



**3DXpert™ for SOLIDWORKS®**

# **ADJUST MODEL FOR 3D PRINTING**

Mesh Diagnostic & Healing

Tutorial\_V3 - 14,0200,1599,1024(SP2)

## Introduction

3DXpert for SOLIDWORKS includes various tools to work with mesh objects.

There are tools for general mesh operations, mending and validation tools.

This exercise discusses **Mesh Diagnostic** tool.

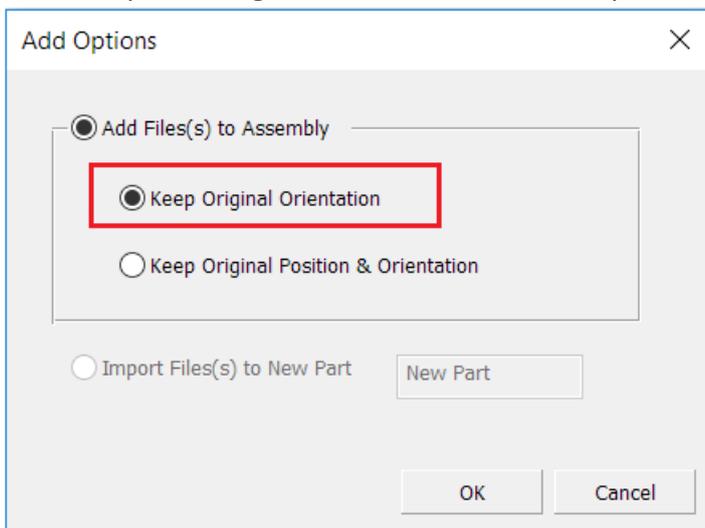
This tool checks the topology of the mesh object. It can also fix mesh bodies with one click of a button.

In this exercise, we will analyze a mesh object and fix it by using automatic healing tool and some mending operations.

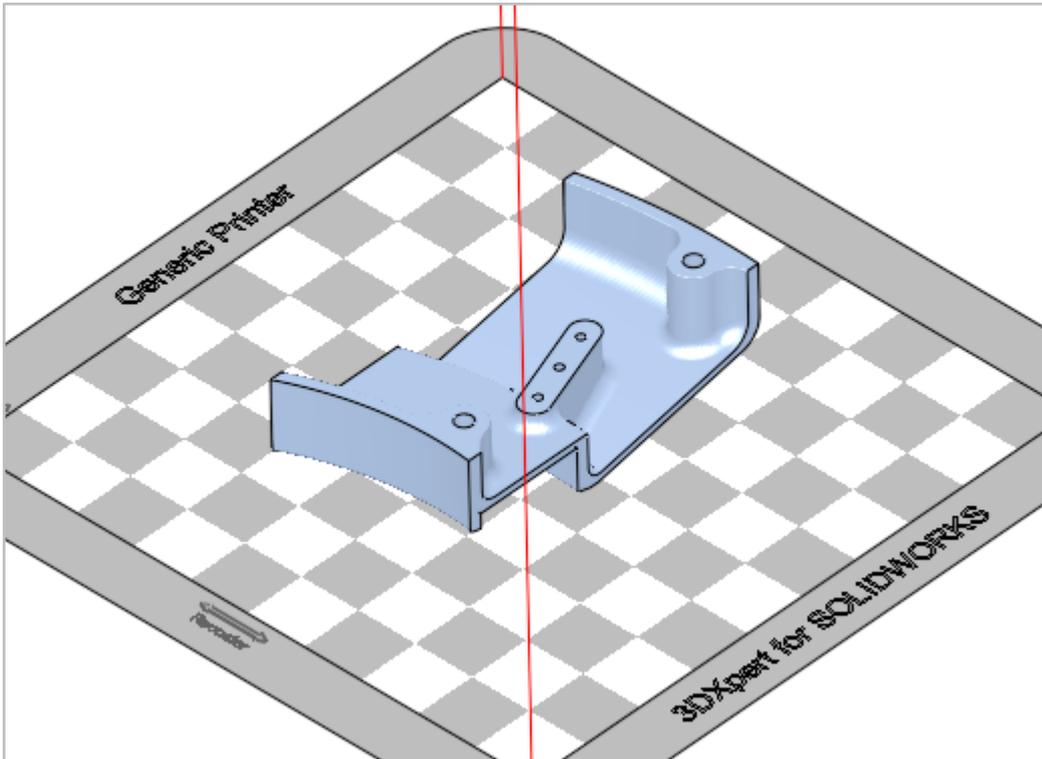
<p><b>!</b></p> <p><b>Notice/ Remember</b></p>		Left mouse button name is " <b><i>pick</i></b> "
		Middle mouse button name is " <b><i>Exit</i></b> "

