Support Creation

Template Based Creation of Supports

TutorialV3-13,0600,1489,1604(SP6)

In this exercise, we will learn the foundation of **Template based creation of supports**.
This exercise is based on the **Automatic region creation** exercise.

Automatic region creation is done as the first stage in the **Support Manager** tool, in order to identify those regions, curves and points. On these regions, we will build the support structure. The Support Manager is activated from the 3D Printing Process Guide.

To use this command we need to follow few steps (guided):

- Open downloaded **3D Printing Project** from the Initial screen.
- Note that **Automatic region creation** is already done.
- Create some supports from the **Support Manager** using templates

| ! Notice/ Remember		Left mouse button name is **"pick"**
		Middle mouse button name is **"Exit"**
		Right mouse button name is **"Click"**

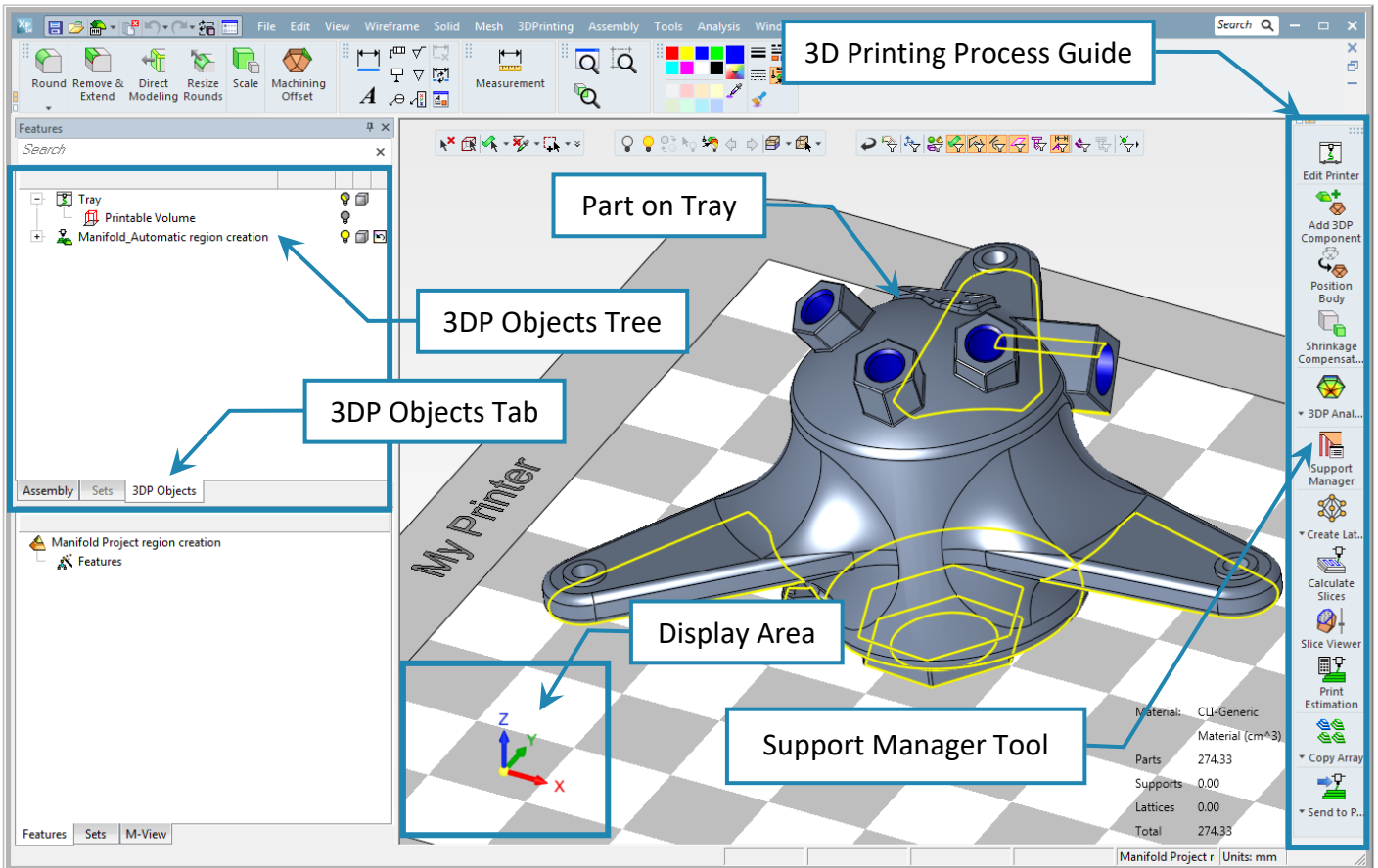1. From the Initial screen *pick* **Open File**.
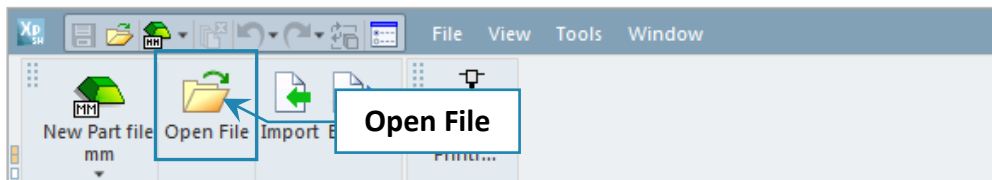
2. This command will open the **3DXpert for SOLIDWORKS Explorer**.
   Load project file **Manifold Project region creation Result** from the same folder where downloaded files.

