

MESH

Quick Start Guide

VisualCAD/CAM 2023

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MecSoft Corporation

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Quick Start

VisualCAD/CAM 2024



[Prefer Printed Documentation? Click Here!](#)

Quick Start Guides for each VisualCAD/CAM module are available in both PDF and Video format. Refer to the following information to access these resources:



What's New!

[What's New in VisualCAD/CAM 2024](#)

[Watch the What's New in 2024 Webinar!](#)



The Complete Quick Start Video Play List

[Here is a link to the complete 2024 Video Play List](#)



How to Access the Quick Start Guide Documents

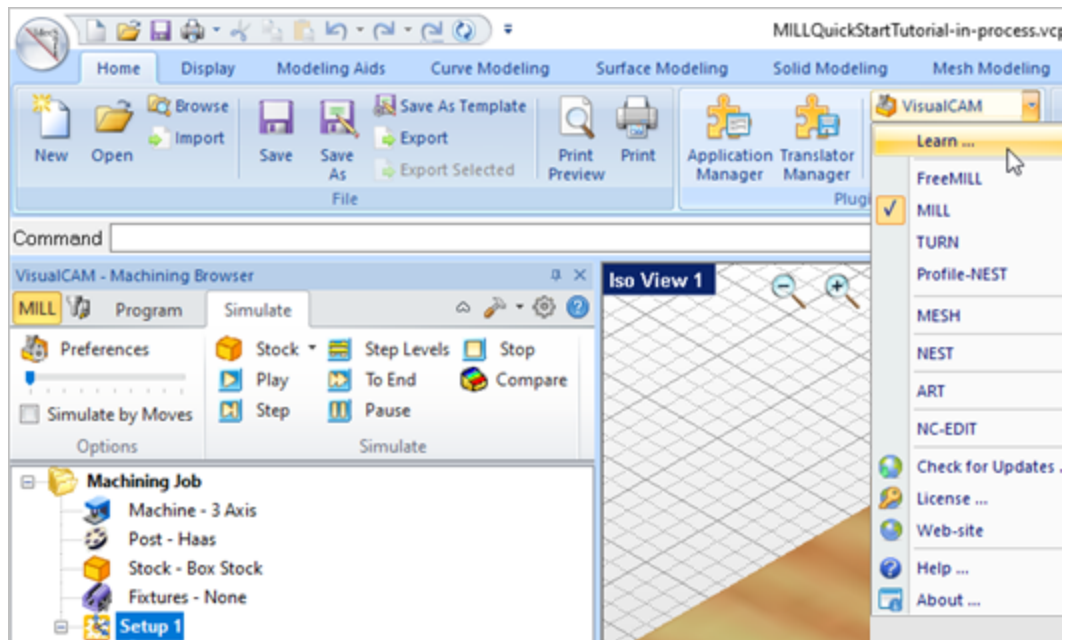
To help you quickly get started in working with each module, select one of the Help buttons located on the [VisualCAD/CAM Learning Resources](#) dialog.

You will find:

- Quick Start Guides
- What's New documents
- Online Help links


The [Quick Start Guides](#) will help you step through an example tutorial which will illustrate how to use the module. To access the [Learning Resources](#) dialog:

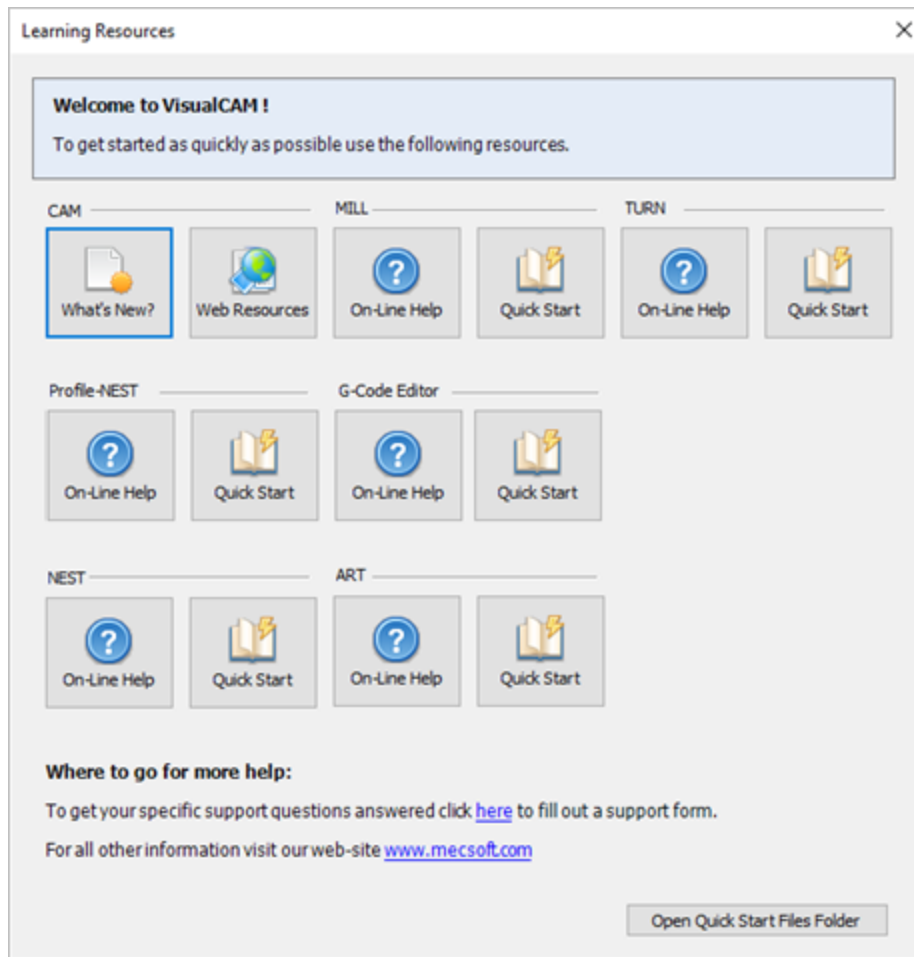
1. From the [VisualCAD Home Ribbon Bar](#), drop down the Main menu and select [Learn ...](#)



To access the Learning Resources dialog in VisualCAM

2. Select a document from the [Learning Resources](#) dialog to get started using the module of your choice.

 You can also select the [Open Quick Start Files Folder](#) button located at the bottom of the dialog to open the [Quick Start](#) folder where the source files (start and completed versions) are located.



Learning Resources Dialog

Resource Guide

Download this PDF Guide for a list of the available [VisualCAD/CAM Resources](#).



2024 VisualCAD/CAM Resource Guide



The 2024 VisualCAD/CAM Resource Guide!

18 Pages

Lists PDF downloads and Online resources including [Quick Start Guides](#), [Reference Guides](#), [Exercise Guides](#), [Tutorials](#) and More.

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About this Guide

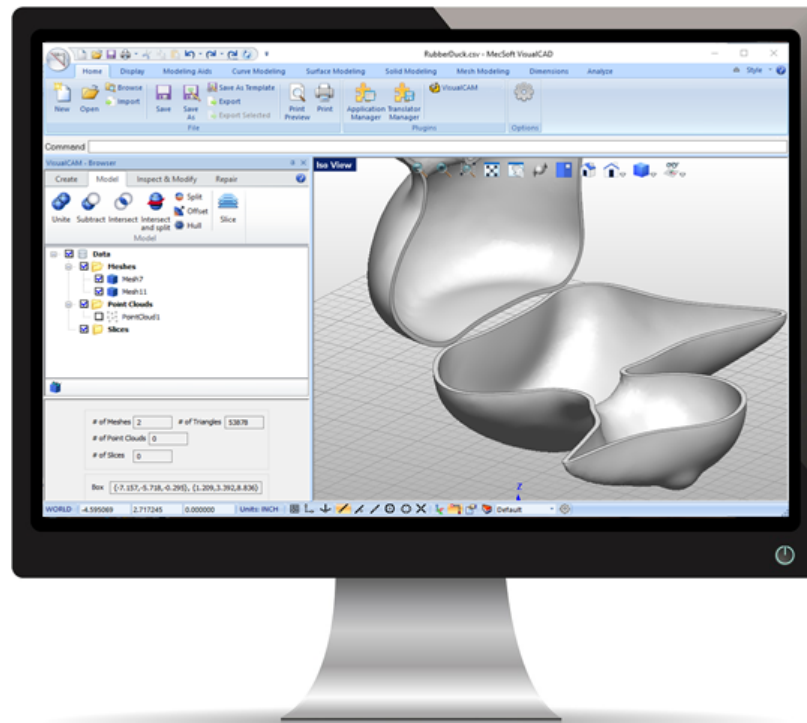
3.1 Useful Tips

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 email and we can help you out.
4. Most of all have fun!

3.2 About the MESH Module

[VisualCAD/CAM](#) is a product from [MecSoft Corporation](#) that runs as a plug-in inside of the [VisualCAD](#) modeling system. This product offers efficient, easy and automatic tools for creating, analyzing and repairing large 3D mesh data sets such as point clouds and other faceted mesh files.

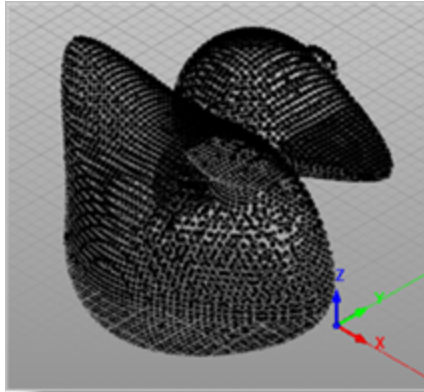


3.3 Using this Guide

This guide will show you how to use [VisualCAD/CAM](#) to create and modify mesh geometry. You will learn how to analyze, repair and modify 3D mesh models. You will learn how to use point

cloud data to create and refine a mesh model. You will also learn how to offset, split and cap a mesh to create a uniform wall thickness.

This guide one two associated files that you can find located in the [QuickStart](#) folder under the installation folder of [VisualCAD/CAM](#).



Point Clouds (File: RubberDuck.csv)

3.4 Watch the Video!

Want to see a video demonstration of this quick start guide? Just click on the play list below and watch the MESH Quick Start Guide video.

[Here is a link to the complete 2023 Video Play List](#)

Getting Ready

4.1 Running VisualCAD/CAM

Locate the [VisualCAD/CAM 2023](#) shortcut on your desktop and double click to launch the application.

