Midpoint Review

Material Testing Fixture

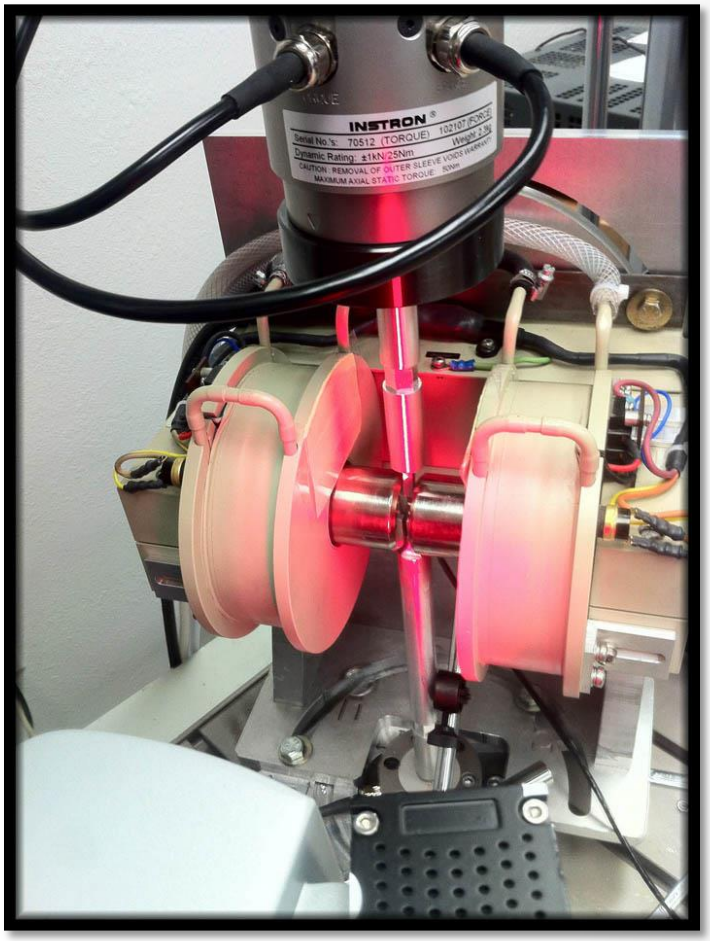
February 28, 2013

Matt Garcia, Randy Jackson, Jeremy Mountain, Qian Tong, Hui Yao

College of Engineering, Forestry, and Natural Sciences
Northern Arizona University

Overview

1. Problem Statement
2. Prototype
3. Modifications
4. Upcoming Tasks
5. Manufacturing
6. Updated Timeline



Jeremy

Problem Statement

Need: *The eccentric loading of the test specimens causes fatigue failure.*

Goal: *Design an improved material testing fixture.*

Constraints:

1. Specimen size (3 x 3 x 20) mm
2. Exposed Length (12mm)
3. Grips cannot bite into specimen
4. Push rods and grips must be non-magnetic
5. Distance between magnets (10mm)
6. Magnetic Field (0.5 - 1.0 T)
7. Axial Alignment (50 µm)

Objectives:

Objectives	Basis for Measurement	Units
Axially Aligned	Distance from Perfect Alginment	µm
Tension Compression Testing	Repeated Testing	# of Tests
Damage Specimen	Cost of Specimen Time to Replace	$$ / Month
Inexpensive	Machining Cost Material Cost	$$

