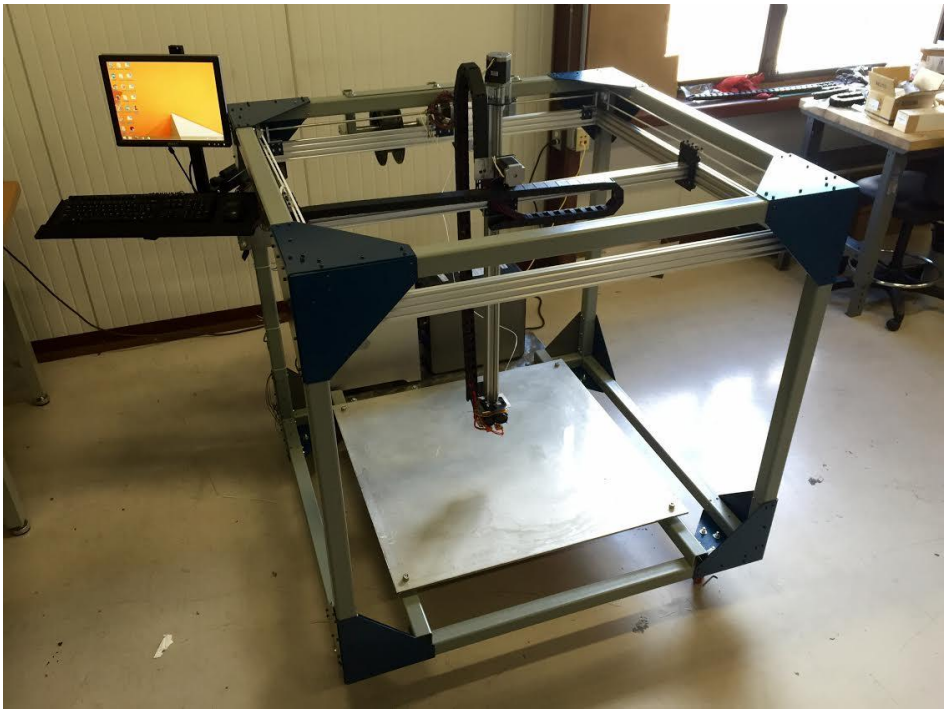
NORTHERN ARIZONA UNIVERSITY

MECHANICAL ENGINEERING CAPSTONE

LARGE SCALE 3D PRINTER

"CONSUELA"

------ USER MANUAL ------



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POWER

(Figure 1) shows the back of the case that holds the control system (Aluminum Case). The power supplies that power the control system should be plugged into the power strip that is attached to the frame of the 3D printer. The power supply should then be plugged into the nearest 120V Power outlet. To power on the control system, flip the switch on the back of the aluminum case to the upright position. The red LED's inside the case will turn on, indicating that the control system is now powered on. No further action is needed for the control system.

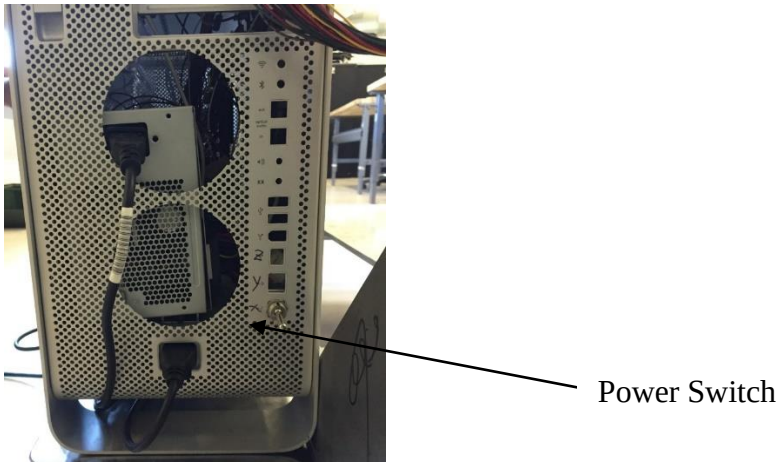

Figure 1 – Control System

To power on the computer, make sure power cable of the computer is plugged into the computer's power supply and into the power outlet attached to the frame. From here, power on the computer with the power button located on the front of the computer. **(Figure 2)** shows the location of the power switch on the computer. The computer will then boot into the operating system. No further action is needed in powering on the computer.