Note: it is possible to use – if done - the project result from 3DXpert- **Support creation & Verification** - **Automatic region creation** exercise.
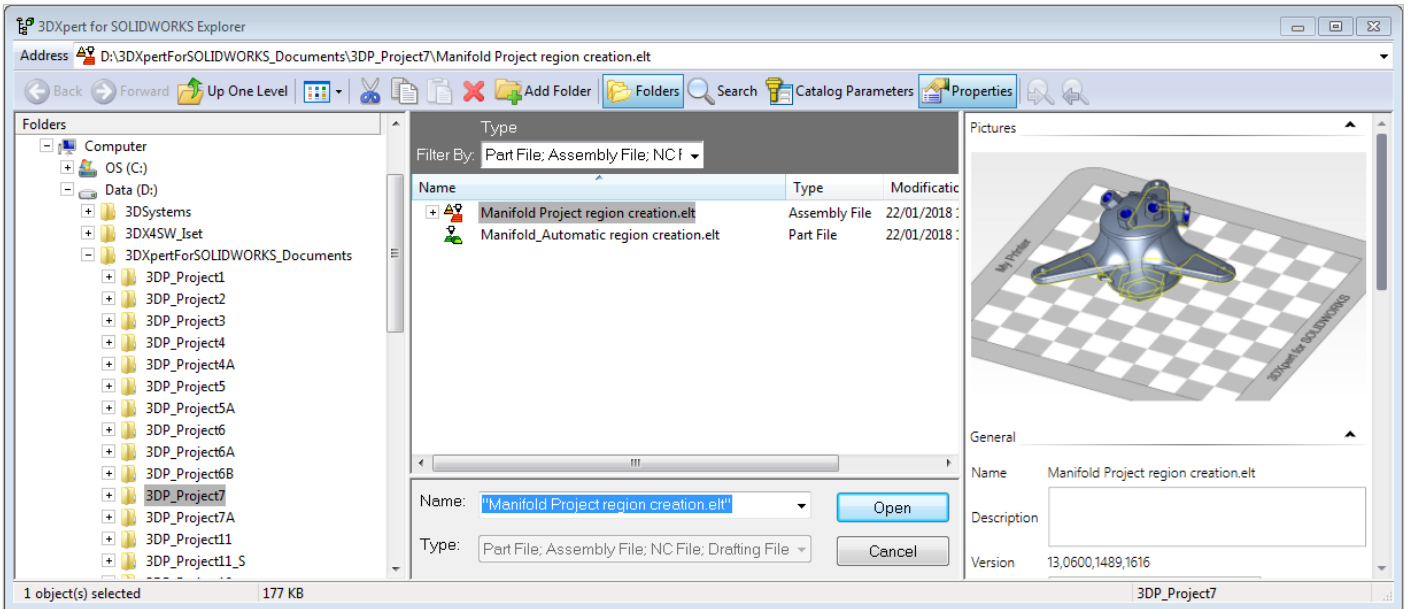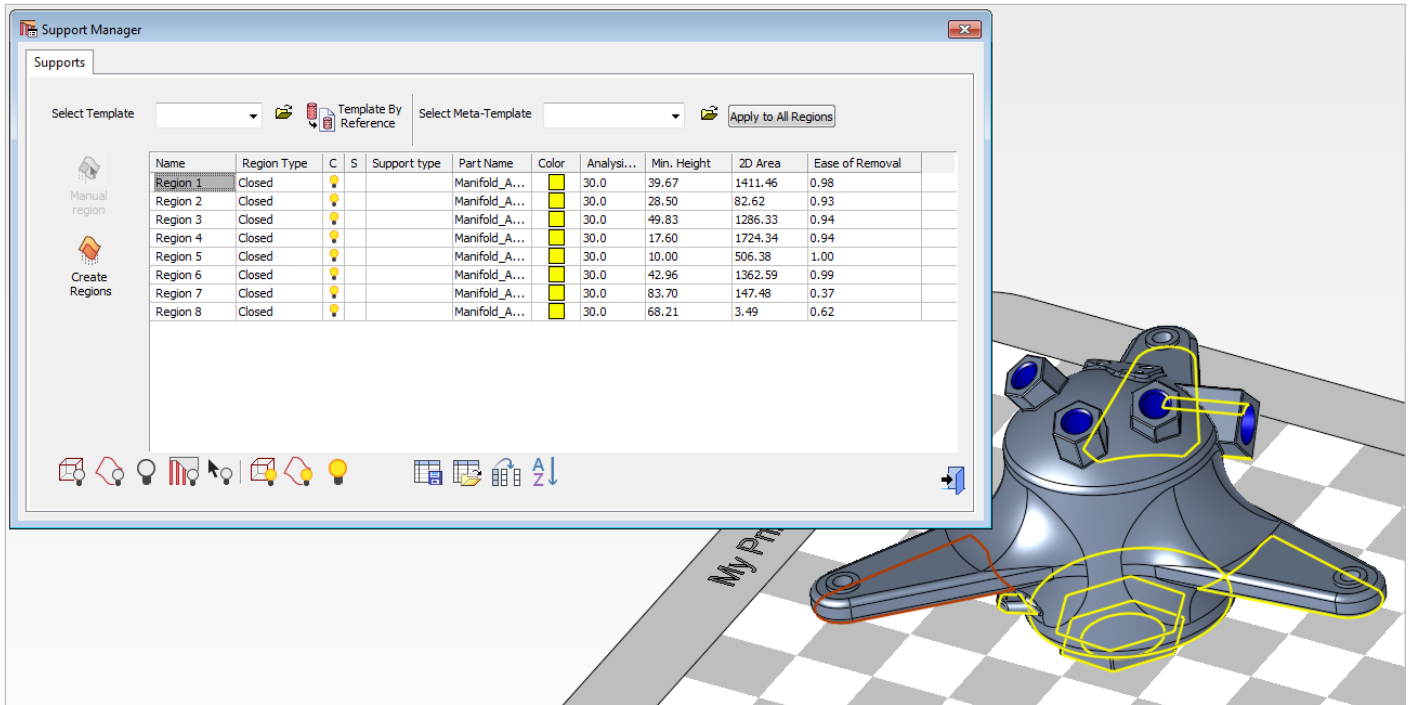
After the file is open, the screen will look like this:
Regions are predefined and marked in yellow.

3. *Pick* the **Support Manager** tool.

Name	Region Type	C	S	Support type	Part Name	Color	Analysi...	Min. Height	2D Area	Ease of Removal
Region 1	Closed				Manifold_A...		30.0	39.67	1411.46	0.98
Region 2	Closed				Manifold_A...		30.0	28.50	82.62	0.93
Region 3	Closed				Manifold_A...		30.0	49.83	1286.33	0.94
Region 4	Closed				Manifold_A...		30.0	17.60	1724.34	0.94
Region 5	Closed				Manifold_A...		30.0	10.00	506.38	1.00
Region 6	Closed				Manifold_A...		30.0	42.96	1362.59	0.99
Region 7	Closed				Manifold_A...		30.0	83.70	147.48	0.37
Region 8	Closed				Manifold_A...		30.0	68.21	3.49	0.62

The **Support Manager** table is open. All regions analyzed at **50°** overhang are listed.

1. **Table of regions** created on this part. Every row describes a different region with its parameters and supports (at this stage, no support is yet defined).
   - **Region Type** indicates whether a region is Closed or Open.
     Some types of supports (like Wall) might change the region from Closed to Open.
   - **Support Type** describes the family name of build support like: **Solid, Wall, Cone, Lattice** and more
   - **Analysis Angle** displays the overhang angle in **Create Region** stage.
   - **Min. Height** displays the minimum distance from tray to lowest point on region.
   - **2D Area** displays the projected area of a region on tray.
   - **Ease of Removal** indication. The scale is from 0 to 1. Where 0 is most difficult to remove and all the range up to 1 which is the easier to remove.

2. **Select Template**. Opens a list of pre-defined supports to apply to selected region. Alternatively, click the Browse button to launch the Load Template dialog. This has the advantage of an image describing each template.

3. **Visibility buttons** for regions and supports.

4. **Dialog settings**. Column chooser, multi sorting table, save and load preferred table look.

5. **Meta Templates**. Automatic use of smart templates to perform single operation to create supports (Meta Templates will be discussed in a separate exercise).

6. **Template By Reference** creates the same supports, as already created on reference (user picked) regions. (with option to edit tilt and shrink)

7. **Create Regions.** Runs Create regions (for example, if the existing regions were deleted by the user). Note that if regions are already created, Create Regions will result in duplicated regions.

> **!** *Please notice:*
> *We recommend to have **the 3DXpert Support Structures – Standard Naming Convention** in hand for a better understanding of supports' templates names.*
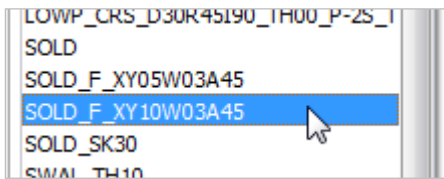
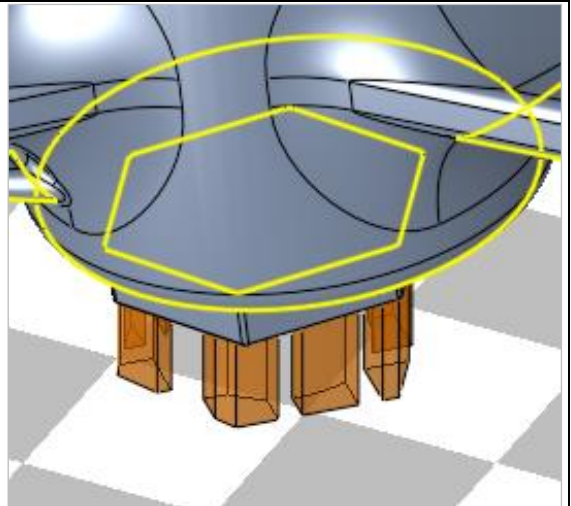4. **Pick Region 5** from the screen or from the table.

