

SAE Mini Baja

Frame Team

Project Update

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Overview

- Introduction
- Customer's Needs and Project Goals
- Updated Final Design and Modifications
- Testing and Analysis
- Fabrication Schedule
- Manufacturing Process

Introduction

- SAE sponsored 2015 Mini Baja Competition
- Designing a Mini Baja
 - Frame
 - Driver Safety

Customer's Needs

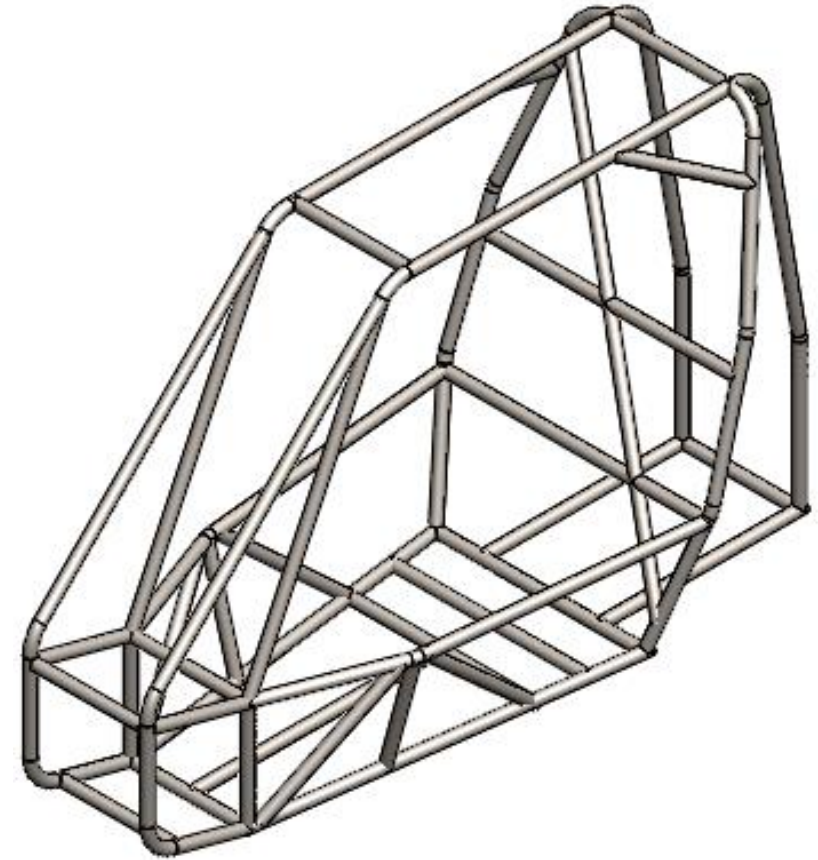
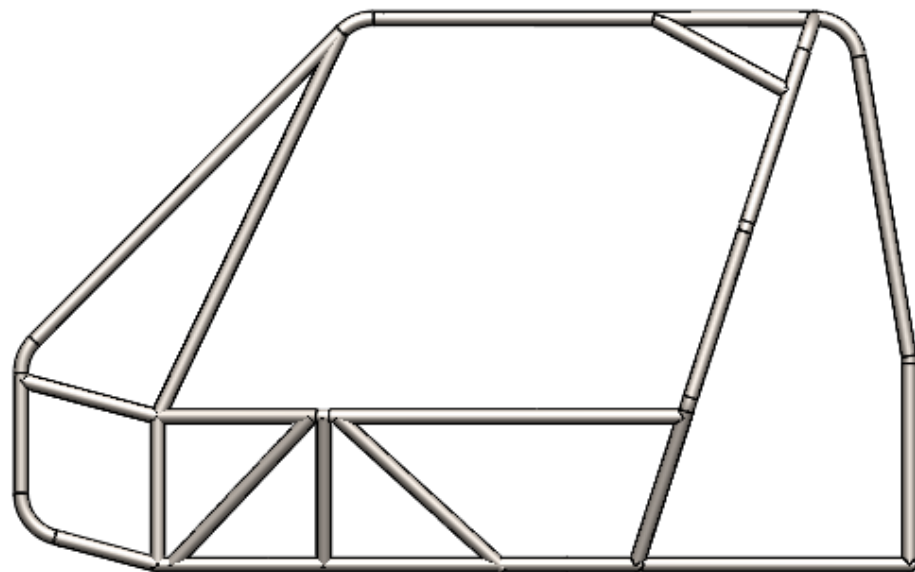
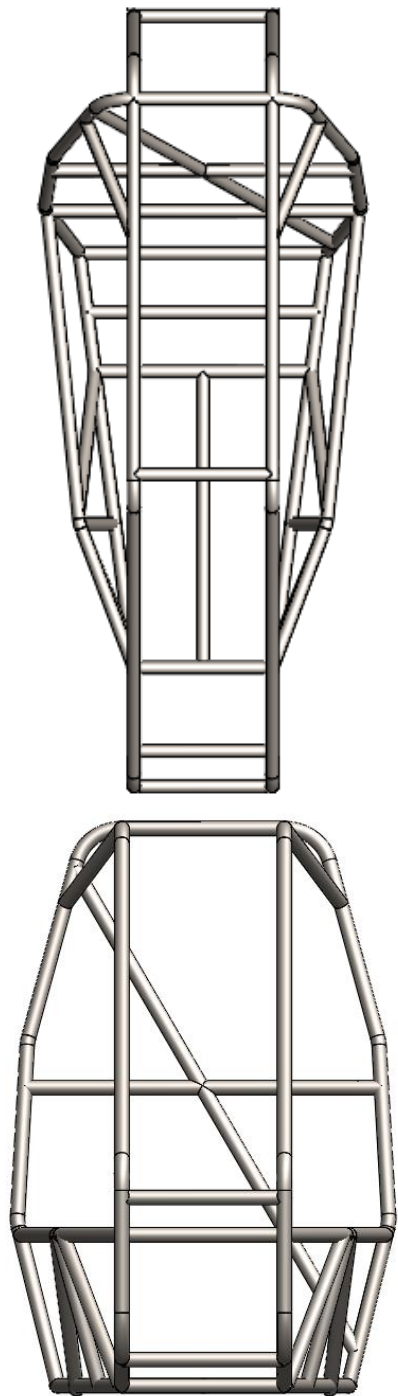
Customer: Dr. John Tester

