MakerBot Tutorial and Test
A step by step guide
## Table of Contents

Step 1 – Generating a Model..........................................................................................................................<i

Step 2 – Saving as an STL...............................................................................................................................1

Step 3 – Importing Model to MakerWare.......................................................................................................3

Step 4 – Positioning Model on Build Plate .................................................................................................4

Step 5 – Printing...............................................................................................................................................6

Figure 1 - Test part (all units in inches).......................................................................................................1

Figure 2 - STL option in save menu...............................................................................................................2

Figure 3 - SolidWorks automatic STL conversion.......................................................................................2

Figure 4 - Adding a model to the build platform.........................................................................................3

Figure 5 - Opening the STL file.....................................................................................................................4

Figure 6 - Rotating the part ..........................................................................................................................5

Figure 7 - Moving the part on to the build platform...................................................................................6

Figure 8 - Sending to Printer........................................................................................................................7

Figure 9 - Final printed part in PLA still attached to raft and scaffold..........................................................8

Figure 10 - PLA part removed from raft and scaffold ...............................................................................8
Step 1 – Generating a Model

- Generate the CAD model using SolidWorks and the drawing seen in Figure 1 - Test part (all units in inches). Additional images of the final print can be seen in FIGURE and an actual physical printed model can be found in the machine shop.

![Figure 1 - Test part (all units in inches)](image)

Step 2 – Saving as an STL
In order to open the file in MakerWare, it must be saved as a **STL (*.stl)** file. In the “Save as type” drop down menu, select STL as the file type.

![Figure 2 - STL option in save menu](image2)

- Allow SolidWorks to generate the default triangles and binary needed for the file.

![Figure 3 - SolidWorks automatic STL conversion](image3)
Step 3 – Importing Model to MakerWare

- Open the MakerWare software. At the top of the screen select the “Add” button to add an object.

Figure 4 - Adding a model to the build platform

- Find the part (.STL file) and select “open”.

Step 4 – Positioning Model on Build Plate

- For this print, the part must be printed in a specific orientation that will demonstrate several key features of the MakerBot. Select the part (it will become outlined in yellow) and click the “Turn” tool on the left side of the window. Rotate the part using the 90° tool until it is oriented as shown in FIGURE.
When a part is rotated, it sometimes ends up partially submerged into the build platform. If the part is not moved to rest level on the build platform the print will not be successful. To ensure the part is on the platform, again select the part (it will be outlined in yellow). Select the “Move” tool on the left side of the screen. Then select the “On Platform” button. The part is now resting directly on the surface of the build platform.
Step 5 – Printing

- Once the part is oriented properly, select “Make” at the top of the screen. Under “Make with”, select the Replicator 2. Select the boxes to include a raft and supports, these options are explained below. Then select “Print” and wait. The default settings should work fine for this test print, but more advanced prints will require tweaking the advanced options.

Export for: the type of printer being used, in this case a Replicator 2.

Material: PLA and ABS plastic are the most common materials used. The Replicator 2 is only capable of printing PLA so this box should be greyed out.

Resolution: Standard is sufficient for most parts. Adjust according to tolerance desired.

Advanced Options
Raft: Rafting should almost always be used especially if the face in contact with the build plate is relatively small. It creates a flat base to start the print on and helps protect the first few layers from separation.

Supports: Supports should only be used if a portion of the part hangs over the platform or another portion of the part. When in doubt, they should be used. Have a pair of tweezers and a file handy to remove these after the build.

Temperature and Speed: These should only be adjusted if the default settings are not working properly. Most problems arise when the printer is moving too fast or printing too hot, or if the extruder wheels do not grip the filament tight enough. Translucent and solid color filament also behave differently so the printer may require some adjustment when switching between the two.

Infill: The MakerWare program will automatically honeycomb any solid parts. The default setting is 15% which produces hexagons about half a centimeter across. For larger parts, less infill will help speed up the print, and for smaller parts, more infill will help preserve the shape of the part and ensure its strength.

Number of Shells: This controls the wall thickness of the part. 2 shells usually provides adequate coverage, and 3 should make it water tight.
Figure 9 - Final printed part in PLA still attached to raft and scaffold

Figure 10 - PLA part removed from raft and scaffold