



# 3DPRINTING EXERCISE

## Meta Templates

Tutorial\_V4: 3DXpert 16 Beta release

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In this exercise, we will discuss 3DXpert's automatic support generation.

This automation is based on pre-defined support templates.

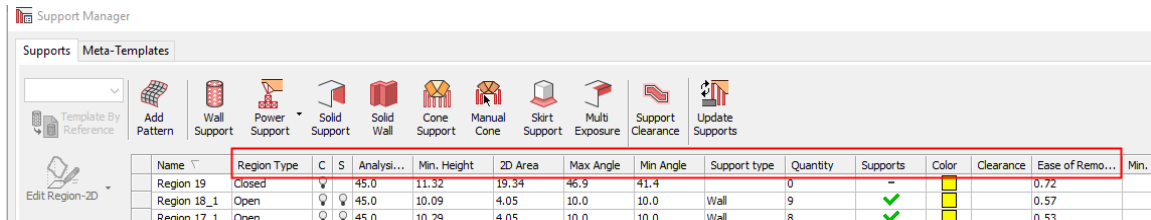
The creation of support templates is explained in a separate exercise. In short, you can save the creation rules of an existing support, including its region (for example, if you use a pattern), and apply it on any other region. You can apply a support template on several regions in one operation.

Meta Templates adds to this an additional level of automation.

You can apply your pre-defined support templates on your part, based on rules, such as the region's Height, Area, Min. Angle and so on.

This method can help you achieve a fast support generation. For example, you can quickly add basic supports using Meta Templates and then continue working on the remaining special regions.

To see the list of items on which you can base your rules, simply open the Support Manager. Any one of the support region's parameters appearing in the table can be used as part of a rule.

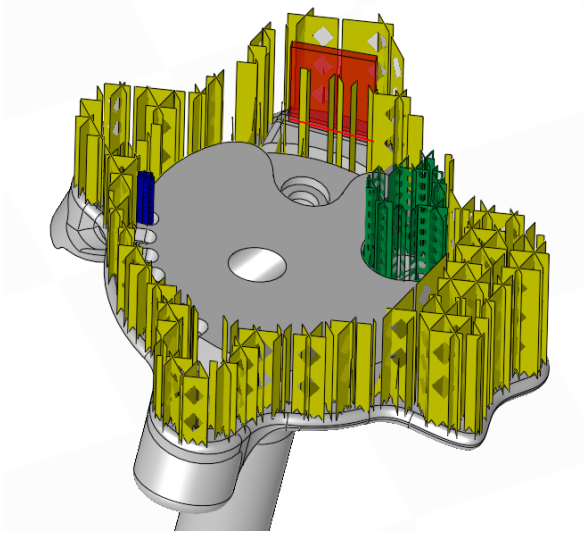


Name	Region Type	C	S	Analysis...	Min. Height	2D Area	Max Angle	Min Angle	Support type	Quantity	Supports	Color	Clearance	Ease of Remo...	Min. 1
Region 19	Closed	✓			45.0	11.32	19.34	46.9	41.4	0	✓	Yellow		0.72	
Region 18_1	Open	✓	✓		45.0	10.09	4.05	10.0	10.0	9	✓	Yellow		0.57	
Region 17_1	Open	✓	✓		45.0	10.29	4.05	10.0	10.0	8	✓	Yellow		0.53	

Let's see how.

## Open a ready-made 3DP project

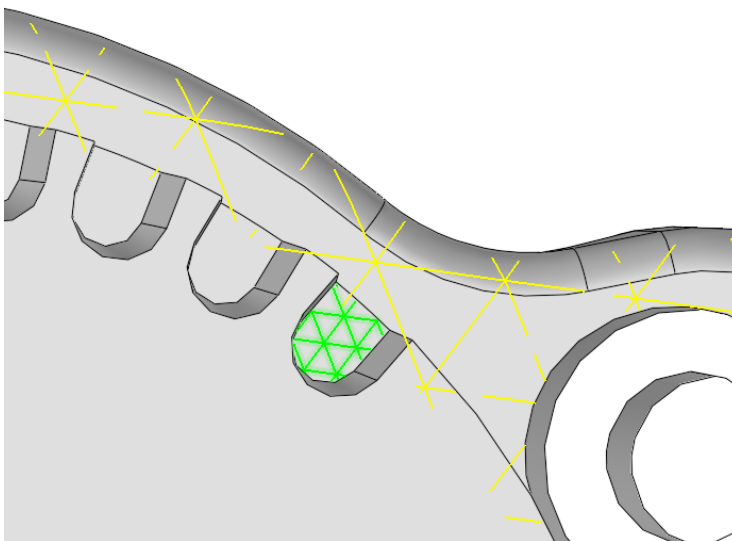
1. Open up the ready-made 3DP project in the directory "**01 Med - Prototype with Supports**" and open the **Support Manager**.