Jeremy

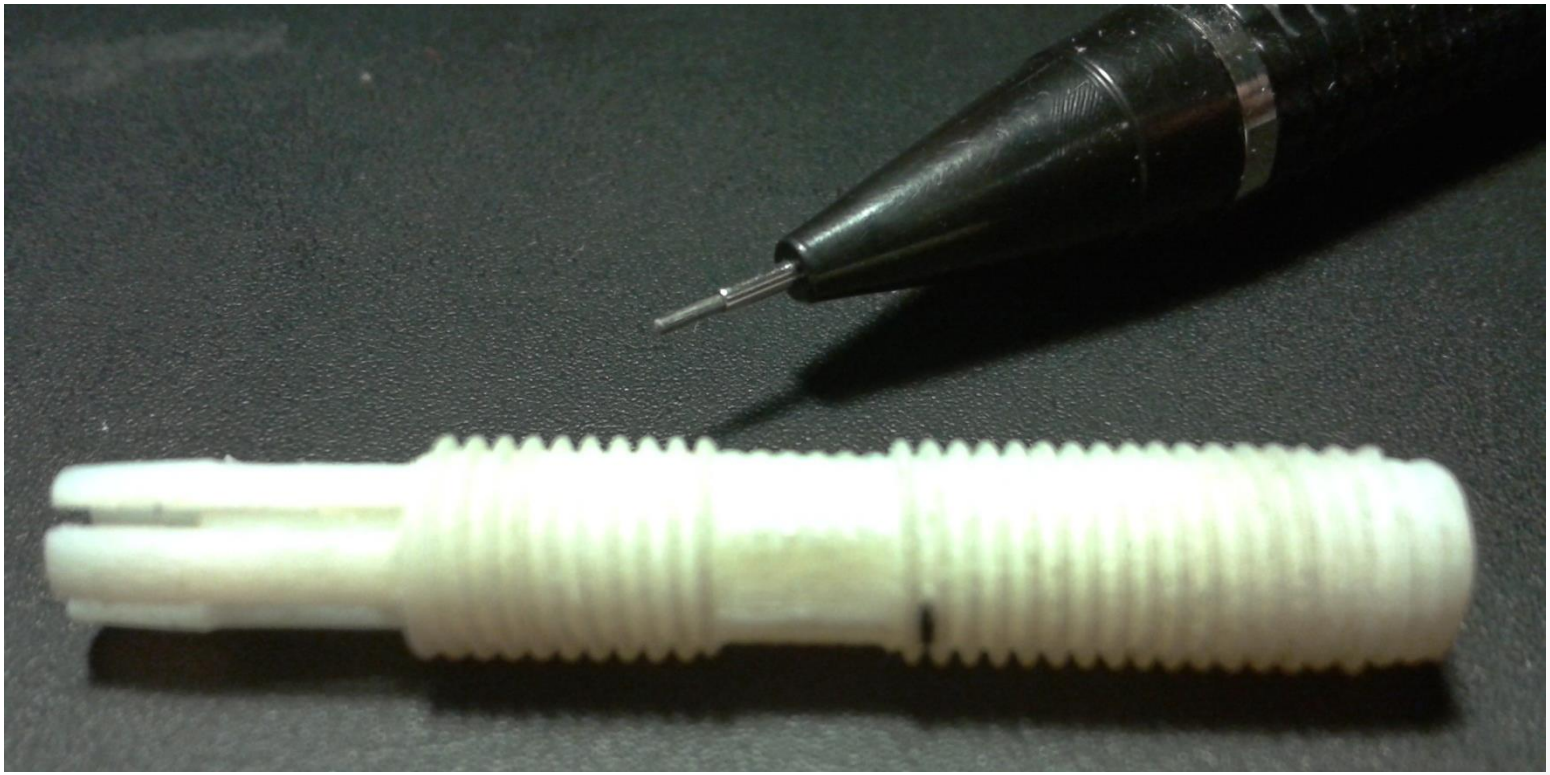
Prototype

- Sleeve

Matt

Prototype – Cont.

