3DXpert™

3DPRINTING EXERCISE - 5

Surface Lattice

Infills

Supports - Cone by 2 Points

Tutorial_V7- Updated: 13,0600,1489,1616(SP6)

3D SYSTEMS

In this exercise, we will discuss specific printing preparation functionality in 3DXPert:

Surface Lattice – Add lattice structures on the part's surfaces (used in medical applications).

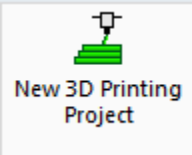
Infills - Filling the part's with Pattern based volume.

Cones by 2 Points – Create cone support using 2 anchor points on the part (this is called a gusset.)

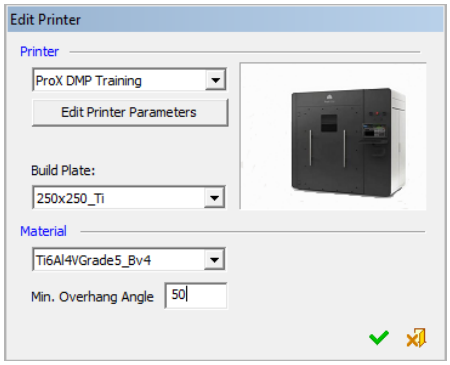
The exercise focuses 3DXPert's 3D printing functionality. Although the various steps to follow are detailed, it is recommended to have a basic knowledge in running the general software tools.

Part 1 – Surface Lattice

1. Let's open a new 3DPrinting project.
2. From the menu bar press the 'New 3DPrinting Project' button.



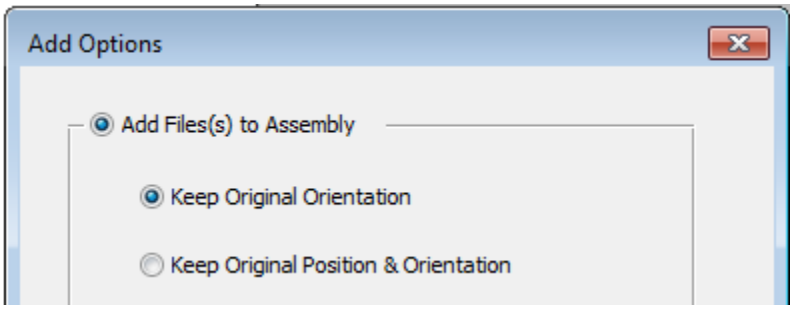
3. Select 'Edit Printer' and define the printer you are going to work with by selecting it from the list of available printers. In this exercise, we will use the ProX DMP Training from 3D Systems.
   Set the Parameters as below:



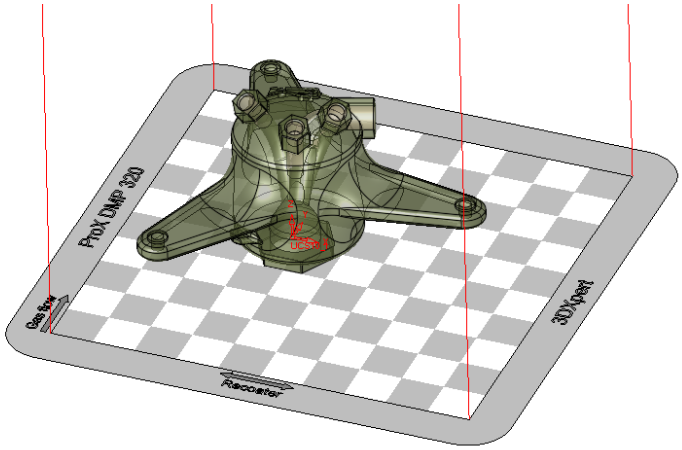
4. Add the part we are going to print. Press the Add 3DP Component 

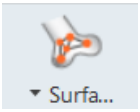
. As the 3DXpert explorer opens up, browse and select the file Manifold_Ex3.elt. Press 'Select' or double click the file.

