubberDuck.txt* located in the *QuickStart* folder and then pick *Open*.

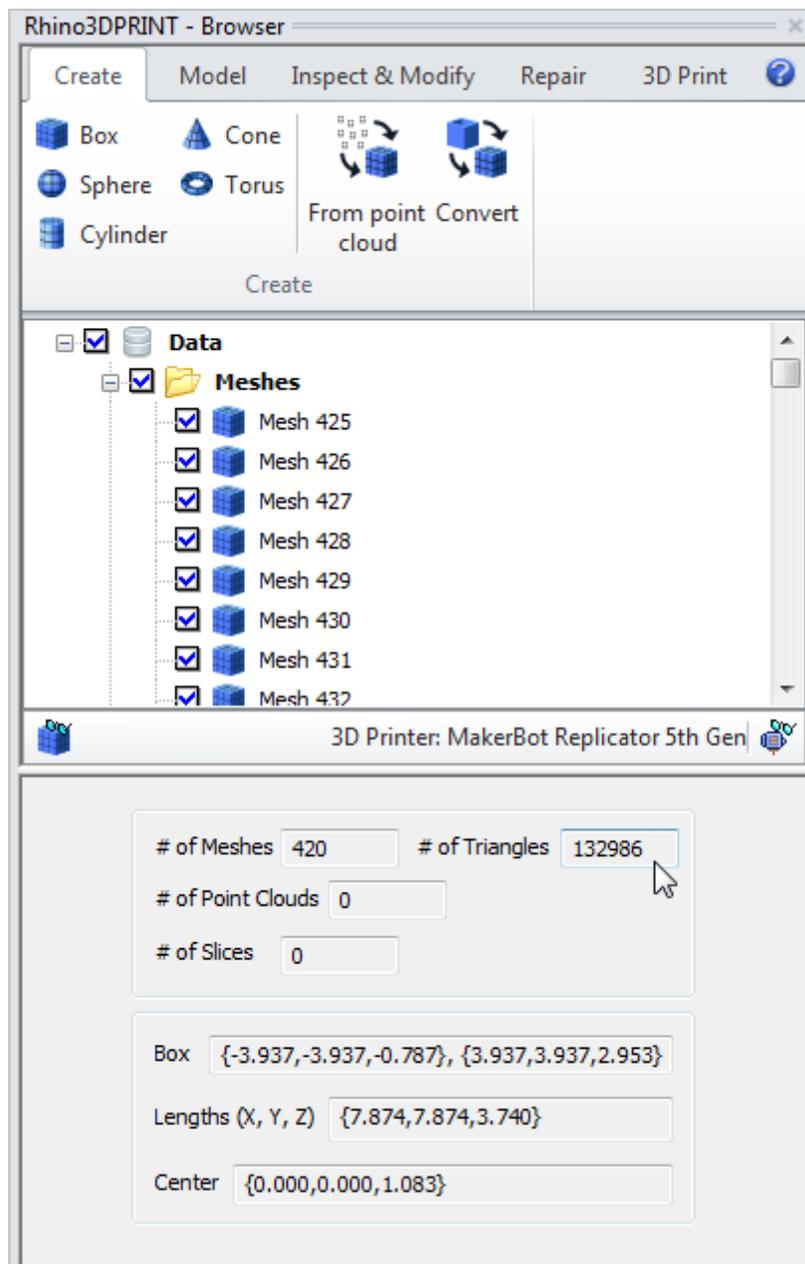


! By default, the *ProgramData* folder is "hidden" from view. Here are the steps to Show hidden files and folders:

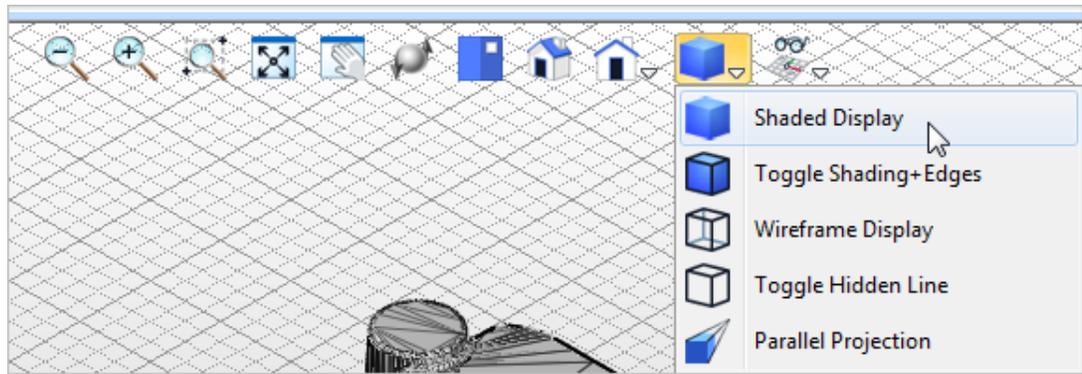
1. For *Windows 7/8* users: Go to *Control Panel > Appearance and Personalization > Folder Options* (*Windows XP* users can locate folder options under *Control Panel*).
2. Select *View* tab and under advanced settings select *Show Hidden files and folders*, clear the check boxes for:
 - *Hide extensions for known file types*
 - *Hide protected operating system files (Recommended)*



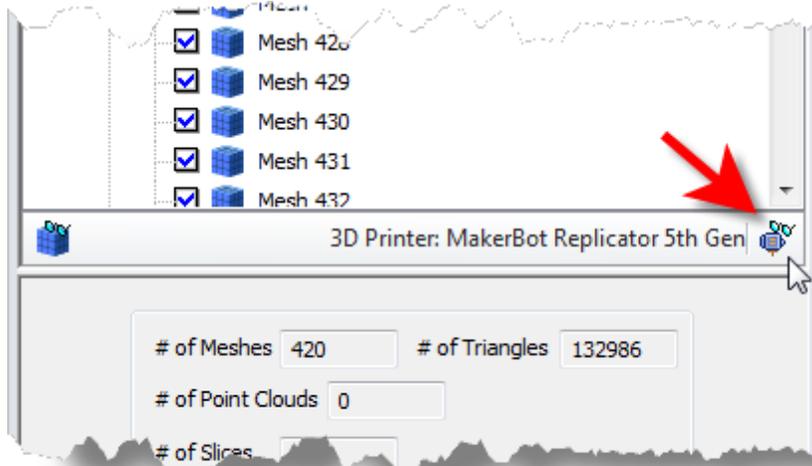
3. From the [Visual3DPRINT 2017 Browser](#) we see that this model contains over 400 individual mesh objects and over 130,000 facet triangles.



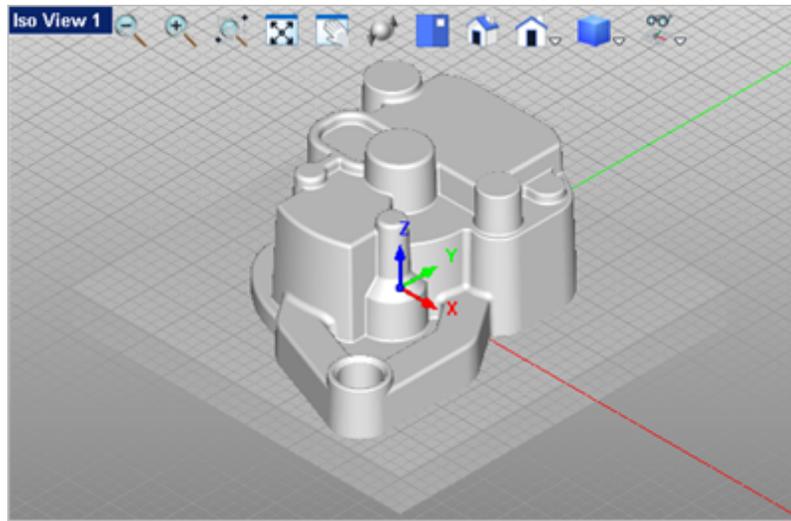
4. From the heads-up View Toolbar of Iso View 1, select Shaded Display so we can see the model more clearly.



5. From the Visual3DPRINT 2017 Browser toolbar, select the icon for Toggle Printer Volume Visibility to make sure the display of the printer volume is turned off.



Your display should now look like this:



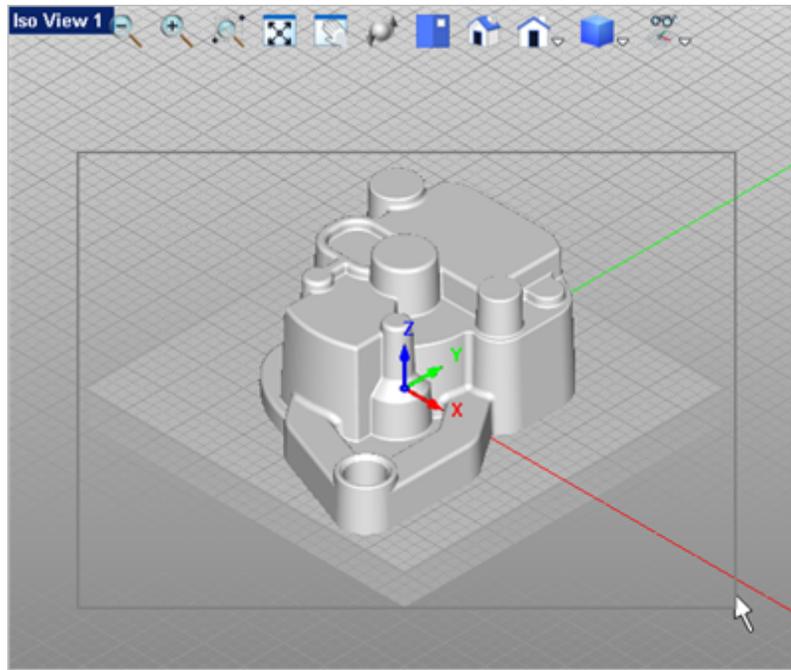
4.2 Diagnose

The first thing we want to do is perform some diagnostics.