## Exercise

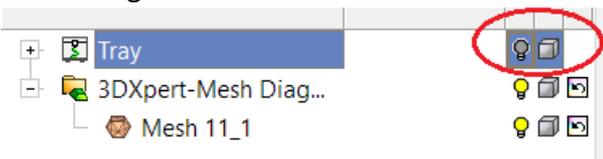
1. Open a new 3DP project and pick 'Add 3DP Component' tool.  
The 3DXpert for SOLIDWORKS explorer opens up. Browse to the part '3DXpert-Mesh Diagnostic & Healing-V1.elt' and pick the 'Select' button.
2. Pick the option 'Original Orientation' and then pick 'OK'.



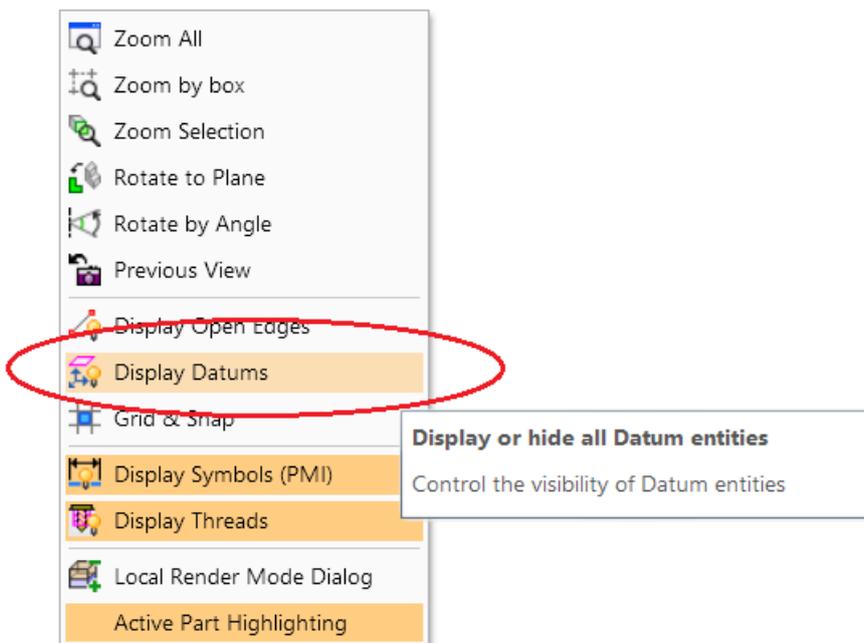
The part will be positioned on the tray:



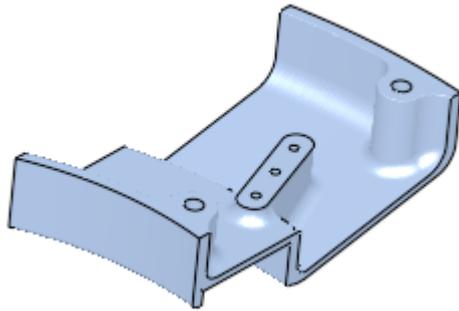
Pick the light bulb from the features tree to Hide the tray



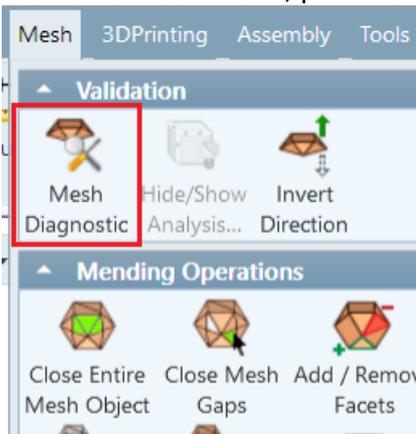
When the cursor hovers above the display area, click the Right Mouse and Middle Mouse buttons together and from the context menu pick 'Display Datum' to hide all datum.