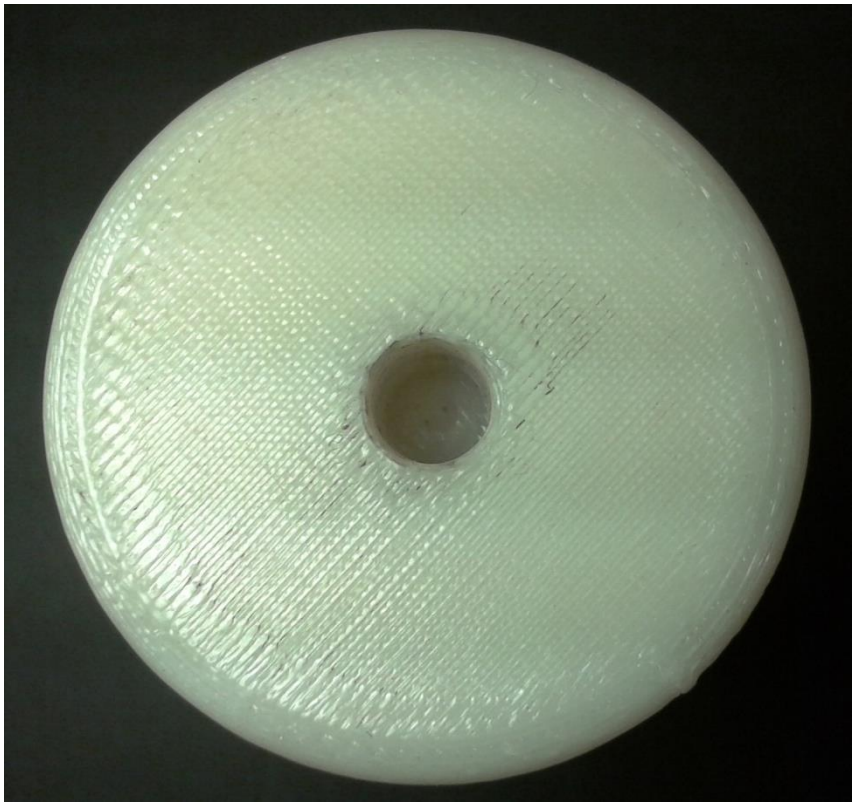
- Tip



Randy

Prototype – Cont.