Region 5	Closed	💡

This region is located at the center of the part as well as the base of part, so it may require some massive holding – let's look for a **"Solid Support"**.
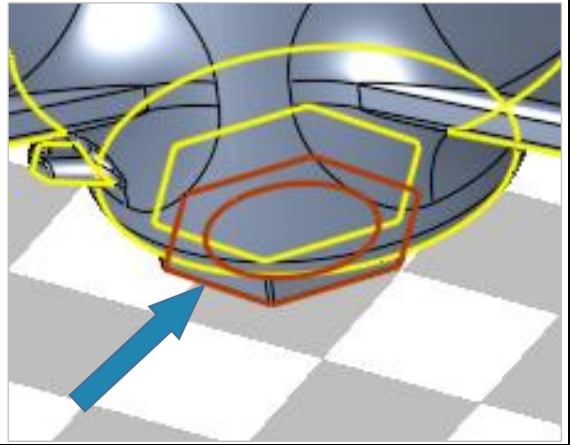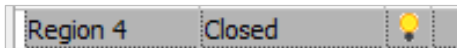

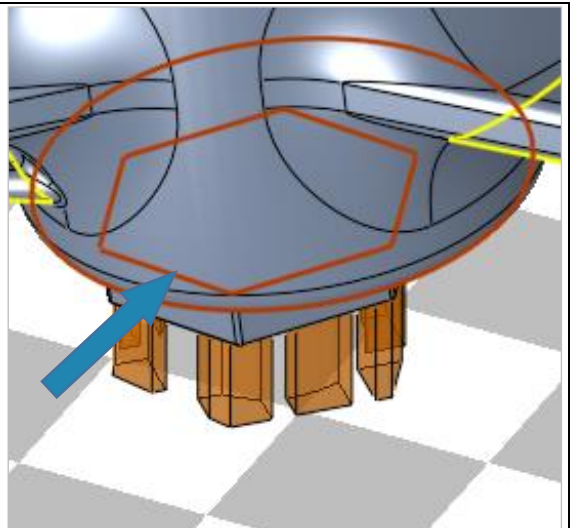From the list of supports in the Select Template **pick SOLD_F_XY10W03A45**

```
LOWP_CRS_D30R45190_TH00_P-2S_T
SOLD
SOLD_F_XY05W03A45
SOLD_F_XY10W03A45    ▣
SOLD_SK30
SWAL_TH10
```

After picking this support, a new support is added on that region.

5. **Pick Region 4** from the screen or from the table.

| Region 4	Closed	💡

This region is also located at the center of the part and may require massive holding, but we can consider it less massive then the first one – let's look for another **"Solid Support"**.

From list of supports in the Select Template **pick SOLD_F_XY05W03A45**

```
LOWP_CRS_D30R45190_TH00_P-2S_T
SOLD
SOLD_F_XY05W03A45    ▣
SOLD_F_XY10W03A45
SOLD_SK30
SWAL_TH10
```
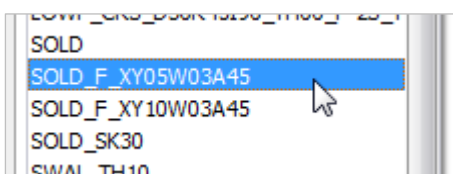
After picking this support, a new support is added to that region.
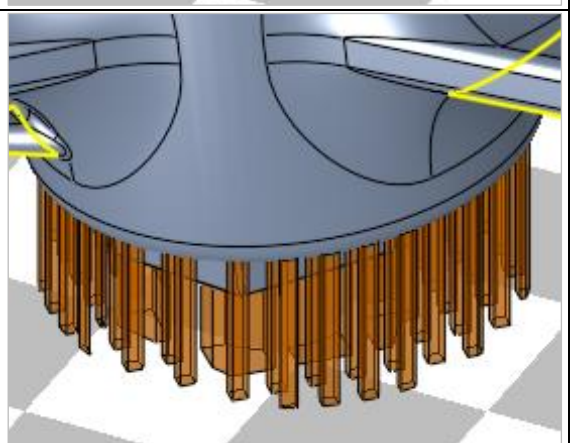
Looking from the bottom (-Z direction) it is possible to see that the first solid support is massive than the second Solid Support.

The names of supports are codded. In this case **SOLD** means Solid support.
The **F** means that the solid have Fragmentation. In general the difference between them is the size of the solid, the first one **XY10** means square of 10 mm and the second one **XY05** means square of 5 mm.

SOLD_F_XY10W03A45

SOLD_F_XY05W03A45
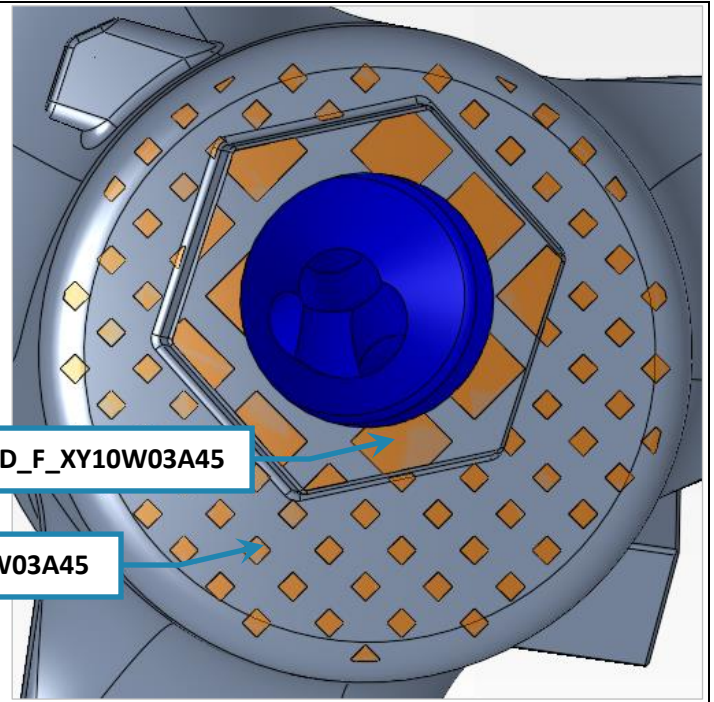
Note on the Table of regions that a bulb was added automatically to indicate that a support was added on this region. The bulb of this region itself is now in **Hide** mode (as this region is no longer required) while the bulb of the relevant support turns to **Show** mode.