5. Select ‘Keep Original Orientation’ and OK

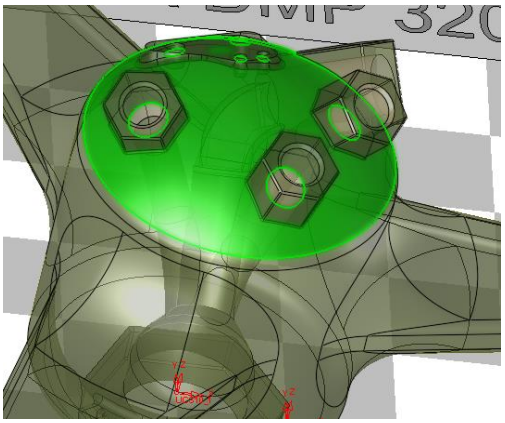


6. The part has now been added to the project.



7. Let’s begin with Surface Lattice. From the Guide Bar select the Create Lattice button and switch to Surface Lattice. 

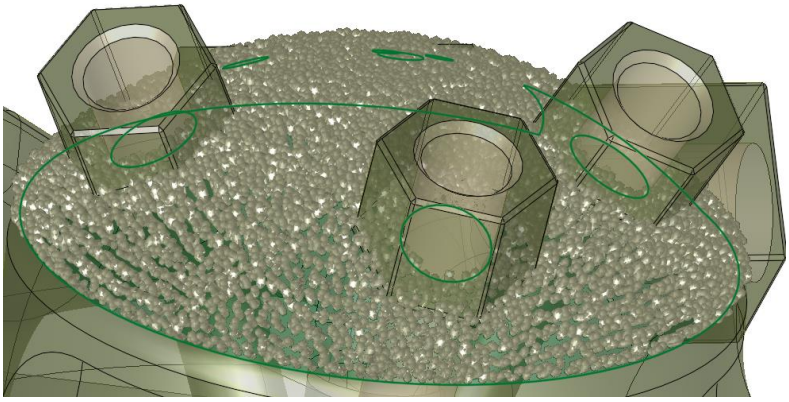
This is a split button, after selection Surface Lattice becomes the predominant option on the Guide.
Pick the upper face of the model and press the middle mouse button to move to the next stage.



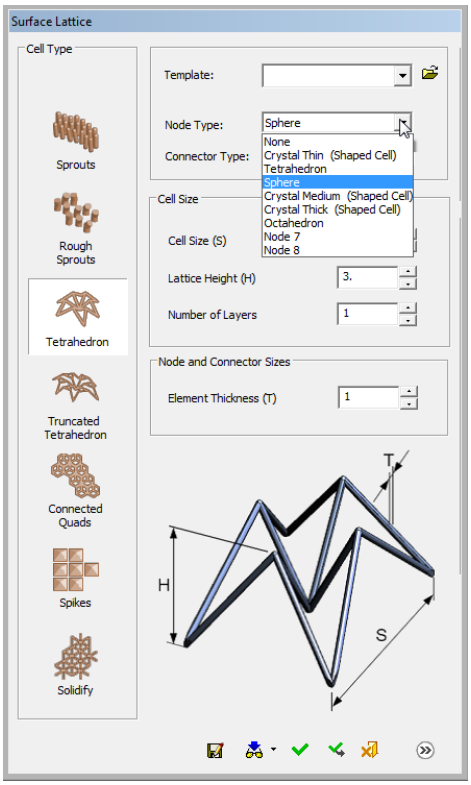
Click the preview button to see the elements added on the face.

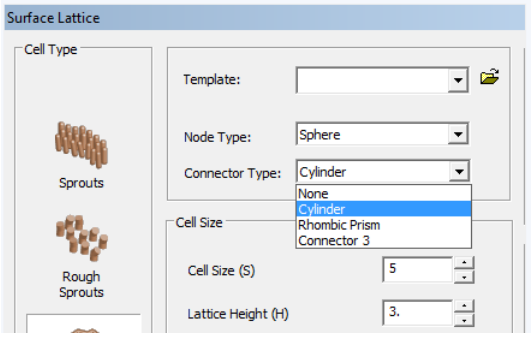
You can control the size of the elements themselves, the Cell size (which is the distance between them) and the height of the elements.