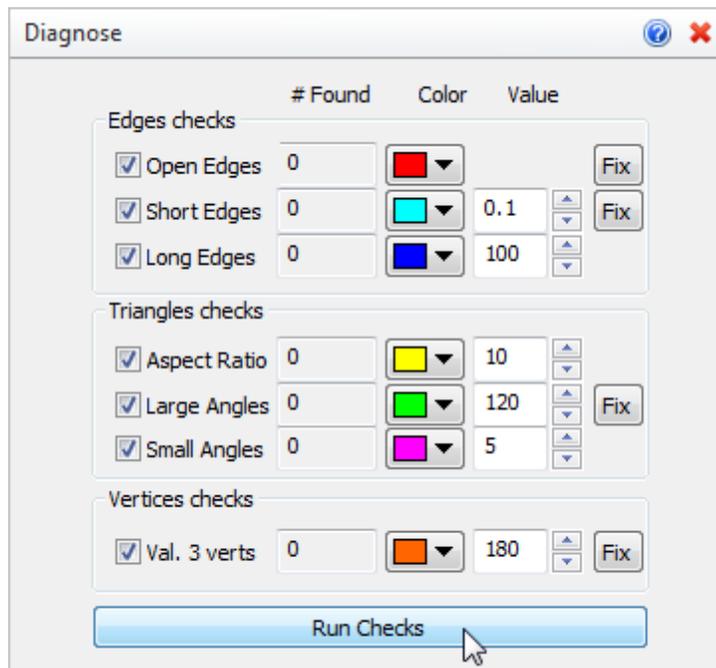
1. From [Visual3DPRINT 2017 Browser](#) select the [Repair](#) tab and then select [Diagnose](#).



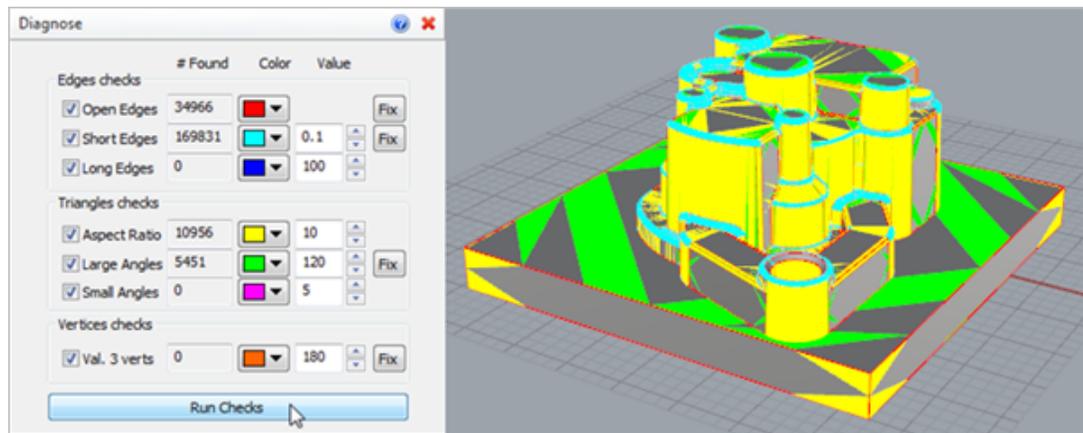
2. Now window select the entire mesh model and then Right-click or press [Enter](#).



3. The **Diagnose** dialog will appear below the **Browser**.



4. Using the default selections, pick the **Run Checks** button.
5. We see that three sets of checks are performed. These include **Edges**, **Triangles** and **Vertices**.
6. The results of each check are color coded for easy recognition on the mesh model.

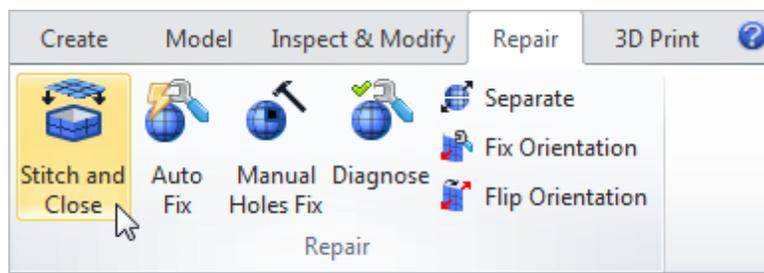


7. **Open Edges** are the most important check as these will cause the 3D print to fail. We see that **Diagnose** found over **30,000** open edges which are assigned the color **red** by default.
8. For now, we'll pick the **Cancel** icon **✖** to close the **Diagnose** dialog.

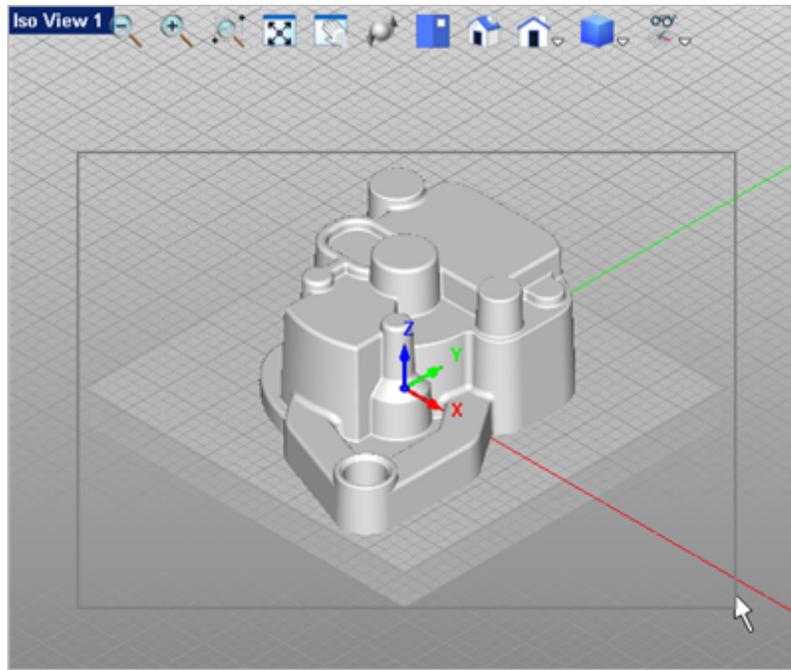
4.3 Stitch & Close

Visual3DPRINT 2017 allows you to fix the open edges automatically.

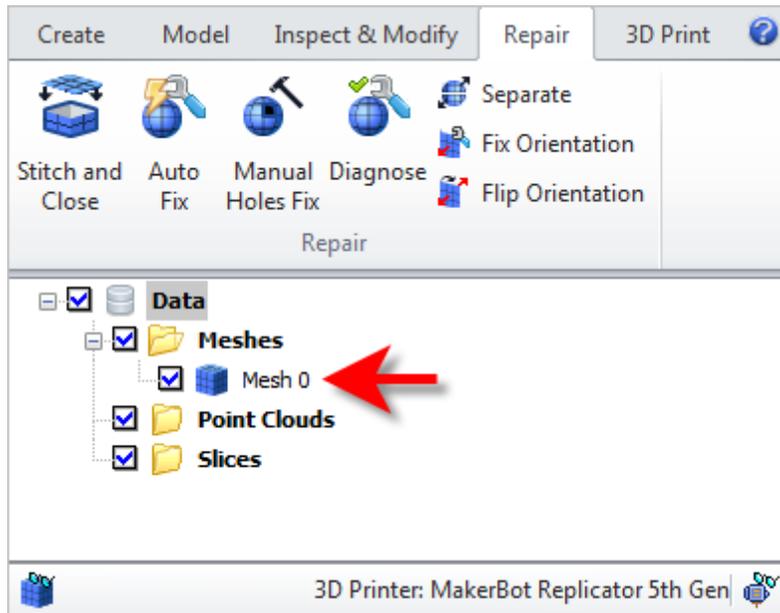
1. From **Visual3DPRINT 2017 Browser** select the **Repair** tab and then select **Stitch and Close**.



