



3DXpert

Editing Material Parameters

Tutorial_V4 - Updated: 13,0603,1489,1732(SP6P3)

Foreword:

When creating a 3D Printing project in 3DXpert, you have to specify the name of the printer on which the part will be built and the exact material (metal powder) name that will be used.

The material name is not just a name. It designates a set of files, a database, which includes the exact technology parameters (scanning parameters, laser parameters and in some printers, layering parameters). Thus, for each different material you can expect a different scan path result.

The technology parameters are set for each Technology Name (like Part, Part Rough, Solid Support, Wall Support, Lattice etc...) and layer thickness. Each set of parameters for a technology is called 'Build Style'. The complete database for a single Material is therefore composed of several Build Styles. In addition, you can define the laser parameters for each Build Style. When we describe here the saving of a material database, we actually refer to the saving of each Build Style (with own laser parameters) separately.

For each printer, 3DXpert users can download a set of materials from a dedicated 3D Systems web server. These materials come in different types (or in other words, different levels of technological setup), they are either Certified Laserform materials, Baseline materials or Empty materials.

This document serves a quick guide to editing material parameters and the related environment. It does not explain the specific scan path or laser parameters, discussed elsewhere.

It is relevant to all users that have the ability (license) to edit the materials database and it shows how to create a user material database and some implications.

1. Types of Materials

Before we explain how to edit material databases, let us first discuss the different types of materials (and again, the term 'material' here applied to the material database, the set of technological rules for each material).

First, the only materials which are validated are of **LaserForm** brand. 3D Systems certifies them to the physical properties datasheet values by using the LaserForm database. All other materials are not certified or validated by 3D Systems.

When you are working with **Certified LaserForm** materials, the following rules apply:

1. Some parameters are not shown (scan path and laser parameters)
2. The Save and Save As buttons are disabled.

For some printers, **Baseline** materials are supplied. These materials have a more basic configuration, and enable a good starting point. For example, they are supplied with CLI based formats, deploying a minimal set of parameters.

Certified Laserform and Baseline materials are software protected - users should have the matching license to run them. Also printers require a dedicated license.

Empty materials are practically...empty. Users have the freedom to configure them as they wish, but of course, the printing results should be tested thoroughly. Once saved again through 3DXpert, the materials are attached to the user's Node ID (see more on saving materials later on in this document).

2. Editing an Empty Material Database:

We start with Empty materials, as they are open for editing.

Remember that such a material database should be regarded as a clean sheet of paper.





In other words, you have to define everything in it.

Create a 3D Printing Project, set the printer, and select a material of type Empty.

In the 3DXpert Guide, click Calculate Slices.



Click the Settings button

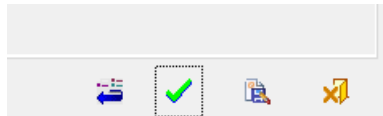
Build Style Name	Settings	Sint...
Part_Empty_LT-9		
<None>		



This opens the slicing parameters' dialogs.

These dialogs contain all the scanning parameters, including all laser parameters, and you can edit the values to create your own material parameter set.

When done, press the Save or Save As buttons at the bottom of the dialog.



A Note on Saving Materials:

When you save a material, this material is attached to your own node ID (i.e., 3DXpert Plug ID). This material can only be used on any 3DXpert installation that is connected to the same Plug. This is done to ensure that your parameters are fully protected and cannot be read by anyone else.

If you wish to share this material with other users, either:

- Send the material back to 3DSystems - to be attached also to another specific Plug ID.
Note: This can be done only where the other plug ID belongs to the same customer.
- Work with a floating license. Users who work with the same license server are essentially working with the same license, which is based on the same Plug ID. Thus, any material saved on one of the PCs connected to the license server can be used by all other PCs that are also connected to the same license server.

3. Create a New Material / Edit Certified LaserForm – Copy Material:

As explained earlier, a 3DXpert material database is composed of various sets of parameters. Therefore, if you need to create a new material, it is best to use any of your existing material databases as reference, or in other words, to copy a material database and edit it. For this purpose, use the dedicated tool, Copy Material.

This tool creates an exact copy of the material, however with a different name, and this copied material still requires the same license as the original material.