Region Type

Type of Support

Name	Region Type	C	S	Support type	Part Name	Color	Analysi...	Min. Height	2D Area	Ease of Removal
Region 1	Closed	💡			Manifold_A...	▯	50.0	35.61	1688.07	0.94
Region 2	Closed	💡			Manifold_A...	▯	50.0	28.30	96.98	0.93
Region 3	Closed	💡			Manifold_A...	▯	50.0	45.37	1551.29	0.91
Region 4	Closed	💡	💡	Solid	Manifold_A...	▯	50.0	17.54	1955.67	0.94
Region 5	Closed	💡	💡	Solid	Manifold_A...	▯	50.0	10.35	546.32	1.00
Region 6	Closed	💡			Manifold_A...	▯	50.0	38.50	1635.55	0.97

Hide or Show Support

Hide or Show Region

3D SYSTEMS

6. *Pick* **Region 3** from the screen or from the table.
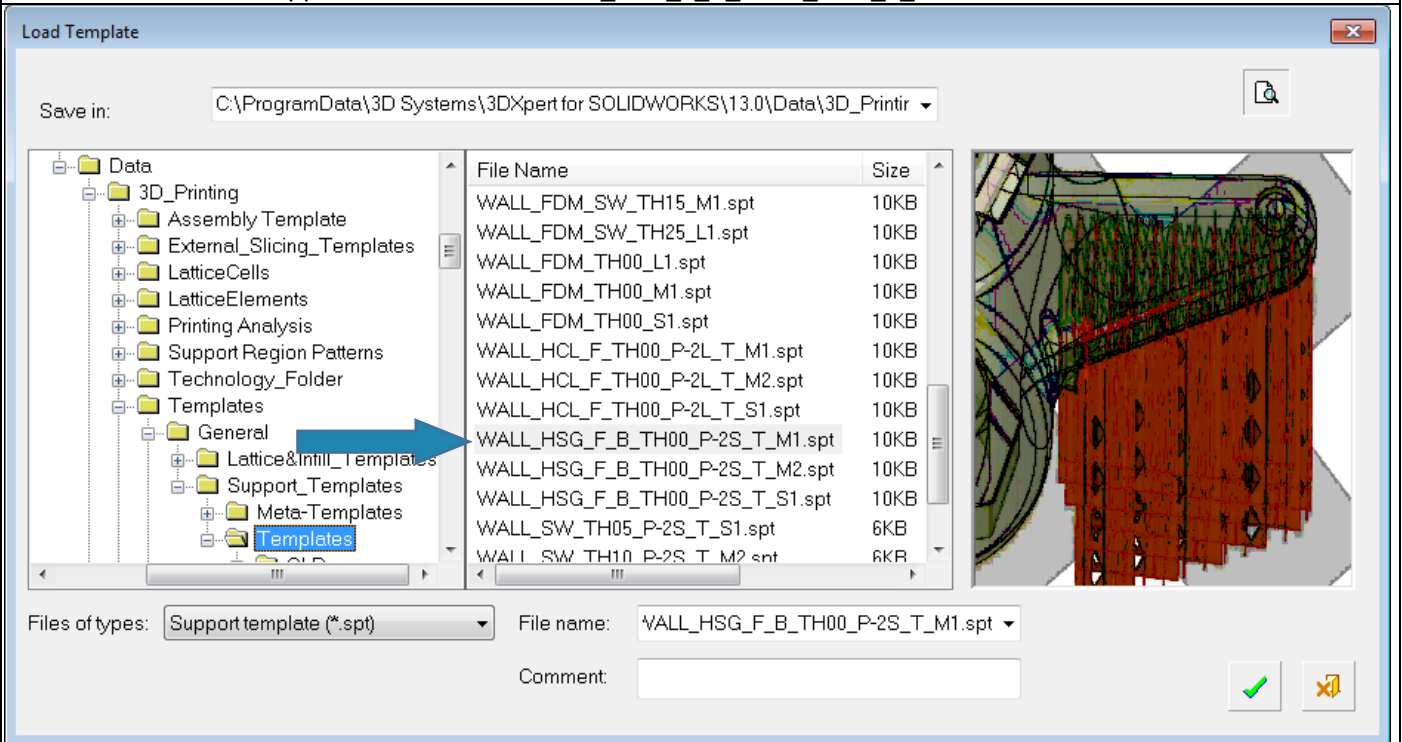

From the table seen above, this region has a **2D Area** (projected area on tray) of around 1550 mm² and is a light structure.

In this case we can consider also a light structure of support - let's look for **"Wall Support"**.
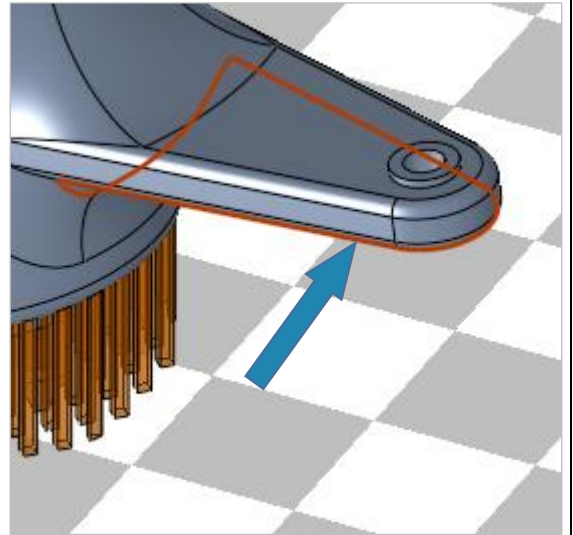
Click the Browse button to launch the **Load Template** dialog.
Pick one of the Wall supports – in this case **WALL_HSG_F_B_TH00_P-2S_T_M1**

This family of supports can give a very good cover for small up to large regions with a good strength and yet easy to remove due to the "**Teeth**" (**T** in the code name) at the touch points with the part.
A view from bottom:
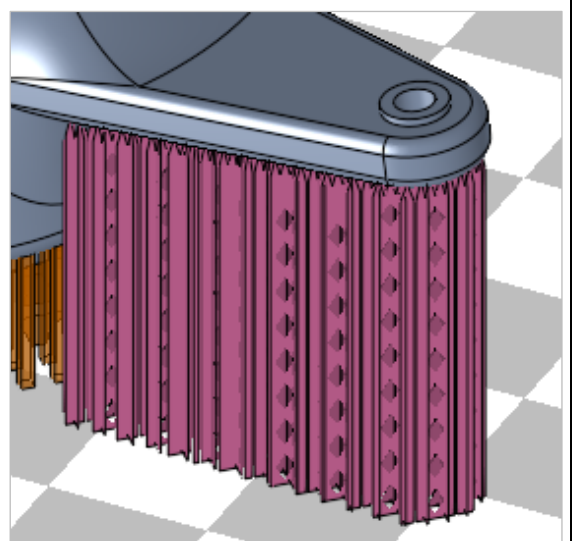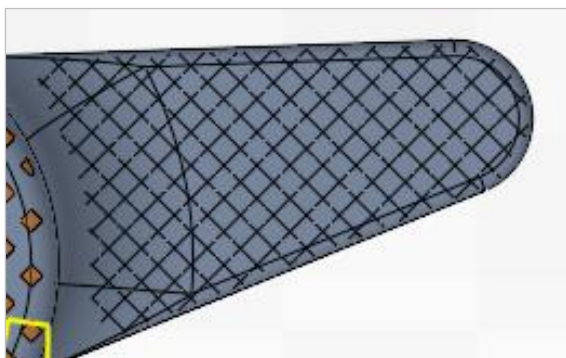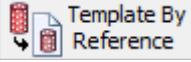
7. *Pick* **Region 1** from the screen or from the table.