You can also control whether they are smooth (rounded) or sharp and finally you can control the cell type out of the four available cell types.

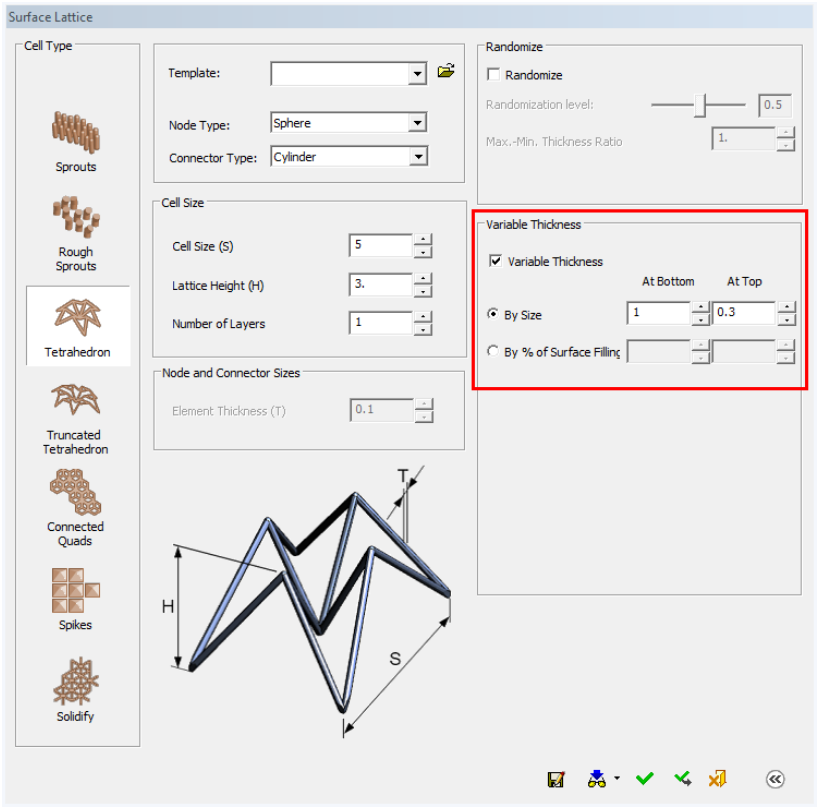


Cell Type=Tetrahedron
Cell Size=5
Lattice Height=3
Number of Layers=1
Element Thickness = 1
Switch between the different 'Node Type' and 'Connector Type' to see the differences. Remember that you should press the Preview button to see the result or set Auto Preview.

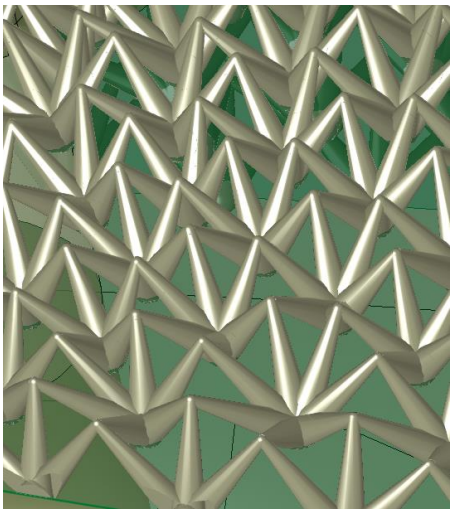




For Tetrahedron lattice shape, you can also set variable element thickness.
Set to Smooth, check on the Variable box and set a top thickness of 0.3.