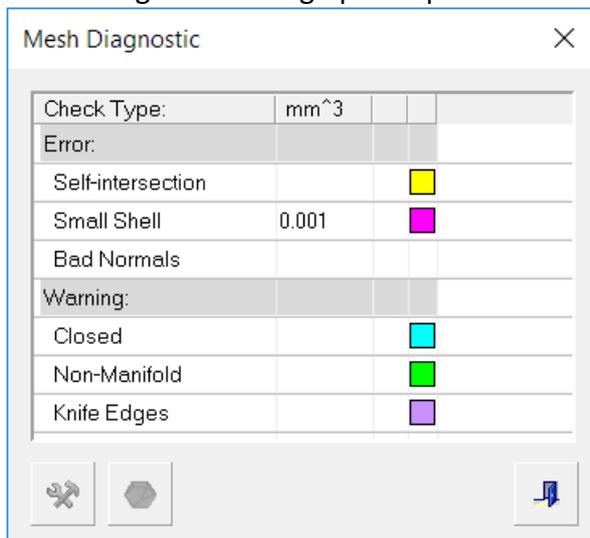
Now only the model is shown on screen:



3. From the Mesh menu, pick Mesh Diagnostic:



The Mesh Diagnostic dialog opens up.



All the analysis checks are presented, grouped into two sections: ‘Error’ and ‘Warning’. Each check type is shown in a separate row and has a column for color next to it that will represent positive results on the screen (The colors are adjustable).

‘Errors’ can be fixed using the dedicated ‘Fix Entities’ in the dialog.

As for Warnings, the relevant areas on the model should be examined.

Let’s explain what each Check Type diagnoses:

**Self-Intersection** - checks all intersections between faces in the selected body.

**Small Shell** - checks for shell volume that is smaller than the value that is set in the column next to it. (For example, here we are looking for shell, smaller than 0.001 mm<sup>3</sup>)

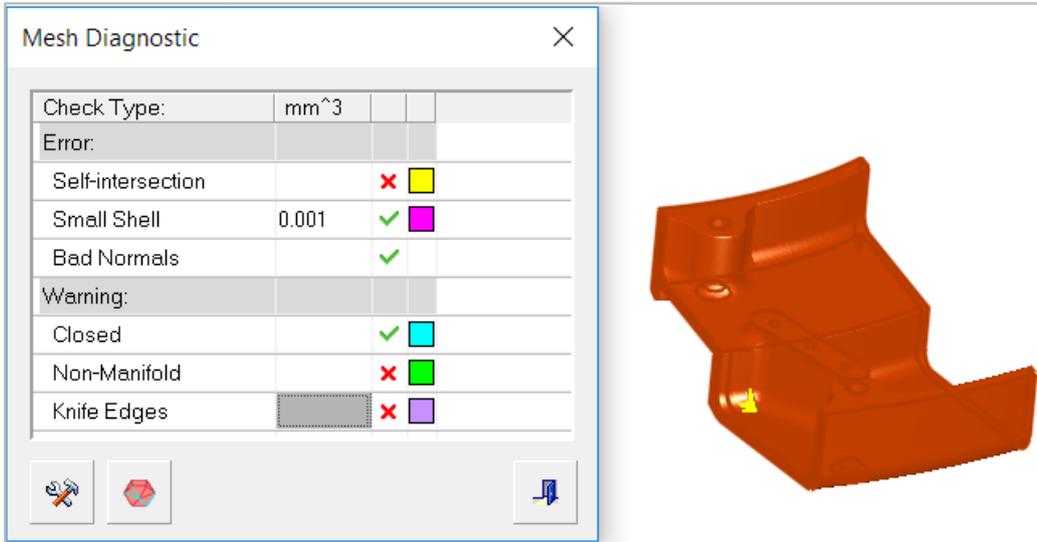
**Bad Normals** - checks that outside direction of all faces are correct.

**Closed** - checks that the body is closed.

**Non-Manifold** - checks for zero thickness or non-manufactured edges\vertices.

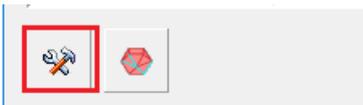
**Knife Edges** - displays areas with very sharp edges.

