

CprE 492 3D Metal Printer

Progress report 1

1/8/18 to 1/25/18

Client: Dr. Bigelow

Faculty Advisor: Dr. Bigelow

Team Members:

Ben Pieper - Control Software

Caleb Toney - Sensor System

Jett Ptacek - Control Software

Kevin Oran - Mechanical Design

Rachel Shannon - Sensor System

Accomplishments during reporting period

- Started working on Sensor System
 - We made sure that we got the barometer working with the Arduino. Also researched some cameras for monitoring.
 - We began working with the oxygen sensor to begin the early stages of its integration into our system.
- Got final parts list for Velmex order to Dr. Bigelow
 - We have been having issues getting a quote from a manufacturer (Velmex) as they keep recommending different solutions for our design rather than giving us a quote. Dr. Bigelow is going to handle ordering the exact parts we need.
- Started g-code interpretation software
 - We wrote some methods to convert a single g-code layer to serial commands for the Velmex motor controllers we will be ordering. We tested the methods for various g-code files and they appear to work as expected, but we can not confirm the serial output format is correct until the Velmex controllers come in.
- Quote for vacuum chamber is in.
 - Sargent Metal has offered to make our vacuum chamber for us for about \$2400. The chamber will still require one more look-over to determine the final ports for the vacuum, exhaust, and nitrogen inlet.
- Velmex
 - Velmex engineers suggested using xslides again over unislides. The 3-axis laser slides were re-selected and arranged.

Pending Issues

- Unsure if the serial interface of our software will work as expected with the Velmex motor controllers
 - We will be re-reading all applicable sections of the motor controller manual to better our understanding of the controller.
 - Dr. Bigelow should be getting a quote from Velmex with controllers on it this week or next, so they should be ordered very soon.
- Sensor System
 - Barometer needs to be tested under pressurized conditions
 - Need to integrate internal oxygen sensor with Arduino if possible
 - Oxygen System cannot be exposed to excess oxygen making working with it much more difficult.
- Bislides
 - Dr. Bigelow underestimated the weight of the laser head significantly. We will need to re-work the laser axis again.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Ben Pieper	Wrote g-code conversion algorithms, ordered Kapton wire for vacuum feedthroughs	10	10
Caleb Toney	Began working with oxygen sensor for integration	6	6
Jett Ptacek	Communicated with Velmex, Found resources for controller communication	8	8
Kevin Oran	Vacuum Chamber Quote, Design revision for xslides, vacuum chamber interfaces	14	14
Rachel Shannon	Worked on barometer pressure sensor for use with Arduino, researched cameras for monitoring	6	6
	Total Hours	45	45

Plans for next work period

- Sensor System
 - Begin integration into a more cohesive sensor unit rather than individual sensors
 - Spend more time working with the internal oxygen sensor system.
- Mechanical
 - Order Vacuum System

- Order exterior enclosure and interior parts

Summary of Advisor Meeting

Discussions with Dr. Bigelow centered on updating him on progress since break as well as help with getting certain things ordered. We have been having issues with Velmex, but Dr. Bigelow offered to step in and see if they would give him a quote. We also discussed some design challenges centered around outgassing.