This region is also located at the center of the part and may require massive holding, but we can consider less massive then the first one – let's look again for a **"Solid Support"**.
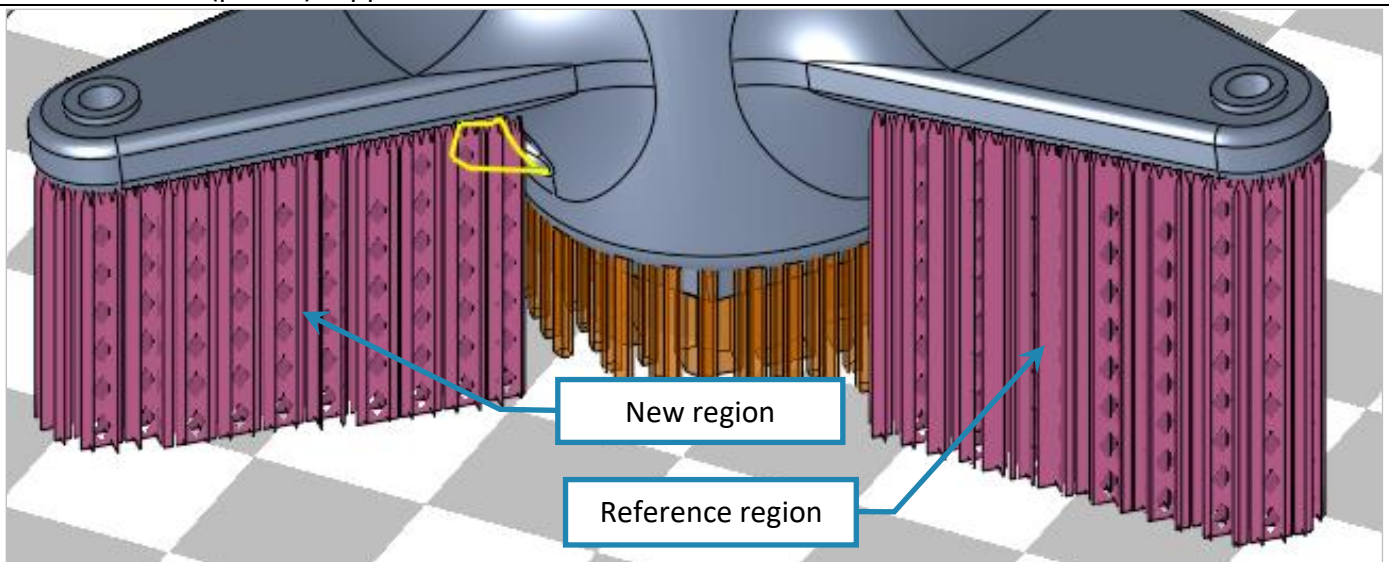
Notice the detail (Region 2) under this wing.
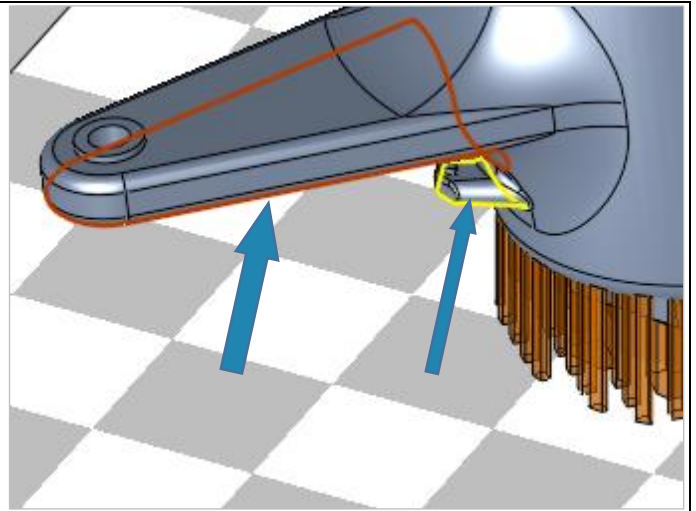
From the **Supports Manager** window *pick* **Template By Reference** [Template By Reference] command then *pick* desired support from screen as reference (Region 3).

This option creates similar supports very quickly.

With this option you can *pick* as many regions as needed, and these will get the support based on the same reference (picked) support.

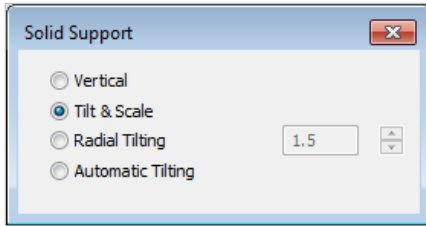

New region

Reference region

Let's have a look from bottom.

Clik on **Region 1** in the table to sub menu. From the sub menu *pick* **Edit Tilting**.
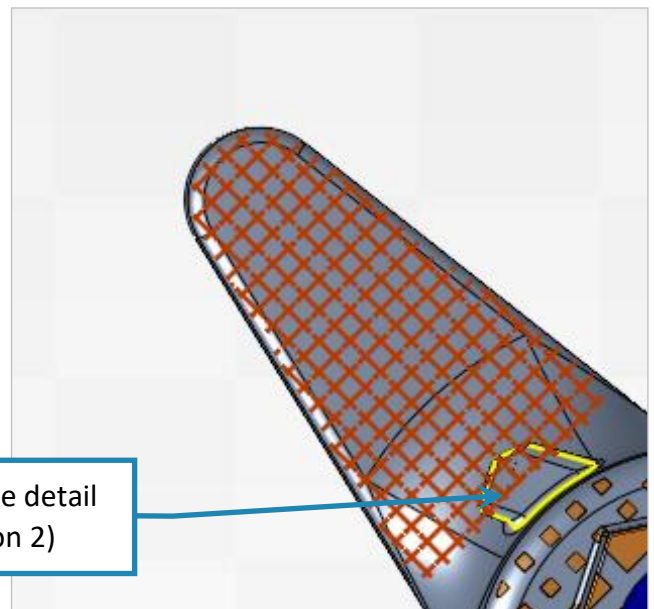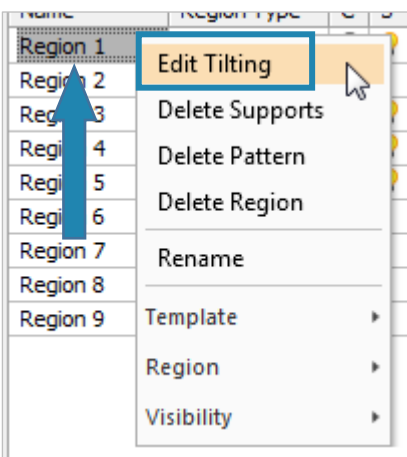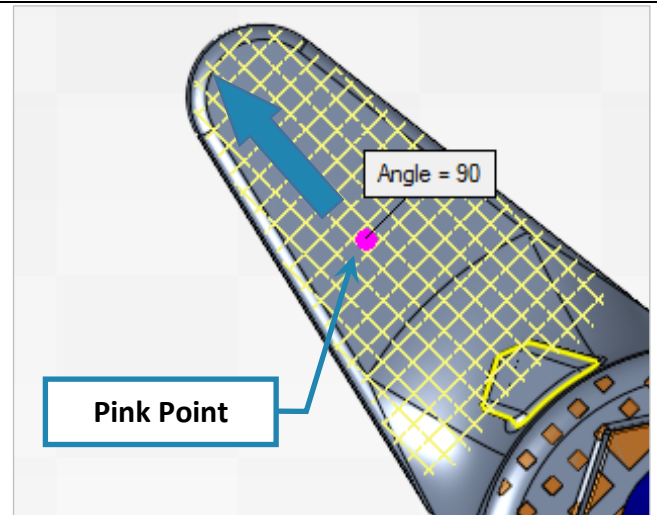

Notice the detail (Region 2)

From the window that was opened *pick* **Tilt & scale**.

This will allow us to move the support on the tray and if necessary to scale and shrink it so it won't gauge with the part.

Pick & drag the **Pink Point** in the arrow direction as shown.


Pink Point

While dragging the Overhang angle is analyzed and result shown on the label attached to the **Angle line**.

Since 50° Overhang angle was used any tilt under this angle might cause a need to support the support itself. In such case happens, the **Angle line** becomes **Red**.