Various supports were already added to this part. Let's examine the supports which are currently visible. There are four different supports:

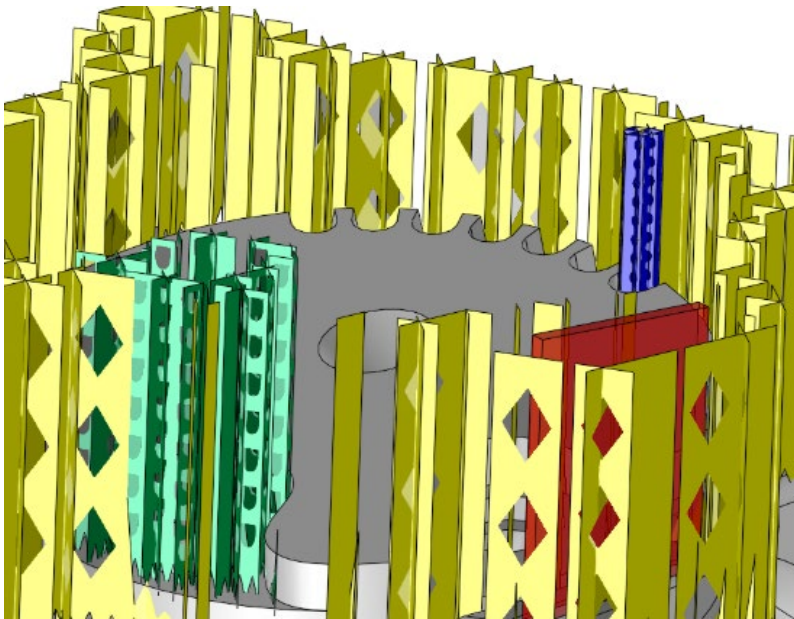
- One Solid Wall support (in red)
- Three Wall supports (yellow, green and blue)

These three wall supports differ in the size of the pattern in the XY plane as well as the wall itself.



A smaller pattern used for the smaller region.

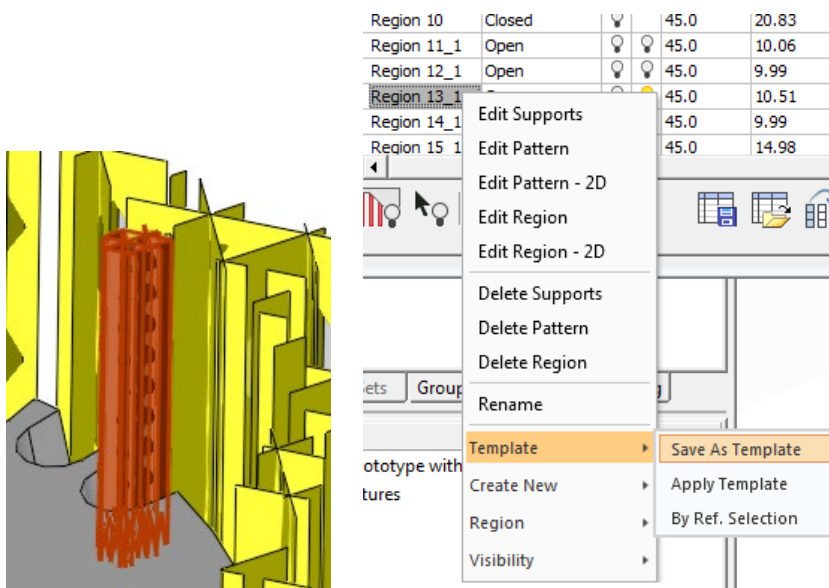
Note the different wall textures for each region:



## Save template for each of the supports

So first, let's save a template for each of these four supports. (Normally this operation is done once so that you will create a 'catalog' of support templates.)

- Pick each support, **right mouse click** the highlighted region on the table and select **Template-Save as Template**