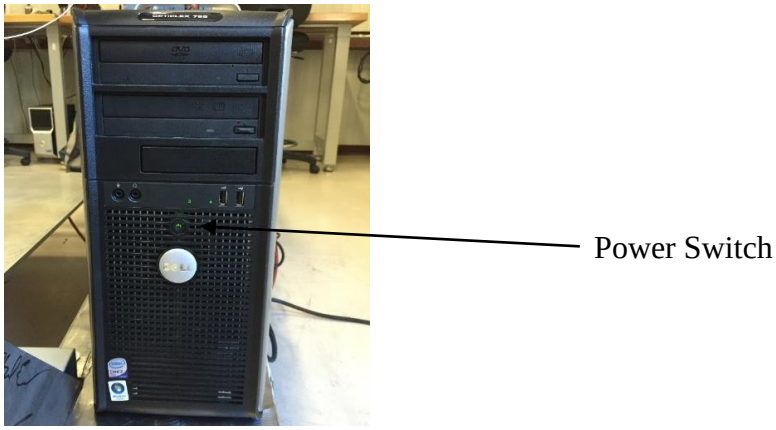

Figure 2 – Computer

FILAMENT

To insert the 1.75mm filament, press the lever arm seen in (**Figure 3**) and then feed the filament through the blue orifice on the top. To ensure the filament has engaged, heat the extruder to 210C for PLA or 230C for ABS and then use the manual controls to feed ~10mm of filament.