Remember that Certified LaserForm materials are blocked for editing. However, if you so wish to make any change in such a material, you can use Copy Material as well (important: after editing, this will no longer be a certified material).

Creating a New material:

1. Add a New Material to the Material Library



From the Tools menu, click Edit Material Library

Right mouse click the left most column and click Insert Row

FEA Material	Aluminum
FEA Material	Beryllium
Insert row	Brass
Delete row	Bronze
FEA Material	Copper - A

If you wish to use an existing material, select the cells (select the first and use Shift with the last). Right mouse click and press Copy:

My New Material	My New Material			27	0.00185
FEA Material	Beryllium	0	0	0.00185	0.00185
FEA Material	Brass	0	0	0.00185	0.00185
FEA Material	Bronze	0	0	0.00185	0.00185
FEA Material	Copper - Annealed	0	0	0.00185	0.00185
FEA Material	Copper - Hard-drawn	0	0	0.00185	0.00185

Right mouse click the new row and select Paste.

Double click the cells you wish to edit (like the Material Name)

My New Material	My New Material
FEA Material	Beryllium
FEA Material	Beryllium
FEA Material	Brass

Or, if you wish to create your own materials:

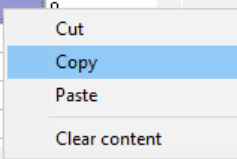
Enter the Name of the material and the rest of the data

FEA Material	Aluminum	
My New Material	My New Material	
FEA Material	Beryllium	

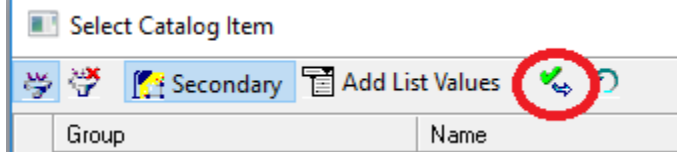
Move from one field to another by Tab.

You can also copy a value from any other cell in the table and paste it to the new cell.

260	27	n
560	55	
560	55	
200	0	
200	0	

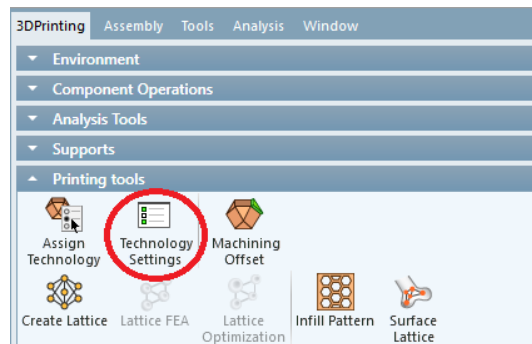


When done press the Save icon

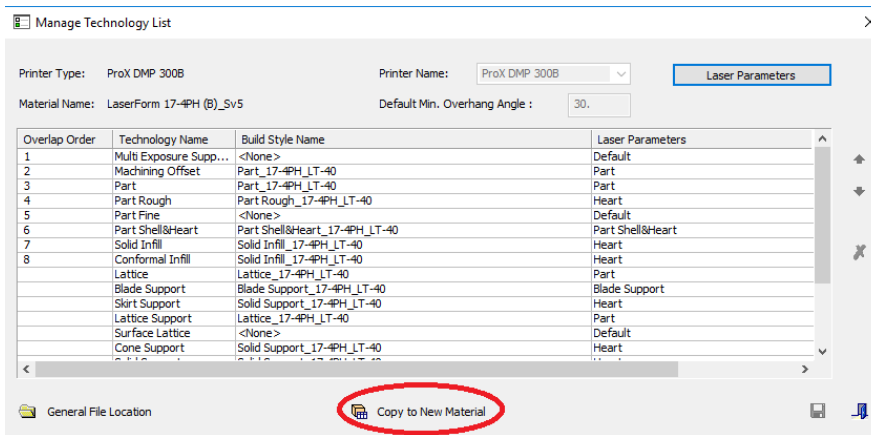


Close the tool.

