White Paper

Design and printing guidelines

Introduction

A print job can be created in either of the following ways:

- By using the HP SmartStream 3D Build Manager

- By using plugins added to Netfabb and Materialise Magics

NOTE: HP SmartStream 3D Build Manager supports STL and 3MF files.

The software creates slices that the printer can convert to layers in order to prepare the job. This preparation process may take from 15 minutes to 2 hours depending on the complexity of the job. It can be done while printing other jobs. Once ready, you can select the job to be printed from the job queue on the printer's front panel. If an error occurs while processing, a message appears on the front panel, and the printer cancels the job.
To retry, you have to resubmit the job.

The rest of this chapter may help you to avoid such errors.

File preparation

Tessellation

Before sending a job to a 3D printer, the model to be printed needs to be tessellated. That means that its geometry needs to be converted into triangles, which are used by the printer to create layers. It is very important to pay attention to this step: if not done correctly, it can cause problems such as inaccuracy or slow processing.

Standard formats in the additive manufacturing industry include 3MF (with more information about the model) and STL.

A normal file size for a model is about 1–30 MB, but the size depends on the type of software that created it, the number of triangles, the number and level of details, and so on.

When exporting to STL in a CAD package, you are often required to introduce some parameters such as angle tolerance and deviation chord height. These parameters define the resolution and file size of the part. The following tips may help you to export with the best surface to file size ratio.

Solid Designer settings

Save as STL, click **Options**, and check the ASCII option. The recommended values for the Distance and Angle box are 0.05 and 1.
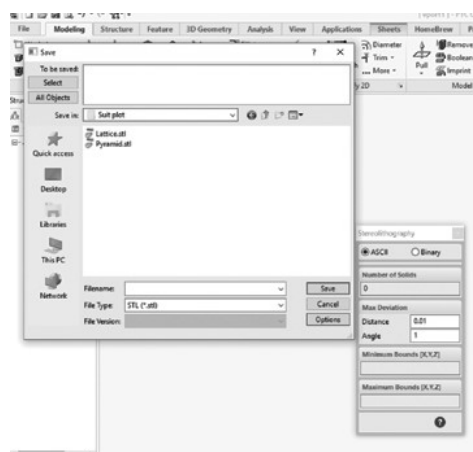
SolidWorks settings

1. Click **File** > **Save As**.

2. Select **STL (*.stl)** as the file type.

3. Click **Options**.

4. Choose the **Binary** option. Binary files are smaller than ASCII files for the same tessellation.

5. Choose **Custom** resolution.

6. Set the deviation tolerance to 0.05 mm.

7. Set the angle tolerance to 1°.
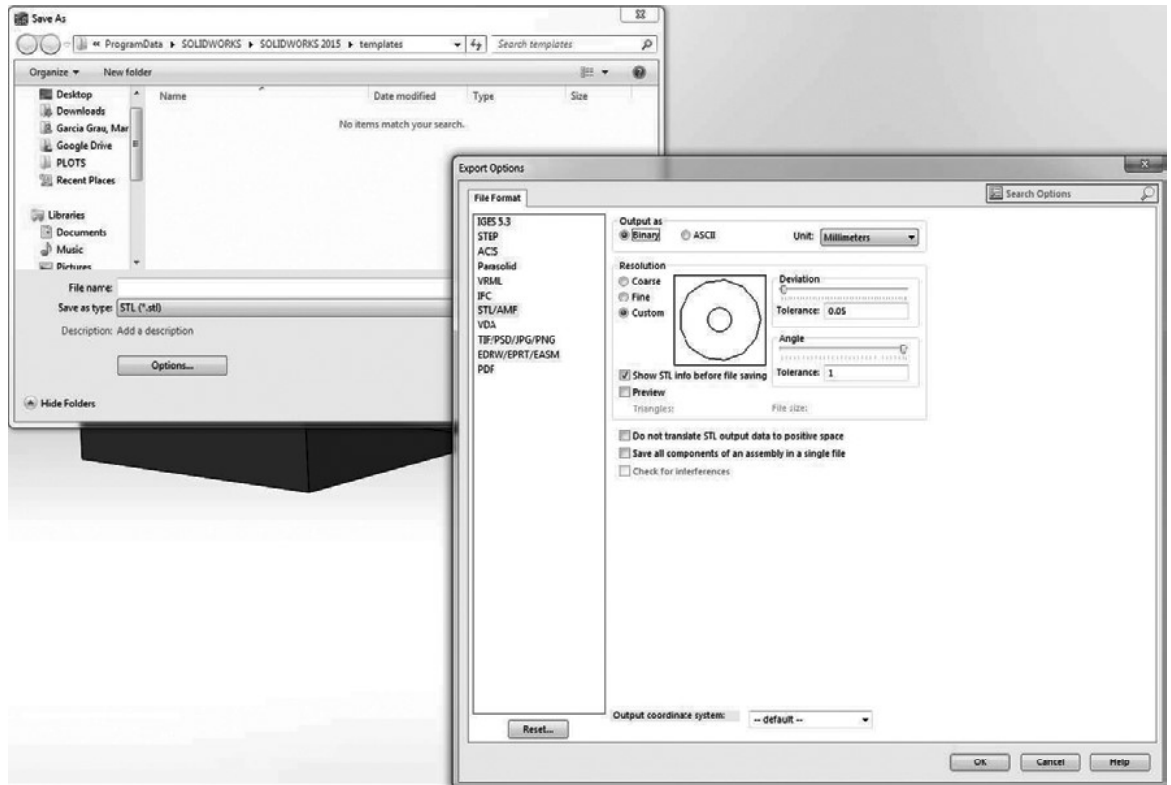
Rhinoceros settings

1. Click **File** > **Save As**.

2. Select **STL (*.stl)** as the file type.

3. Click **File Name** > **Save**.

4. Select **Binary**.

5. Select **Detail Controls** from the Mesh Options.

6. Set the maximum angle to 1, the maximum aspect ratio to 6, and the minimum edge length to 0.05.

STL problems

- Too many or too few triangles

   Too many triangles are difficult to process and, when a certain size is reached, the extra triangles do not provide any further accuracy. For this reason, an excess of triangles could increase processing time for no benefit.

   Triangulation of a surface causes faceting of the 3D model. The parameters used to output an STL model affect how much faceting occurs.