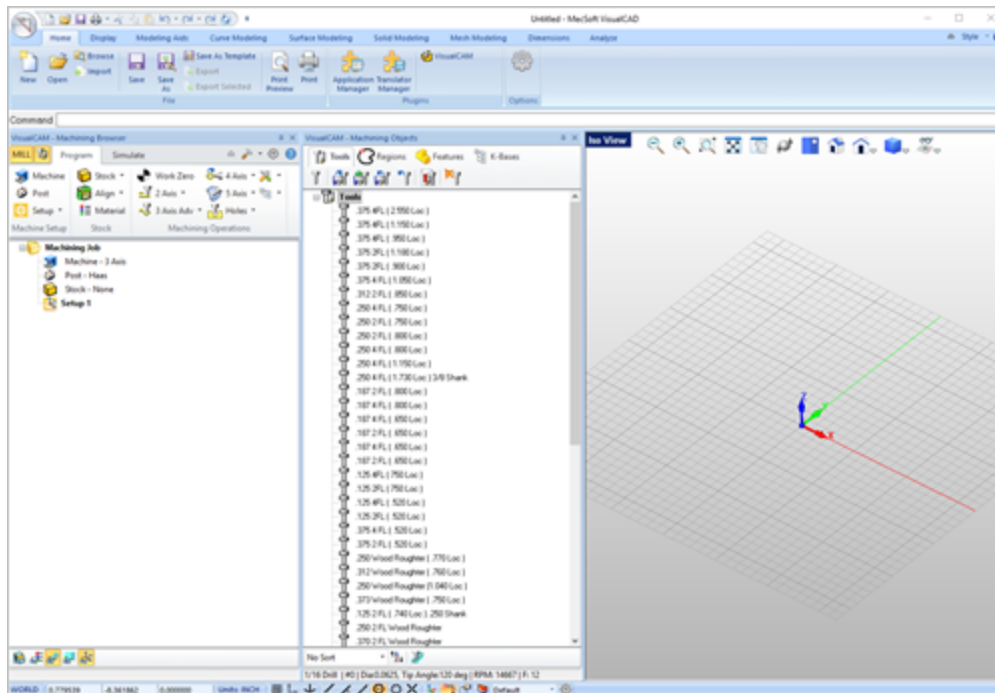
Alternatively you can also click on the Windows [Start](#) button and select [All Programs](#). Go to the program group containing [VisualCAD/CAM 2023](#). (The name of this program group will usually be called [VisualCAD/CAM 2023](#), unless you specified otherwise during setup.)

Once you locate the program group, select it and then select [VisualCAD/CAM 2023](#) to launch the application.

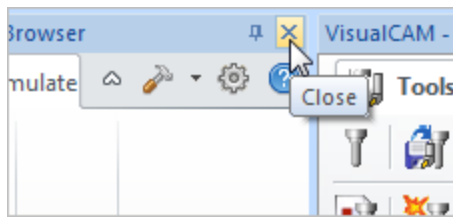
If the installation was successful, upon launching of [VisualCAD/CAM 2023](#) you should observe a menu entry called [VisualCAM 2023](#) on the [Home Ribbon Bar](#) menu of [VisualCAD](#).

4.2 About the VisualCAM Display

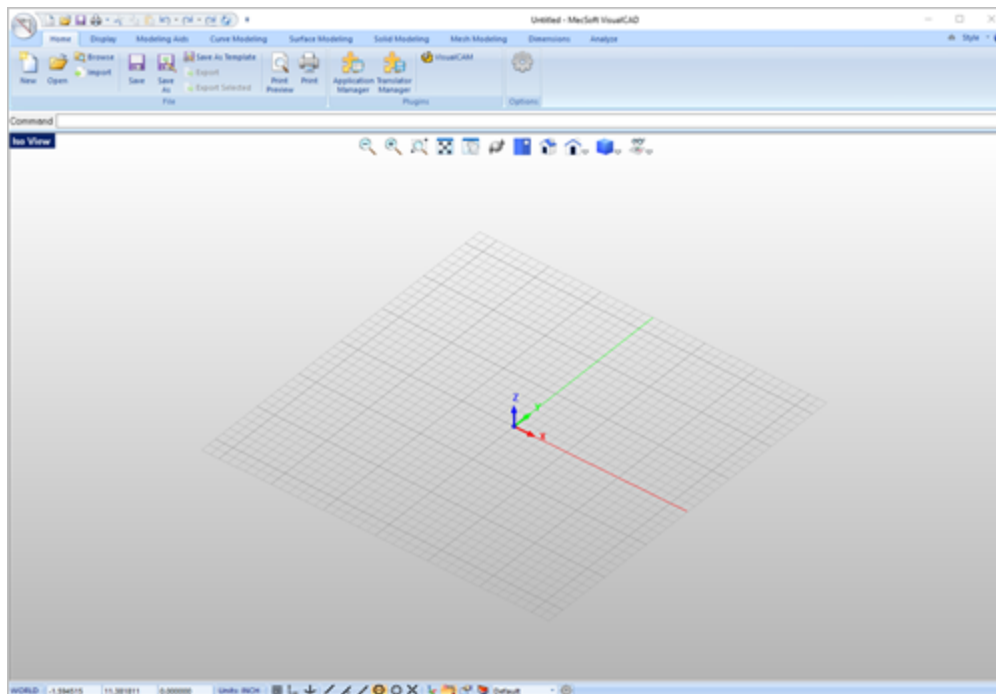
Before we begin, let's talk a bit about the [VisualCAD](#) display. When you run [VisualCAD](#) for the very first time, your screen may look this.



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



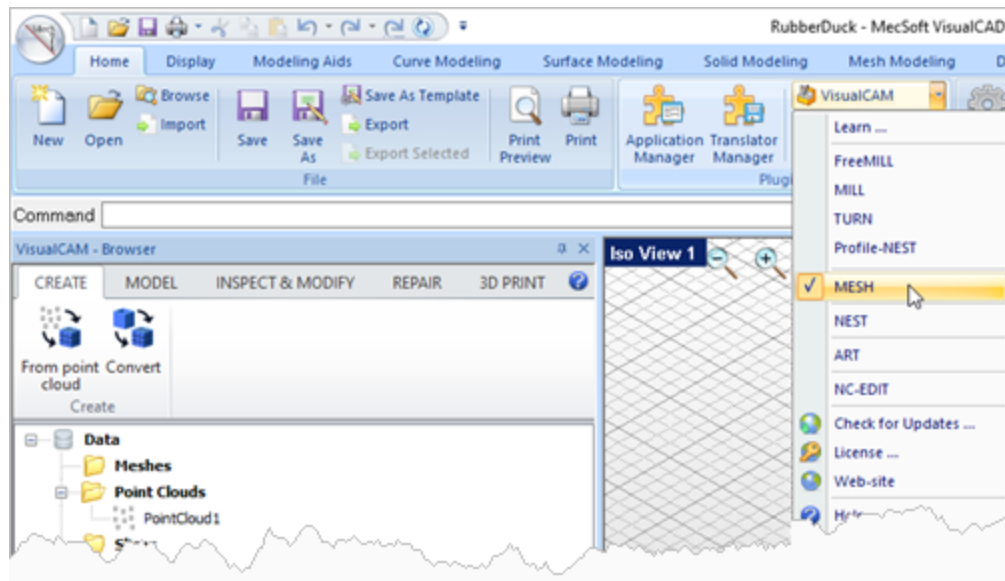
With all plug-in modules closed your screen will look like this:



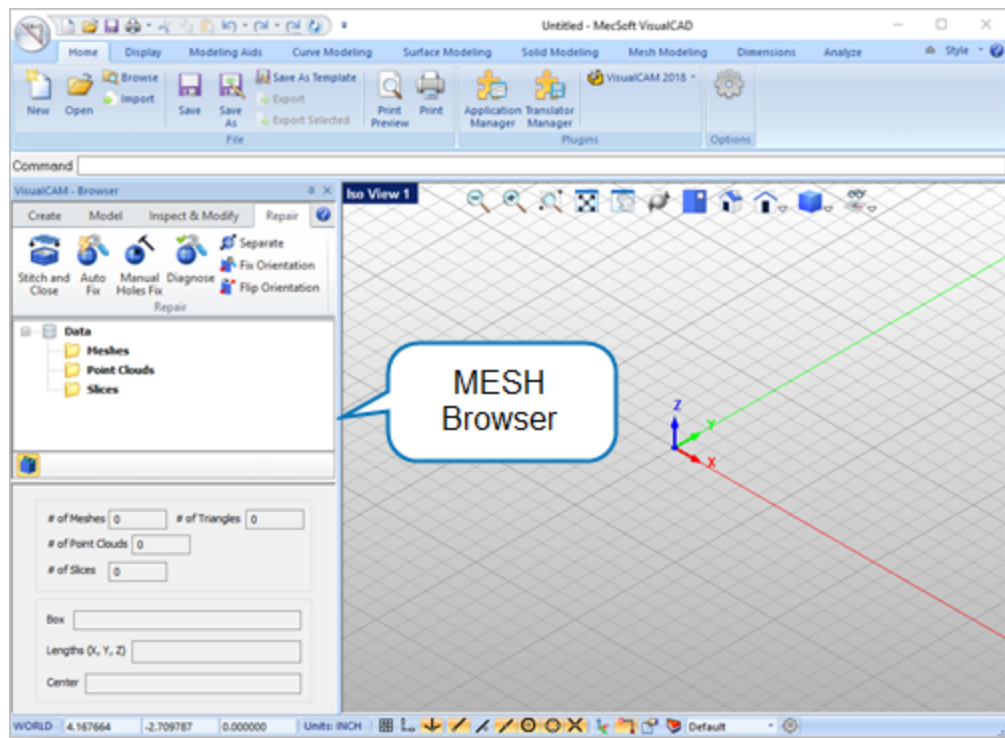
4.3 Launch the MESH Module

Now, let's begin by launching [VisualCAD/CAM](#).