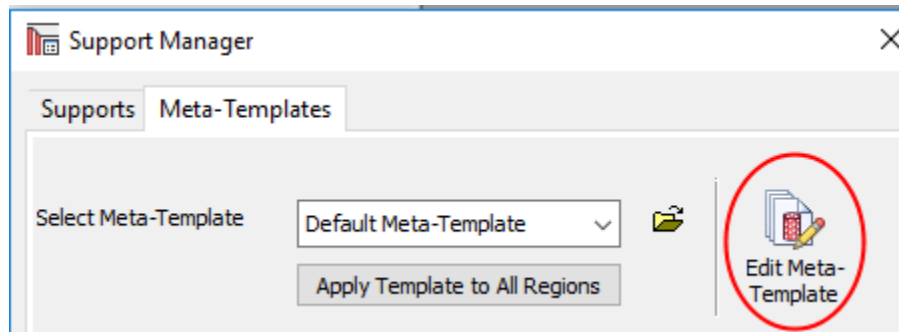


Files of types: Support template (\*.spt) File name: Wall - small area

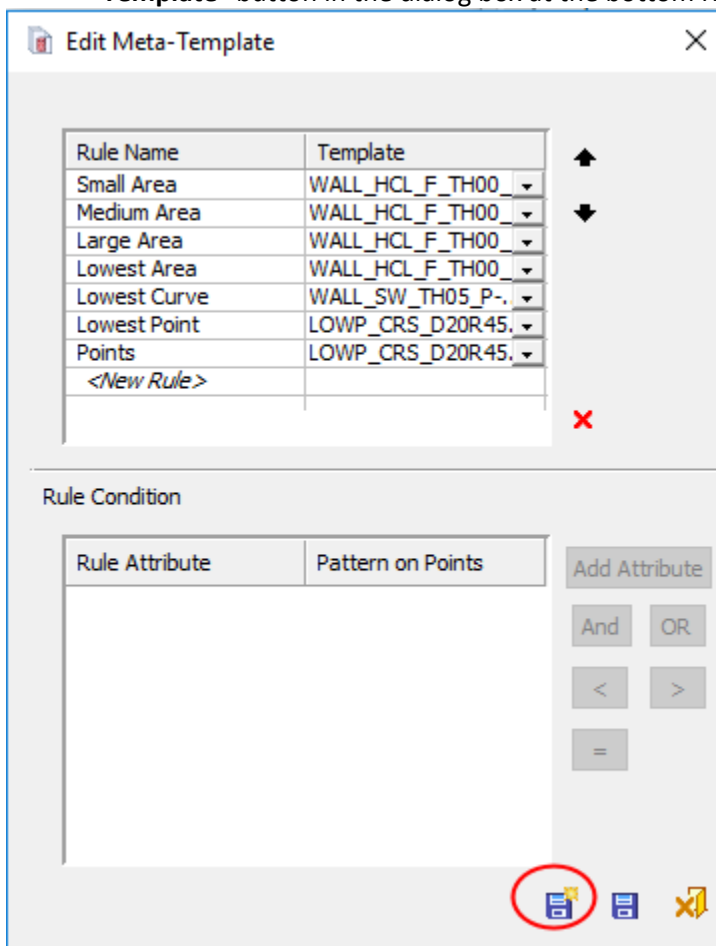
- Keep the systems default support template location.  
**Template files are stored in - C:\ProgramData\3D Systems\3DXpert\16.0\Data\3D\_Printing\Templates\General\Support\_Templates\Templates\**
- Name the templates as follows:
  - Save the **red Solid Wall** support with the name "**Solid Wall 1mm wide**".
  - Save the **blue Wall** support with the name "**Wall - small area**".
  - Save the **green Wall** support with the name "**Wall - medium area**".
  - Save the **yellow Wall** support with the name "**Wall - large area**".

## Edit Meta Template

5. Still in the Support Manager, enter the tab "Meta Templates". Select the Default Meta Template and press the "Edit Meta-Template" button:



- To avoid modifying the existing (default) Meta Template, click the "**Save new Meta-Template**" button in the dialog box at the bottom right.