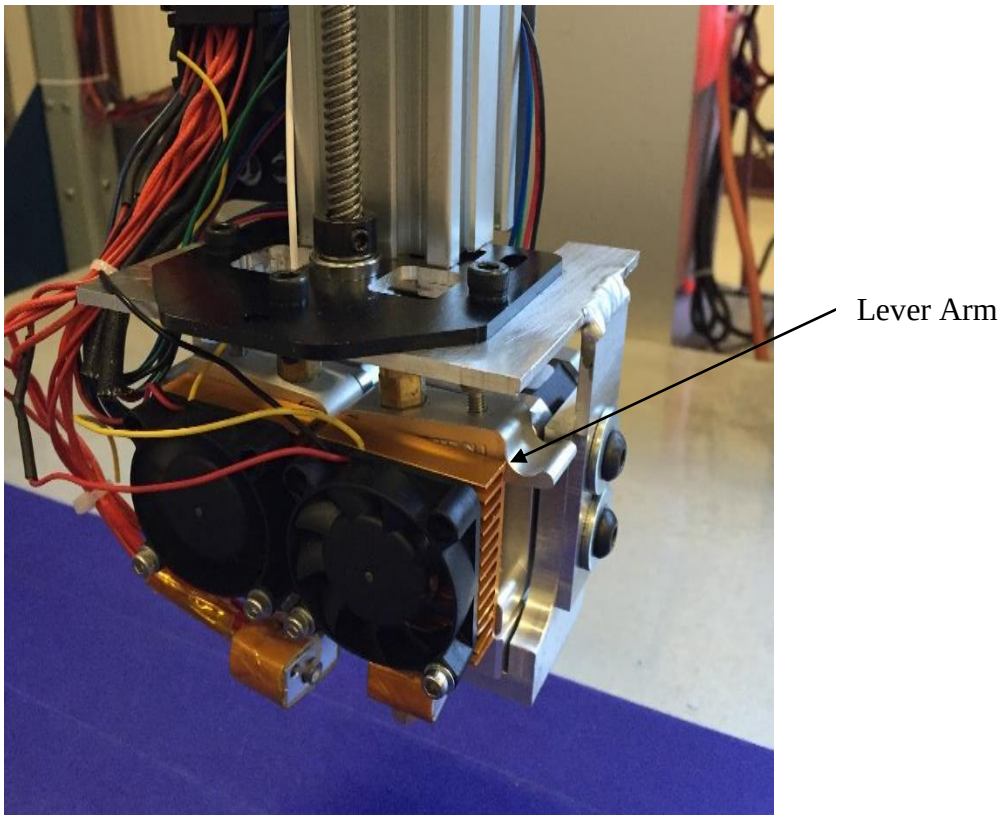

Figure 3 – Print Head

HEAT BED

To operate the heat bed, plug the heat bed into a 220V power supply. Next set the thermostat seen in (**Figure 4**) to the desired temperature. We recommend the print bed be heated to 70C (158F) for prints with PLA and 100C (212F) for prints with ABS.\

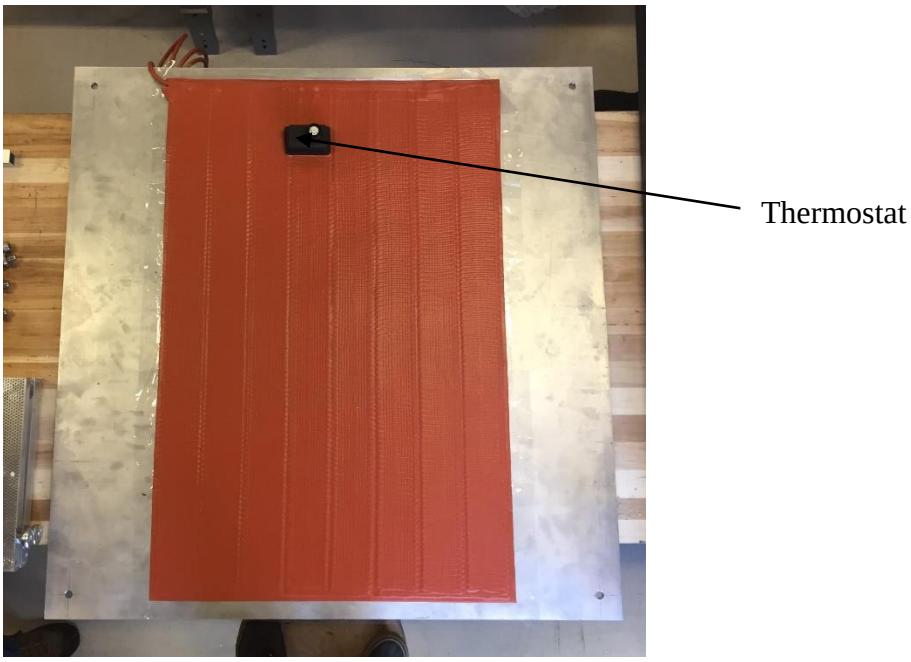

Figure 4 – Heat Bed

SOFTWARE

The control interface seen in (**Figure 5**) is where the 3D printer can be controlled.