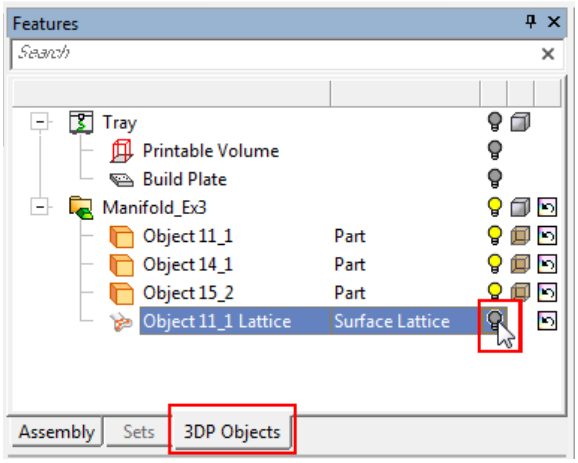


Press the Preview button and examine the result: the lattice gets narrower along it height.



Press OK.

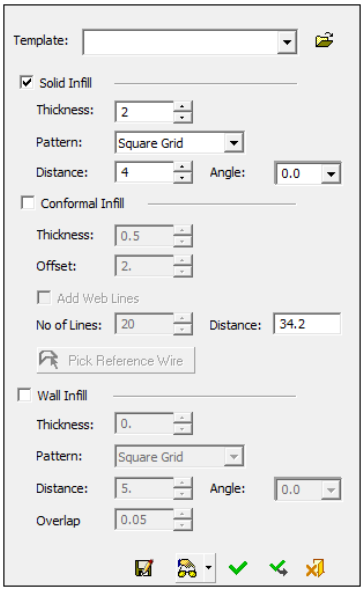
Hide the Surface Lattice Object. This can be done from the the 3DP Objects tab, as you click the object's light bulb.



Part 2 – Infill

Infills are used for creating structures that support the inner volume and save sintering time. The Infill creation dialog is divided into three Infill types: Solid Infill, Conformal Infill and Wall Infill

8. Click the Solid Infill box. This creates a solid inner structure based on the selected predefined pattern.

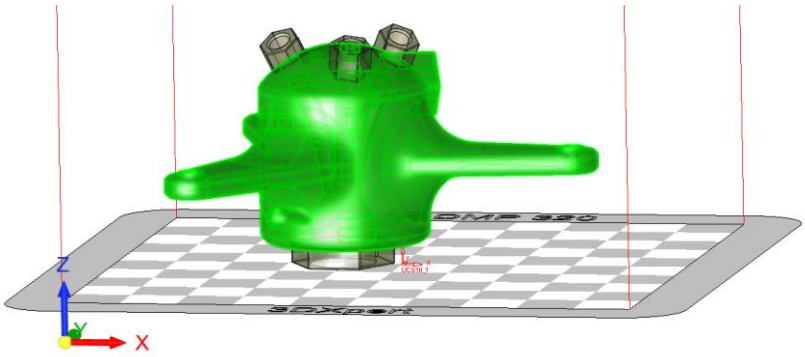


The model used in this exercise is the manifold part used for the first exercises of 3DXpert, only we have closed it and separated it into 3 objects, as we want to keep the upper and lower areas full of material.

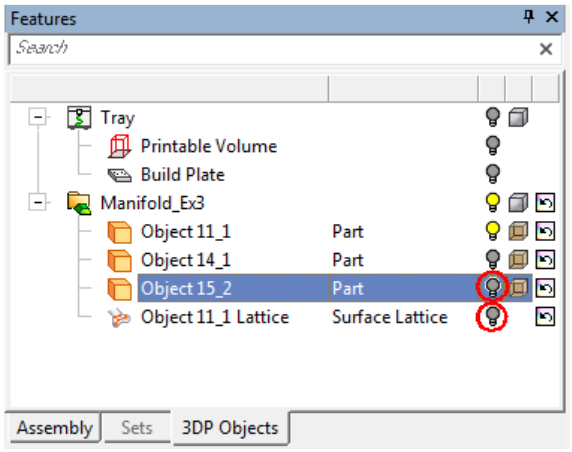
If you are using the original Manifold part, make sure to do the relevant steps as explained in Exercise #2.

Click the Infills button from the Guide Bar. 