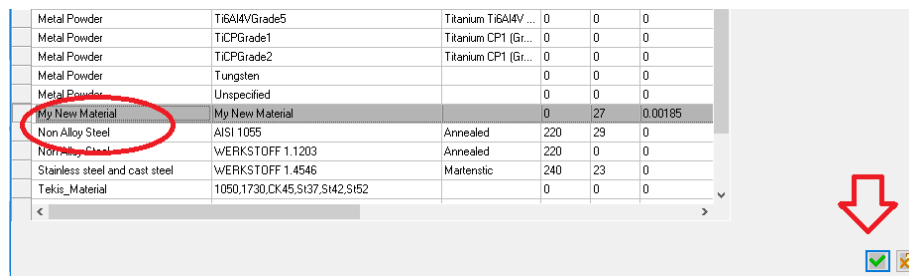
- From the 3DPrinting-Printing Tools menu, launch the Technology Settings tool:



Press the 'Copy to New Material' button at the bottom of the dialog:



The Materials Library is launched – choose the new material just created and press the OK button.



This creates a new material folder, which is located under the same printer folder.

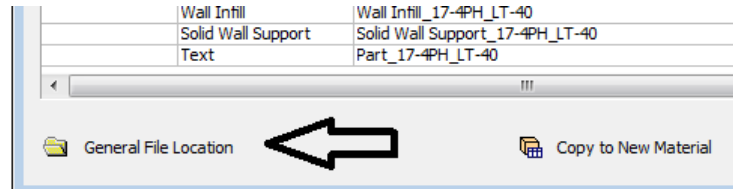
Exit the Technology Settings tool.

NOTE:

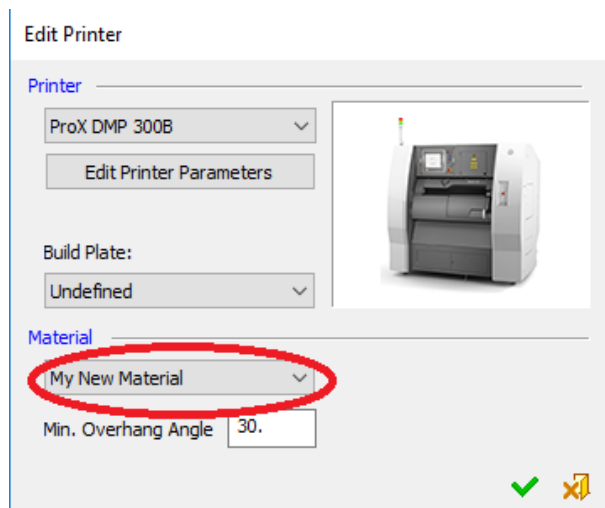
The default printer folder on your PC is located in the installation folder:

`C:\ProgramData\3D Systems\3DXpert\13.0\Data\3D_Printing\Technology_Folder\<Printer Name>`

You can set a different folder (this can also be a shared folder on the network) by clicking the General File Location button and browse to the folder you wish to designate.



Select the Edit Printer button on the Guide and from the list select the new material you have created.



Through the 3DPrinting Guide, enter Calculate Slicing and click Settings.

Notice that:

1. Some of the parameters are still hidden (this material was copied from a Certified LaserForm material).
2. The Save and Save As buttons are enabled. You can edit the visible parameters and save them with this material.

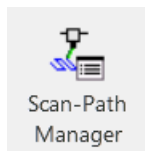
And remember:

A scan path calculated with such material will no longer be of Certified LaserForm brand.

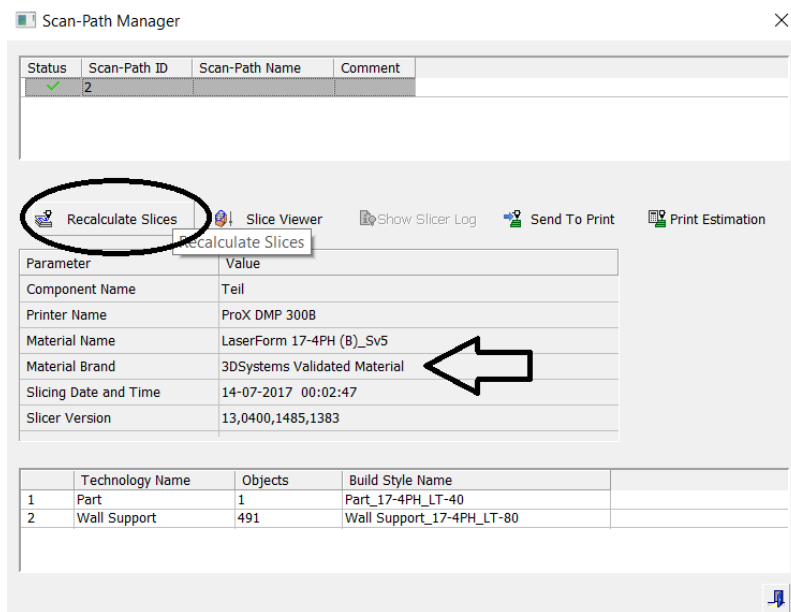
4. Editing Materials' Parameters through the Scan Path Manager:

Once you calculate a scan path, it is kept in the file. You can view and review the result using the Slice Viewer, but if you wish to review also the slicing parameters or go through the calculation history, enter the Scan Path Manager.

Select a Certified LaserForm material and calculate it. From the Guide select Scan-Path Manager.



Notice that since you have used a Certified LaserForm material, this calculated scan path is designated accordingly. See image below (Material Brand).



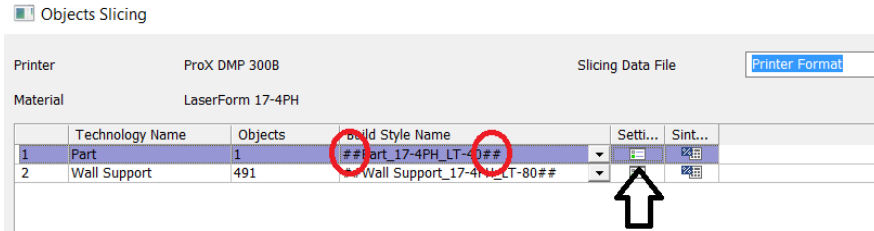
With the Scan Path Manager you can review any of the scan paths saved within the file.

Click Recalculate Slices.

The dialog that shows up resembles the dialog as in Calculate Slices.

However, note the ## signs before and after the Build Style names. This means you are looking at the parameters of the scan path calculated and saved within this specific file (and not the parameters of the material database that is kept as default with your 3DXpert installation).

Click the Setting button.



Notice that:

1. Since you are looking at the parameters of a Certified LaserForm material, some parameters are hidden. (NOTE: When working with Baseline or Empty materials, all the parameters are available.)

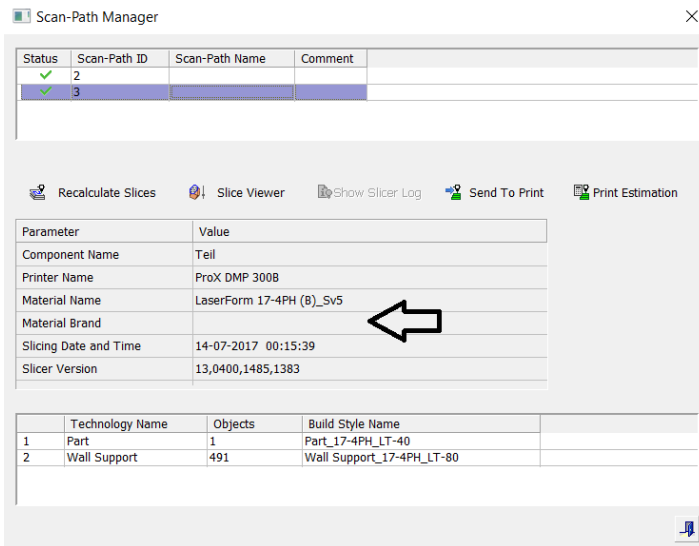
2. The Save button is available.

Edit some parameters, press the Save button and the Ok button for File Protection.

This means that you can edit parameters and recalculate the scan path. This will only change the parameters within this specific file.

However, doing this has an important implication: As you have changed parameters of a Certified LaserForm material, this new calculated Scan-Path will no longer be Certified.

Notice that after recalculation, the Scan Path's Material Brand attribute is now empty.