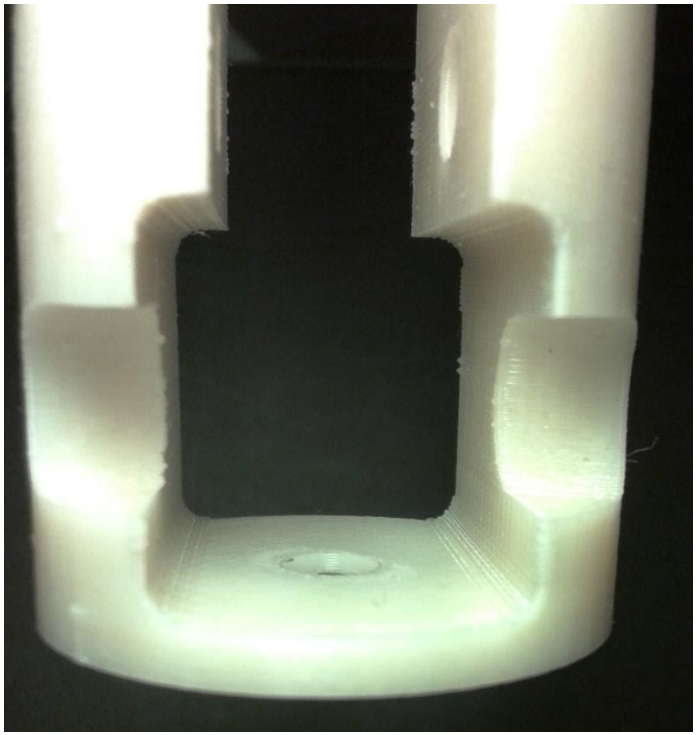
- Base – Top / Right

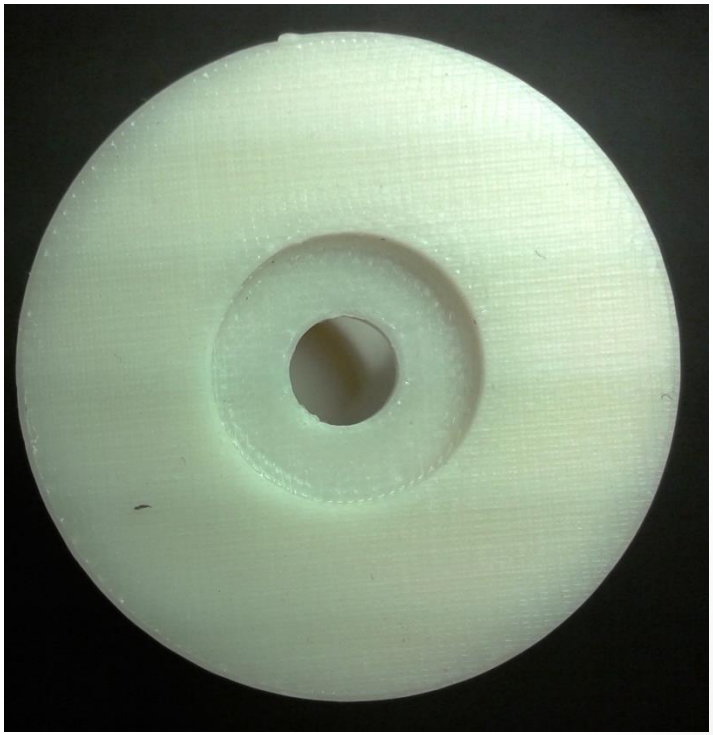


Qian

Prototype – Cont.

- Base – Front / Bottom

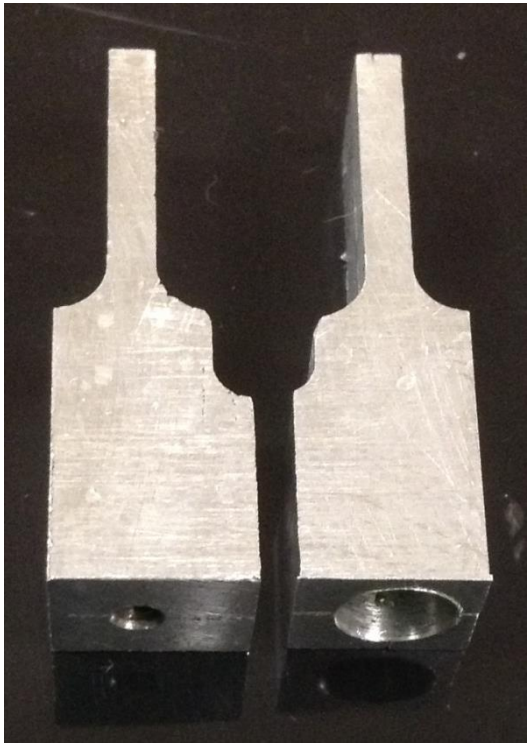


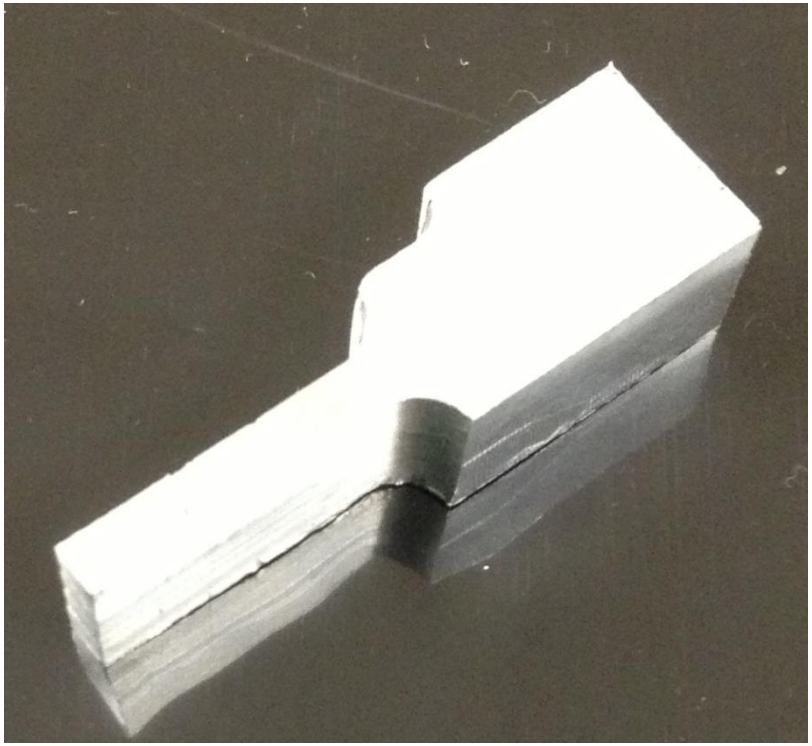


Qian

Prototype – Cont.