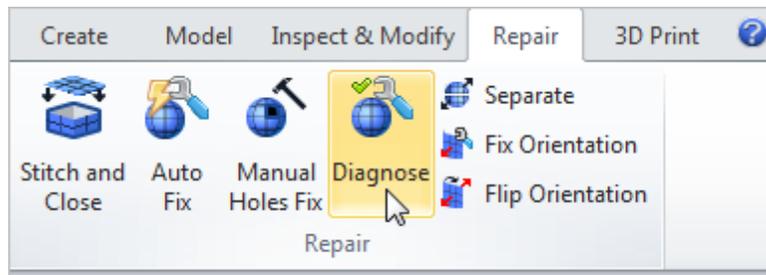
2. Now window select the entire mesh model again and, Right-click or press **Enter**. The mesh is repaired automatically.



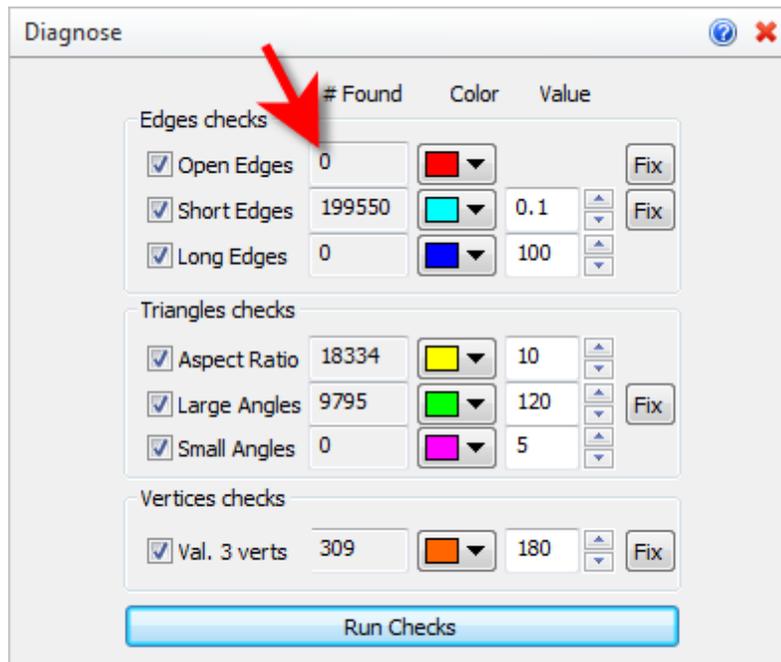
3. Notice that in the [Browser](#) there is now only one mesh in the [Data Tree](#).



4. From the [Repair](#) tab, we'll select [Diagnose](#) again. Window select the entire mesh model again, Right-click or press [Enter](#) and then pick [Run Checks](#) to see the new results.



5. We see that we now have zero open edges!!

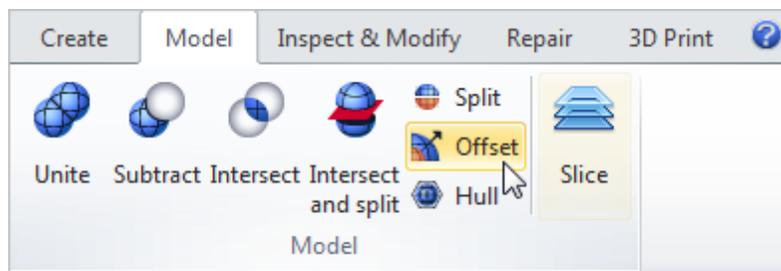


6. Pick the **Cancel** icon **×** to close the **Diagnose** dialog.

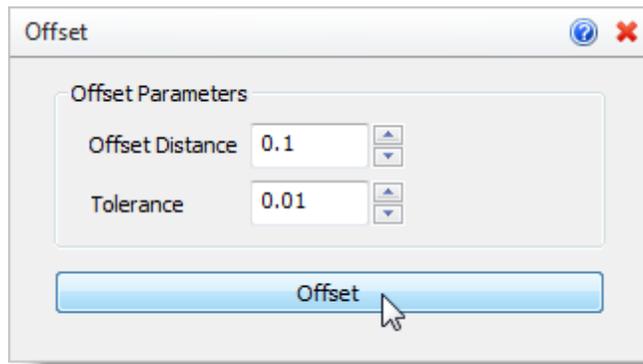
4.4 Offset

Now that we have only one mesh, let's **Offset** to create a wall thickness.

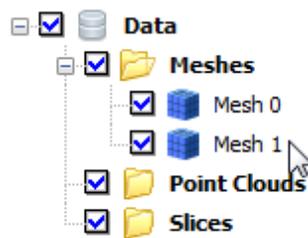
1. From the **Visual3DPRINT 2017 Browser** select the **Model** tab and then select **Offset**.



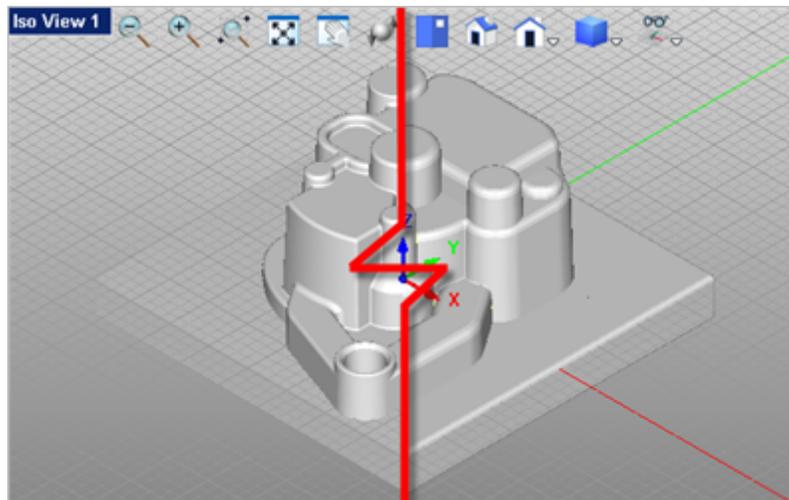
2. Select the mesh and the **Offset** dialog will display.



3. We'll set the **Offset Distance** to 0.1
4. Then we'll set the **Tolerance** to 0.01 and then pick **Offset**.
5. Now we see that a second mesh was added to the **Data Tree** that is a positive offset of the first.



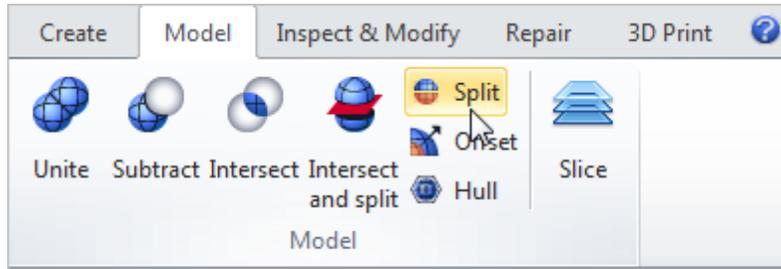
6. We can see the difference clearly on the screen by unchecking and checking each mesh individually.



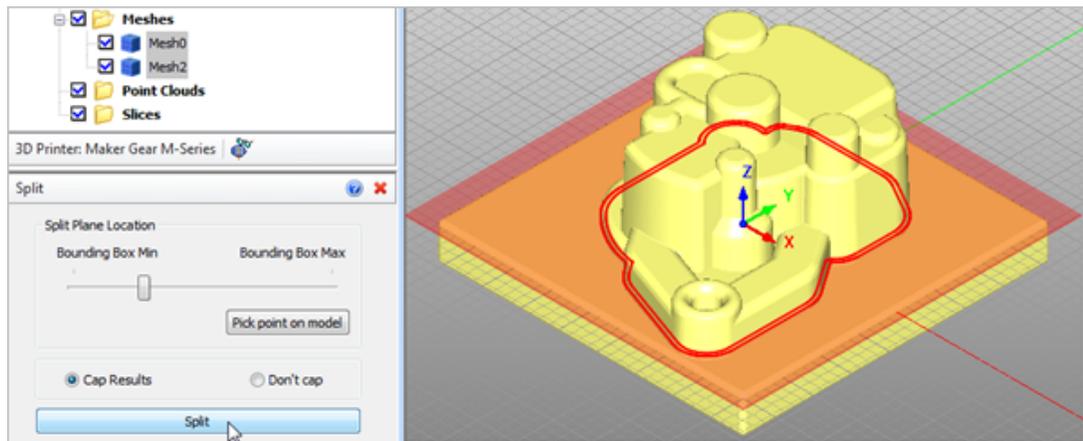
4.5 Split & Cap

Now that we have a uniform wall thickness, let's [Split](#) the mesh.

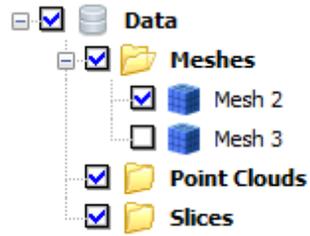
1. We'll go back to the [Model](#) tab and select [Split](#).