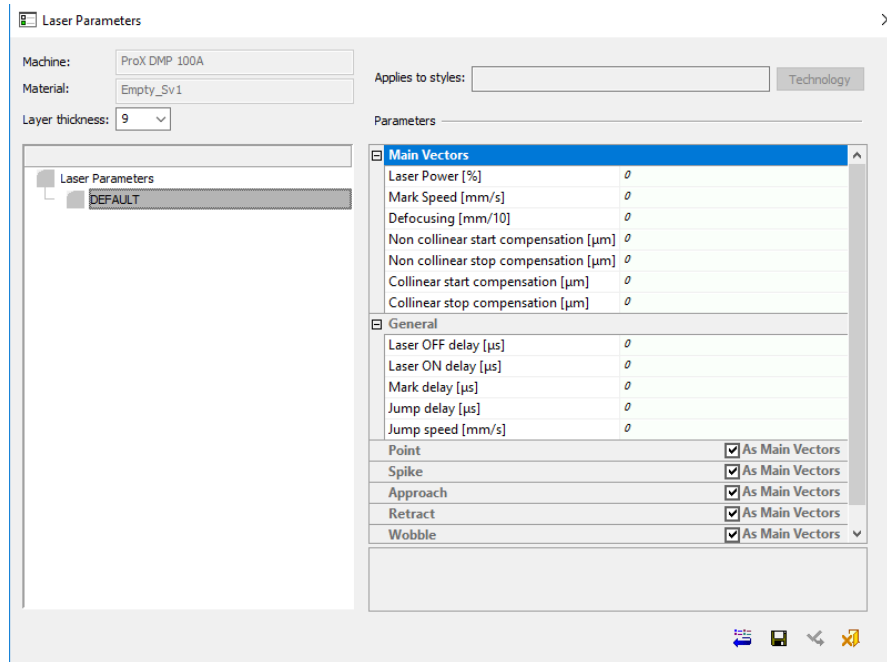


This image shows a Non-Certified scan path (see Material Brand)

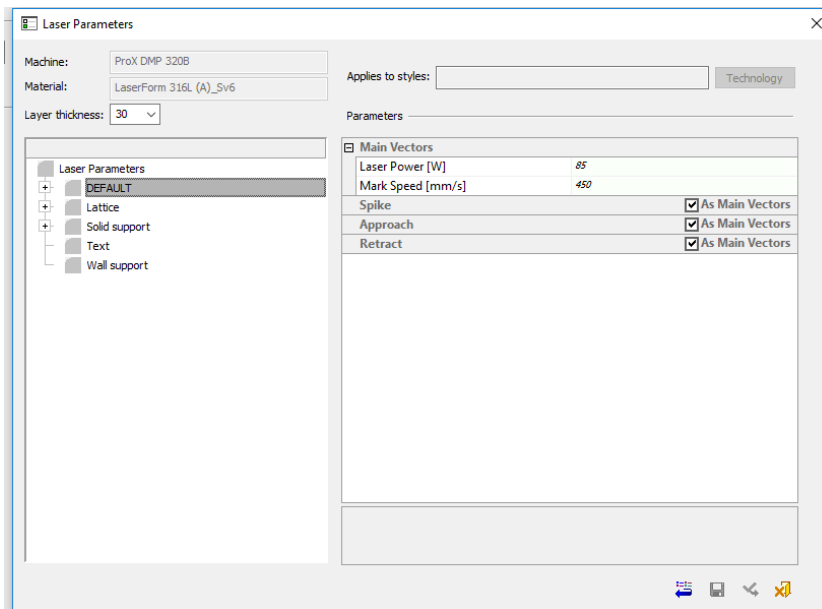
5. Laser Parameters

The material database includes also the laser parameters database for specific combinations of Machine, Material and Layer Thickness.

When starting with a generic or an empty buildstyle, all laser parameters are visible, and the values are all set as a default '0'.