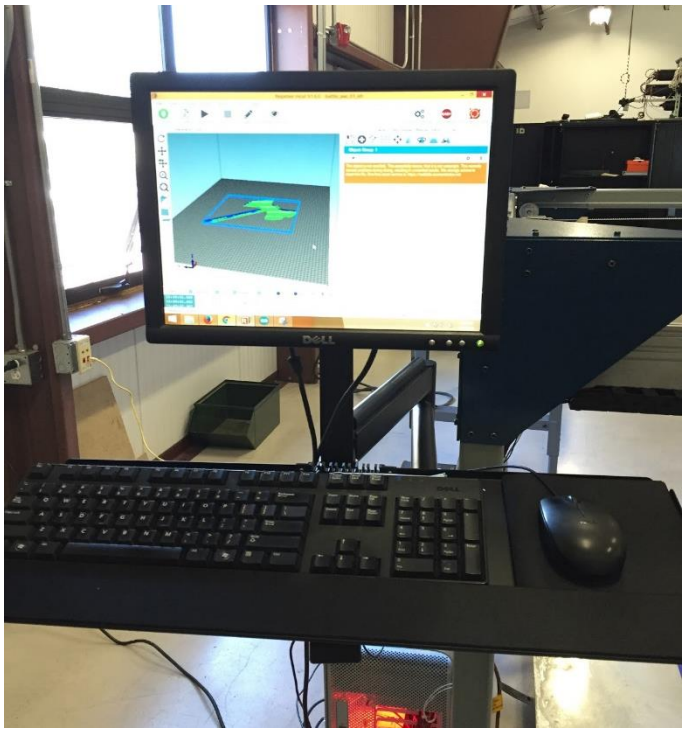

Figure 5 – Control Interface

Once the 3D printer is turned on and the home screen is displayed, open Repetier located as seen in (**Figure 6**)

Repetier Software

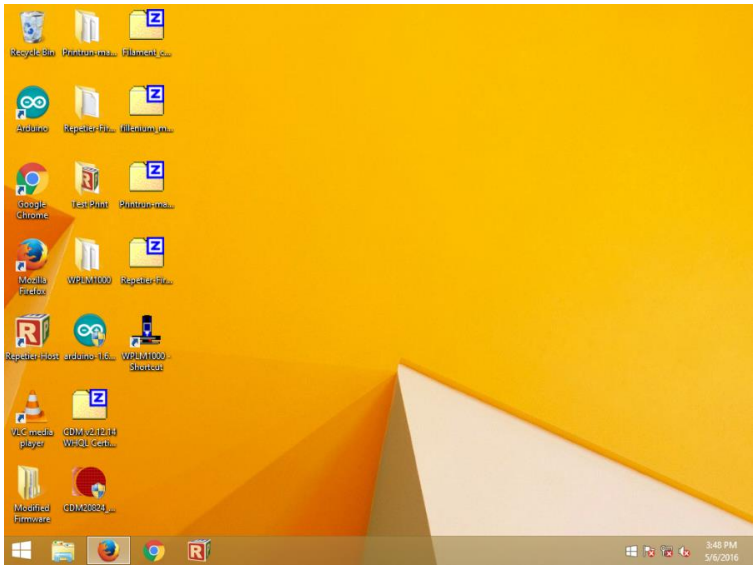

Figure 6 – Home Screen

The startup screen for Repetier can be seen in (**Figure 7**), from here the object can be manipulated, the printer can be controlled manually, slicer can be configured, and the print can be started.