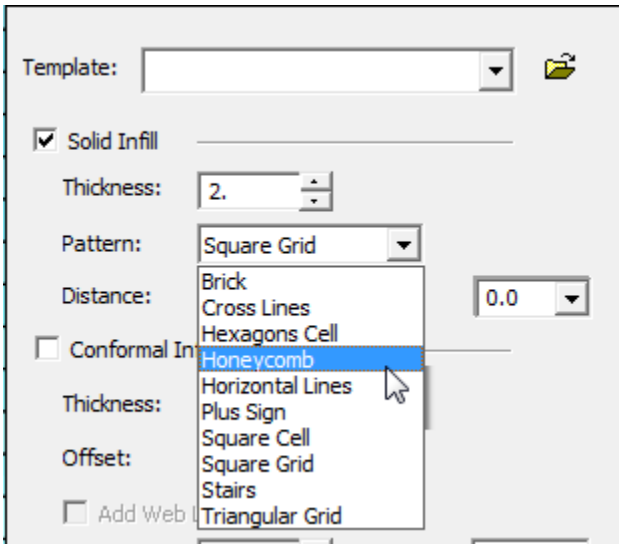
Pick the main object.



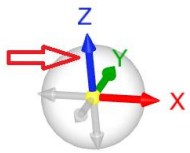
From the 3DP Objects tab, hide the upper and lower objects by clicking their relevant bulbs:

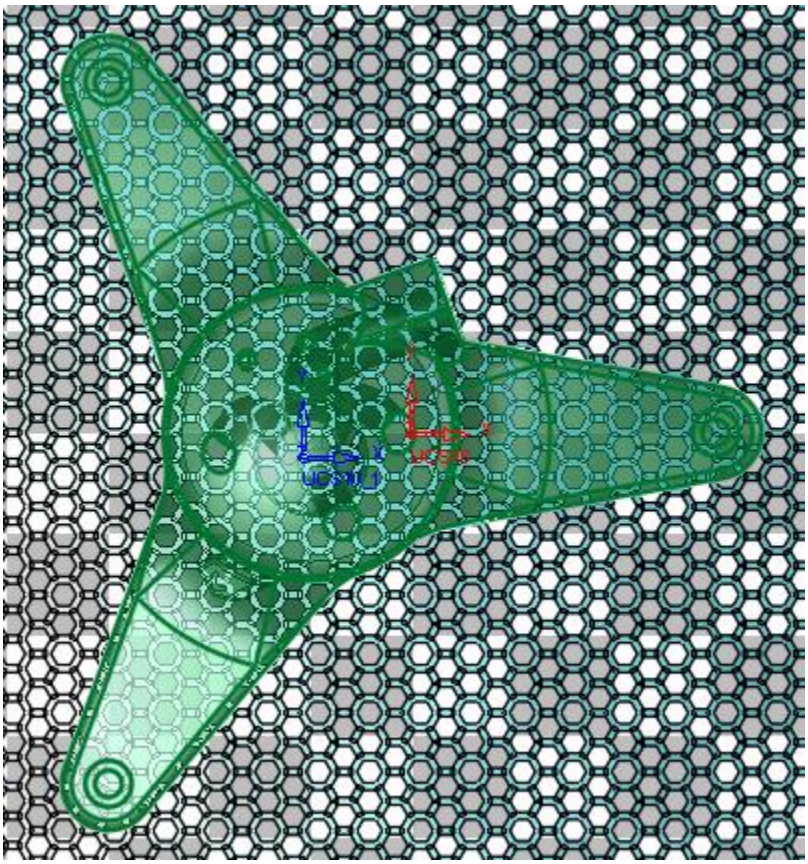


You can choose from various types of Infills patterns. For example, select the Honeycomb pattern. Set the Wall thickness to 2 and the Distance to 8.