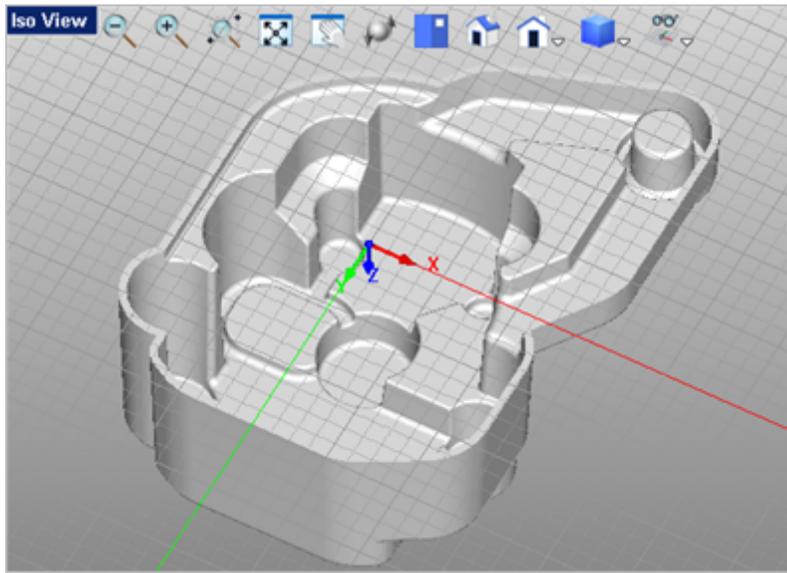
2. Window select **both meshes** or select them both from the [Visual3DPRINT 2017 Browser Data Tree](#) and then [right-click](#) or press [Enter](#) to display the [Split](#) dialog.
3. The upper portion of the dialog contains a slider that allows you to control the [Split Plane Location](#).
4. Move the [Split Plane](#), shown graphically on the screen, by adjusting the slider between the [Min](#) and [Max](#) of the mesh's [Bounding Box](#).



5. Section curves shown in **Red**, and also displayed dynamically, update as you adjust the slider. Move the slider until the section curves are located approximately as shown in the example above.
6. We are provided with a [Cap Results](#) option. Selecting this will ensure that once split, each section of the mesh will be a capped closed volume.
7. Now we pick [Split](#).
8. Once completed, we'll uncheck all but the upper mesh from the [Data Tree](#).



9. Now in **VisualCAD**, right-click in the display area, hold and drag to rotate the upper mesh so that the cavity and offset wall thickness can be clearly seen. Mesh offsets can be used in a variety of applications.



This completes [Chapter 4](#) of the [Quick Start Guide](#) for **Visual3DPRINT 2017**.

For further assistance you can visit the [Online Help](#) supplied with the program or visit www.mecsoft.com for additional tutorials.

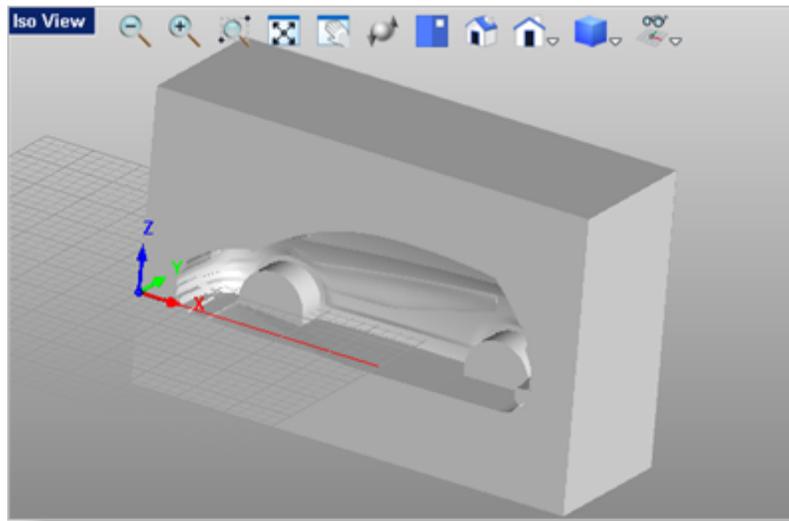
Chapter 5: Cavity Block

In this chapter we'll be working with an STL file to create a core and cavity block.

We will perform the following basic steps to complete this chapter:

1. [Open](#) the [STL](#) part file.
2. [Diagnose](#) the mesh for possible problems.
3. Use [Stitch & Close](#) to combine and fix the mesh.
4. Use [Reduce](#) to simplify the mesh.
5. Create a [Box](#) for the core and cavity.
6. [Subtract](#) the original mesh from the cavity block.

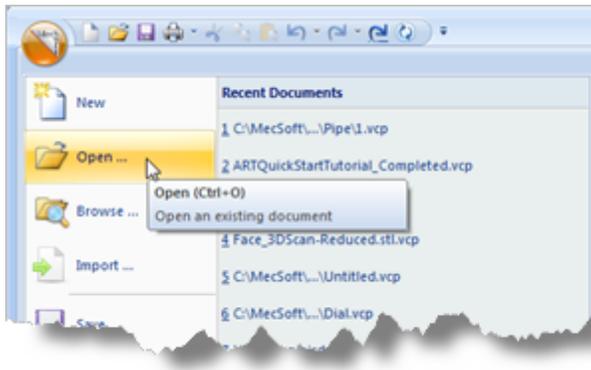
Our completed part will look like this:



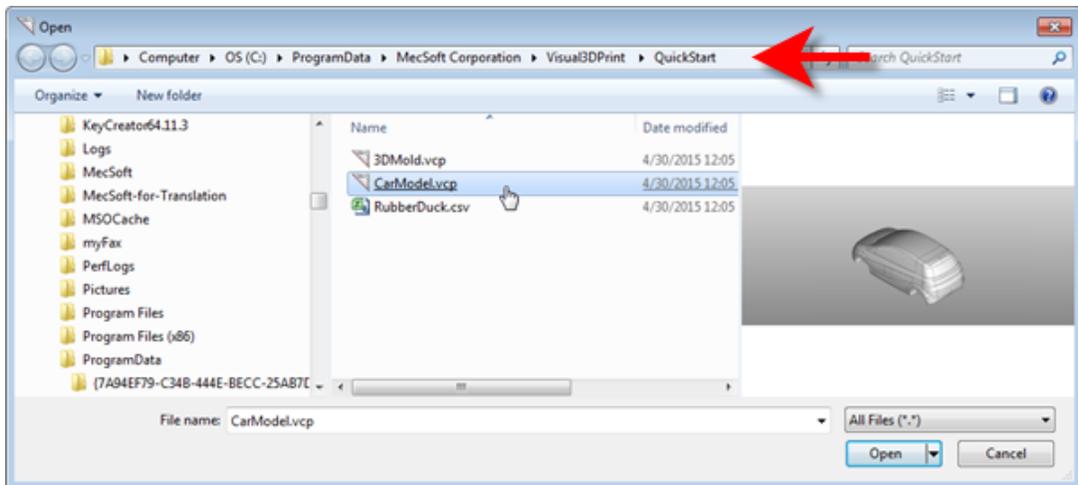
5.1 Load the Part File

Now, let's load the part file for this tutorial.

