

Next Generation 3D Printer

Midpoint Review Presentation

Fahad Alahmari, Sebastian Arevalo, Brad Evans, Tomas Garcia,
Ben Gouveia, Jake Work

NORTHERN
ARIZONA
UNIVERSITY®



3/9/16



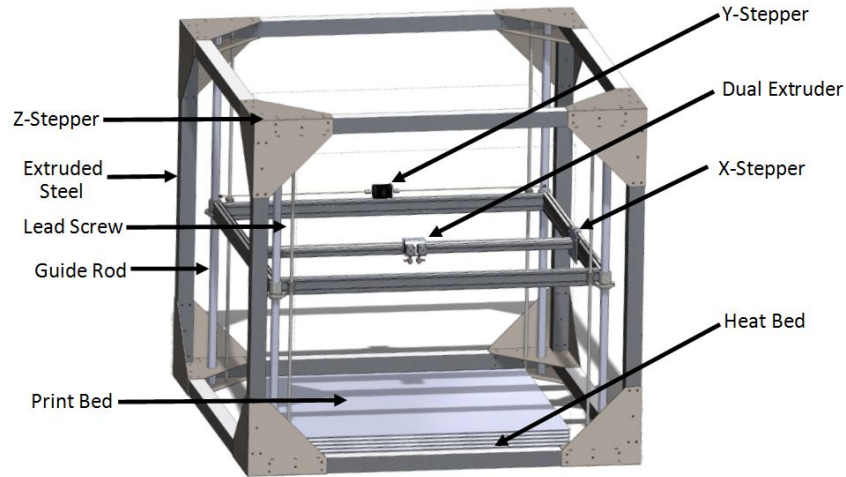
Overview

- Introduction
- The Design
- Manufacturing: The Print Bed
- Manufacturing: The Frame
- Manufacturing: The Gantry
- Electronics: The Programming
- Electronics: Control System
- Current Assembly
- Conclusion
- References

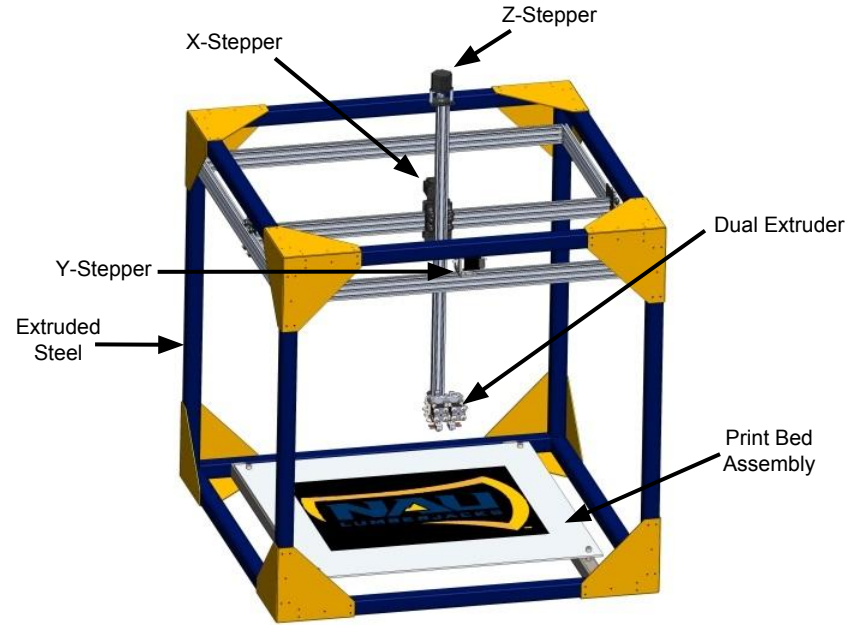
Introduction

- Novakinetics is seeking a new way to manufacture their products
- The project goal is to aid Novakinetics in optimizing their manufacturing process
- Our team determined that a large format 3D printer can be used to speed up their manufacturing process
- This semester manufacturing and testing has begun