- Micrometer Tips





Hui

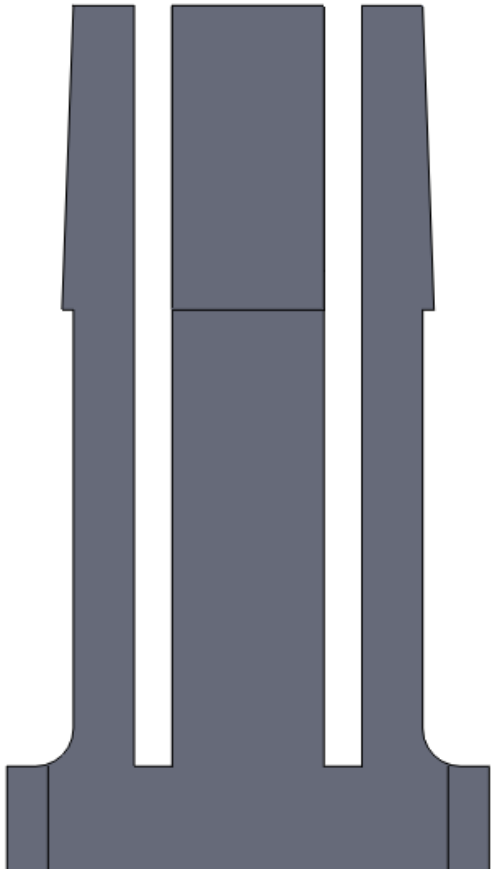
Prototype – Cont.