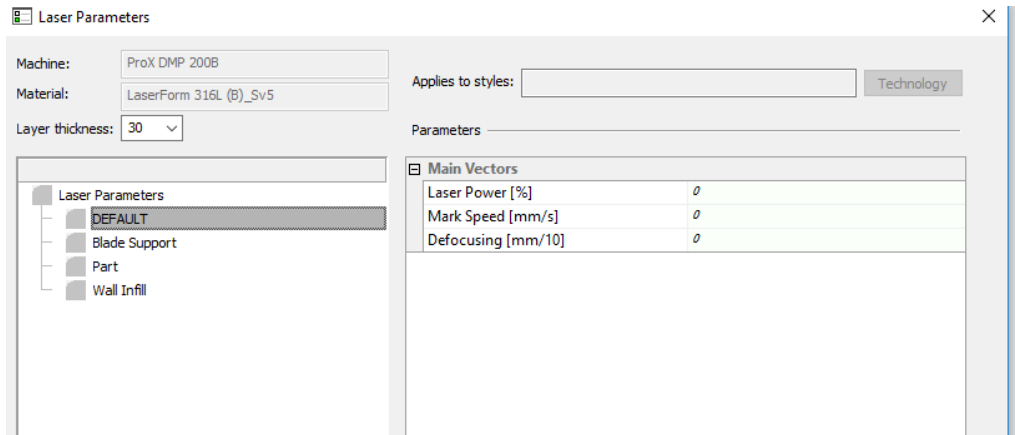
When working with Certified LaserForm materials, some parameters are protected and therefore, not shown.



If you copy validated material as a new material, the parameters are visible, and their values are set as '0' as well.

A note for 3D Systems ProX DMP 100/200/300 printers:

When working with any of these printers, the values are also set a default as '0', as can be seen in the following image:



However, the data is driven by internal formulas so that the system converts automatically these '0' values to real values, which are written into the output file (*.FAB3).

Therefore, a value of '0' in anyone of the laser parameters means that it will get an automatic value.

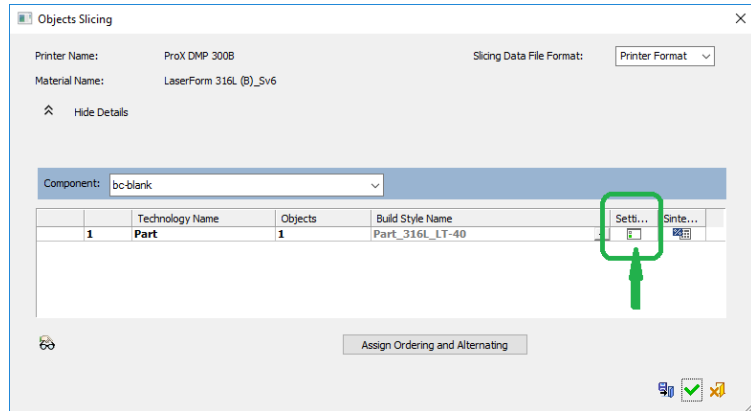
In case that the user changes the value to a different value, this value will be written in the output (*.FAB3) file.

6. Adjusting Sintering Factors

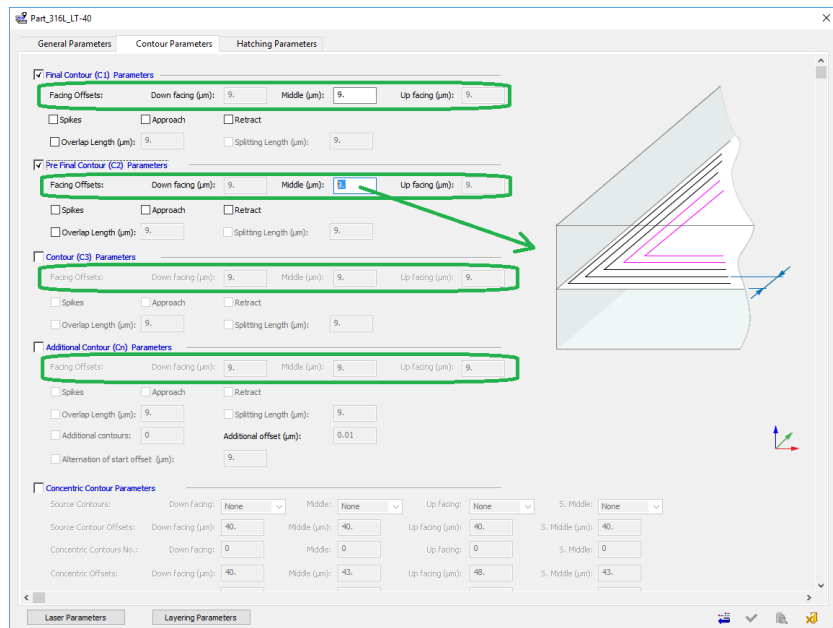
The previous sections of this document discuss editing of a material database and setting the values of the specific parameters.