Preliminary Design vs Modified Design

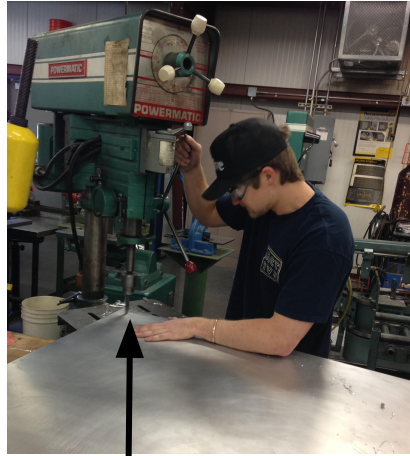


Initial Design



Current Design

Manufacturing: The Print Bed



1/2 inch holes

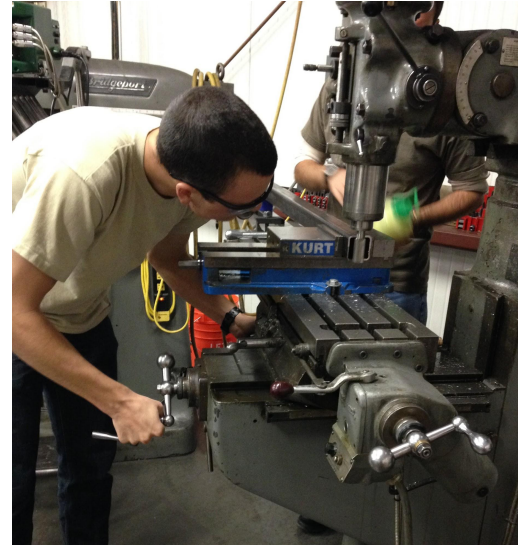
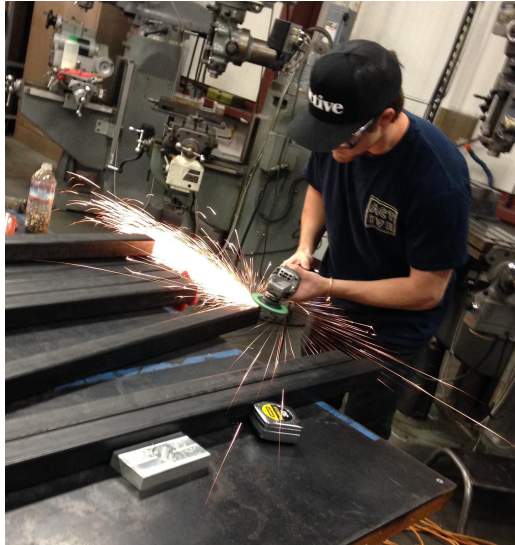