Angle = 42.6
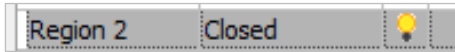
Angle = 58.6

Angle Line
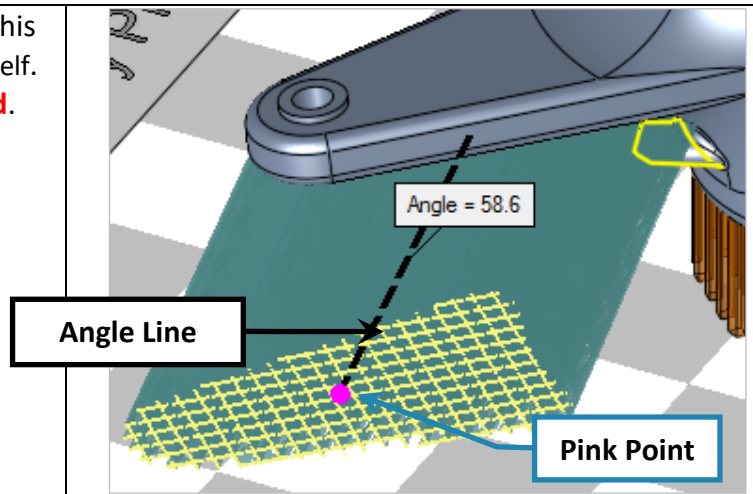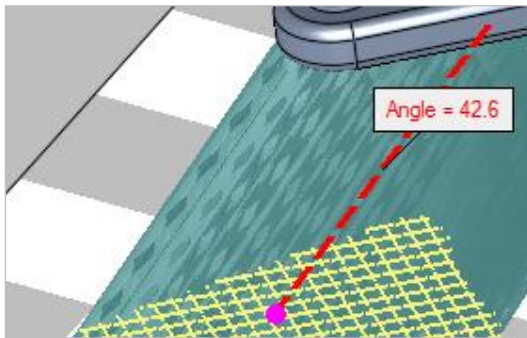
Pink Point

Pick anywhere on the **Angle Line**, a Red Point appear. It is possible to drag it to any direction as well add scaling to the support's section.
It is also possible to pick the point at tray level (Pink Point) to move and scale it as well if needed. By doing so, we released the detail so the support won't relay on it on the upper side.

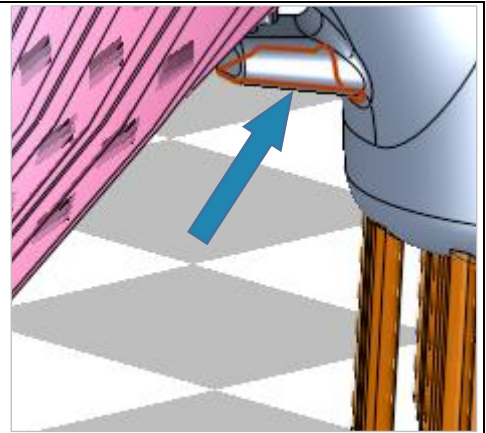*OK* ✔ in Feature Guide to keep tilting.

Angle = 53.7

Angle = 59.7

Scale = 0.8

Scale = 0.6

3D SYSTEMS
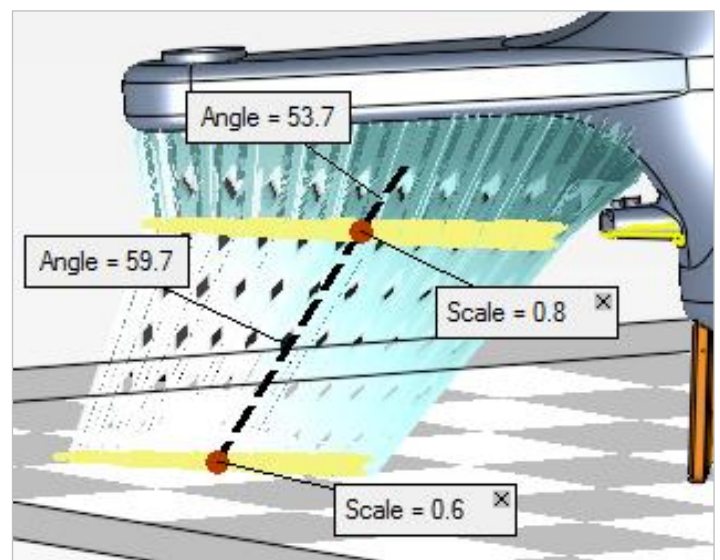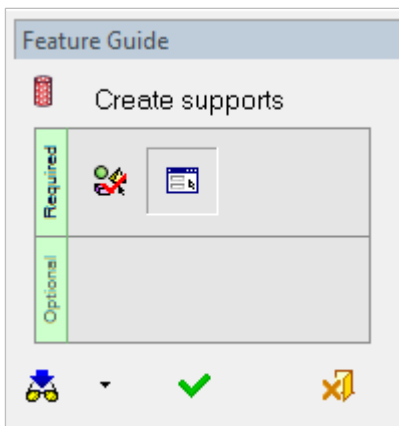
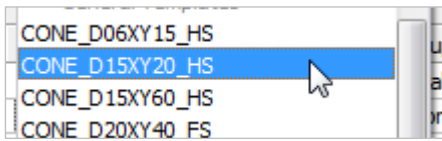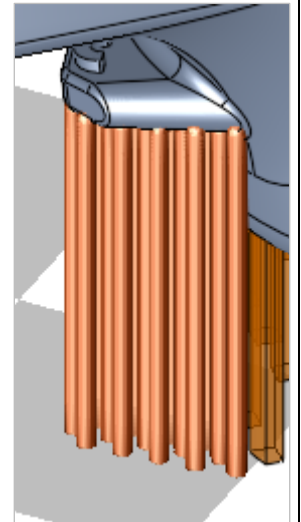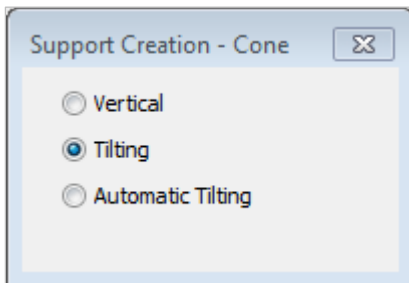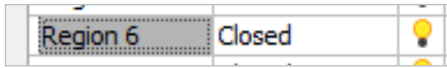|	
8. *Pick* **Region 2** from the screen or from the table. Region 2 | Closed | 💡 This region is small and very light – let's try for that a **"Cone Support"**. For a better view Hide Region 1 using the bulb. Name | Region Type | C | S | Suppo... Region 1 | Open | 💡 | 💡 | Wall	
From the list of supports in the Select Template (or lunch **Load Template** dialog) *pick* **CONE_D15XY20_HS** CONE_D06XY15_HS CONE_D15XY20_HS CONE_D15XY60_HS CONE_D20XY40_FS This support has a ball shape at touch points with the part to ease the removal. After picking this support, a new support is added to that region.	
It is also possible to tilt the Cone Support to minimize touching with the side of the part. **Support Creation - Cone** ○ Vertical ◉ Tilting ○ Automatic Tilting *OK* ✔ in Feature Guide to keep tilting.	 Angle = 70.5
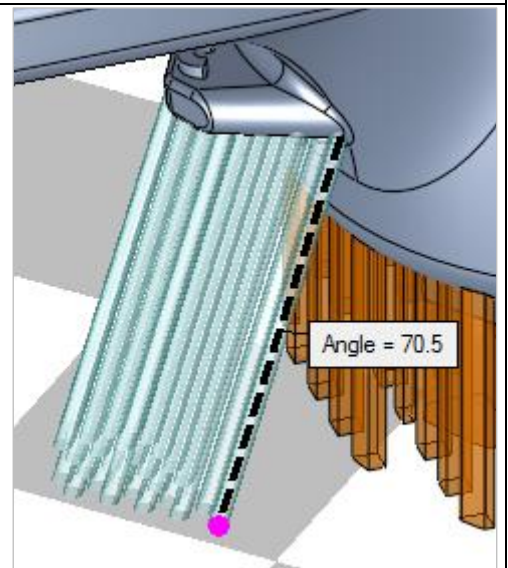
9. *Pick* **Region 6** from the screen or from the table.