1. From the [VisualCAD](#) menu, select [Open](#).

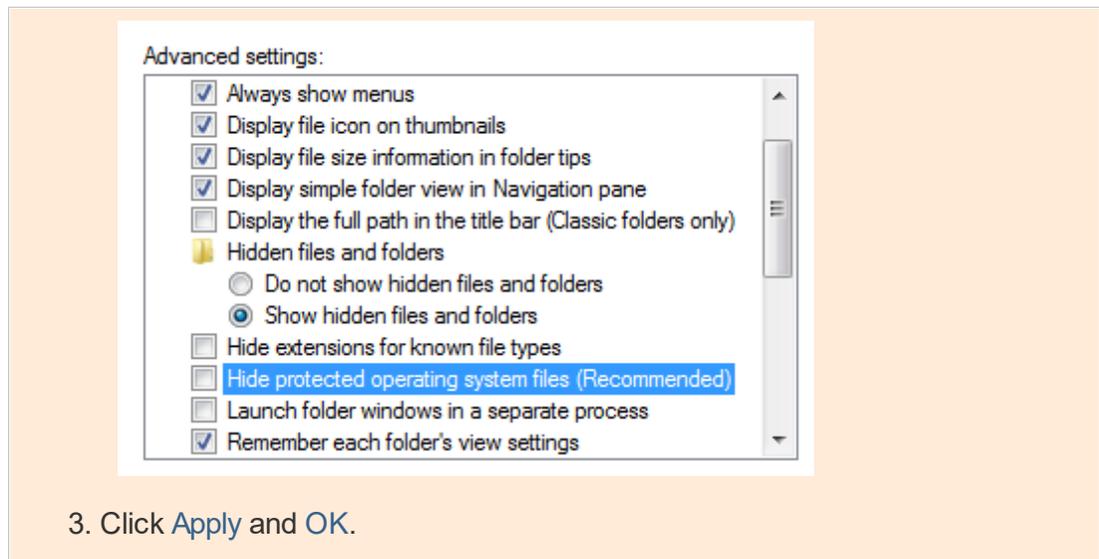


2. Find the part file named *CarModel.stl* located in the *QuickStart* folder and then pick *Open*.



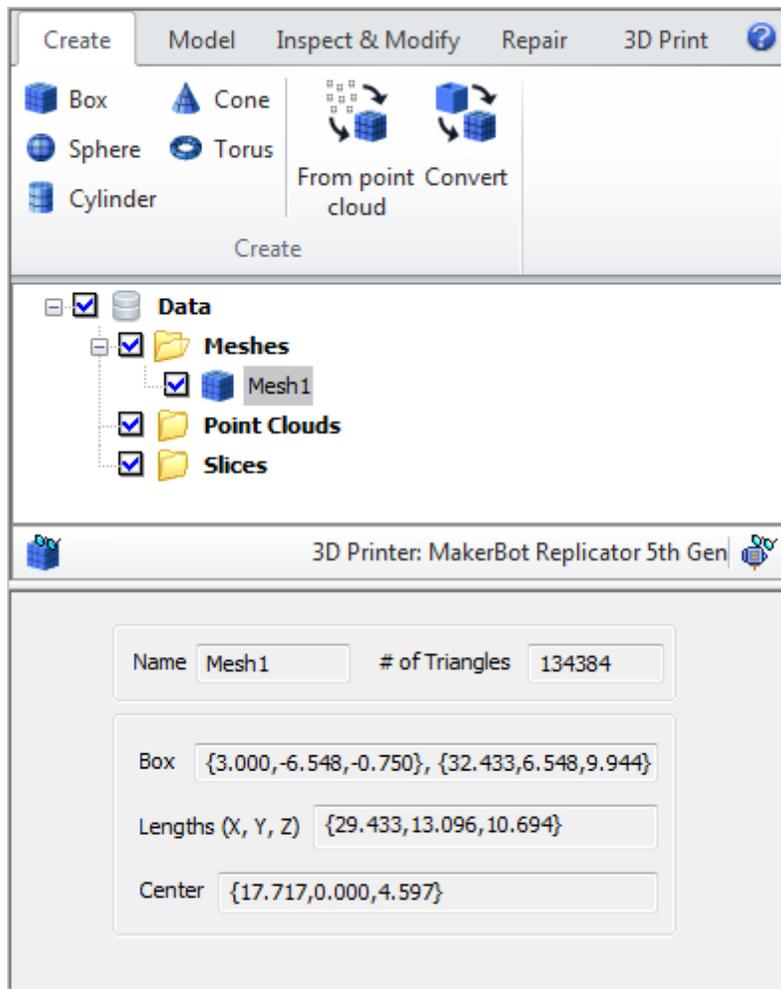
! By default, the *ProgramData* folder is "hidden" from view. Here are the steps to Show hidden files and folders:

1. For *Windows 7/8* users: Go to *Control Panel > Appearance and Personalization > Folder Options* (*Windows XP* users can locate folder options under *Control Panel*).
2. Select *View* tab and under advanced settings select *Show Hidden files and folders*, clear the check boxes for:
 - *Hide extensions for known file types*
 - *Hide protected operating system files (Recommended)*

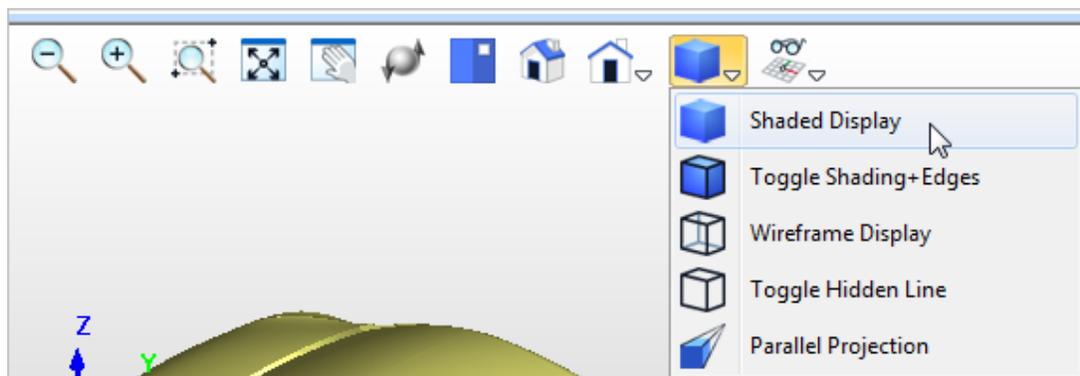


3. Click [Apply](#) and [OK](#).

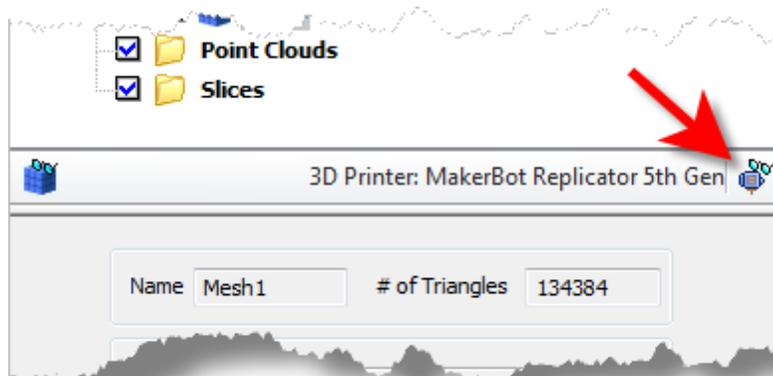
3. From the [Visual3DPRINT 2017 Browser](#) we see that this model contains over 300 individual mesh objects and over 130,000 facet triangles.



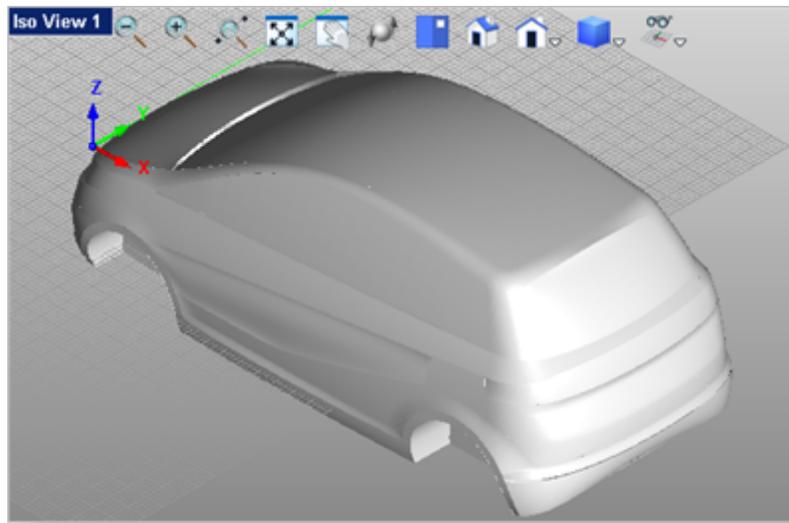
4. From the heads-up View Toolbar of Iso View 1, select Shaded Display so we can see the model more clearly.



5. From the Visual3DPRINT 2017 Browser toolbar, select the icon for Toggle Printer Volume Visibility to make sure the display of the printer volume is turned off.



Your display should now look like this:



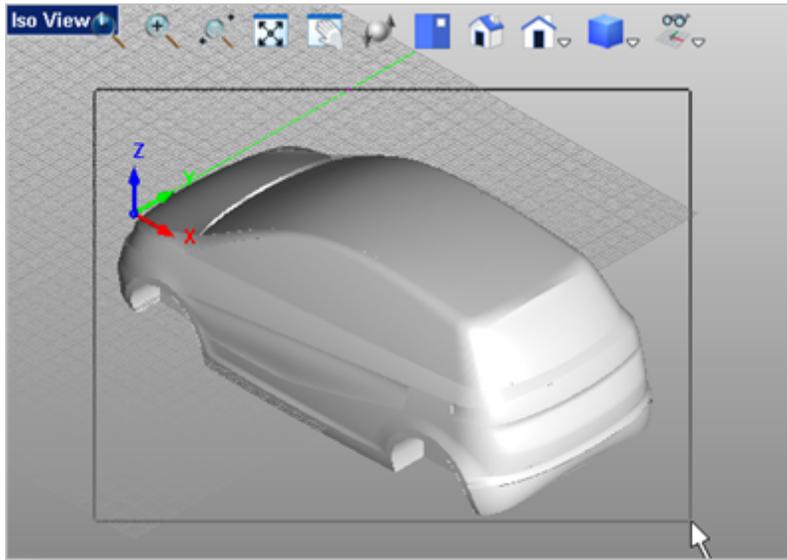
5.2 Diagnose

The first thing we want to do is perform some diagnostics.