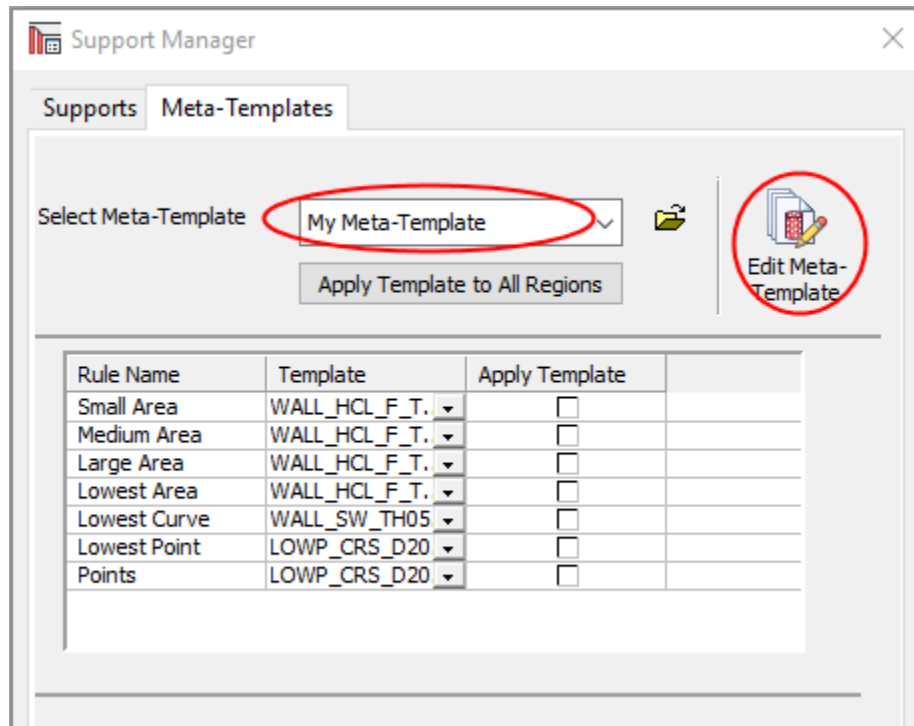


This opens up the browser.( ProgramData\3D Systems\3DXpert\16.0\Data\3D\_Printing\Templates\General\Support\_Templates\Meta-Templates\)

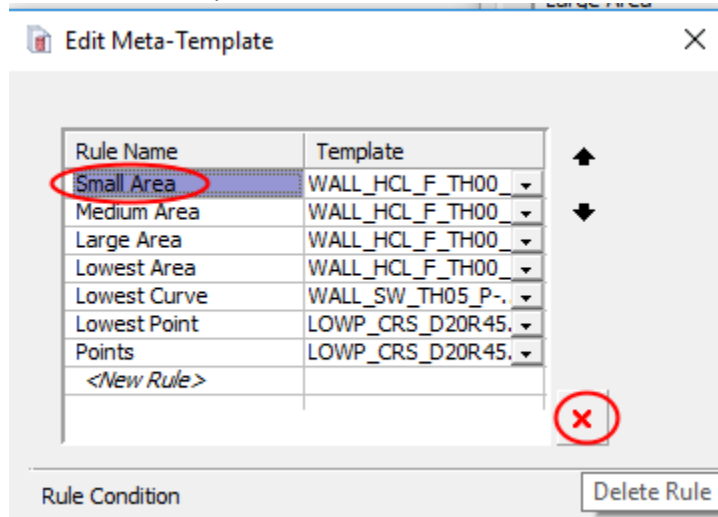
Type a name for a new Meta Template; let's call it "**My Meta-Template**".

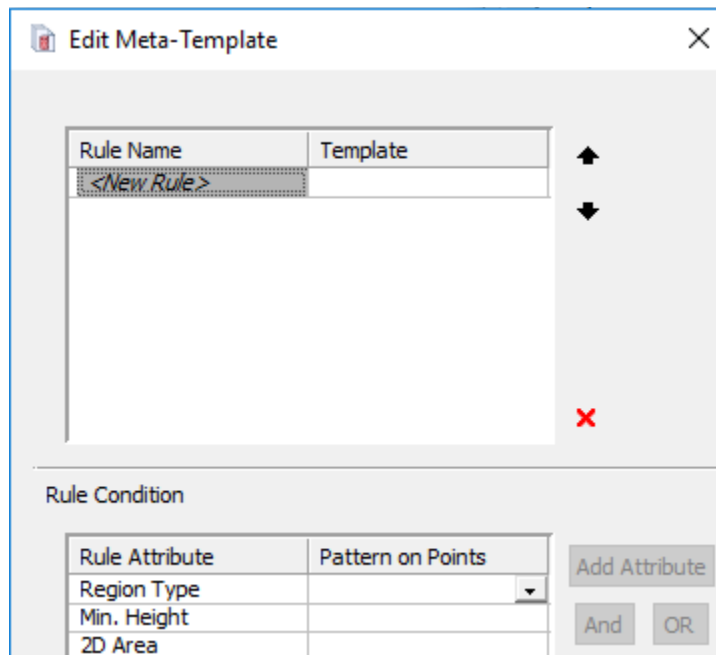
- Now that we have a new Meta Template, select it from the Meta-Templates' list and click on the "**Edit Meta-Template**" button again to edit it.





8. Delete the existing rows, so that we can define completely new rules. Select a rule and press the "Delete rule" button.