4. Pick the mesh object to select it.



**!** When a mesh object is selected, the system analyzes it. 'Good' entities are marked with a green check mark ✓ and 'Bad' entities are marked with a red X mark ✗.

As we can see, a self-intersection error, non-manifold and knife-edges warnings were found. Pick Fix Entities button.

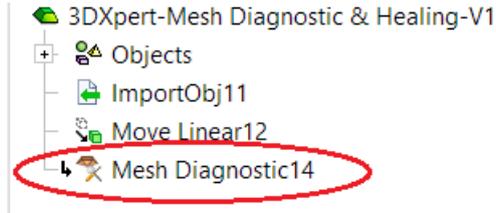


See how the self-intersection is now marked as fixed:

<b>Error:</b>			
Self-intersection		✓	■
Small Shell	0.001	✓	■
Bad Normals		✓	

Press Exit  to exit from Mesh Diagnostic tool.  
 Activate the part (By double clicking it on the features tree)

See that a new feature has been created:

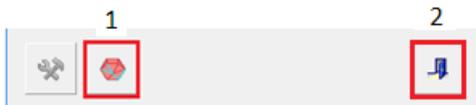


- Pick Mesh Diagnostic to invoke the tool again. Pick the part.

We will now review the two warnings:

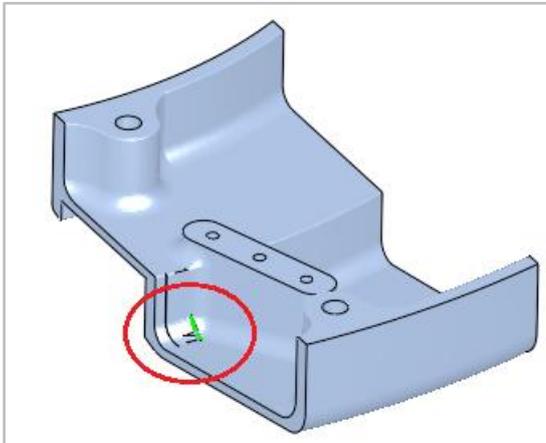
Closed	✓	■
Non-Manifold	✗	■
Knife Edges	✗	■

Pick Mark Entities button and then Exit button.

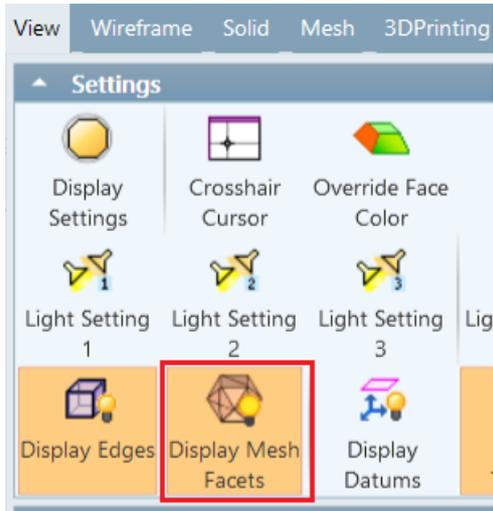


The problematic areas remain with their marking on the body after we exited from the tool:

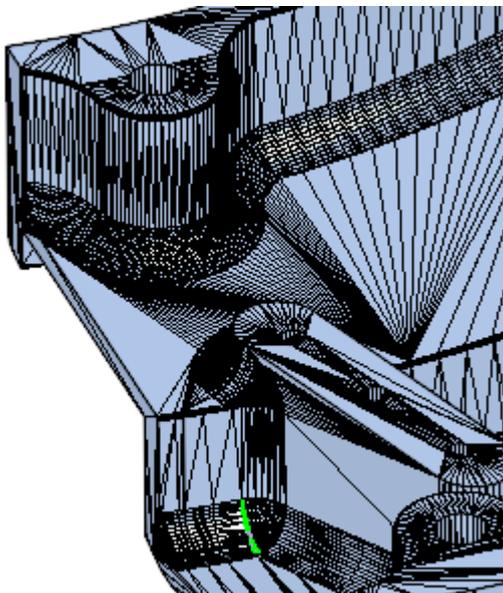
Zoom into the areas:



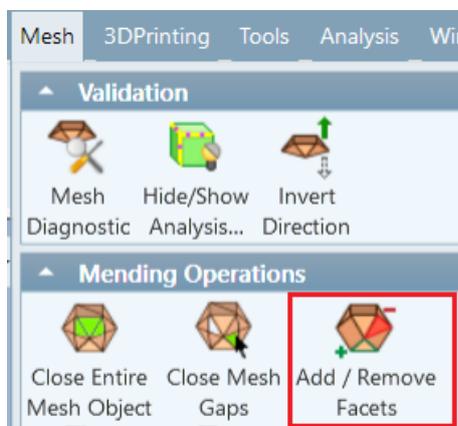
- From View menu, pick Display Mesh Facets



The mesh triangles are now shown on screen:

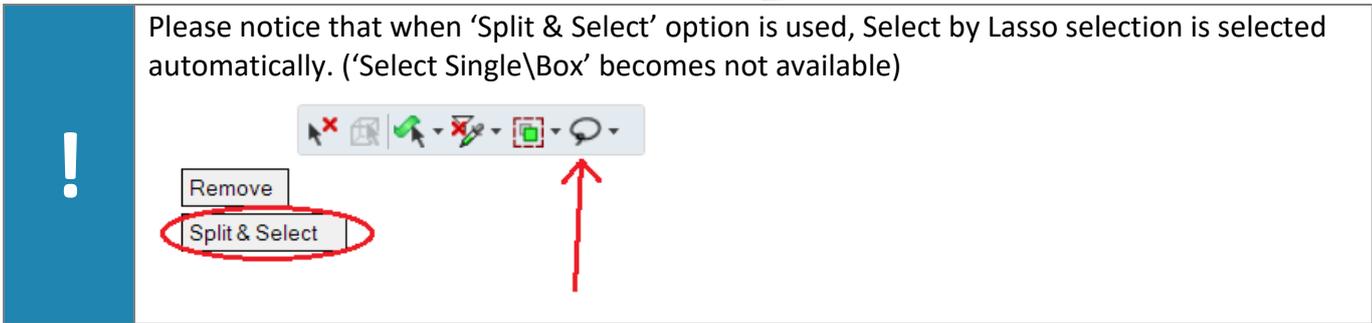


7. From Mesh menu, pick Add/Remove Facets

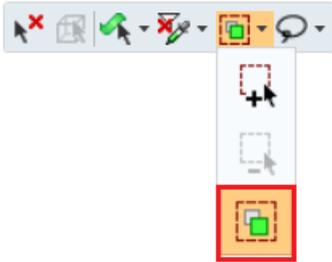


Use the settings “Remove” and “Split & Select”.

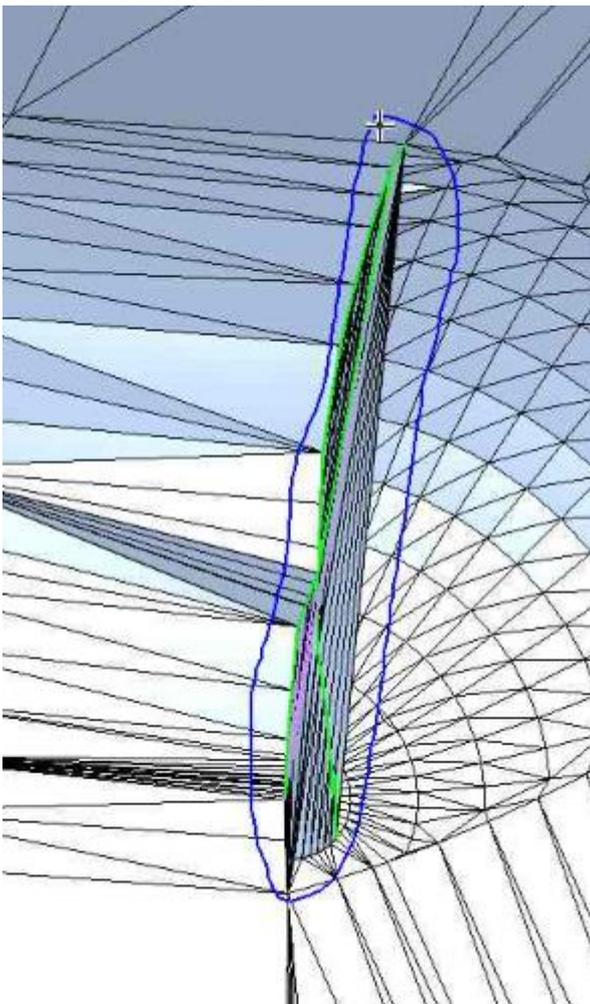
Please notice that when 'Split & Select' option is used, Select by Lasso selection is selected automatically. ('Select Single\Box' becomes not available)