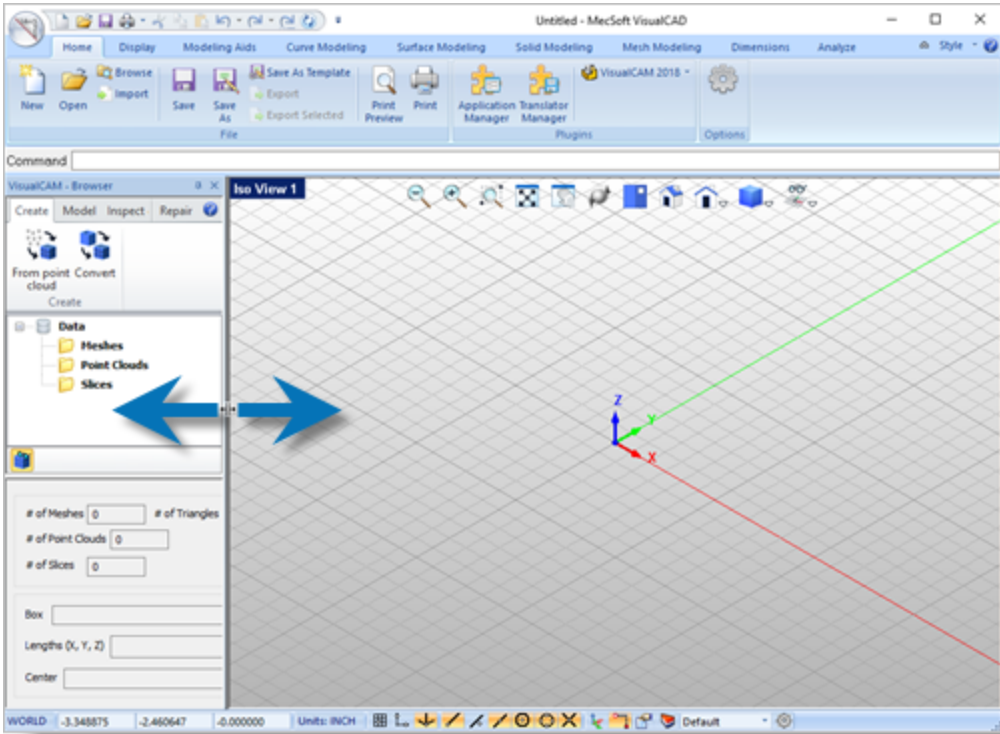
1. From the [Plugins](#) pane of [VisualCAD's Home Ribbon Bar](#), you will see the [VisualCAM 2023](#) main menu item.
2. To load the module, drop-down the menu and pick [MESH](#).



3. Docked on the left you will see the Mesh Browser.



4. You can re-size the width of the browser making sure that all of the command icons and menus are easily accessible.

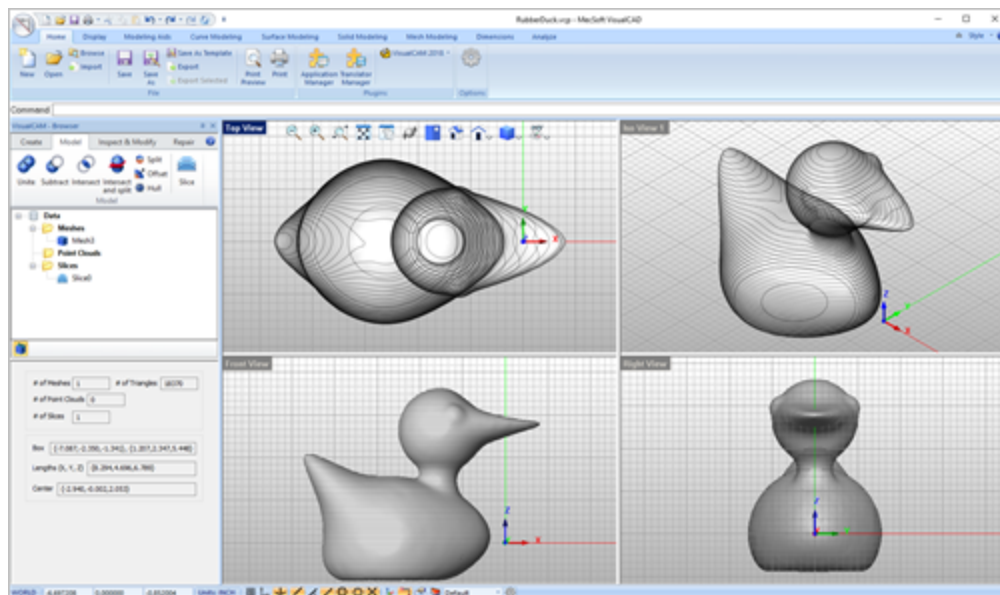


Inspect & Modify a Mesh

In this section we will work with [Point Cloud](#) data to create, analyze and repair a [Mesh](#) model.

We will perform the following steps:

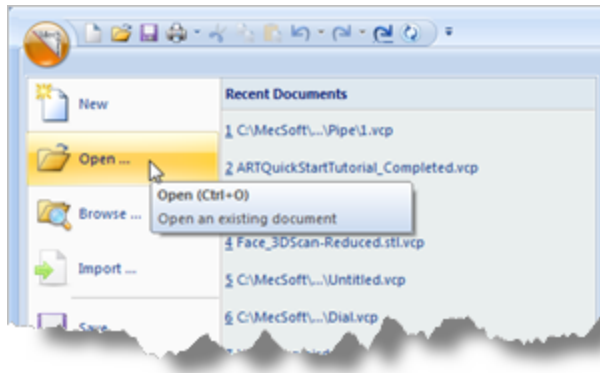
1. [Open](#) a [Point Cloud](#) data file.
2. Create a [Mesh](#) model from the [Point Cloud](#).
3. [Auto Fix](#) the mesh.
4. Perform a [Re-Mesh](#).
5. [Smooth & Analyze](#) the mesh.
6. [Slice](#) the mesh.
7. Our completed part will look like this:



5.1 Load a Point File

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

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

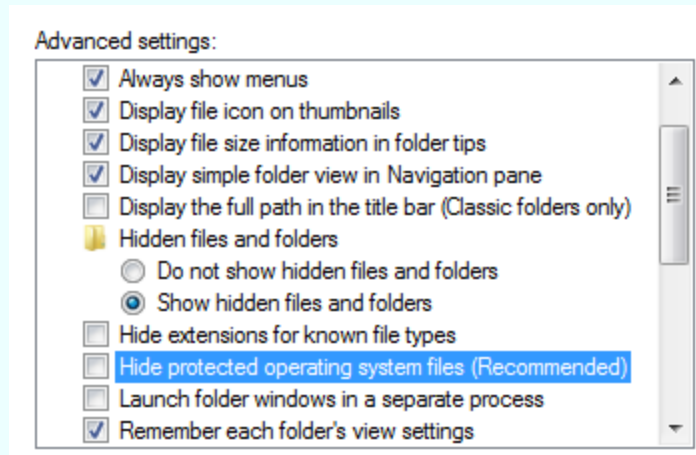


2. Find the part file named *RubberDuck.csv* located in the *QuickStart* folder and then pick *Open*. From the *Open* dialog box, select the *RubberDuck.csv* file from the *C:\ProgramData\MecSoft Corporation\VisualCAM 2023\QuickStart* folder. It is advisable to make a copy of this part at a suitable alternative folder so that you have write privileges to modify the part.

Note: This is a **.csv* file so be sure to set the *File Type* to **.** (all files) from the *File Open* dialog.

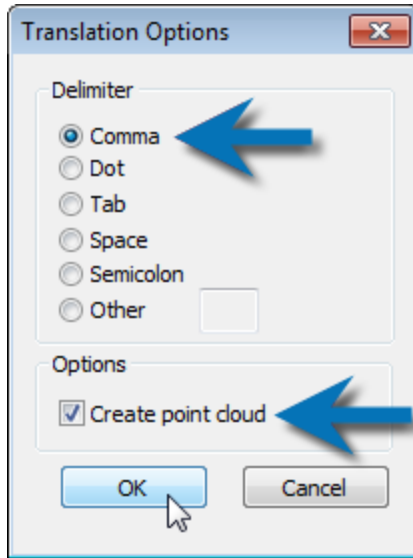
- ❗ By default, the *ProgramData* folder is "hidden" from view. Here are the steps to Show hidden files and folders:

1. Go to *Control Panel > Appearance and Personalization > Folder Options*.
2. Select *View* tab and under advanced settings:
 - Select *Show Hidden files and folders*
 - Uncheck *Hide extensions for known file types*
 - Uncheck *Hide protected operating system files (Recommended)*



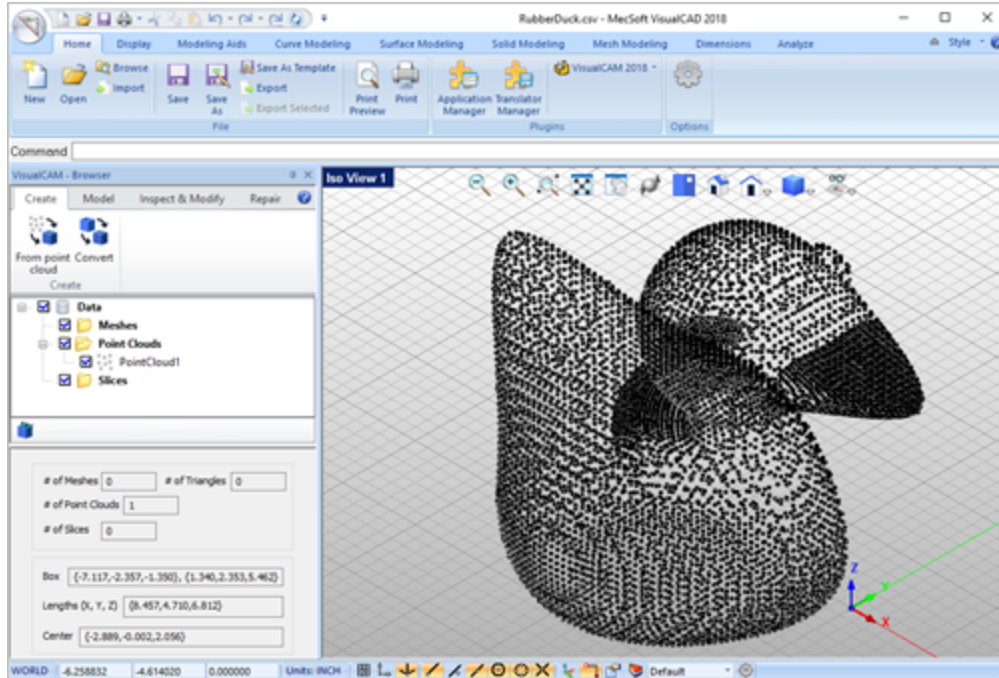
3. Click *Apply* and *OK*.