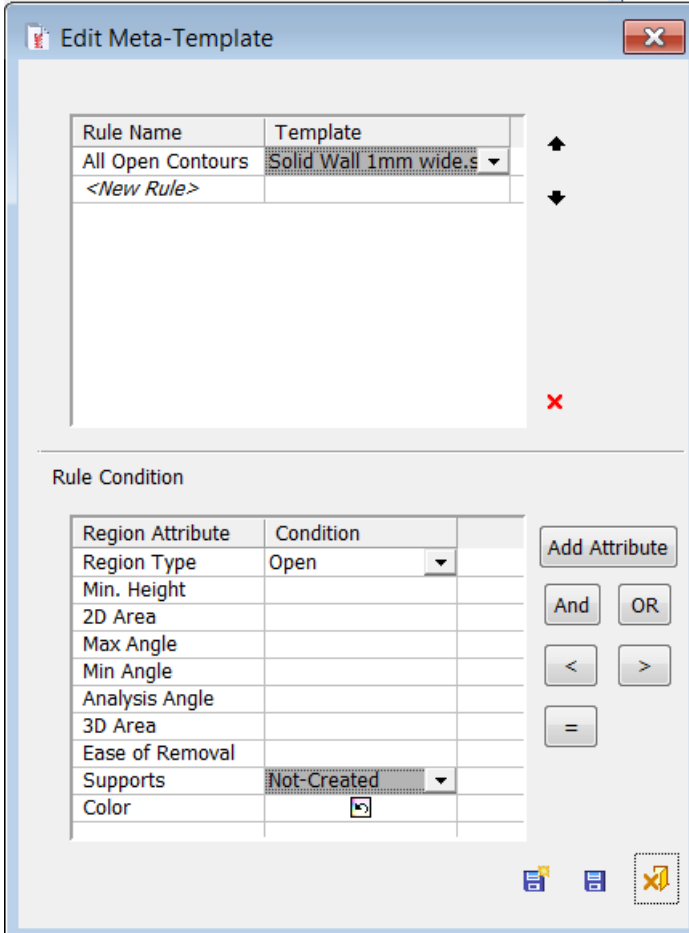




We will now define a new rule, which is based on a Solid Wall template.


9. Double-click <New rule> and enter "**All open contours**". You can now define the rule to apply this template automatically.

We wish to apply the "**Solid Wall 1mm wide**" pattern to all open contours.



Rule Name	Template
All Open Contours	Solid Wall 1mm wide.s
<New Rule>	

Region Attribute	Condition
Region Type	Open
Min. Height	
2D Area	
Max Angle	
Min Angle	
Analysis Angle	
3D Area	
Ease of Removal	
Supports	Not-Created
Color	

10. Open the list in the "**Template**" column and note that all your predefined support templates appear in it.
11. Select this template from the list.
12. In the **Condition** column, select "**Open**" for "**Region Type**"  
 Note: It may be that some supports already exist on the part (on which we will later apply the Meta-Template), or that the support was already created by a previous rule in the same Meta-Template.
13. To ensure that an additional support will not be created, set a rule for "**Supports**" = "**Not-Created**".  
 Now let's add rules for Wall Supports and assume we want these only on closed boundaries.
14. In addition, we will set the rules so that the wall support's size is dictated by the 2D Area of the region.

15. Define the following three rules and assign to each the relevant support template:

**Edit Meta-Template**

Rule Name	Template
All Open Contours	Solid Wall 1mm wide
Small Area	Wall - small area
<New Rule>	

Rule Condition

Rule Attribute	Pattern on Points
Region Type	Closed
Min. Height	
2D Area	<111
Max Angle	
Min Angle	
Analysis Angle	
3D Area	
Ease of Removal	
Supports	Not-Created
Color	

Add Attribute

And OR

< >

=

**Edit Meta-Template**

Rule Name	Template
All Open Contours	Solid Wall 1mm wide
Small Area	Wall - small area
Medium Area	Wall - medium area
<New Rule>	

Rule Condition

Rule Attribute	Pattern on Points
Region Type	Closed
Min. Height	
2D Area	>=111 AND <150
Max Angle	
Min Angle	
Analysis Angle	
3D Area	
Ease of Removal	
Supports	Not-Created
Color	

Add Attribute

And OR

< >

=

**Edit Meta-Template**

Rule Name	Template
All Open Contours	Solid Wall 1mm wide
Small Area	Wall - small area
Medium Area	Wall - medium area
Large Area	Wall - large area
<New Rule>	

Rule Condition

Rule Attribute	Pattern on Points
Region Type	Closed
Min. Height	
2D Area	>=150
Max Angle	
Min Angle	
Analysis Angle	
3D Area	
Ease of Removal	
Supports	Not-Created
Color	

Add Attribute

And OR

< >

=

16. Notice the values assigned to:

- Region Type (select Closed in all).
- 2D Area (manually enter the value per each type).

- Supports (select Not-Created in all).

17. When finished, save the Meta-Template by pressing the save button.



Your Meta-Template is stored in folder

**C:\ProgramData\3D Systems\3DXpert\16.0\Data\3D\_Printing\Support\_Templates\Meta-Templates**

18. Close the file (no need to save it).

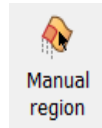
## Apply the Meta-Template on a new part

19. We will now apply the Meta-Template on a new part.

20. **Open** the predefined 3DP project in the "**02 Med series**" directory. The part is similar to the project before, but of course, this could be any other part.