From the floating toolbar, select the option 'Select Visible Faces'

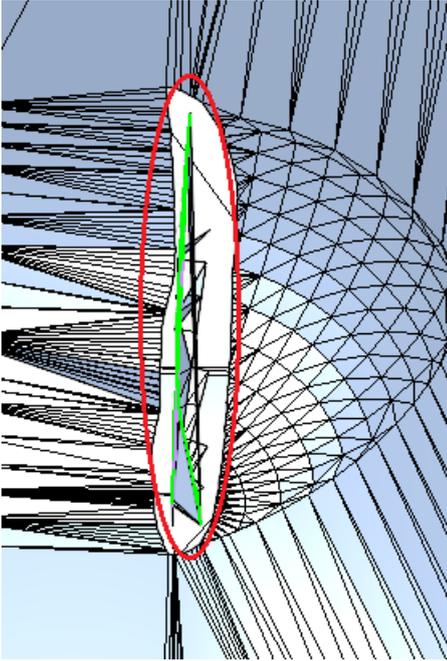


Select facets as follows:



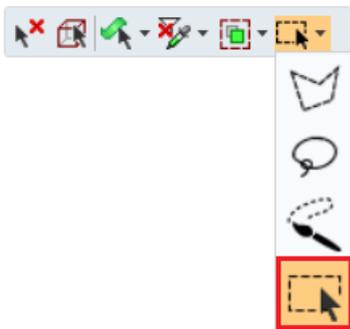
Pick Apply.

We need to remove more facets:

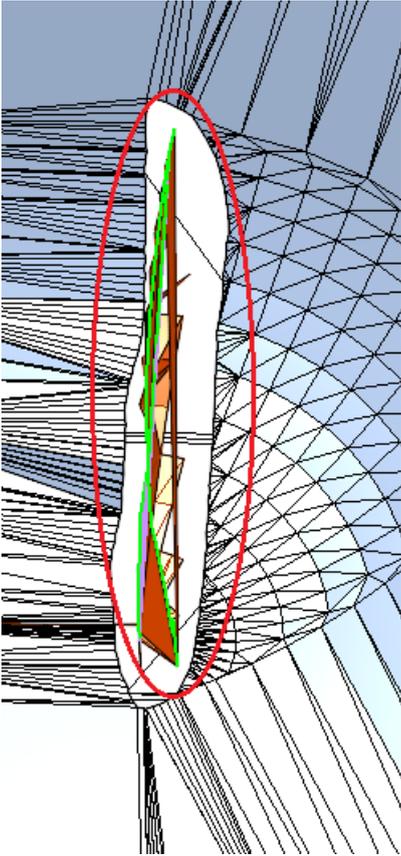


Pick 'Split & Select' button to toggle to 'Selection Only'.

From the floating toolbar, select the option 'Select Single\Box':

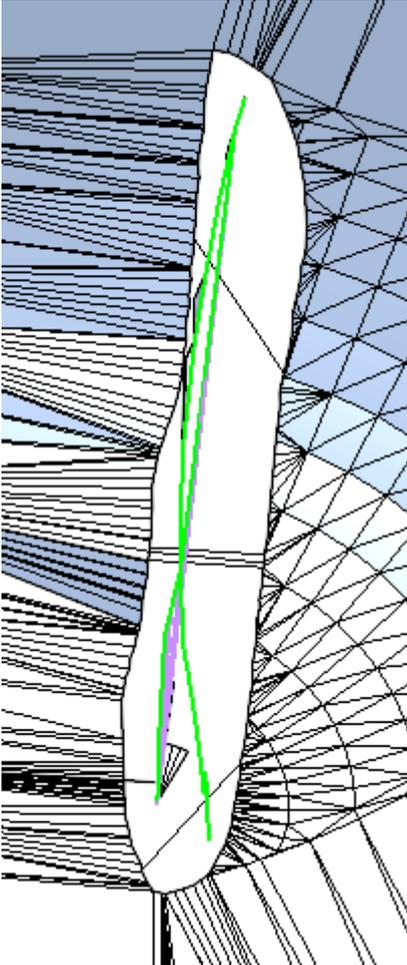


Pick the facets as shown:



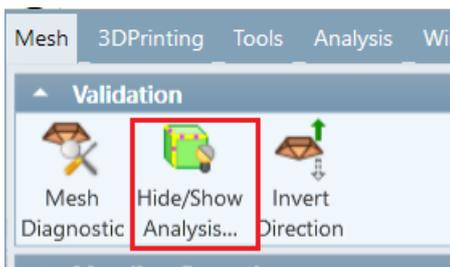
Pick Apply.

We still have a few more leftovers:

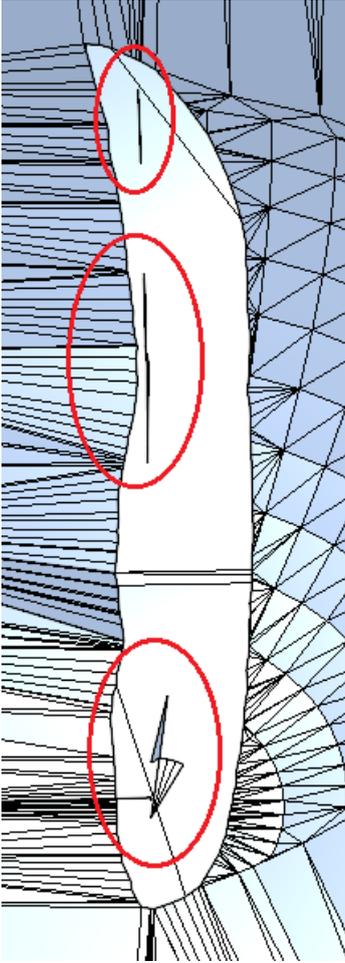


8. For clearer look, we will now remove the marking:

Without exiting from Add\Remove Mesh Facets tool, pick Hide\Show Analysis Marks from the Mesh menu.



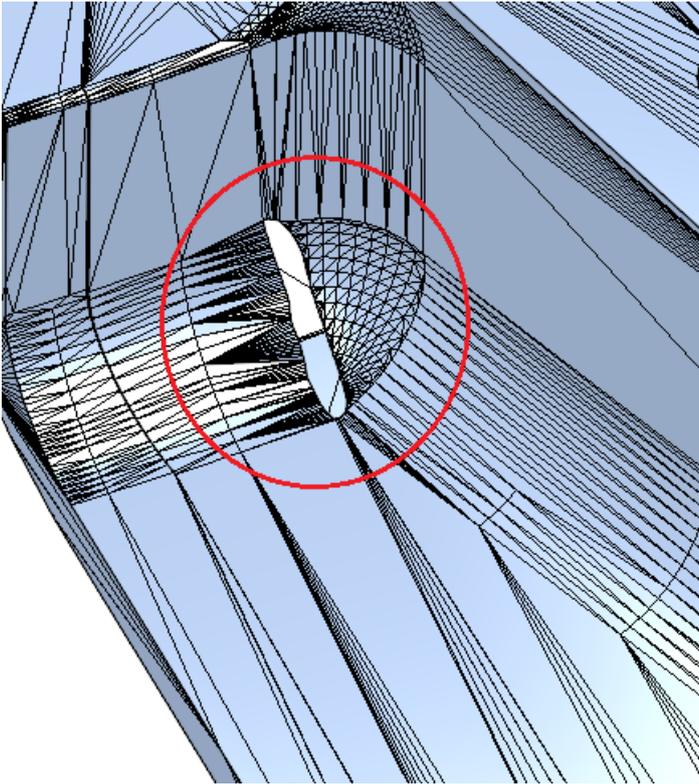
The leftovers are very clear and accessible now.



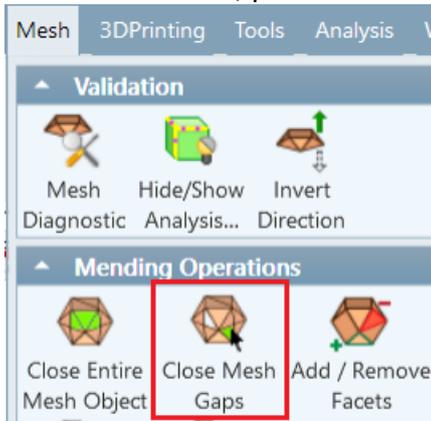
Pick them to select and pick Ok to approve and exit from the tool.