- Assembled – Proof of Concept

Hui

Modifications

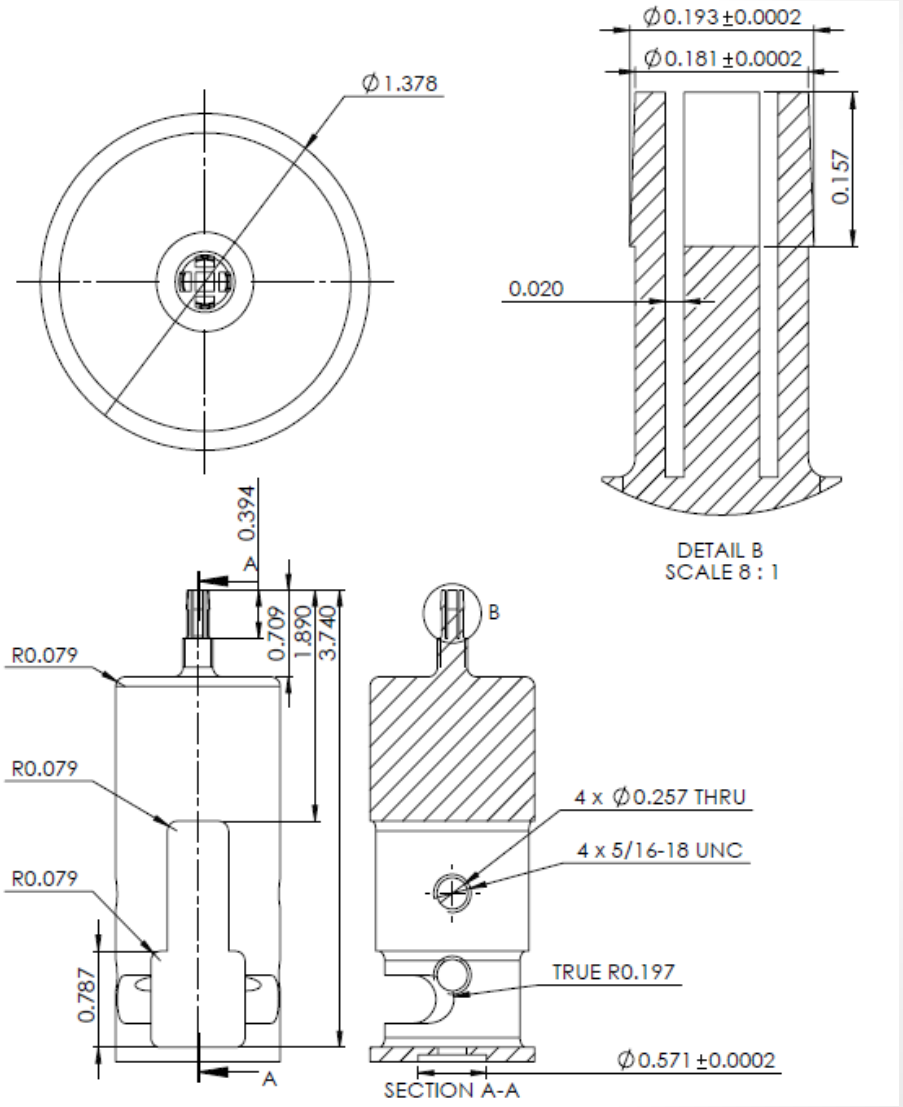
- More aggressive taper
- Thicker tines



Randy

Upcoming Tasks

- Finite Element Analysis (COSMOS)
- Complete Manufacturer's Drawings
- Machine/Outsource Final Product



Randy

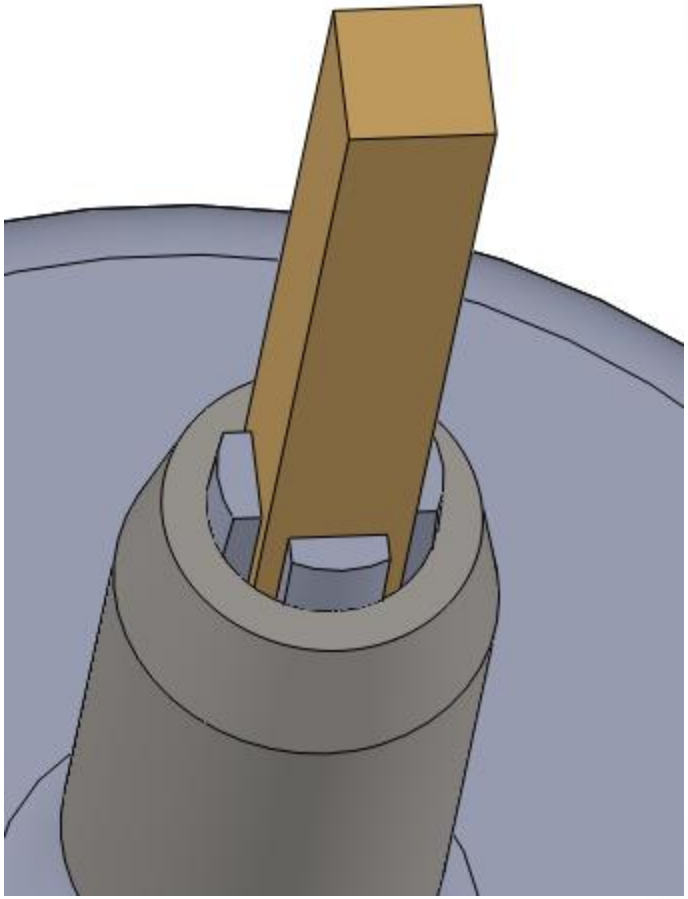
Manufacturing – Cont.

- NAU Machine Shop
- David Barnes Company
- Elrod Machine & Manufacturing Inc.