Region 6	Closed	💡

Similarly to Region 1, this region has a **2D Area** (projected area on tray) of around 1635 mm² and a light structure.

In this case we can consider also a light structure of support - let's look now for **"Lattice Support"**.
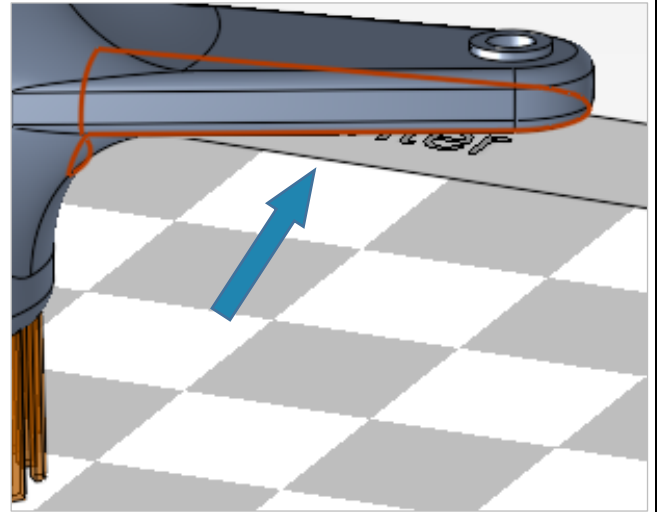
From list of supports in the Select Template (or lunch **Load Template** dialog) *pick* **LATT_B_D05L20**

| CONE_D20XY40_FS |
|---|
| LATT_B_D05L20 |
| LATT_B_D05L30 |
| LATT_B_D05L40 |
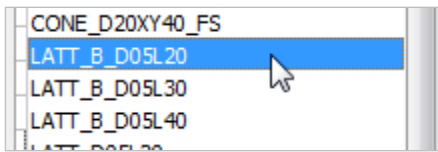
This family of supports can give a very good cover for small medium up to very large regions with a good strength and yet easy to remove because of the **Ball** (**B** in the code name) shape at touch points with the part.

After picking this support, a new support is added to that region.
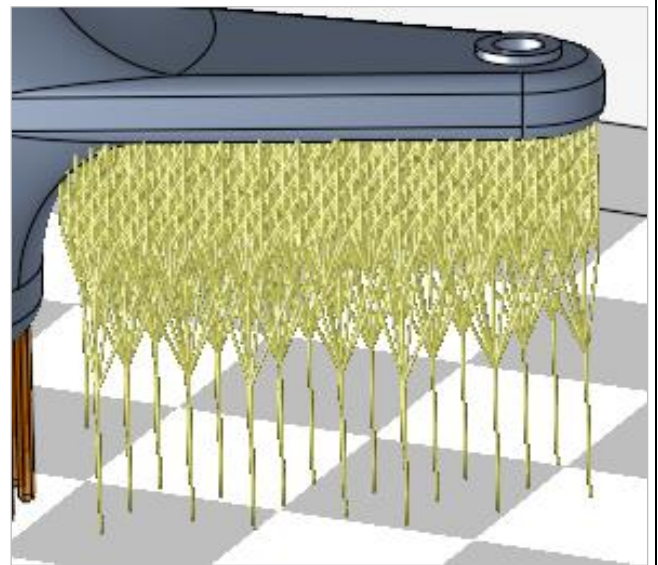
From a close look it is possible to see the light but yet strong structure of the **Lattice Support**.
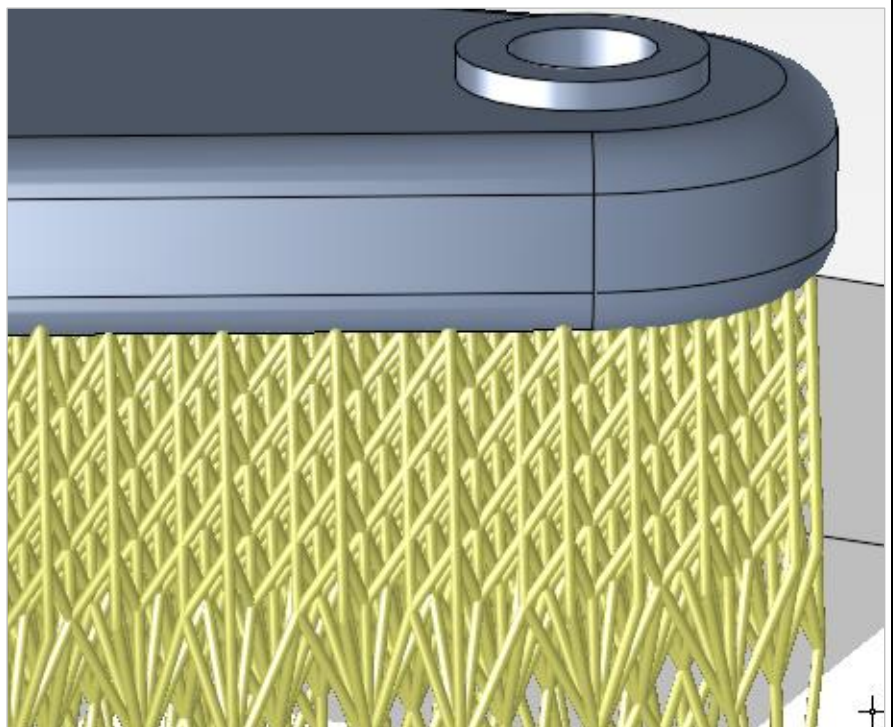
10. *Pick* Regions **7** and **8** from the screen or from the table (only pick in the table requires to hold the CTRL key).
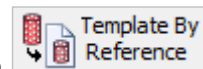
| Region 7 | Closed | 💡 | |
| Region 8 | Closed | 💡 | |