For example, this enables control over each and every offset value – you can set the contour offset for any type of contour for the different areas (Up, Middle or Down Facing areas) as well as the offset for the hatching in each area (all these offsets are independent).

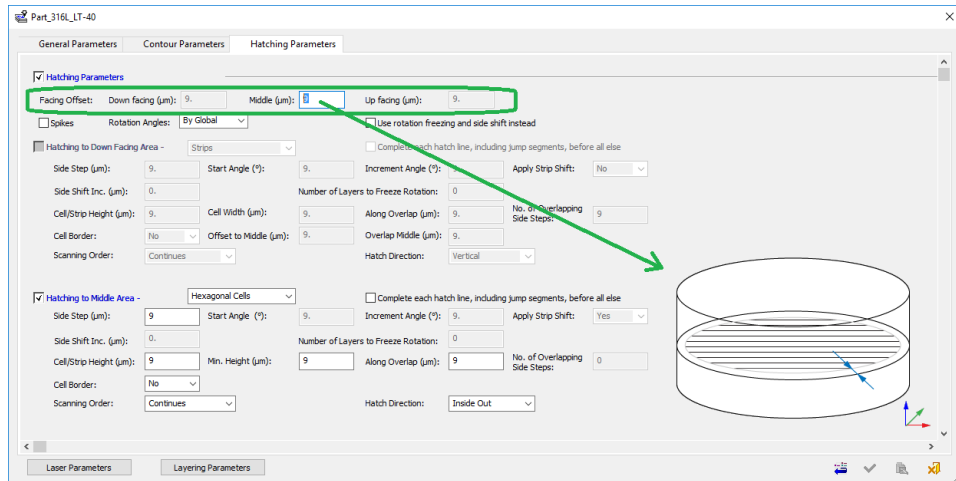
Access the buildstyle:



Setting for the individual Contour Offsets:



Setting for the individual Hatching Offsets:

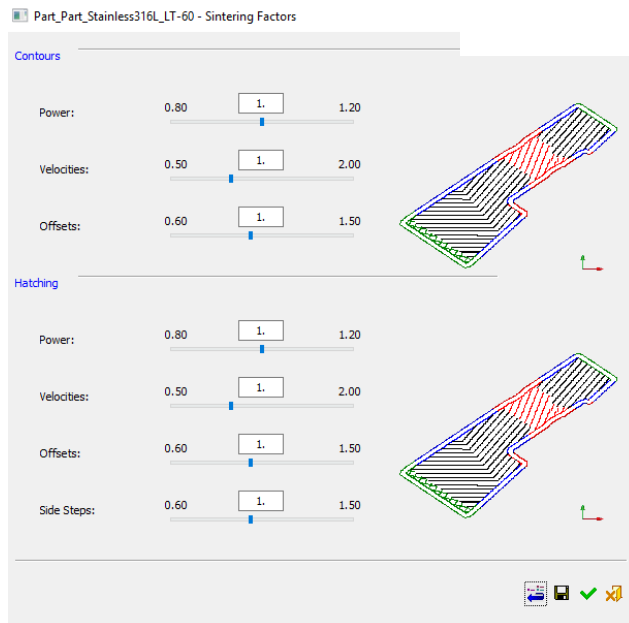


And yet, sometimes you may need to make a single change that will affect all the related parameters. This can be done from the Sintering Factors dialog.

Referring to the example above, you may need to make a single change that will affect all the offset values for all the contours and/or hatching.

Access the Sintering Factors dialog for the relevant buildstyle:

Build Style Name	Setti...	Sinte...
Part_Ni625_LT-30		
Wall-Support_LT-60		



This dialog enable to control global Laser Power and Velocity & Offset values for both Contours and Hatching, and also the Side Steps for Hatching.

Thus, a change in the Offsets factor for Contours will affect all contour offsets set within the buildstyle. A factor of 1.2 for Contour offsets, for example, means that the offset value for each offset will increase by 1.2 (each offset value in the buildstyle will get multiplied by this factor).

Note that the Sintering Factor dialog is disabled for Certified LaserForm materials, as such a change means that such materials are no longer validated. However, if these materials are copied as new materials, they are enabled.