24 x 36 inch
Heat Bed

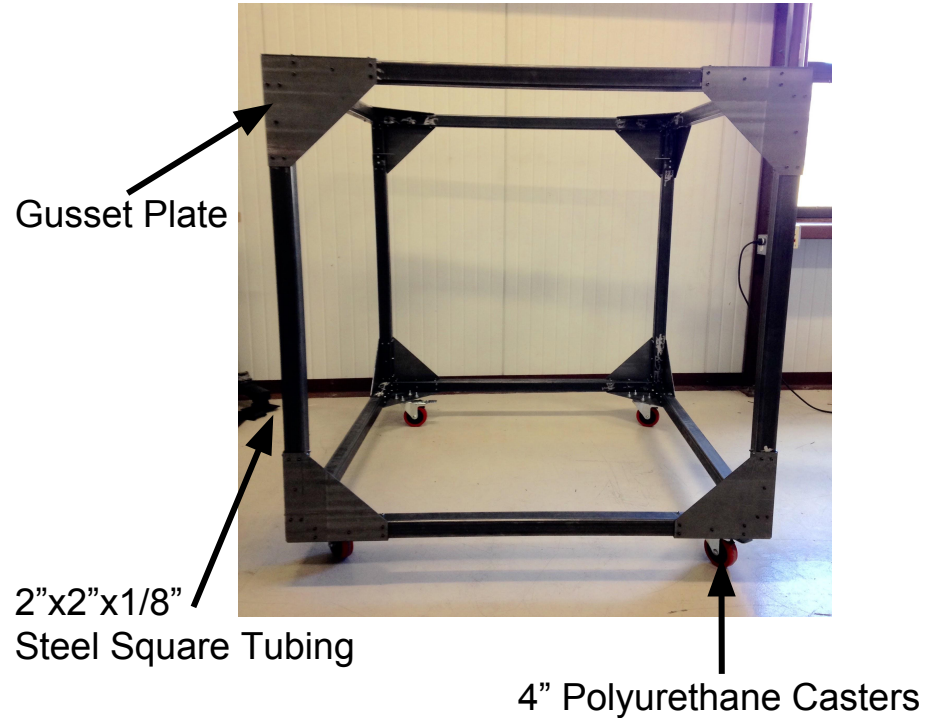


38 x 38 x 3/8 inch
6061 Aluminum

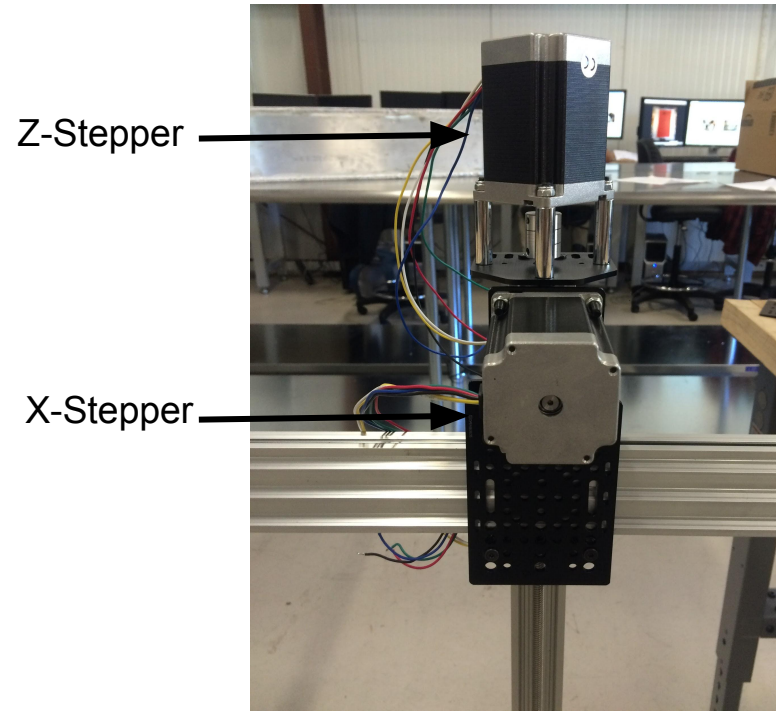
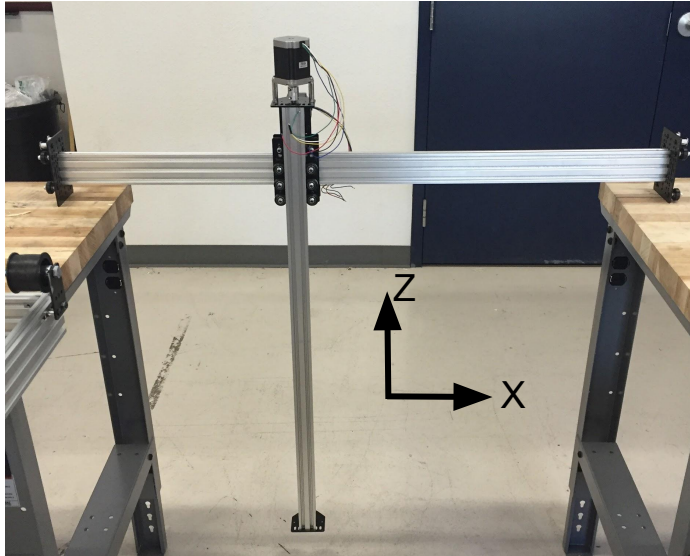
Manufacturing: The Frame