Region 7 is internal and small so it will support itself on the other side of the hole.
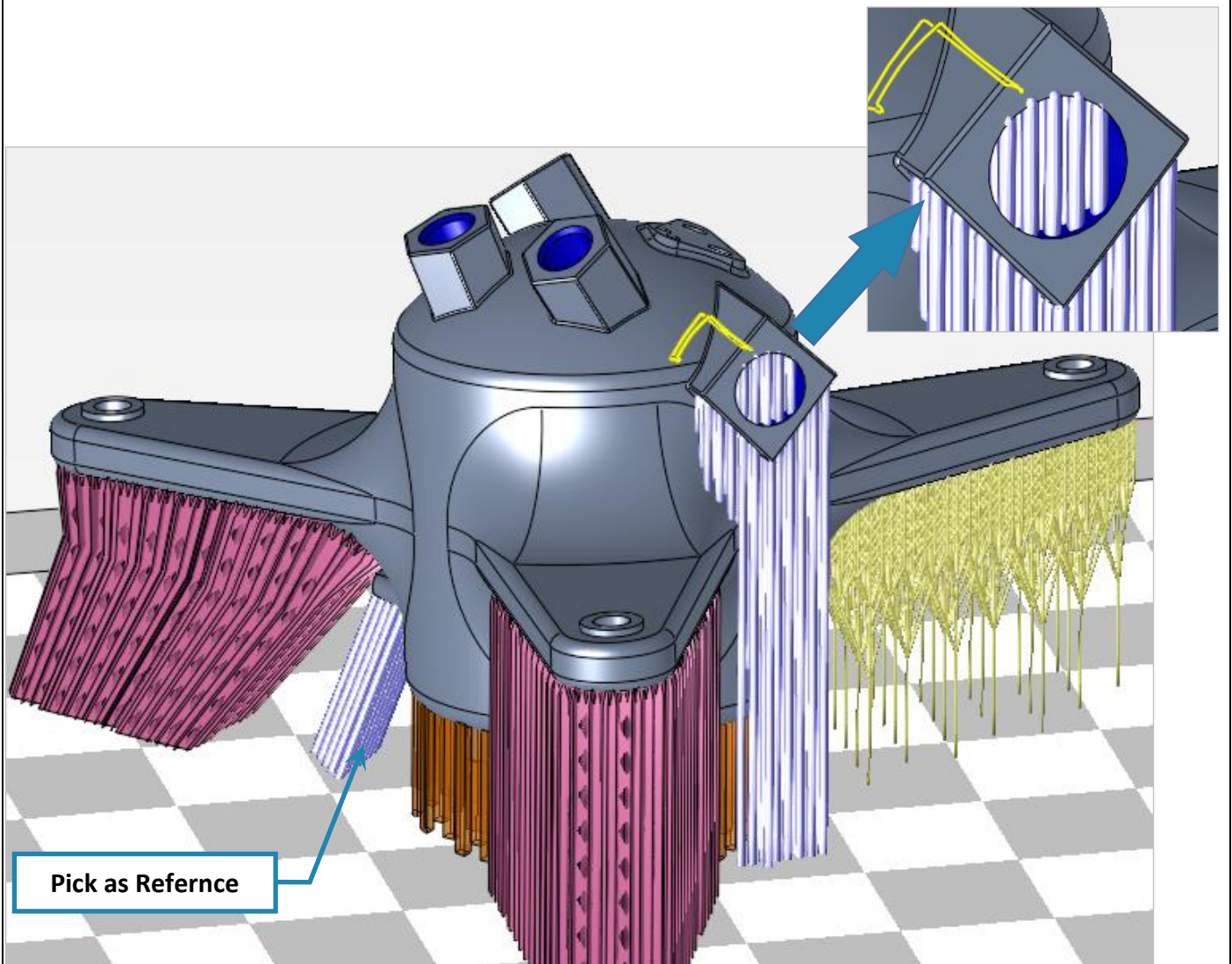**Region 8** is rather small.
Both can have a **Cone Support.**
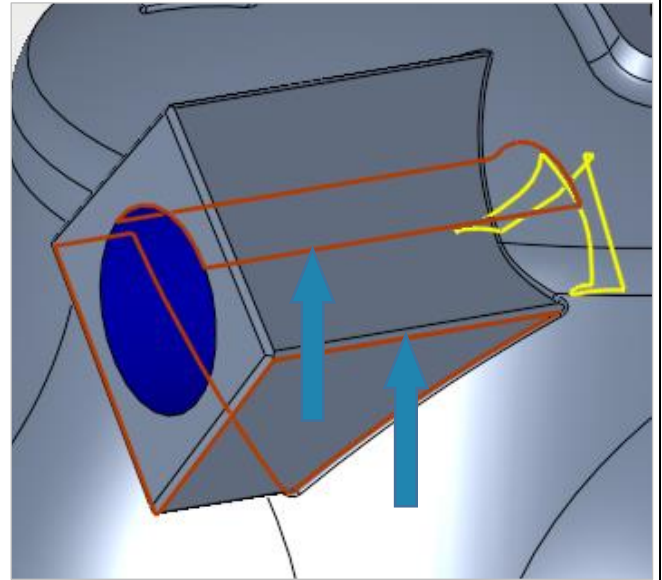
From the **Supports Manager** window *pick* **Template By Reference** [Template By Reference] command then *pick* desired support from screen as reference (Region 2).

Pick as Refernce

11. **Regions 9** is completely internal and hence, removal is very difficult.

| Region 9	Open	💡
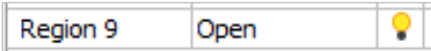
In the **Support Manager** we can see the **Ease of Removal** indication.
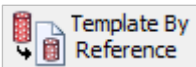The scale is from 0 to 1. Where 0 is most difficult to remove and all the range up to 1 which is the easier to remove.

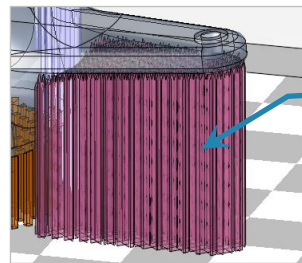| Ease of Removal |
|-----------------|
| 0.94 |
| 0.93 |

This region got 0.94, so a light support like the first one we use will be good and reachable from both sides of the hole. This support has **Teeth** on both sides.
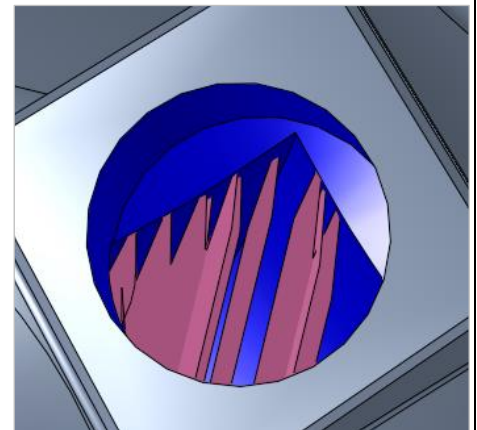

From the **Supports Manager** window *pick* **Template By Reference**
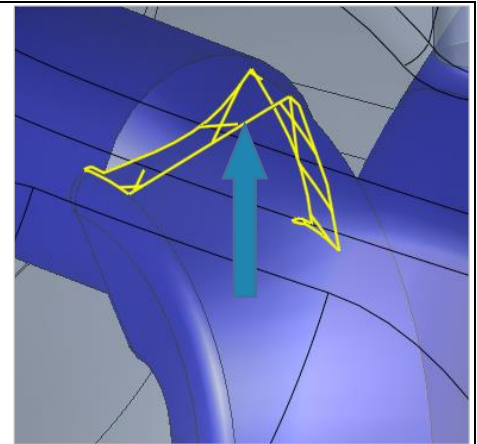
Template By Reference command then *pick* the required support from screen as reference (Region 3).
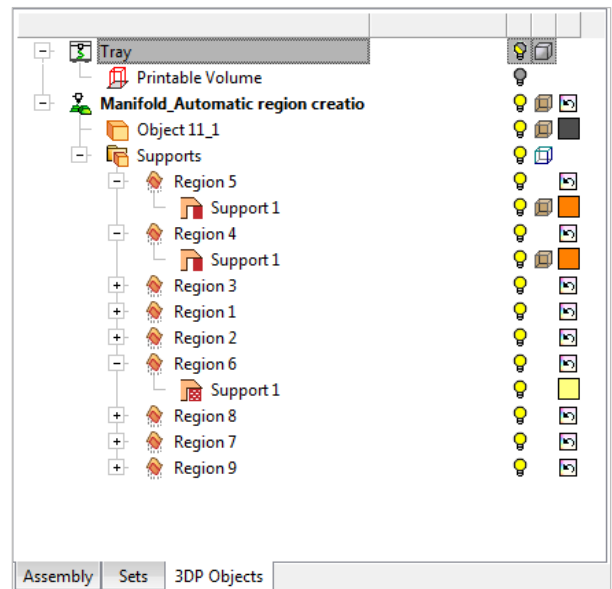

Pick as Refernce

Notice on the left side on the **3DP Objects Tab,** each region and support that was build get its own leaf on the Objects tree.
From that row it is possible to hide or show, to set a render mode (Solid, Transparent, and Wireframe) and to change color.

End of Exercise.