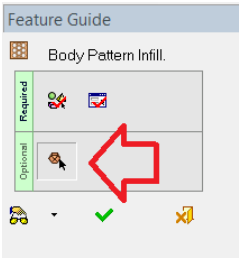


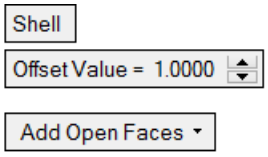
It is convenient to see the pattern and part from top view so click the Z Axis of the dynamic UCS.

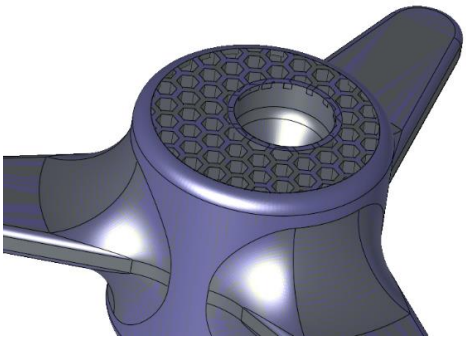


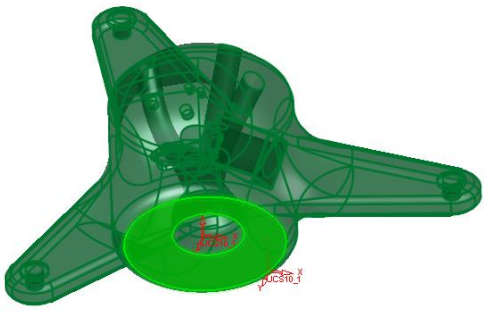


Click the optional Shell button through the Feature Guide, use the option Add Open Faces and set an Offset Value of 1mm. Pick the lower face as the open face. Press OK.

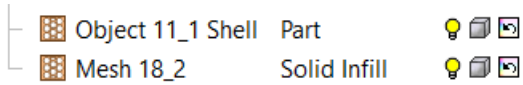








Check the Objects tree for the new part and Infill objects:

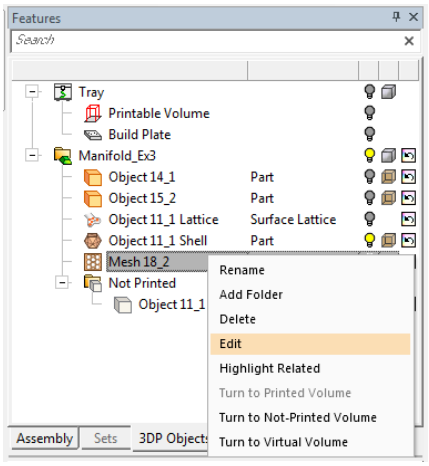


Notice that each has its own technology assigned automatically.

Note: Instead of opening the part, you can add drain holes.

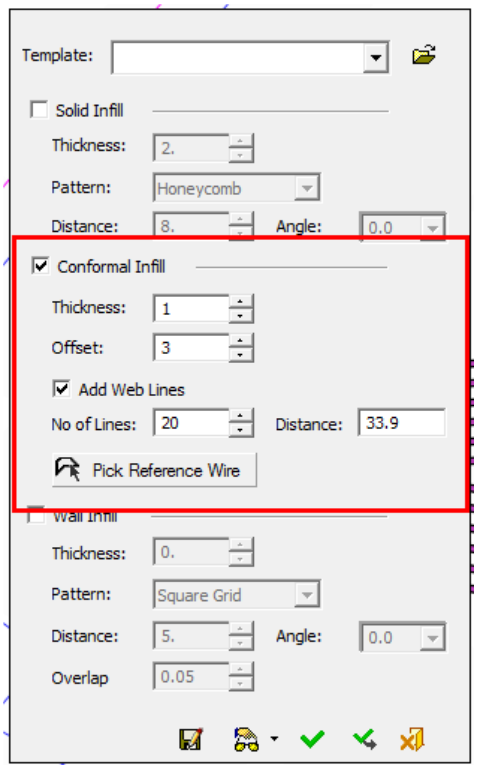
This is similar to the drain holes feature on the Lattice interaction. This is explained in the Volume Lattice Exercise (3DXpert Exercise #3).