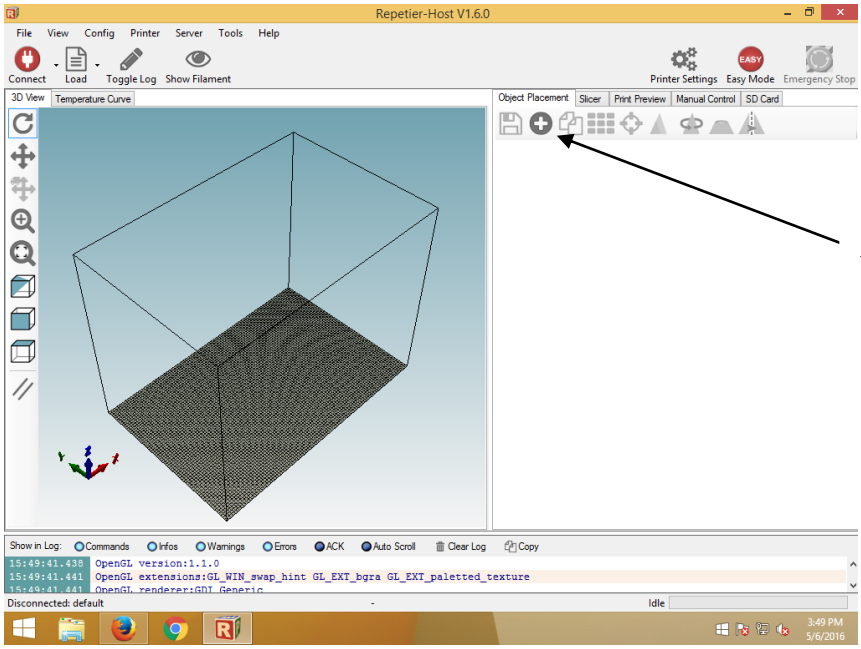

Figure 7 – Repetier Software

In (**Figure 8**) the manual controls can be seen. This allows each axis to be moved, the hot end to be turned on, and filament to be extruded. The home button illustrated in (**Figure 8**) is used to home the print head. This will move the X, Y, and Z axes until they hit the end stop. It is good practice to home the 3D printer before each print to ensure each axis is moving properly and that the end stops are being engaged.

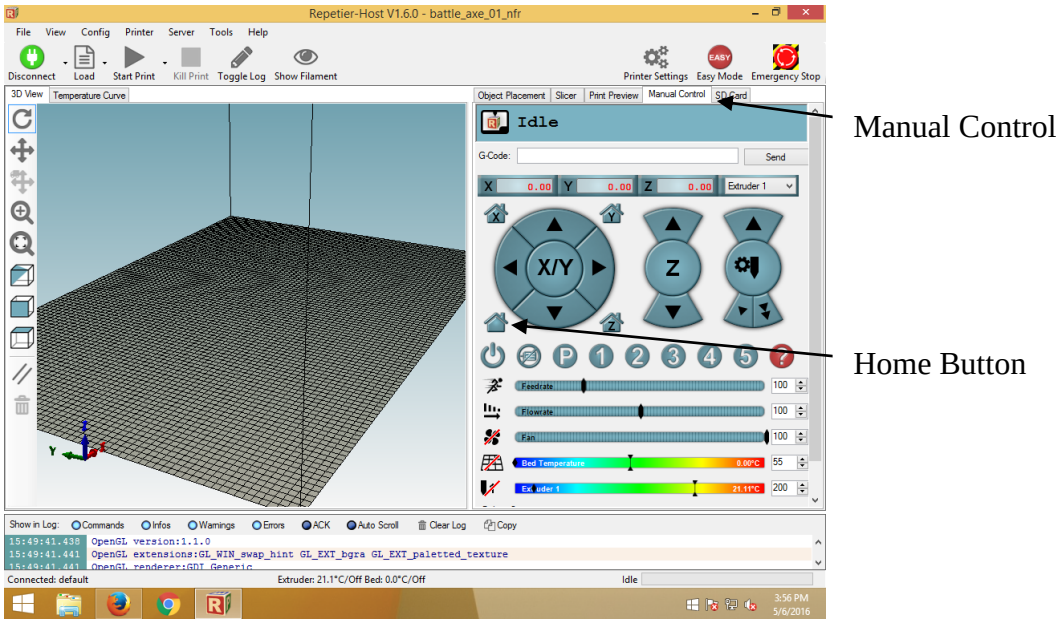

Figure 8 – Manual Control

To add a CAD file hit the button illustrated in (**Figure 7**), then select an STL file as seen in (**Figure 9**).