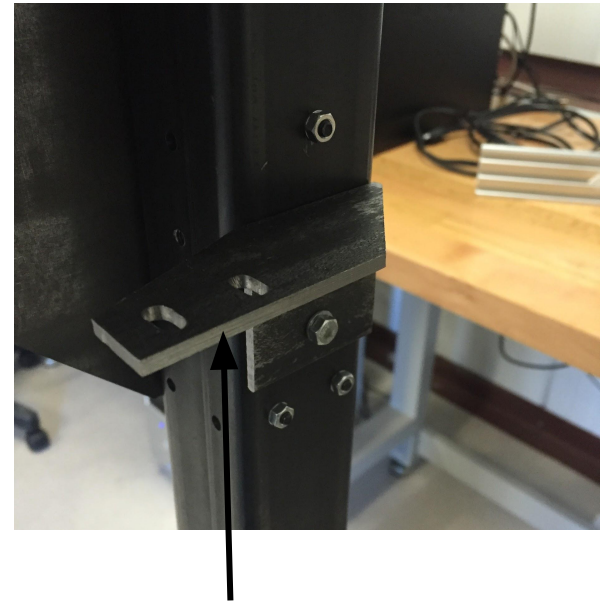
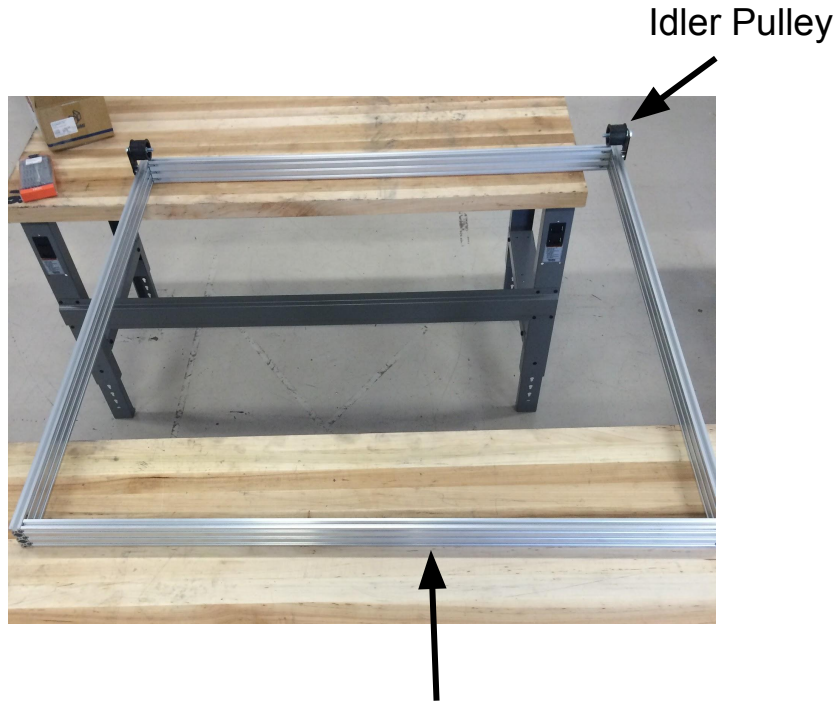
Manufacturing: The Frame



Manufacturing: The Gantry



Manufacturing: The Gantry



Electronics: Programing

- Repetier Host installed on control PC
- Repetier Firmware Installed on Azteeg X3 Pro
- Installed Motor Drivers
- Started Calibration
 - Calculated Steps/mm for X&Y axis

$$\text{steps/mm} = \frac{\text{motor steps per rev} * \text{driver microstep}}{\text{belt pitch} * \text{pulley number of teeth}}$$

- Calculated Steps/mm for Z axis

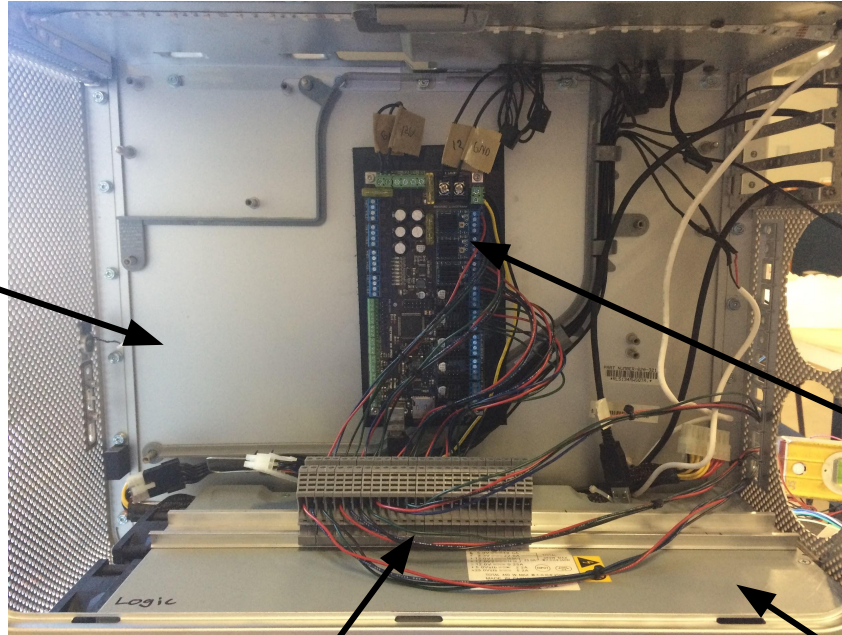
$$\text{steps/mm} = \frac{\text{motor steps per rev} * \text{driver microstep}}{\text{thread pitch}}$$