- From the **Translation Options** dialog:



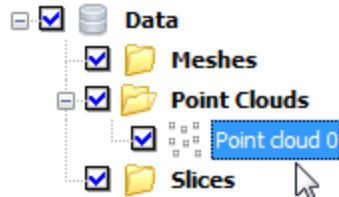
Select **Comma** under **Delimiters**
Check **Create point cloud** under options
Pick **OK** to import the point file

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

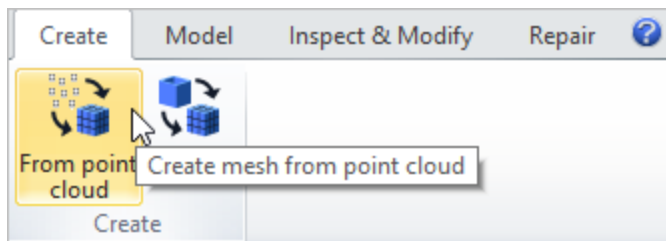


5.2 Mesh from Point Cloud

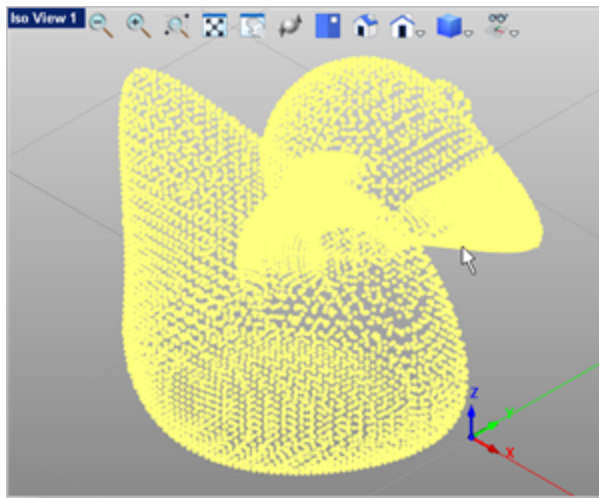
First, let's create a mesh from the point cloud. In the [MESH Browser](#) we see that we have one point cloud.



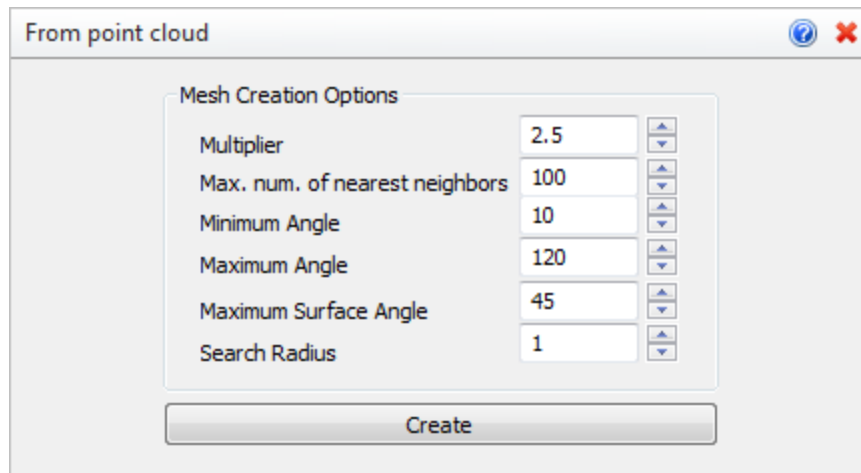
1. From the [Create](#) tab of the [MESH Browser](#), select [From Point Cloud](#) to create a [Mesh](#) model from the point cloud.



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

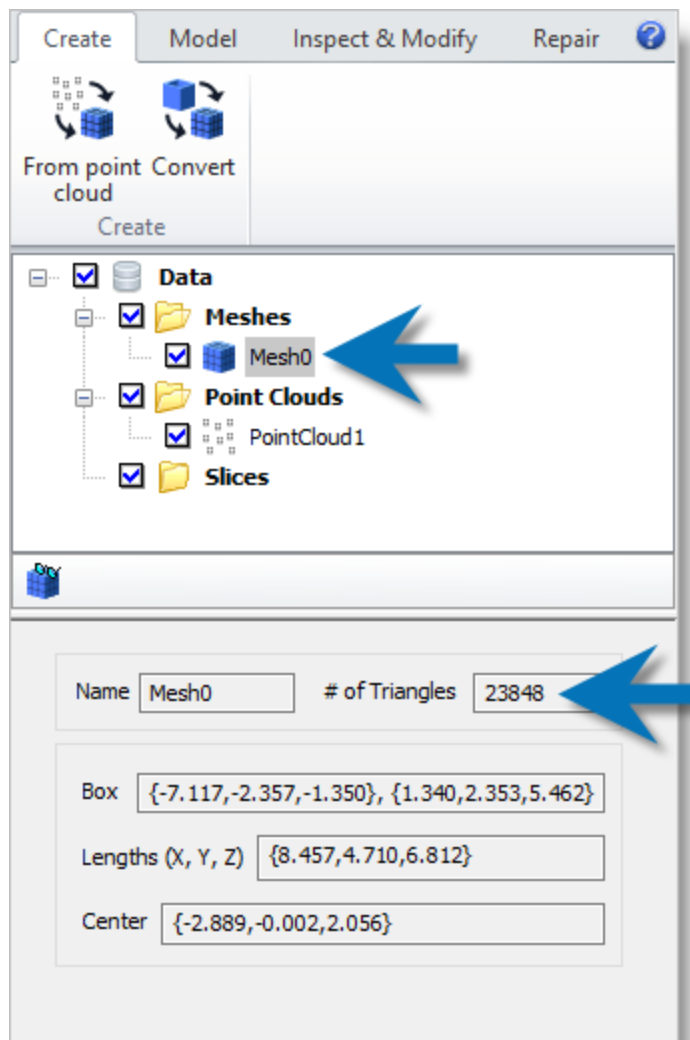


Notice that an options dialog appears below the [MESH Browser](#).

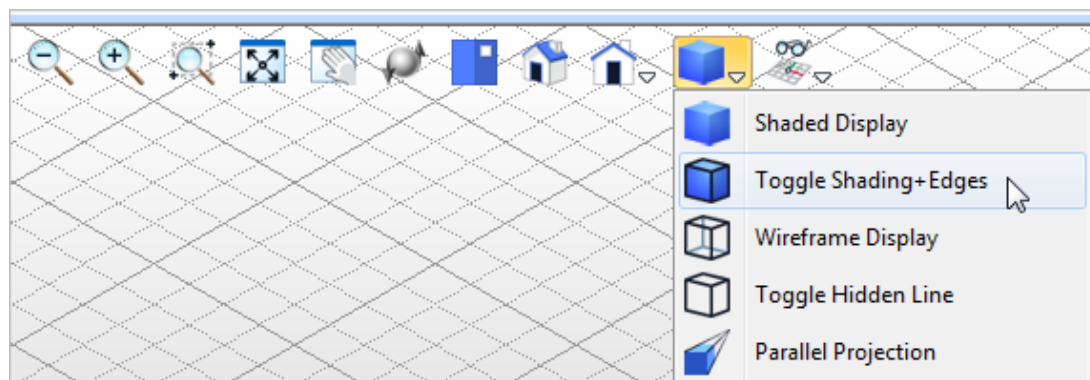


3. Accept the default options and then pick [Create](#).

From the [MESH Browser](#) we see that we now have [1 Point Cloud](#) and [1 Mesh](#) with over [20,000 Triangles](#).



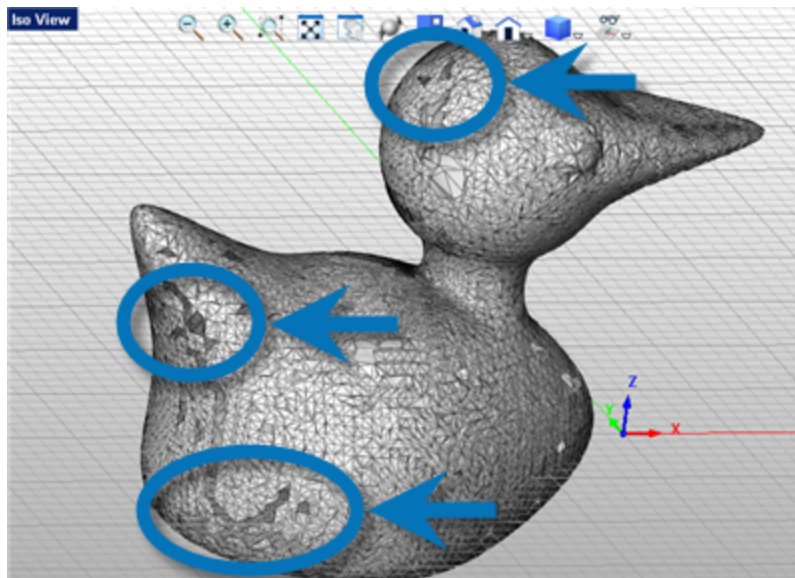
4. From the heads-up **View Toolbar** of **Iso View 1**, select **Toggle Shading + Edges** so we can see the model more clearly.



- Then from the **MESH 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 un-checking it) and take a look at the mesh that was created.



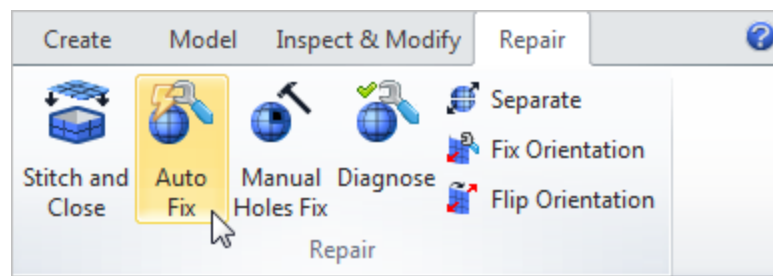
We notice that the point cloud data is incomplete.