9. Edit the Infill feature by right mouse click either of the two objects and selecting Edit



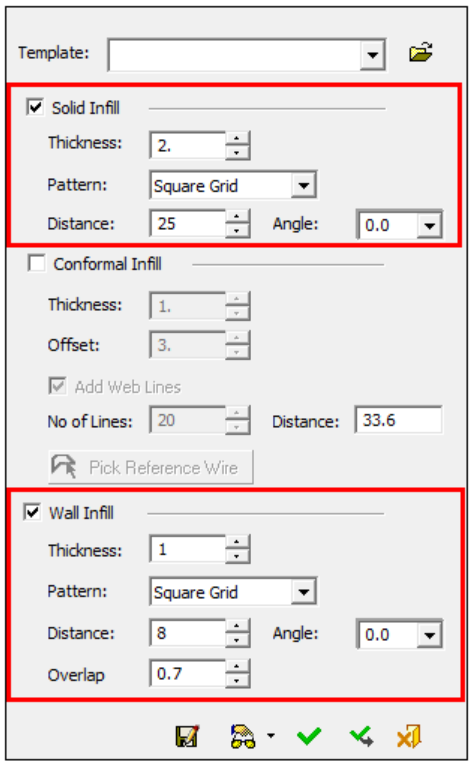
Uncheck Solid Infill and check Conformal Infill. This Infill pattern uses by default the outer shape (silhouette) of the object.

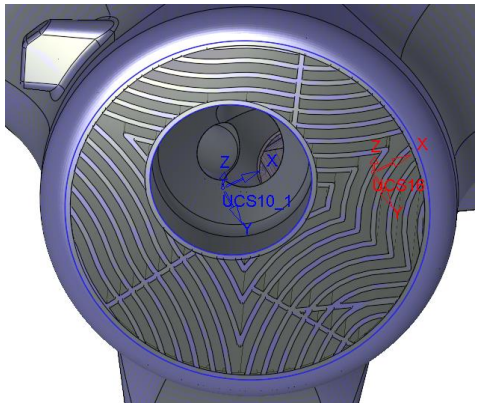
Set a thickness of 1mm and Offset of 3mm, check Add Web Lines (use the default 20 lines) and press OK.



Note: You can change the reference wire by clicking the 'Pick Reference Wire' button and picking a 2D wire so the conformal Infill will be created according to this wire.

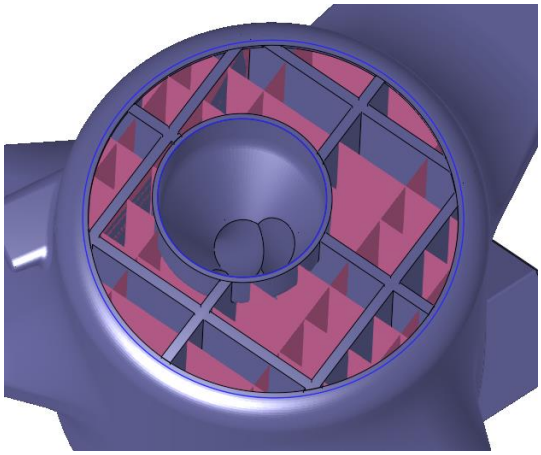
10. Edit the Infill once again.
    Uncheck the Conformal Infill option.
    Check both the Solid Infill and Wall Infill and enter the parameters shown here:



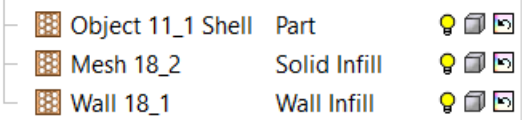


The Overlap parameter controls how much the Wall Infill penetrates the part. Press Ok.

The result is a mix of robust Solid Infill and in-between, intermediate Wall Infill supports.



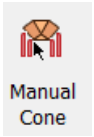
Note that the new part and each Infill is assigned with its own Technology.