Electronics: Control System



Electronics: Control System

G5 Apple Case

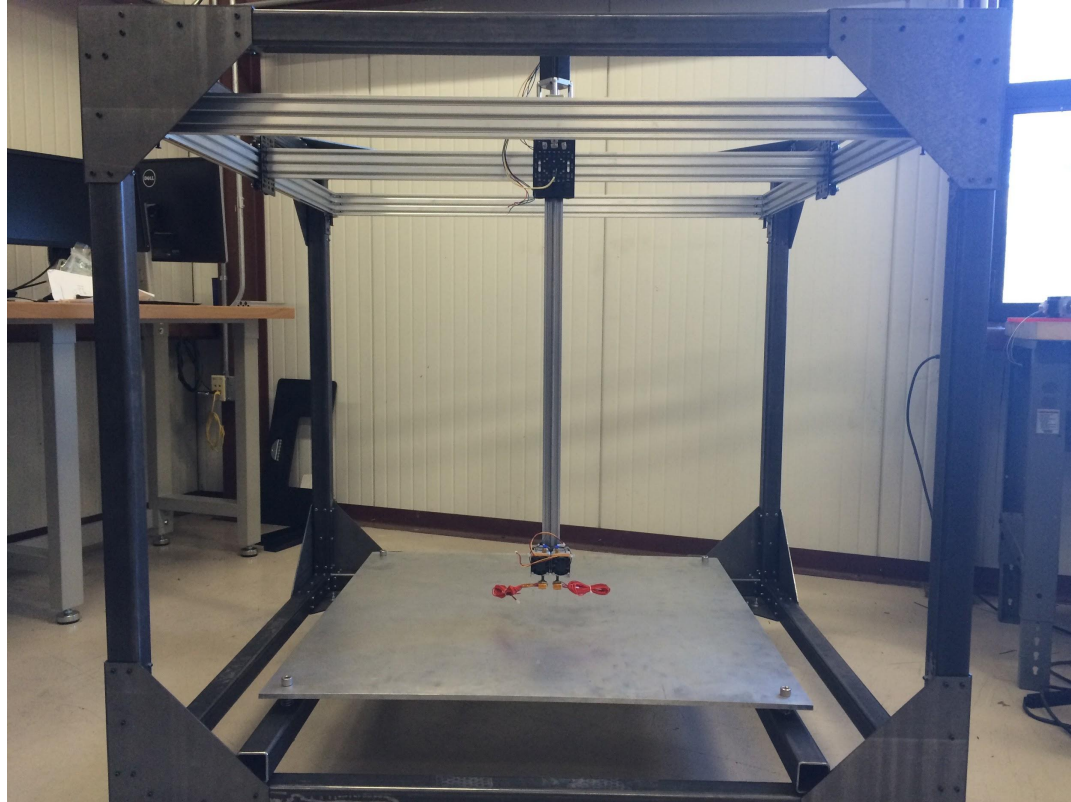


Azteeg X3-Pro

Terminal Block

12V 14-Amp Power Supply

Current Assembly



Next Steps

- Calibrating the movement
- Installation of the Print Head
- Installing feed system
- Troubleshooting
- Powder Coating of the 3D Printer

Conclusion

- Novakinetics is seeking a new way to manufacture their products
- The team determined that a large scale 3D printer can be used to speed up their manufacturing process
- Individual Components of the 3D Printer were selected based on research, functional diagrams and relative weight matrices.
- With components selected, the team created a CAD model and B.O.M of the design.
- Using the CAD model and B.O.M. parts were ordered and the manufacturing,programming, and assembly process of the 3D Printer began.

Conclusion

- The Manufacturing Process of the 3D Printer was broken up into 4 sections: the Print Bed, Frame, Gantry, and Electronics
- A control system enclosure was assembled and programming and calibration of the steppers has begun
- With the individual components configured, the 3D printer was assembled
- The next steps include movement calibration, installation of the printhead and feed system, troubleshooting, and powder coating of the 3D Printer

References

[1] Novakinetics.com, 'Composite Manufacturing Products', 2015. [Online]. Available: <http://www.novakinetics.com/>. [Accessed: 20- Sep- 2015].

[2]S. Bhandari, '3D Printing and Its Applications', *Saveetha School of Engineering*, 2014.

[3]'The Free Beginner's Guide To 3D Printing', *3D Printing Industry*, pp. 3-72, 2015.

[4] 3ders.org, 'how to build 3d printer', 2015. [Online]. Available: <http://www.3ders.org/3d-printer/how-to-build-3d-printer.html>. [Accessed: 18- Oct- 2015].

Questions?