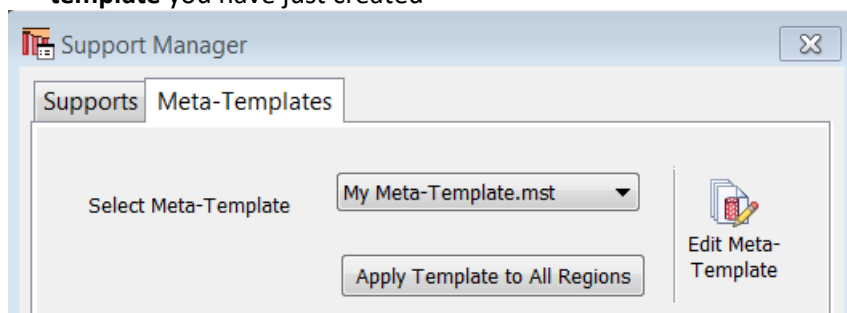
21. Invoke the **Support Manager**.

22. Enter **Manual Region**, rotate the part and create a line shown in the following image:





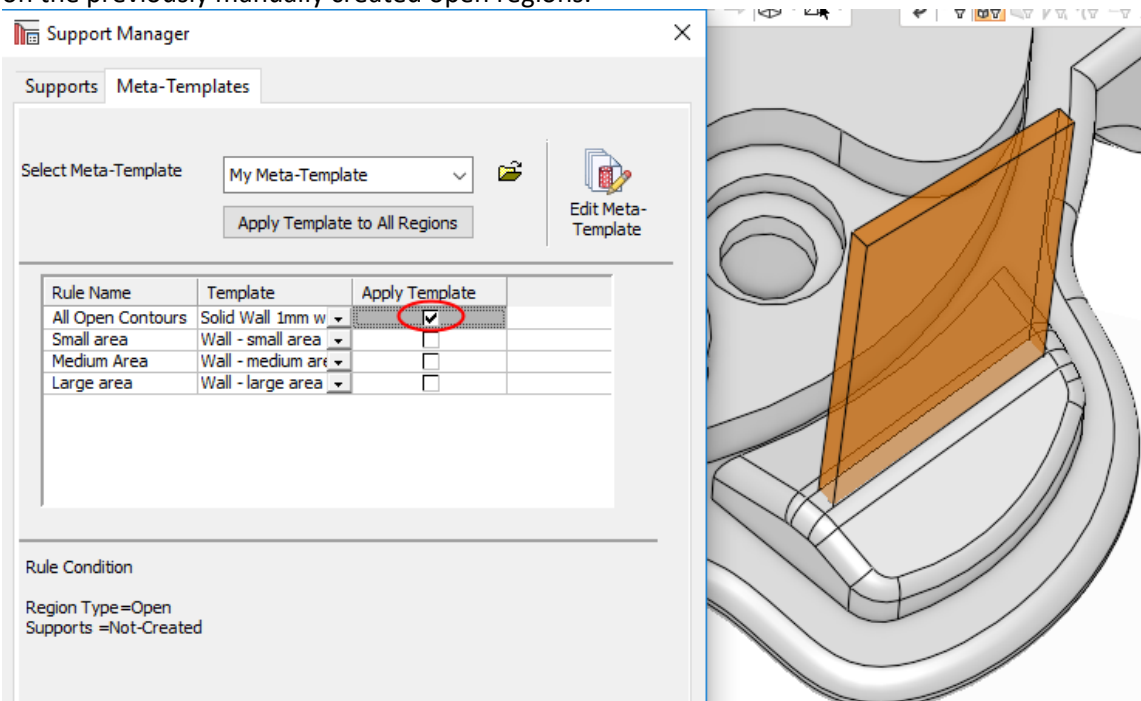
23. Still in the Support Manager, switch to the **“Meta-Templates”** tab and select the **meta-template** you have just created