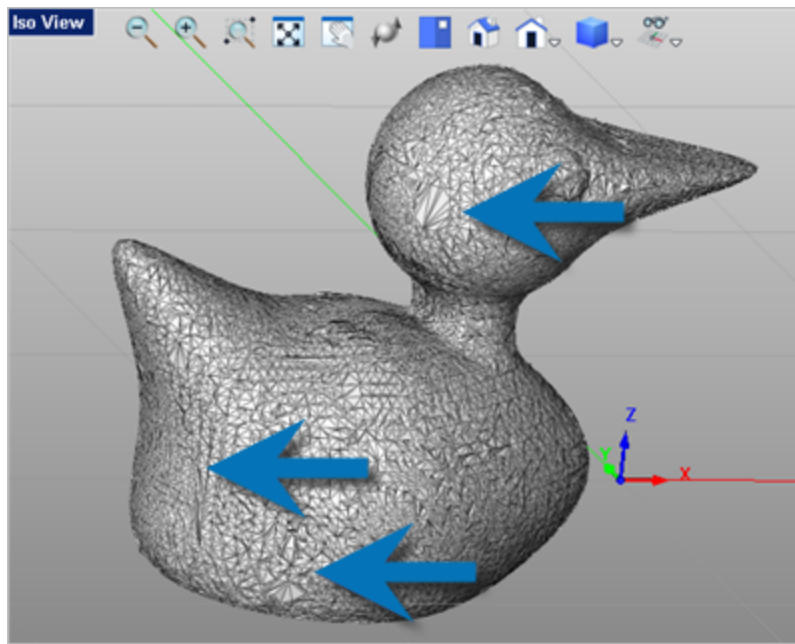
5.3 Auto Fix

We can repair the mesh automatically.

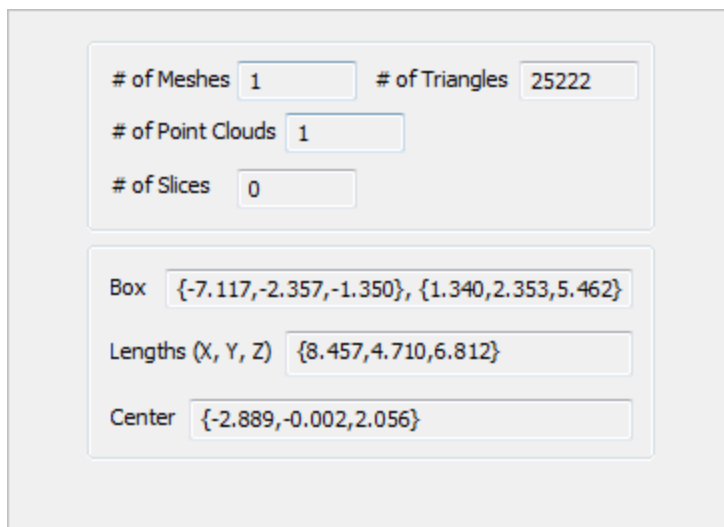
- From the **MESH Browser** select the **Repair** tab and then select **Auto Fix**. This will automatically fix holes, self-intersecting facets and more.



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



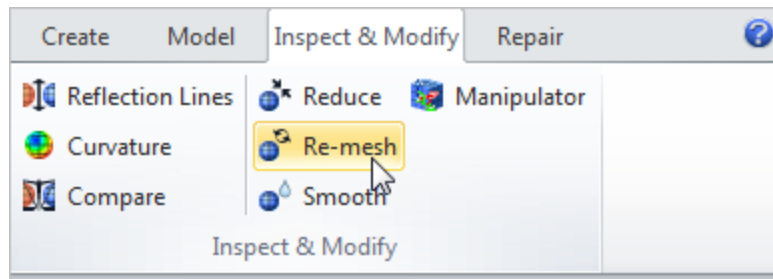
The browser now reports that the mesh has about 25,000 triangles. The exact [# of Triangles](#) reported may differ slightly depending on the exact build version of [VisualCAD/CAM](#) you are running.



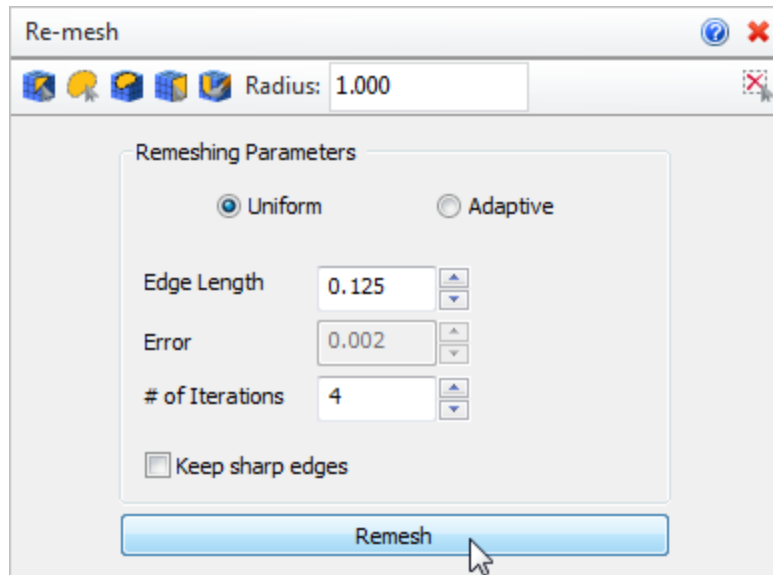
5.4 Re-Mesh

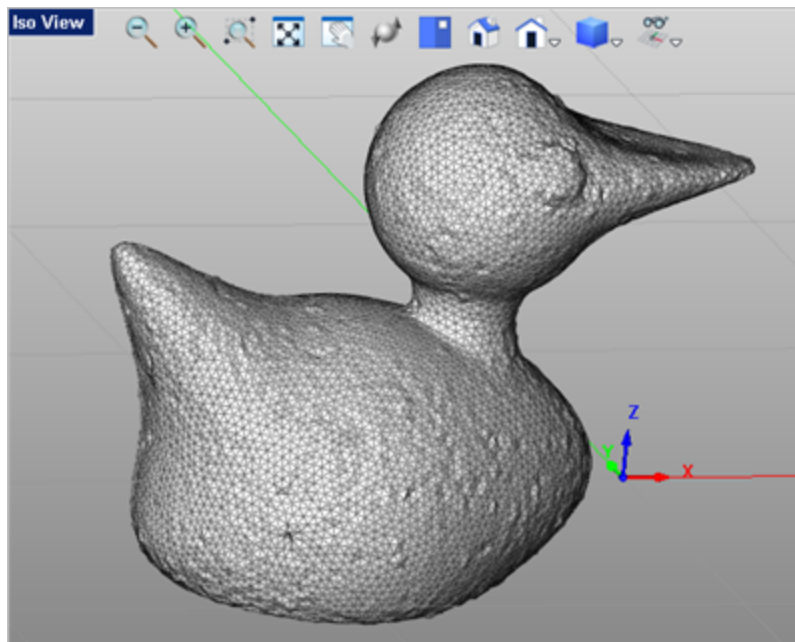
Next we'll re-mesh the model creating a more uniform mesh.

1. From the [Inspect & Modify](#) tab, select [Re-mesh](#).

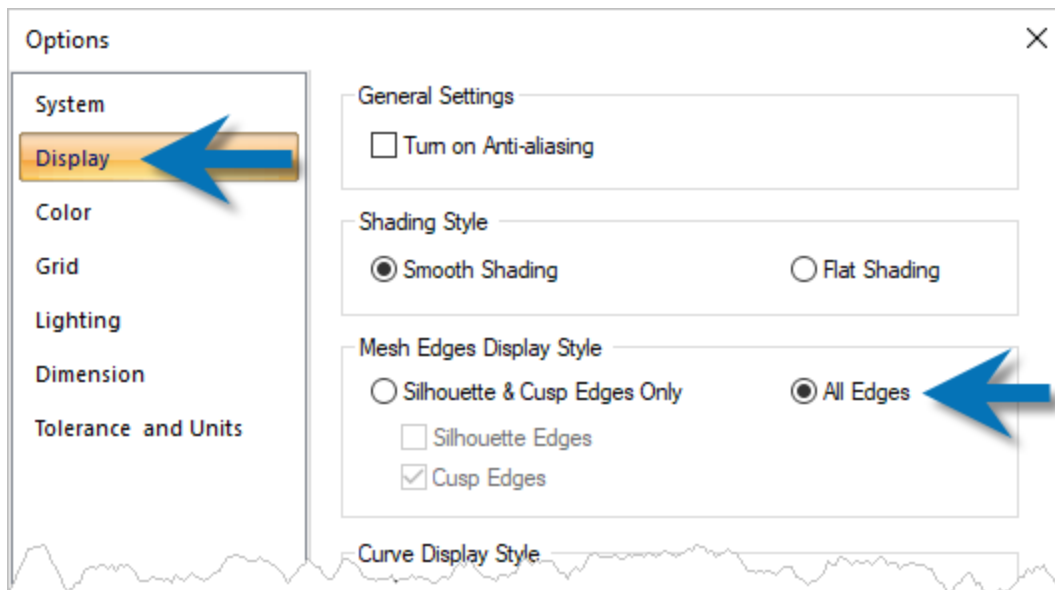


2. Now we select the mesh model and then right-click or press **Enter** to display the **Re-mesh** dialog.
3. Selecting the **Uniform** method will re-mesh the model based on a fixed **Edge Length**.
4. Then set the **Edge Length** to **0.125** and the **# of Iterations** to **4**.
5. Then uncheck **Keep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



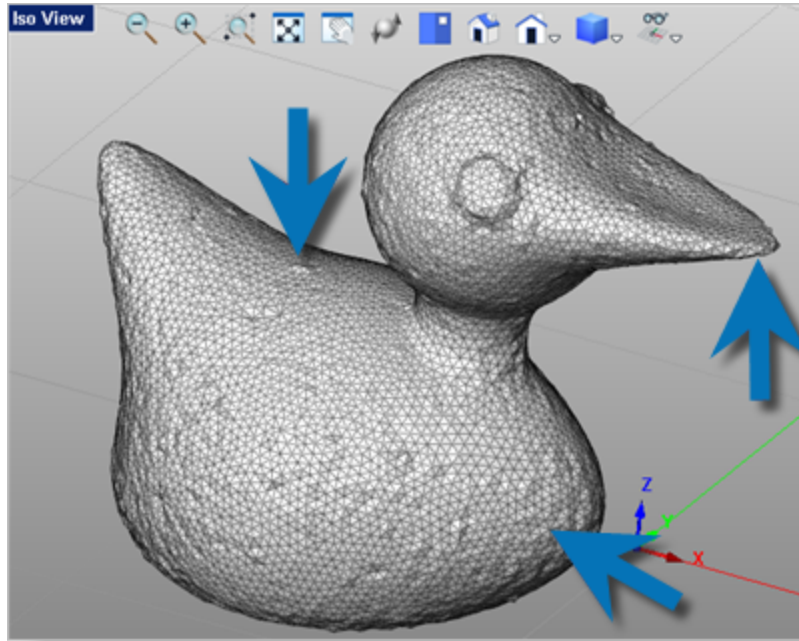


If you do not see the mesh wires, go to the [Home](#) tab in [VisualCAD](#) and select [Options](#). Select [Display](#) from the left side pane and then check the box for [All Edges](#). This is under the [Mesh Edges Display Style](#) section of the dialog.