Jeremy

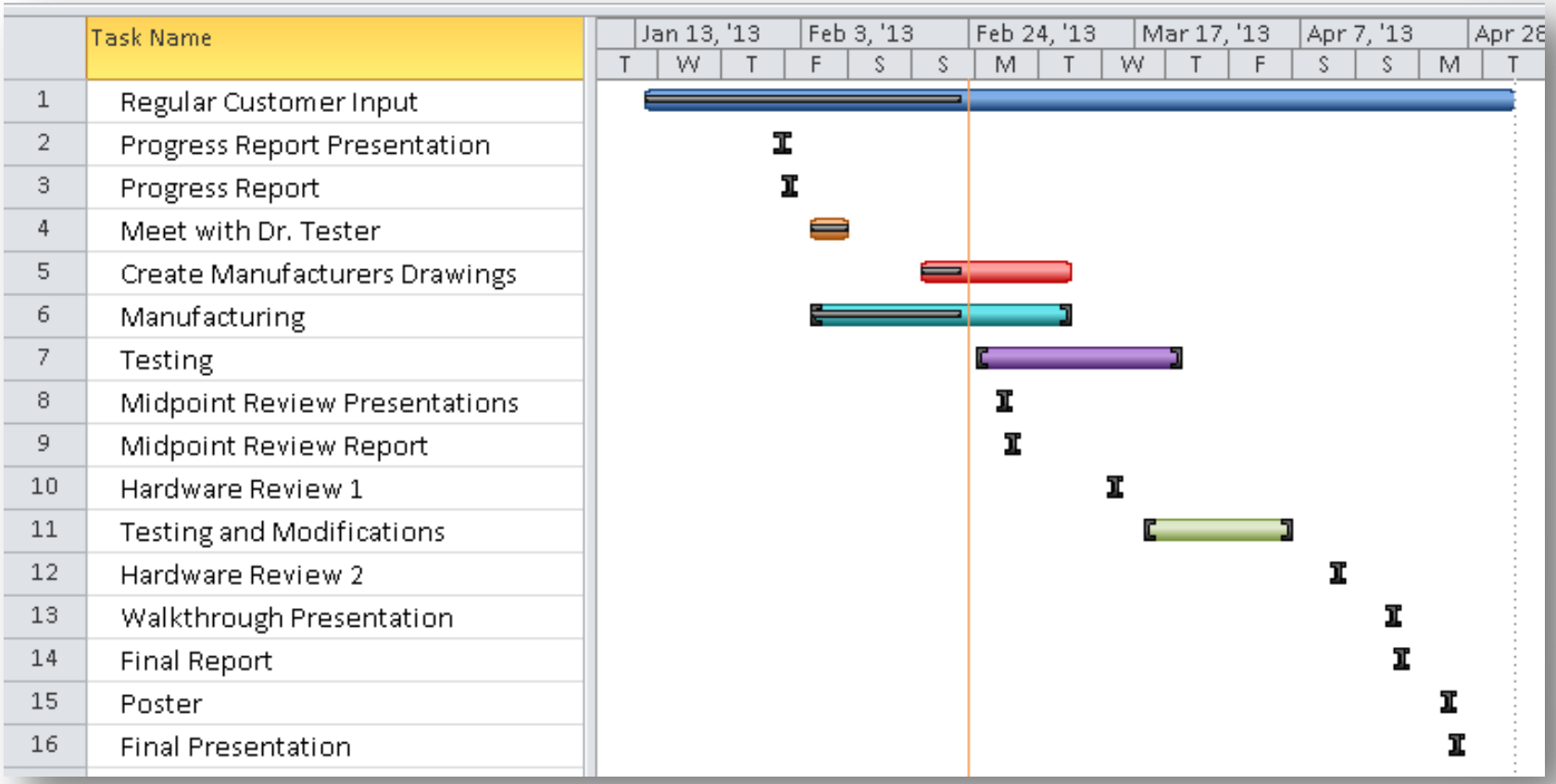
Conclusion

1. Problem Statement
2. Prototype
3. Modifications
4. Manufacturing
5. Updated Timeline



Matt

Updated Timeline



	Task Name
1	Regular Customer Input
2	Progress Report Presentation
3	Progress Report
4	Meet with Dr. Tester
5	Create Manufacturers Drawings
6	Manufacturing
7	Testing
8	Midpoint Review Presentations
9	Midpoint Review Report
10	Hardware Review 1
11	Testing and Modifications
12	Hardware Review 2
13	Walkthrough Presentation
14	Final Report
15	Poster
16	Final Presentation

Matt

References

http://www.davidbarnescompany.com

http://www.goodfellow.com

http://www.engineershandbook.com/Tables/frictioncoefficients.htm

http://www.engineersedge.com

http://www.alibaba.com

http://www.tcdcinc.com

http://www.engineeringtoolbox.com/friction-coefficients-d_778.html

http://www.youtube.com/watch?v=sPwURRG9_Gs

http://nau.edu/Research/Feature-Stories/NAU-on-Leading-Edge-of-Smart-Materials-Research/

Shigley's Mechanical Engineering Design, 9th Edition.

Dr. Constantin Ciocanel