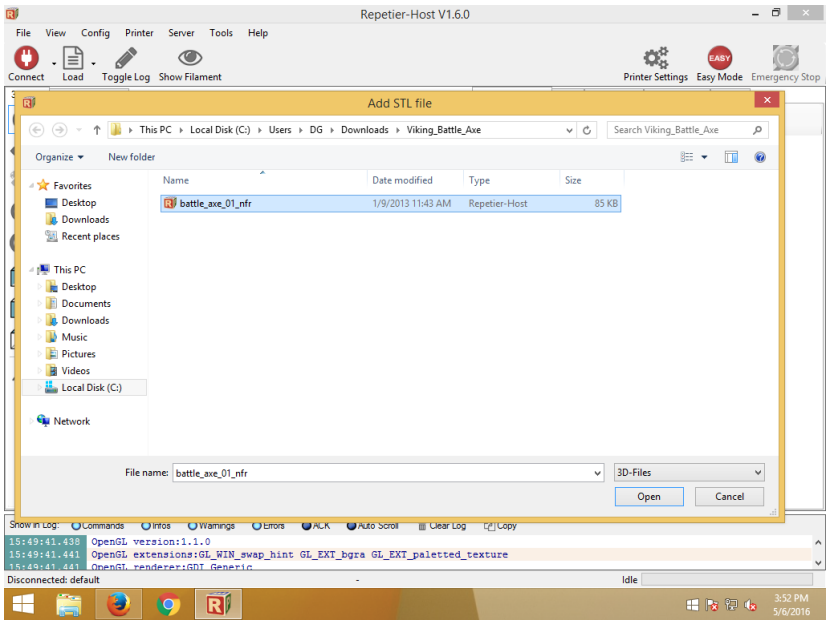

Figure 9 – Import CAD File

With the CAD file imported, it can then be scaled to size, rotated, and manipulated using a variety of built in functions as seen in (**Figure 10**)

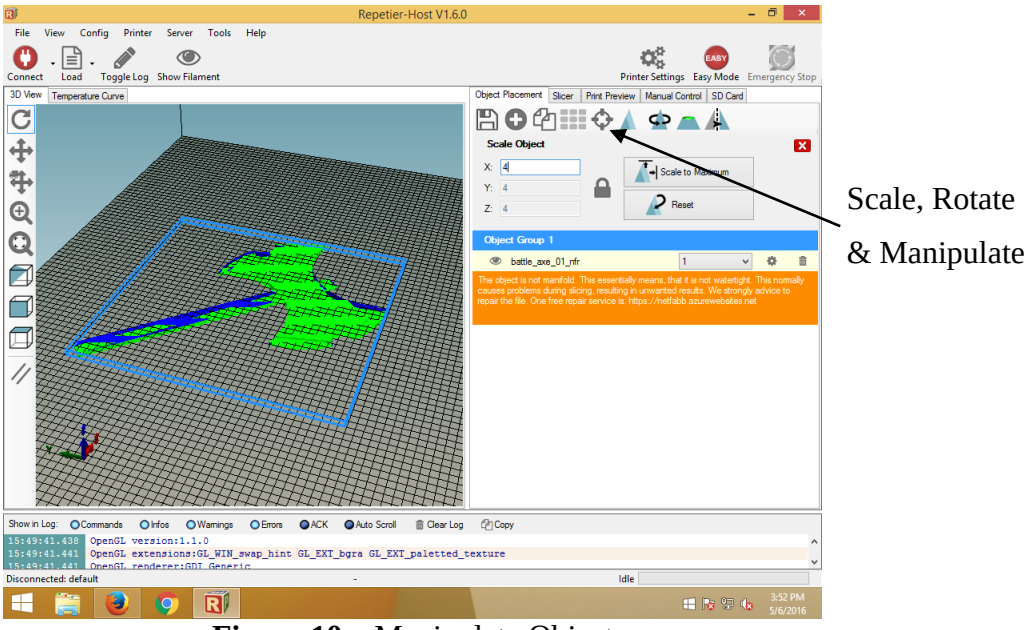

Figure 10 – Manipulate Object

Once the CAD model is properly orientated, it is ready to be sliced using the software slicer. This will effectively turn the CAD model into G-code that the 3D printer can understand.