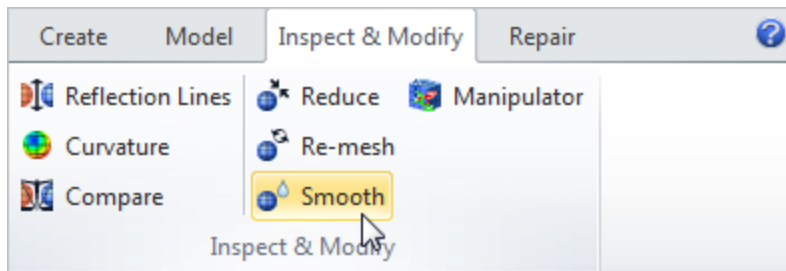


5.5 Smooth

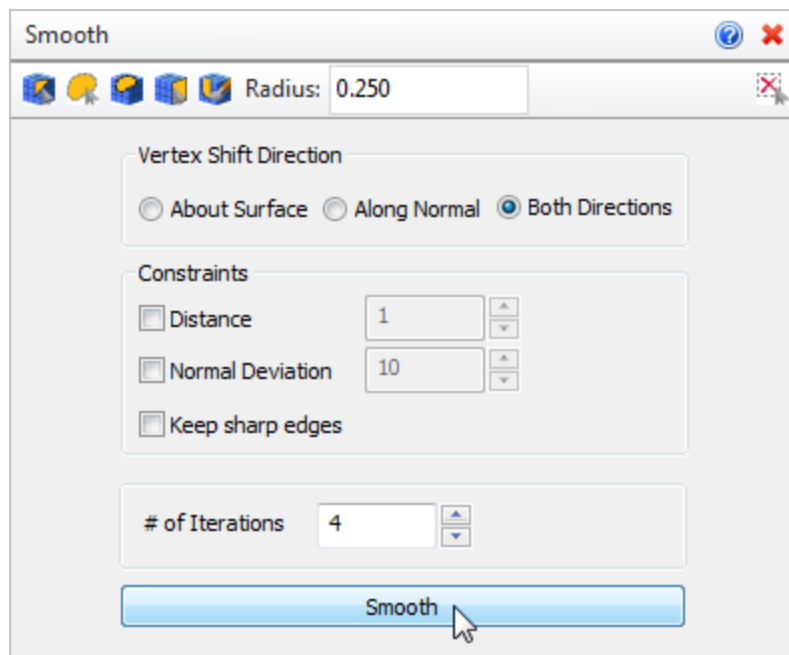
Although uniform, we still see areas in the mesh that are rough. Let's smooth these out a bit.



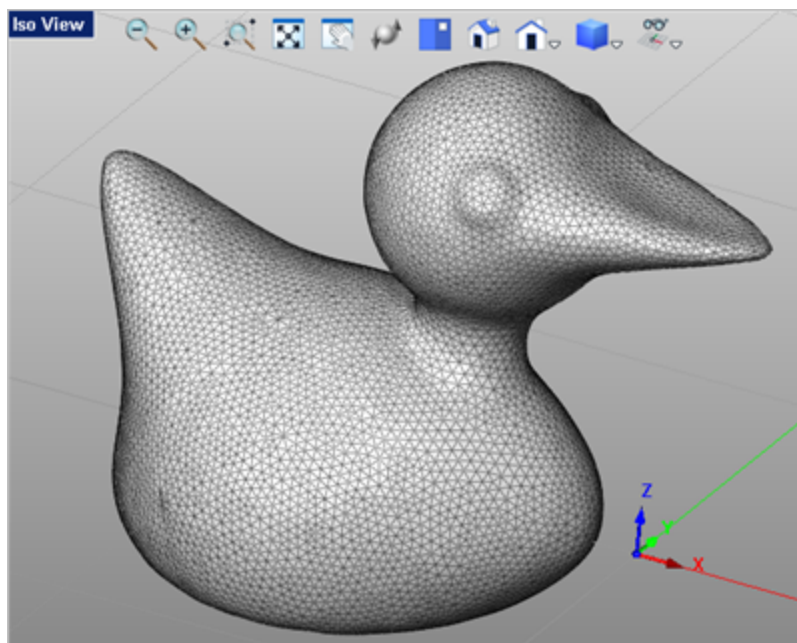
1. From the **Inspect & Modify** tab, select **Smooth**.



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.



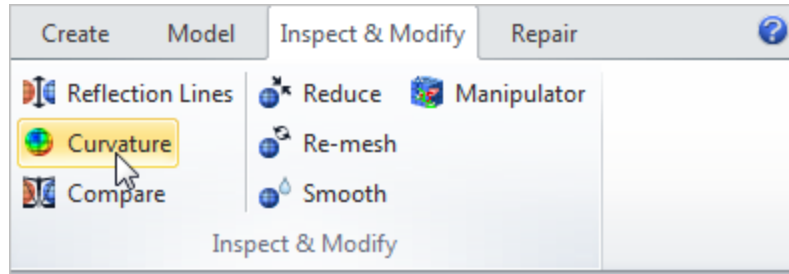
- Now we'll pick the [Smooth](#) button and review the results. We see that the mesh looks much smoother now.



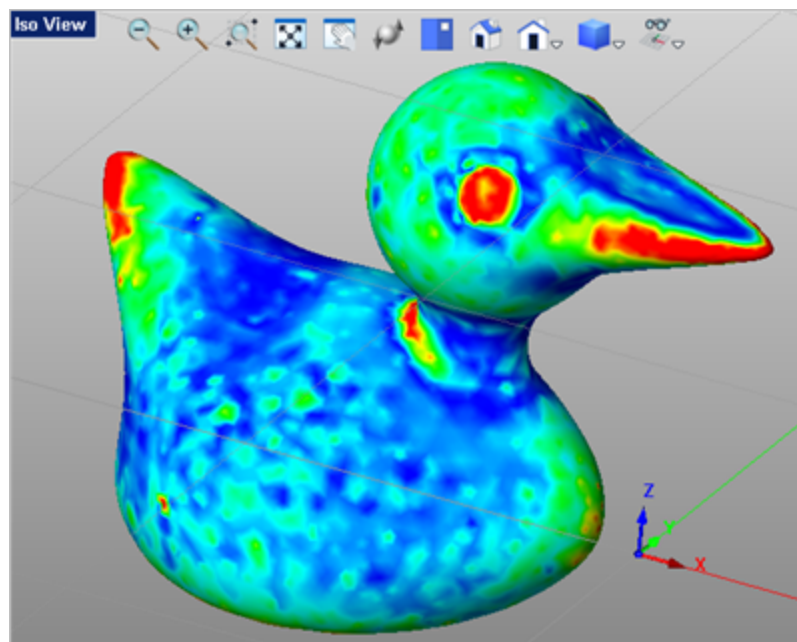
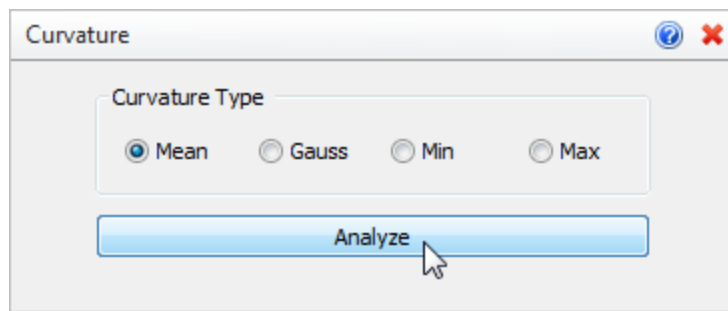
5.6 Analyze


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

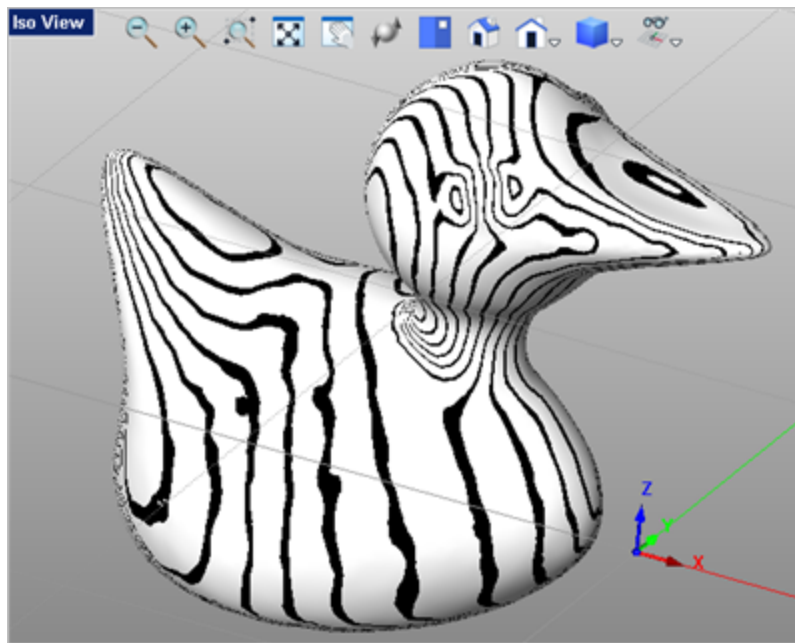
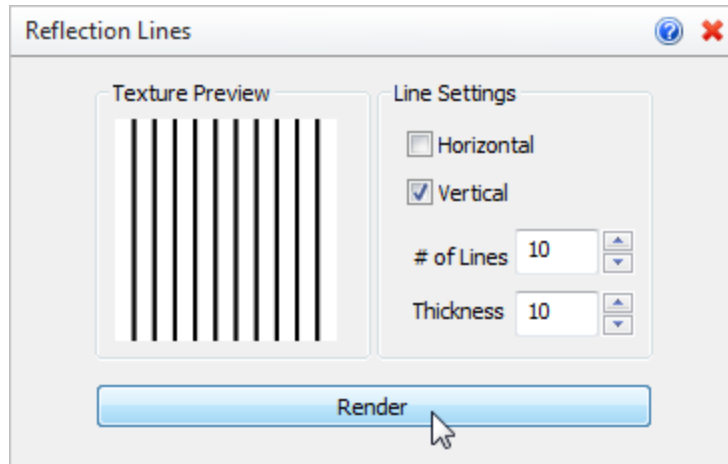
1. From the **Inspect & Modify** tab, select **Curvature**. This will highlight areas of curvature across the model.