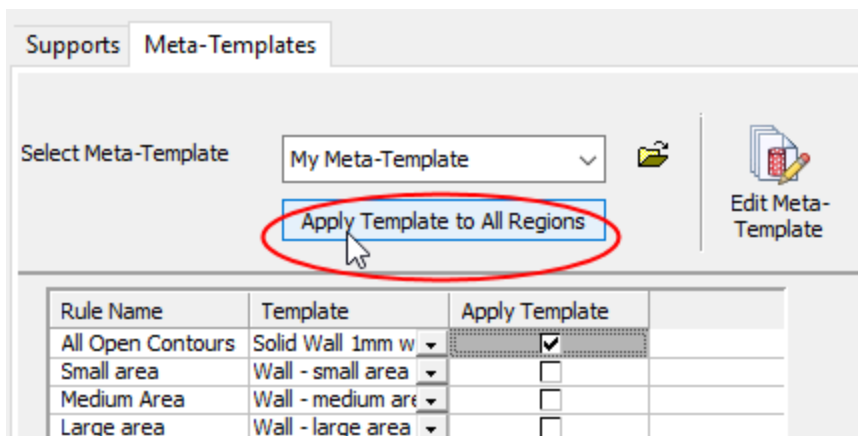
The meta template can be used in two ways:

**A.** By the **“Apply Template”** column, you can apply a single rule.

Enable the first rule from our template and see that the system creates two Solid Wall supports on the previously manually created open regions.



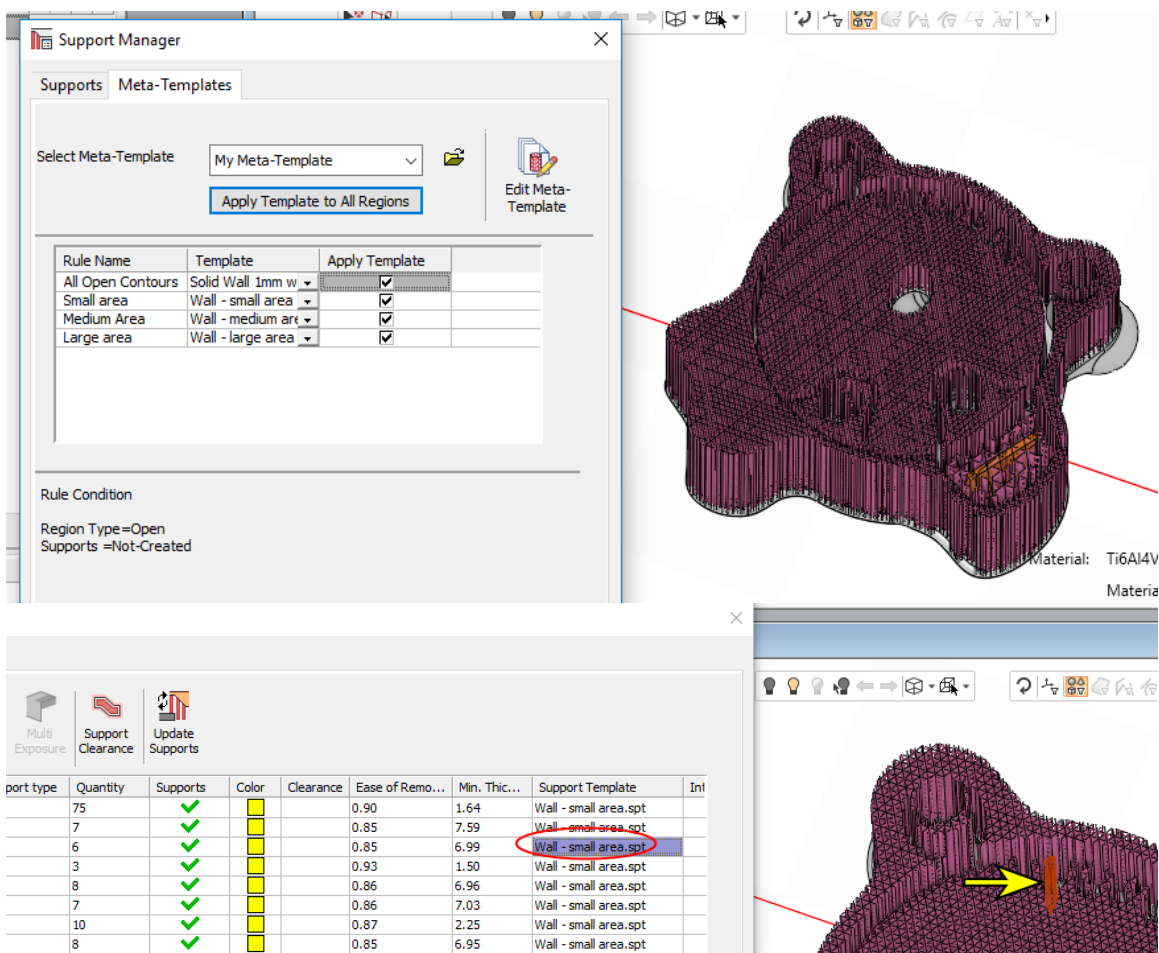
**B.** By pressing the button, all rules from the meta template are applied to the whole part, using the rules.



24. **Press** this button.