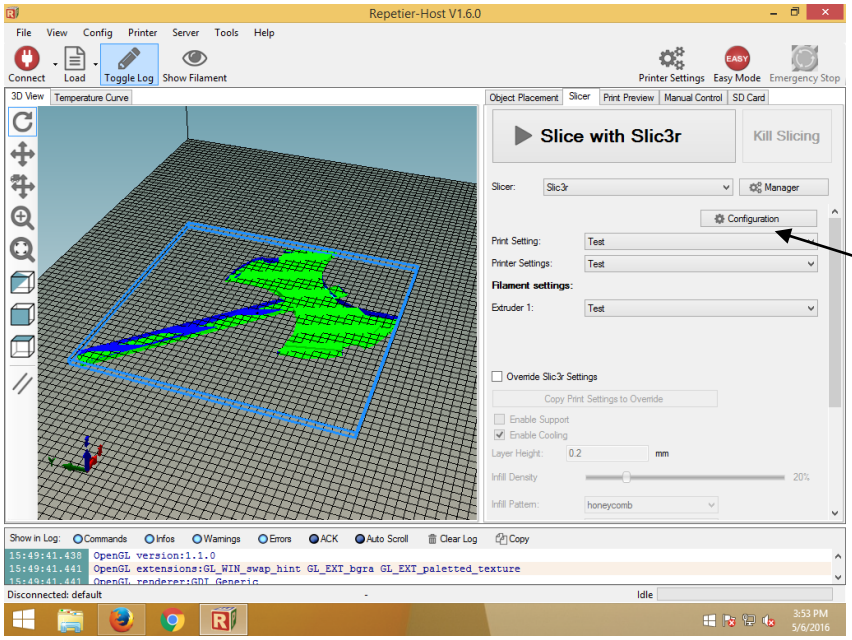

Figure 11 – Slicer

There is a wide range of settings within slicer than can be used to optimize the printing process. To access these settings hit the button illustrated in (**Figure 11**). From here print speed, infill settings, filament settings, and much more can be changed.

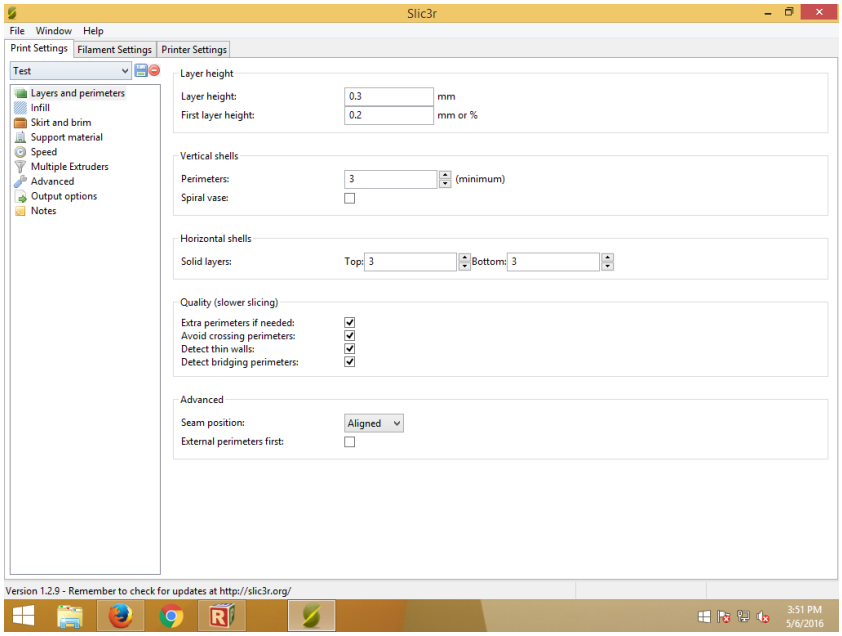

Figure 12 – Slicer Configuration

With all the settings configured, go to the print preview section as seen in (**Figure 13**). Next hit the print button to begin the printing process. The printer will first go to the home position and then proceed to print the first layer. Be careful to ensure that the print head does not collide into the print bed and watch the first layer print to make sure proper adhesion occurs. To help the first layer adhere, we recommend that a layer of painters tape be placed on the print bed. This will also help with removing the finished print.