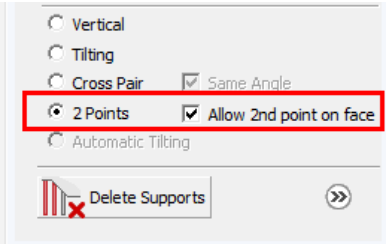


Part 3 – Manual Cones – 2 Points

11. It is possible to easily create individual cone supports, using the part or tray as reference points with tilting. Practically, this offers an easy way to create an angled support using 2 anchor points on the part - a gusset.

    This is done by 'Manual Cone Supports - 2 Points'. Enter the Support Manager cancel the Create region dialog and enter Manual Cone .



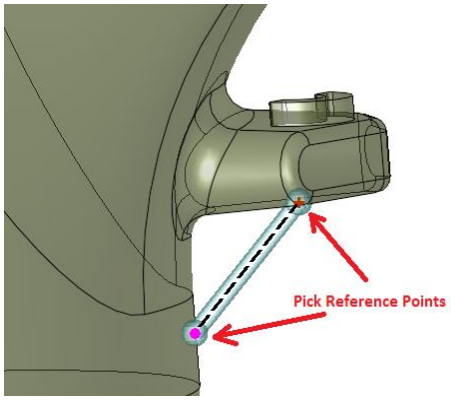


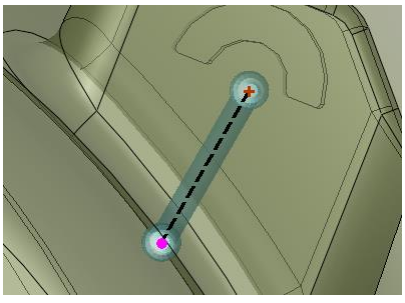
    Click the 2 Points option and check "Allow 2nd point on face:

    Note:

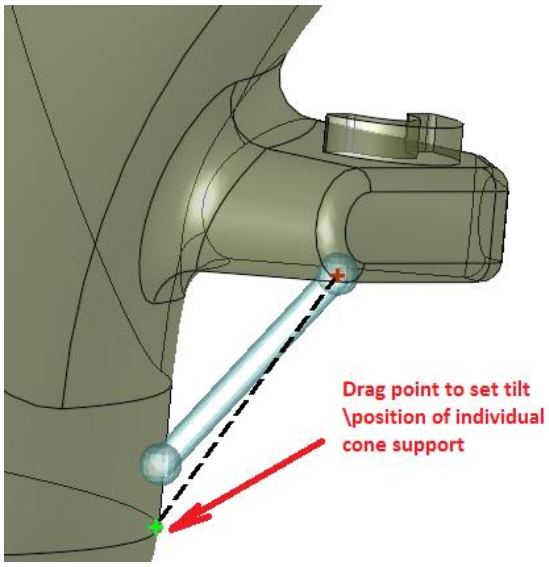
    Commonly it is required to make such cones by 2 points - between part and tray.
    In the 2nd selection the part may interfere with the selection on the tray and therefore selection on part is disabled.
    If a gusset is required, i.e., you need to pick two points on the part, then use the option "Allow 2nd point on face".

    Each cone can be placed between any points picked on the part or the tray. Pick the reference point on the part so that the cone will support the horizontal area:

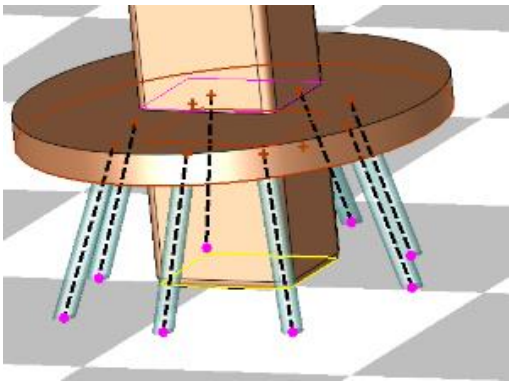




    You can now drag each point to set the tilt or position it anywhere you like.



This method enables you to easily create multiple cones with the same parameters, with different tilting for each cone, as in the following representation:



End of Exercise.