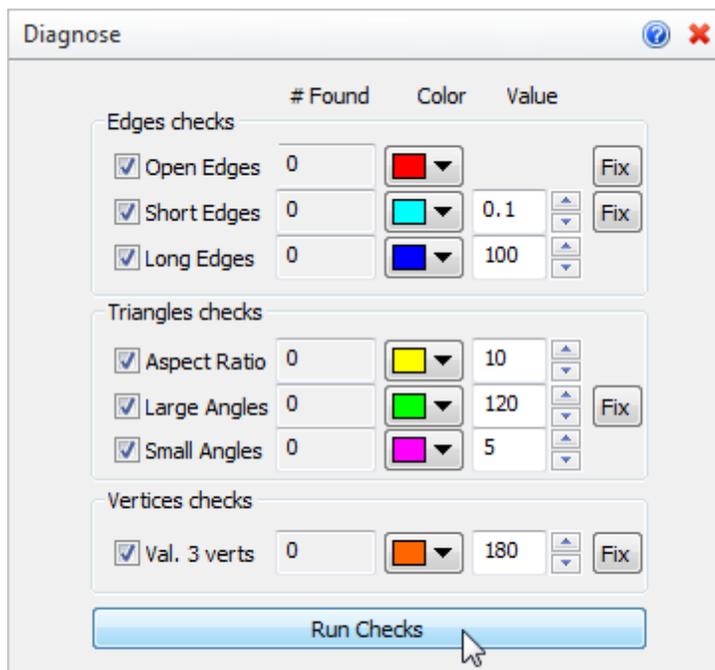
1. From *Visual3DPRINT 2017 Browser* select the **Repair** tab and then select **Diagnose**.



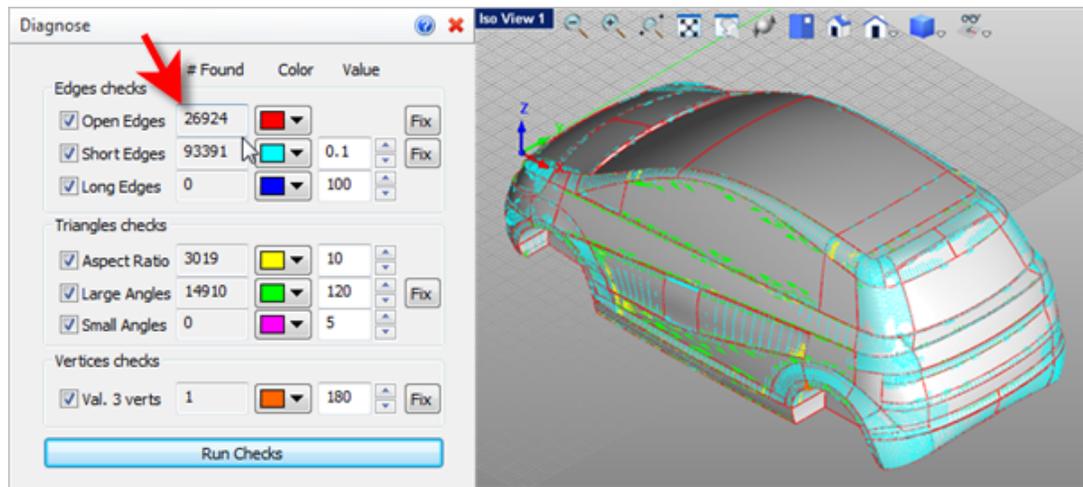
2. Now window select the entire mesh model and **Right-click** or press **Enter**.



3. The **Diagnose** dialog will appear below the **Browser**.



4. Using the default selections, pick the **Run Checks** button.
5. We see that three sets of checks are performed. These include **Edges**, **Triangles** and **Vertices**.
6. The results of each check are color coded for easy recognition on the mesh model.

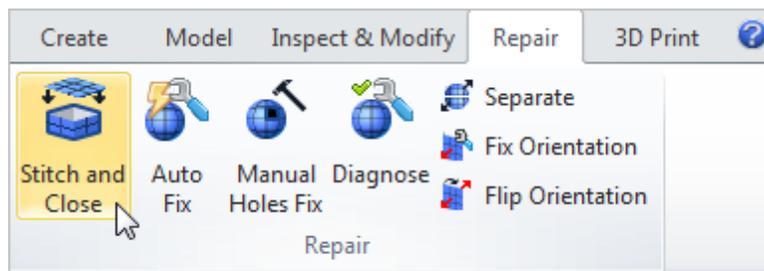


7. For example, **Diagnose** found over 25,000 open edges which are assigned the color red by default.
8. For now, we'll pick the **Cancel** icon **✖** to close the **Diagnose** dialog.

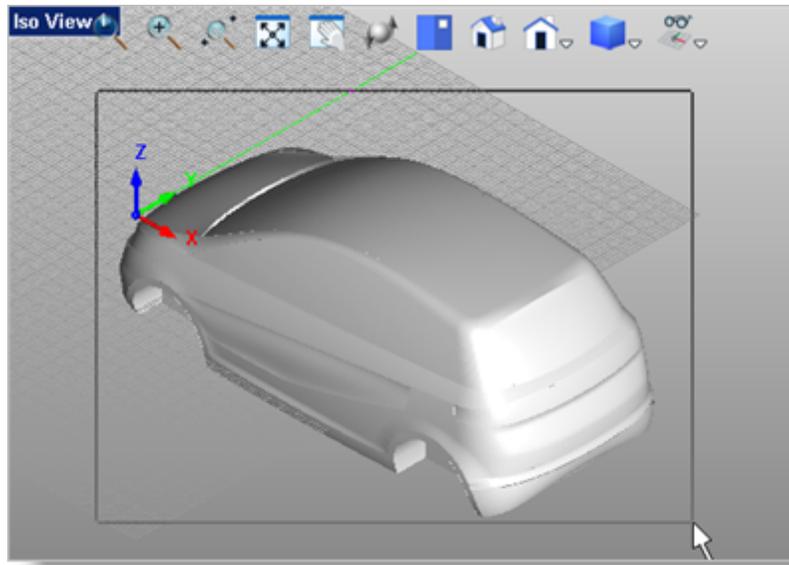
5.3 Stitch & Close

Visual3DPRINT 2017 allows you to fix the open edges automatically.

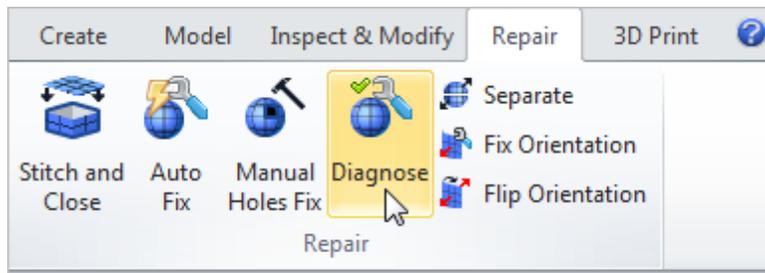
1. From **Visual3DPRINT 2017 Browser** select the **Repair** tab and then select **Stitch and Close**.



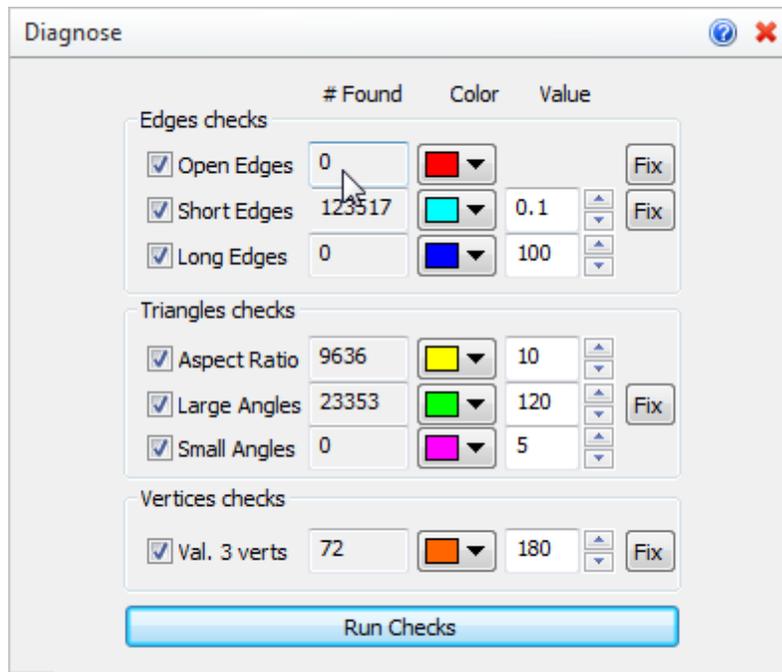
2. Now window select the entire mesh model again and **Right-click** or press **Enter**. The mesh is repaired automatically.



3. Now from [Visual3DPRINT 2017 Browser](#) select the [Repair](#) tab and then select [Diagnose](#) again.



4. Window select the entire mesh model and then Right-click or press [Enter](#).
5. We see that we now have zero open edges!!