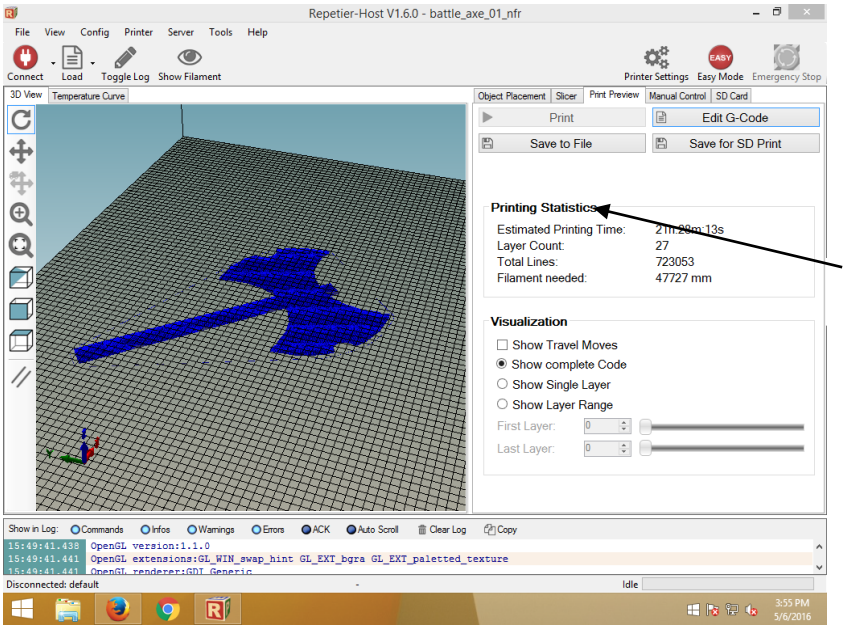

Figure 13 – Print Preview

REFERENCE

SPECIFICATIONS

PRINTING

Print Technology:	Fused deposition modeling
Build Volume:	35 L x 35 W x 30 H in [88.9 L x 88.9 W x 76.2 H cm]
Layer Resolution:	100 microns
Filament:	1.75 mm [0.069 in] MakerBot PLA Filament
Nozzle Diameter:	0.0138 in [0.35 mm]

SOFTWARE

Primary Software:	Repetier Host V1.6.1
Firmware:	Repetier Firmware V0.92.x
3D Model File Types:	.stl, .obj, .3ds
Installed OS:	Windows 8

PHYSICAL DIMENSIONS

Printer:	49 L x 58 W x 60 H in [125 L x 147 W x 152 H in]
Printer Weight:	~350 lbs (~160 kg)

POWER REQUIREMENTS

Printer:	110 VAC; 15 A
Heat Bed:	220 VAC; 9 A; Single Phase

MECHANICAL

Construction:	Powder coated steel frame, aluminum gantry system
Build Surface:	Aluminum sheet, epoxy surface, blue tape

CONTACT AND SUPPORT

THINGIVERSE

For a thriving design community for discovering, making, and sharing 3D printable things, visit Makerbot's *Thingiverse.com* or one of the many other online databases for 3d printable files.

REPRAP WIKI

For a comprehensive 3D printing community, visit *RepRap.org* or one of the many other online 3D printing communities.

REPETIER

For general inquiries regarding the use, operation, and troubleshooting of the Repetier software, visit *https://www.repetier.com/documentation/repetier-host/*

THE TEAM

For any other questions regarding this machine, feel free to contact the NAU ME Capstone team that built it.

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