(You may need to add more iterations until all the “internal” faces are removed).

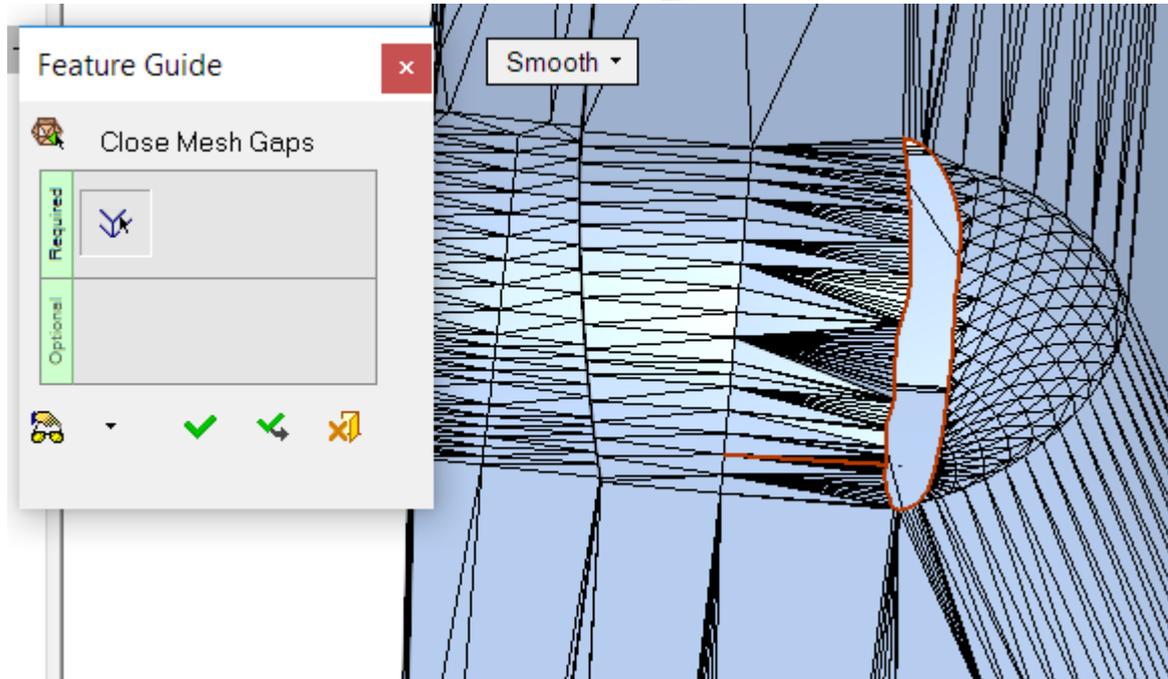
9. We will now close the gap.



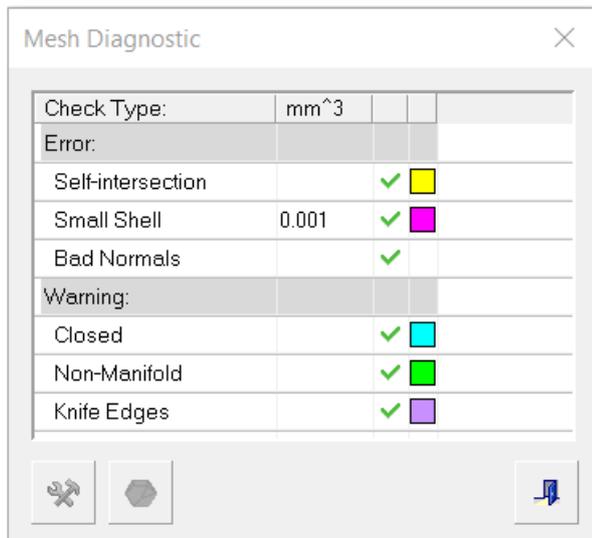
From Mesh menu, pick Close Mesh Gaps tool.



Pick the open loop and pick OK to approve.



10. Pick Mesh Diagnostic tool again and pick the body.  
All check fine now:



End of Exercise