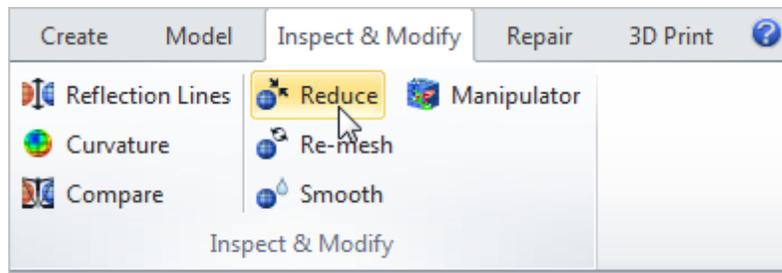


6. Pick the **Cancel** icon **✖** to close the **Diagnose** dialog.

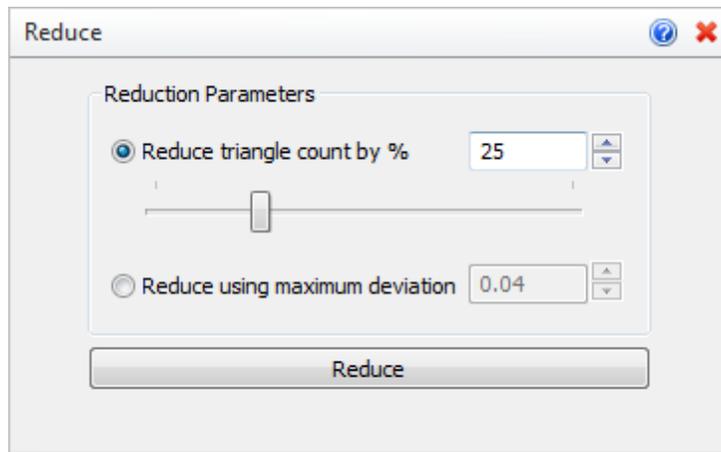
5.4 Reduce

Now that the mesh is fixed, let's simplify it some before moving on.

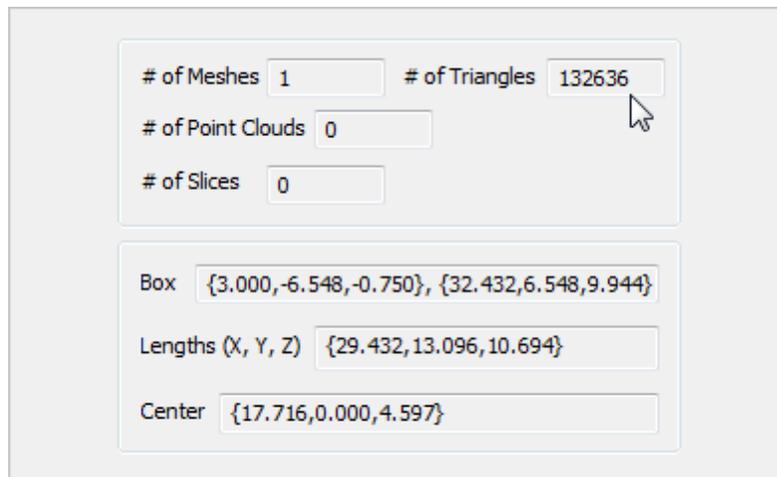
1. From **Visual3DPRINT 2017 Browser** select the **Inspect & Modify** tab and then select **Reduce**.



2. Select the mesh and then press **Enter** to display the **Reduce** dialog.



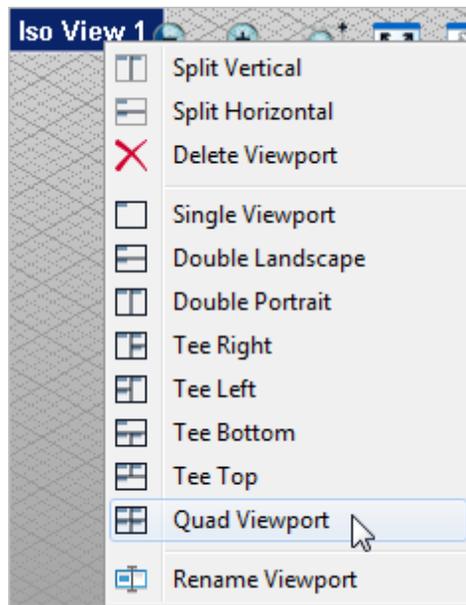
3. We'll adjust the slider to reduce the mesh by a percentage of the total facet triangle count. In this case we'll set it to 25% and then pick [Reduce](#).
4. With the mesh selected in the [Visual3DPRINT 2017 Browser](#) we now see that the total number of facet triangles is reduced.



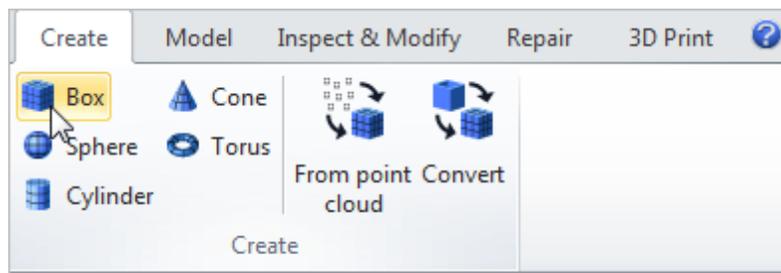
5.5 Create a Box

Next we'll create our cavity block by.

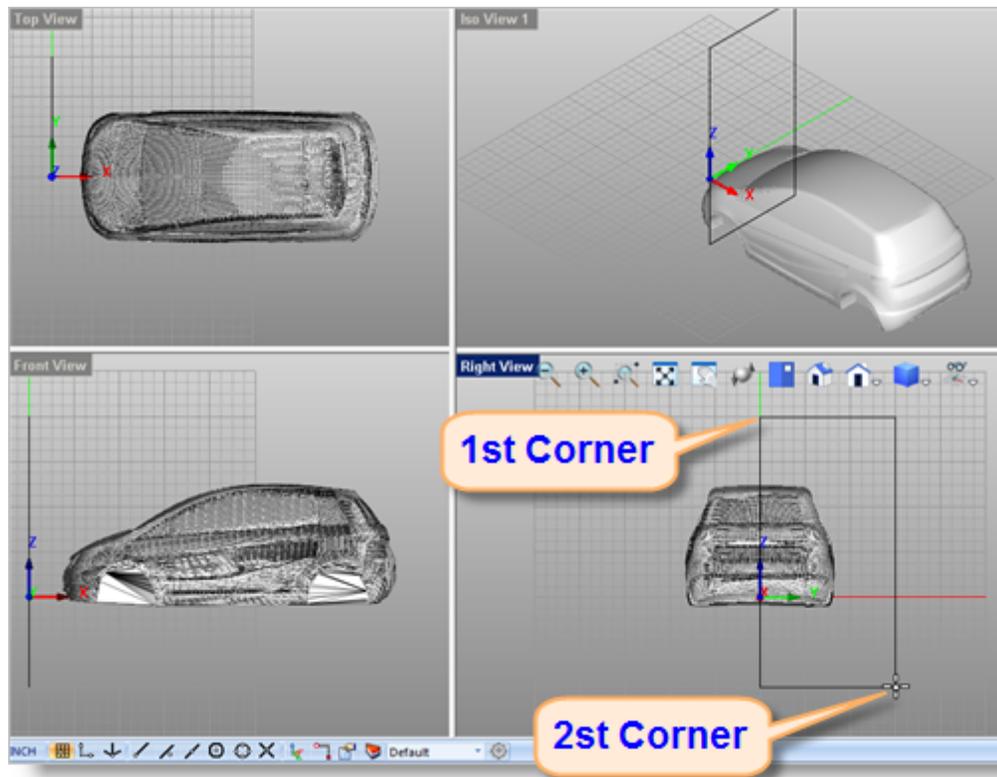
1. In [VisualCAD](#), right-click on [Iso View 1](#) and select the [Quad Viewport](#) option.



2. Then from the [Create](#) tab of the [Visual3DPRINT 2017 Browser](#), we select [Box](#).

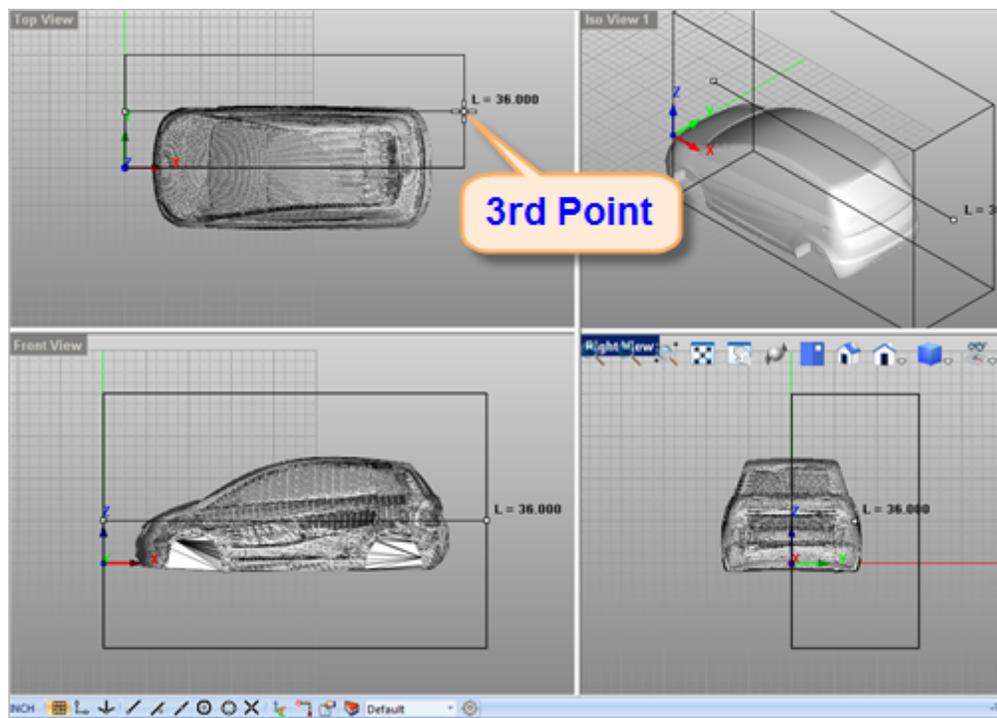


3. We want to pick two diagonal points to define the base of the box.
4. First, from [VisualCAD Status Toolbar](#), select [Grid Snap](#)  and then activate the [Right](#) view to work in.
5. For the first corner of the base, we select a grid point that is above and on the centerline of the mesh.