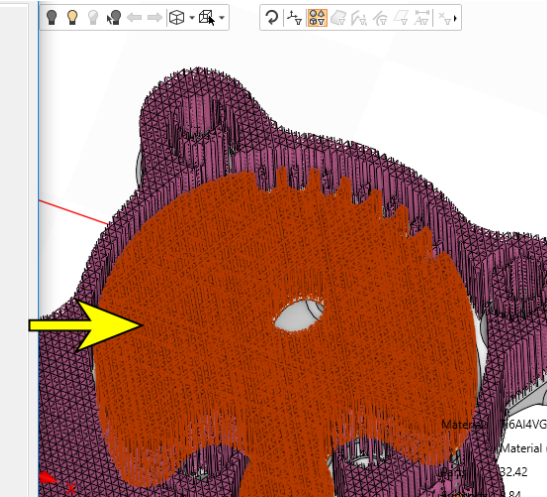
The result - all the closed contours get wall supports.

Note, that depending on the size of the area, a different size for the support is automatically used.

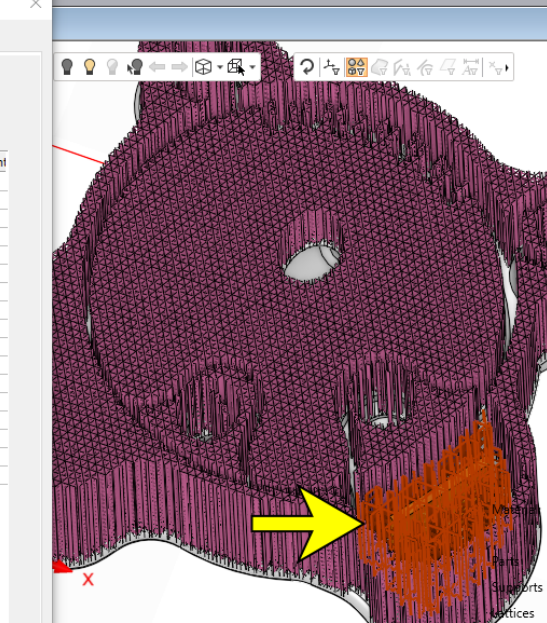




prt type	Quantity	Supports	Color	Clearance	Ease of Remo...	Min. Thic...	Support Template	Int
75		✓	■		0.90	1.64	Wall - small area.spt	
7		✓	■		0.85	7.59	Wall - small area.spt	
6		✓	■		0.85	6.99	Wall - small area.spt	
3		✓	■		0.93	1.50	Wall - small area.spt	
8		✓	■		0.86	6.96	Wall - small area.spt	
7		✓	■		0.86	7.03	Wall - small area.spt	
10		✓	■		0.87	2.25	Wall - small area.spt	
8		✓	■		0.85	6.95	Wall - small area.spt	
7		✓	■		0.86	6.94	Wall - small area.spt	
79		✓	■		0.89	6.03	Wall - small area.spt	
6		✓	■		0.86	6.95	Wall - small area.spt	
252		✓	■		1.00	3.70	Wall - large area.spt	
44		✓	■		0.73	6.00	Wall - small area.spt	
43		✓	■		0.81	6.00	Wall - small area.spt	
62		✓	■		0.99	4.00	Wall - medium area.spt	
521		✓	■		0.96	2.04	Wall - large area.spt	
all	1	✓	■	<input type="checkbox"/>			Solid Wall 1mm wide.spt	



Quantity	Supports	Color	Clearance	Ease of Remo...	Min. Thic...	Support Template	Int
75	✓	■		0.90	1.64	Wall - small area.spt	
7	✓	■		0.85	7.59	Wall - small area.spt	
6	✓	■		0.85	6.99	Wall - small area.spt	
3	✓	■		0.93	1.50	Wall - small area.spt	
8	✓	■		0.86	6.96	Wall - small area.spt	
7	✓	■		0.86	7.03	Wall - small area.spt	
10	✓	■		0.87	2.25	Wall - small area.spt	
8	✓	■		0.85	6.95	Wall - small area.spt	
7	✓	■		0.86	6.94	Wall - small area.spt	
79	✓	■		0.89	6.03	Wall - small area.spt	
6	✓	■		0.86	6.95	Wall - small area.spt	
252	✓	■		1.00	3.70	Wall - large area.spt	
44	✓	■		0.73	6.00	Wall - small area.spt	
43	✓	■		0.81	6.00	Wall - small area.spt	
62	✓	■		0.99	4.00	Wall - medium area.spt	
521	✓	■		0.96	2.04	Wall - large area.spt	
1	✓	■	<input type="checkbox"/>			Solid Wall 1mm wide.spt	



Save the file.

End of Exercise.