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.
6. Just right-click or press **Enter** since we left the mesh selected from the previous command. When the **Reflection Lines** dialog displays pick the **Render** button to display the results.

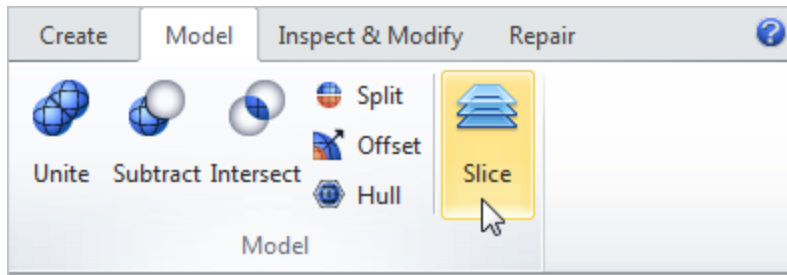


7. Again, you can pick the **Cancel** icon  to close the command dialog leaving the mesh selected.

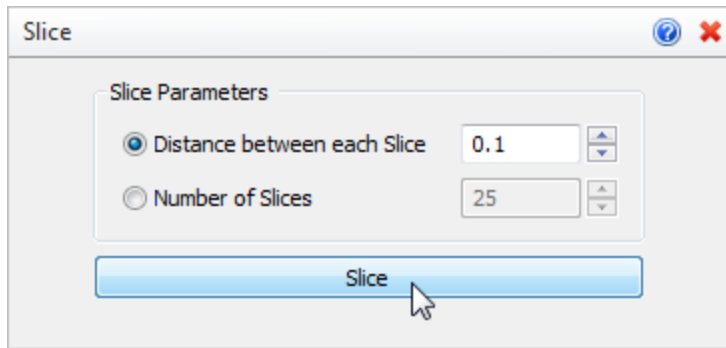
5.7 Slice

Next, we'll visually [Slice](#) the mesh model.

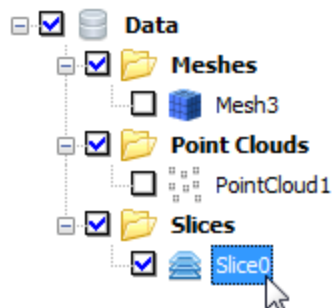
1. With the mesh still selected from the previous step, from the [Model](#) tab, select [Slice](#).

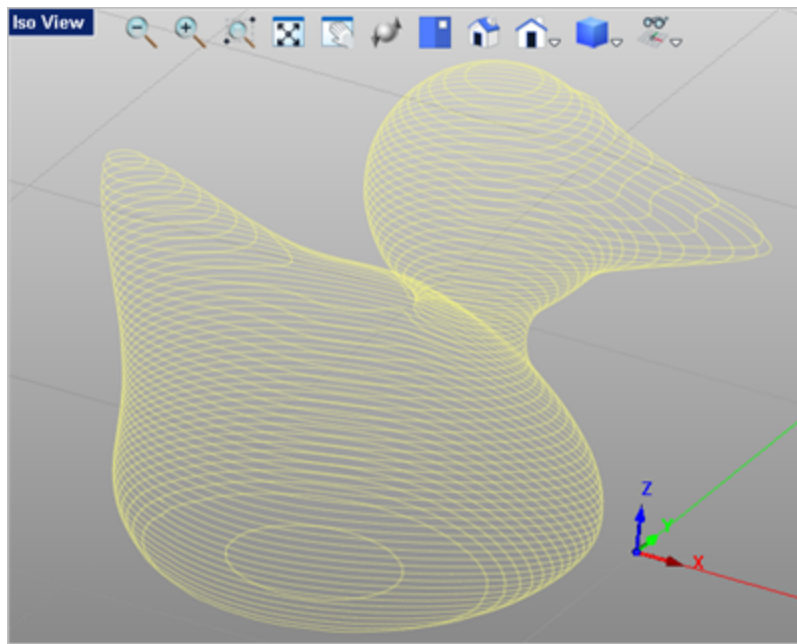



2. Select the mesh (if it is not already selected) and press [<Enter>](#). From the [Slice](#) dialog, we'll set the [Distance between each slice](#) to 0.1 and then pick [Slice](#).

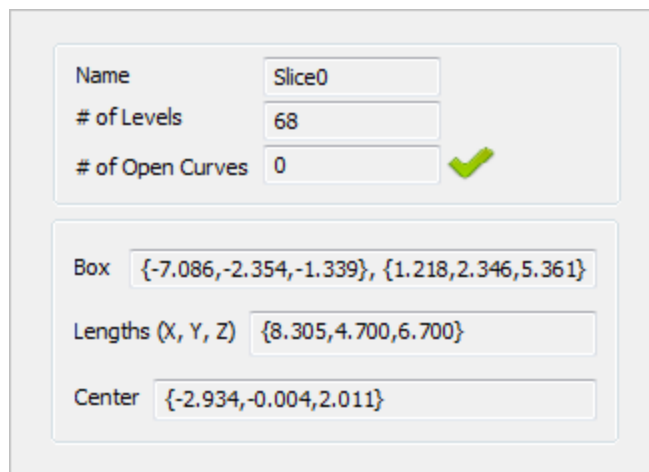


3. From the [MESH Browser](#), first check the [Slice](#) object and then uncheck the [Mesh](#) object. The [Slice](#) will be isolated and clearly highlighted on the screen.

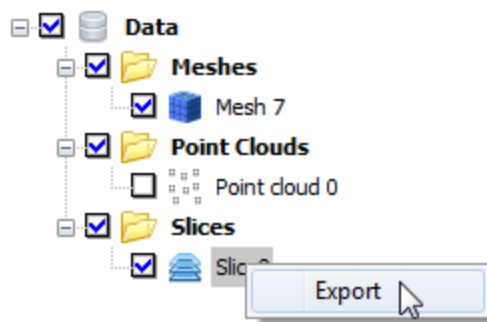




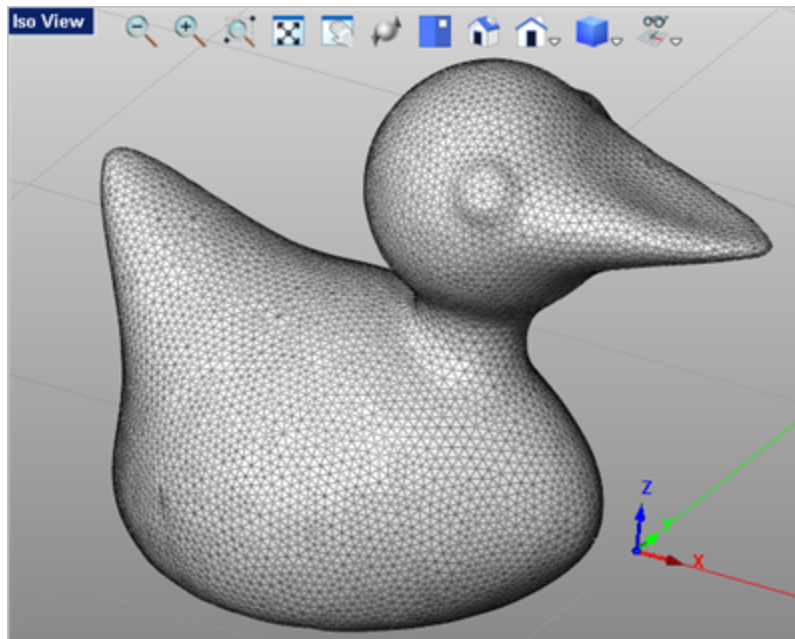
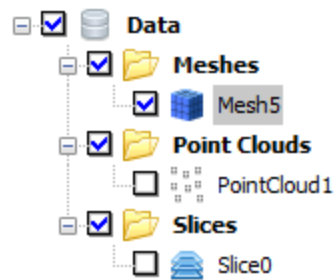
The **MESH Browser** displays information about the **Slice**. Notice that the  icon is displayed indicating that **NO** open curves are present.



4. If you right-click on the **Slice** object from the **MESH 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.

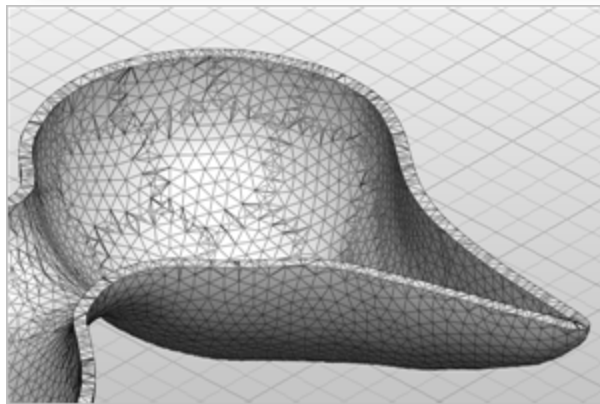
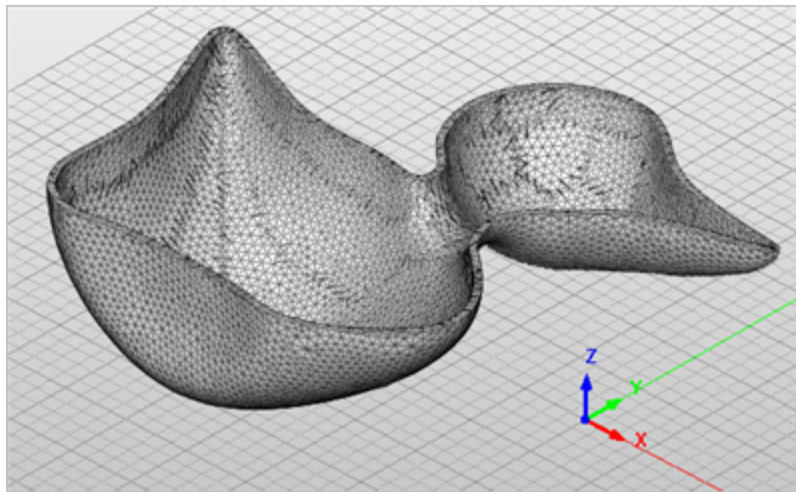


Offset & Split a Mesh

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

We will perform the following basic steps:

1. Use [Offset](#) to create a second a uniform distances away from the first mesh.
2. Use [Split](#) and [CAP](#) the two resulting mesh halves.
3. Our completed part will look like this:



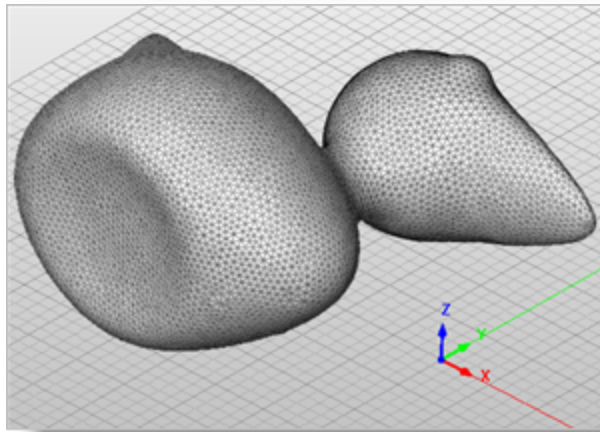
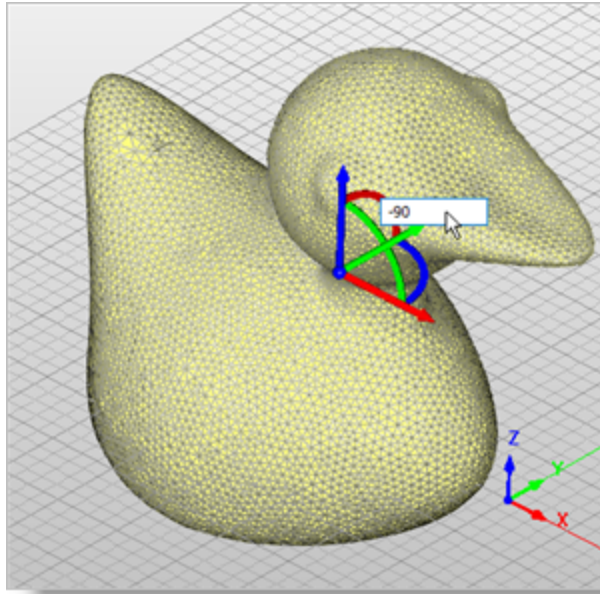
6.1 Offset

Now that we have a nice mesh from our point file, let's [Offset](#) it to create a wall thickness.

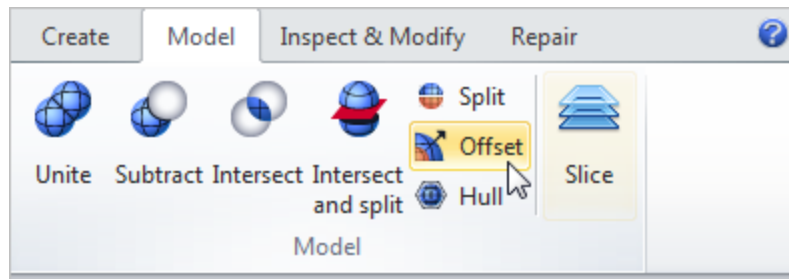
1. First we will rotate our current mesh onto its side using the [Manipulator](#) in [VisualCAD](#).
2. From the [VisualCAD Status Bar](#), toggle **ON** the [Manipulator](#).



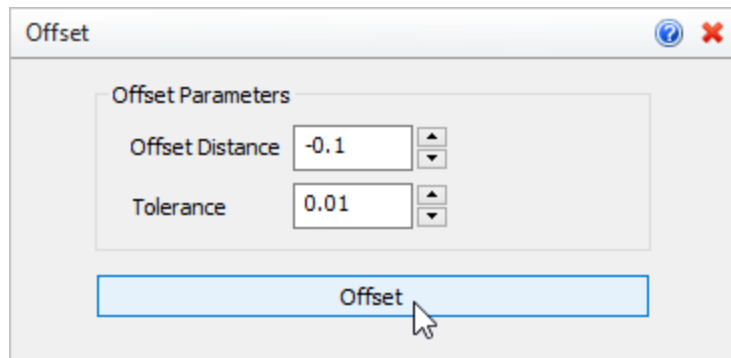
3. Now select the mesh and the **Manipulator** will display. Select the **X Rotation** arc and enter **-90** and press **Enter**. The mesh will rotated about the **X axis** by **-90** degrees.



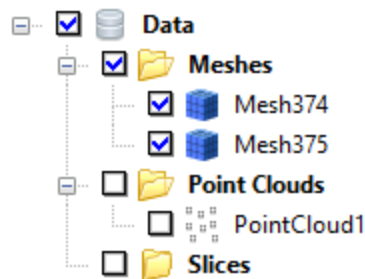
4. From the **MESH Browser** select the **Model** tab and then select **Offset**.



5. Select the mesh and the [Offset](#) dialog will display.



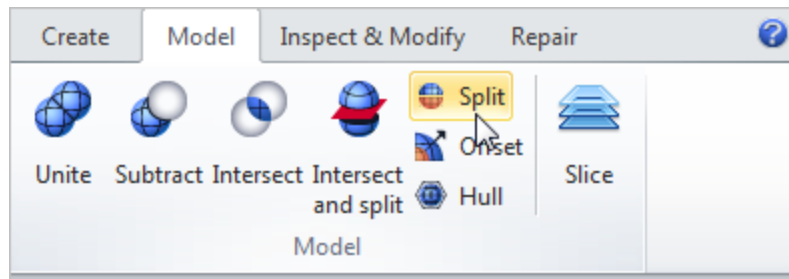
6. We'll set the [Offset Distance](#) to negative 0.1 (-0.1)
7. Then we'll set the [Tolerance](#) to 0.01 and then pick [Offset](#).
8. Now we see that a second mesh was added to the [Data Tree](#) that is a negative offset of the first.



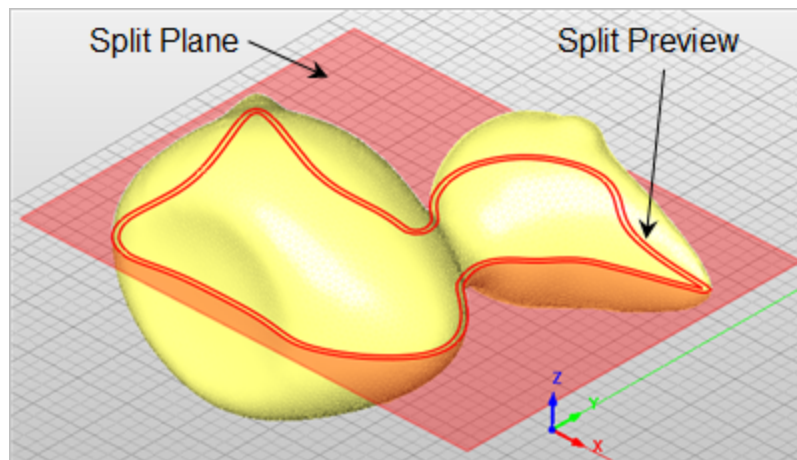
6.2 Split & Cap

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

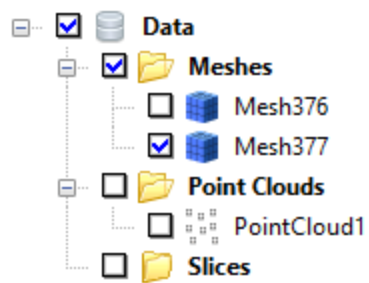
1. We'll go back to the [Model](#) tab and select [Split](#).



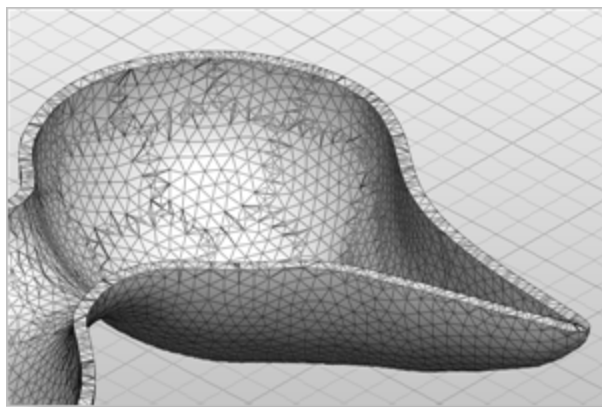
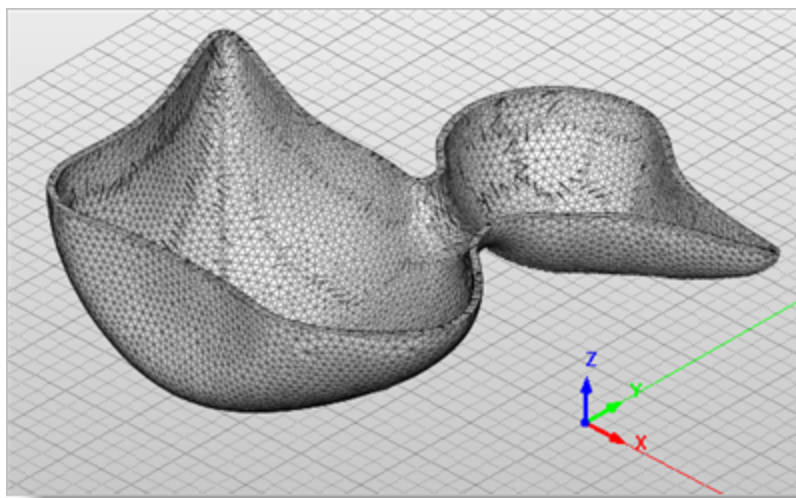
2. Window select **both meshes** or select them both from the **MESH Browser** and then **right-click** or press **Enter** to display the **Split** dialog.
3. The upper portion of the dialog contains a slider that allows you to control the **Split Plane Location**.
4. Move the **Split Plane**, shown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



5. The **Split Preview** (section curves) are shown in **Red**, and also dynamically update as you adjust the slider. Move the slider until the section curves are located approximately as shown in the example above.
6. Now select the **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 the upper mesh to toggle its display off.



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.

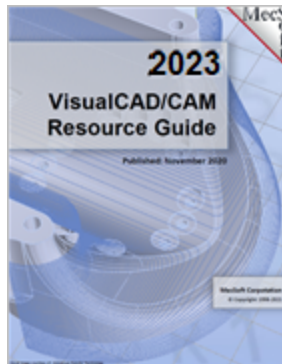


Where to go for more help

Download this PDF Guide for a list of the available [VisualCAD/CAM Resources](#).



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