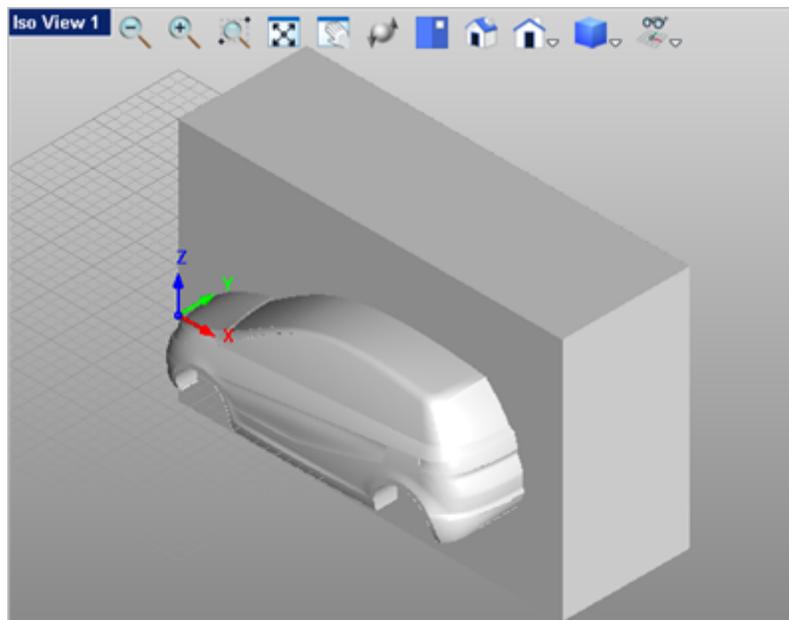


6. For the second corner of the base, we select a grid point that is below and to the right of the mesh, making sure that half of the mesh is completely enclosed by the base of the box.
7. Now a third point is needed to define the height of the box.

For this we switch to the **Top** view and select a grid point that is behind and to the right of the mesh, again making sure that half of the mesh is completely enclosed by the height of the box.



8. Now we activate the **Perspective** view to see the box clearly.

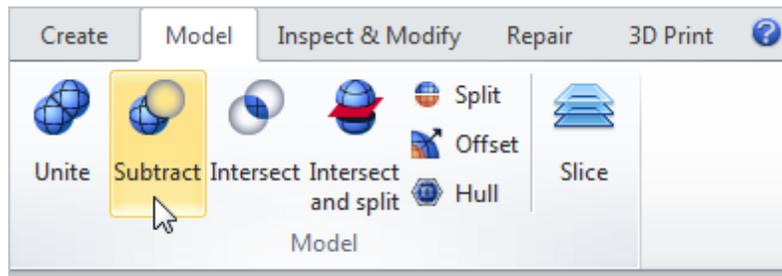


5.6 Subtract

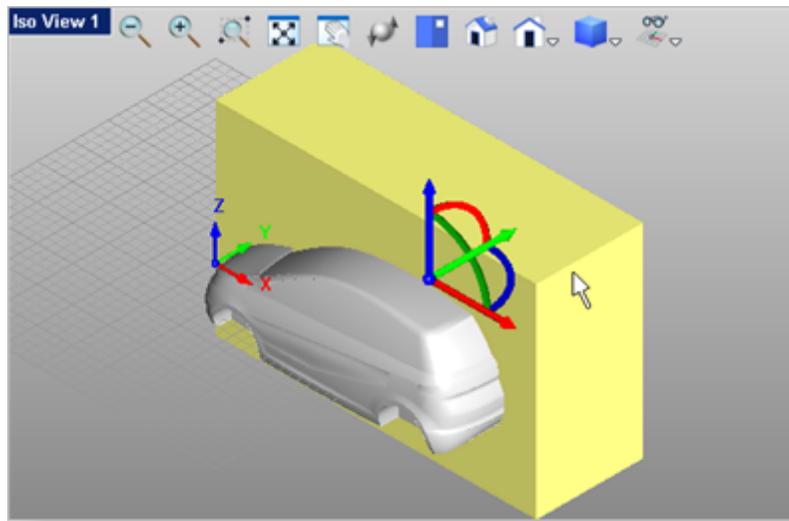
To create our cavity block, we will subtract the mesh from the box we just created.

1. In the **Visual3DPRINT 2017 Browser**, we'll switch to the **Model** tab and then pick

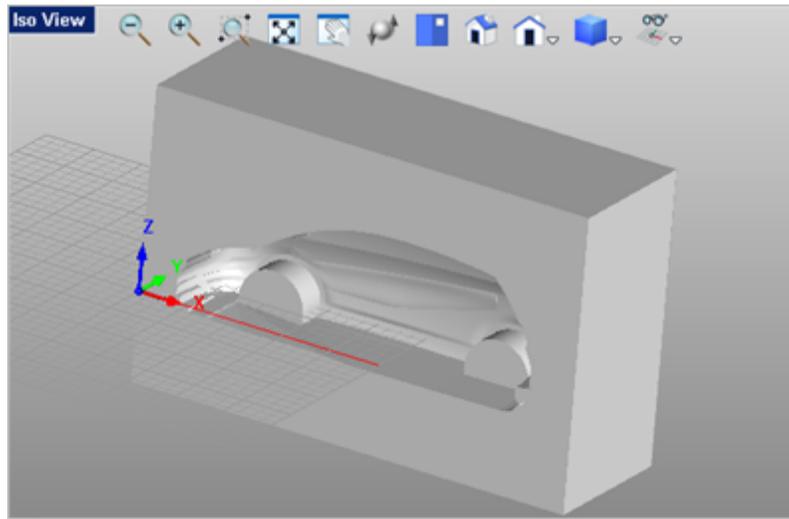
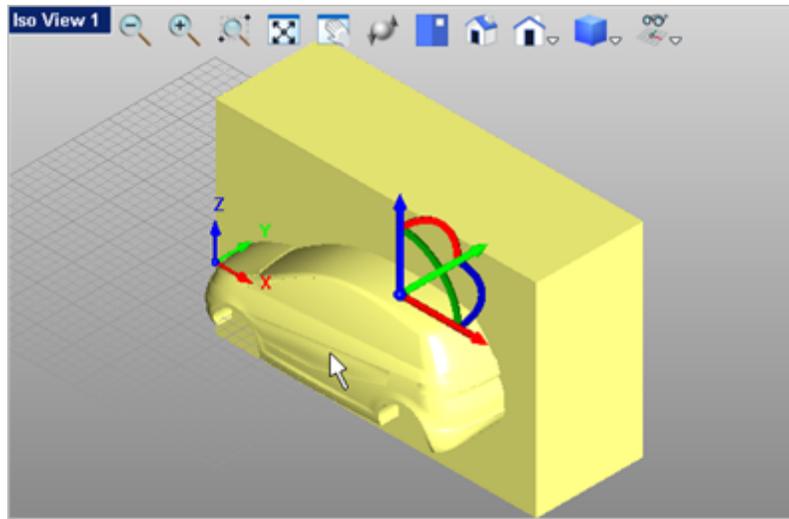
Subtract.



2. The command prompt says "Select mesh set to subtract from:" For this we select the box and then press **Enter**.



3. Now the prompt says "Select mesh set to subtract:" For this we select the mesh and then press **Enter** to see the results.



This completes Chapter 5 of the Quick Start Guide for Visual3DPRINT 2017.

For further assistance you can visit the [Online Help](#) supplied with the program or visit www.mecsoft.com for additional tutorials.

Where to go for more help

We have come to the end of the [Quick Start Guide](#) of the [Visual3DPRINT 2017](#) module. This tutorial is just the tip of the proverbial iceberg of the various functions and controls available in the [Visual3DPRINT 2017](#) module. Please explore the product in more depth to get a feel for how these functions and controls operate.

If you need additional help please use the following resources:

- The on-line help distributed with the product is a great resource to find reference information on the various functions available.
- Apart from the on-line help system you can download other tutorials and projects from [MecSoft Corporation's](#) web site at www.mecsoft.com.
- If you need additional help, or if you have any questions regarding [Visual3DPRINT 2017](#), you may contact us via e-mail at support@mecsoft.com
- MecSoft offers Online training as well as personalized full day training sessions. Please look up our website or email us at sales@mecsoft.com for further details
- Please do continue to visit our home page to learn about the latest updates to [Visual3DPRINT 2017](#) and any other help material.

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