- Weight reduction
- Weight distributions cannot exceed a 40x60 front to rear weight ratio
- Strength of the frame must be able to withstand a roll over and/or collision
- Must be safe and ergonomic for driver.
- Obstacle clearance

Project Goals

- Design and build a light weight frame that will meet strength, safety, and dimension requirements for SAE Baja Competition(s) and customer needs.
- Integrate all additional equipment into frame with mounting tabs
- Incorporate packaged extras. Examples: Glove box, Speakers, Winch, Lights, and Body Paneling
- Driver ergonomics
- Outperform previous NAU Baja team in events

Updated Final Design

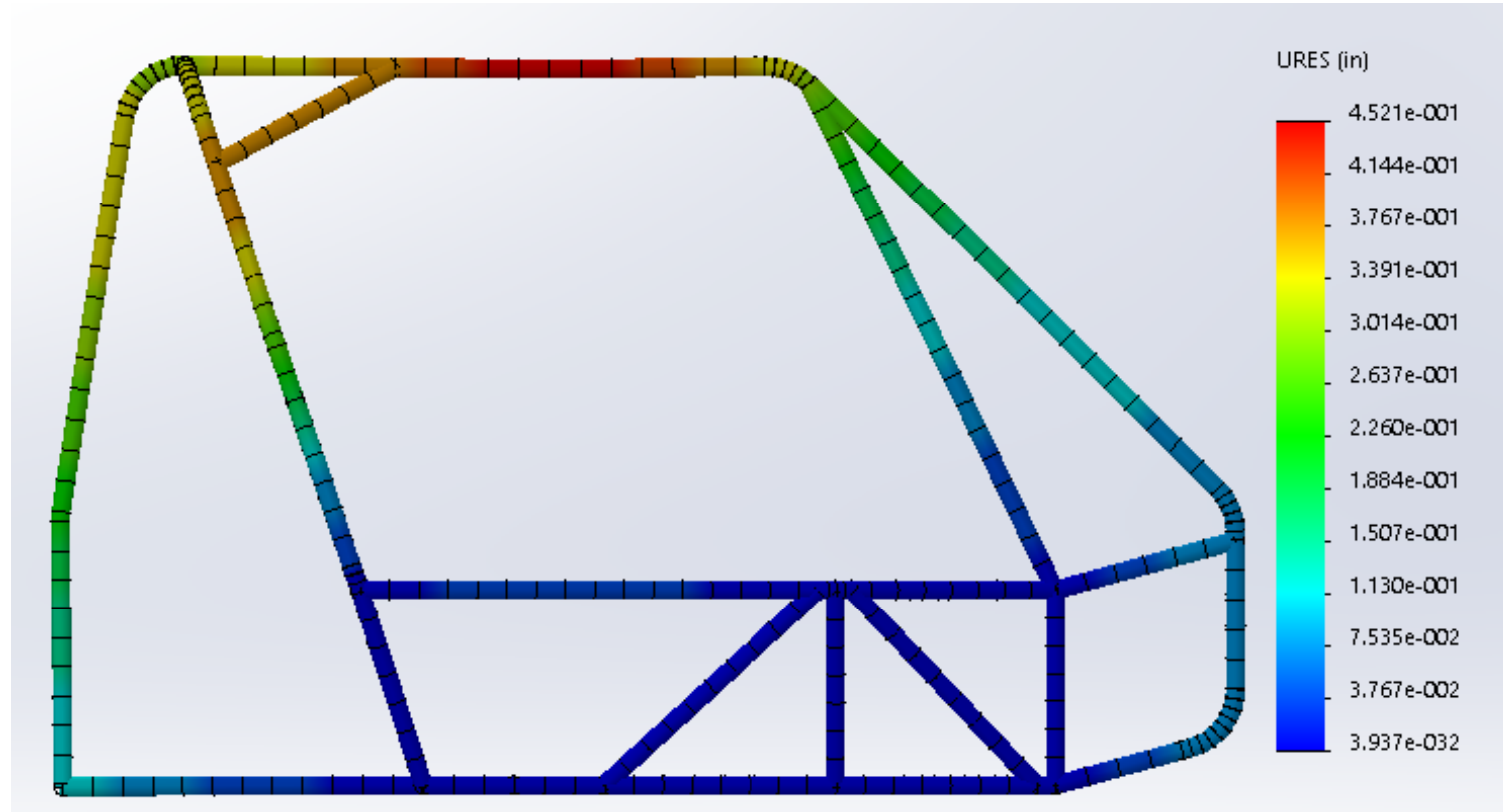


Modifications to Final Design

- Decreased the weight by 10 lbs
- Decreased cross-sectional area of the firewall
- Secondary tubing changed to 1.0" x 0.035" tubing
- Using previous years baja plastic bucket seat due to minimal change in weight

Drop Test

Displacement

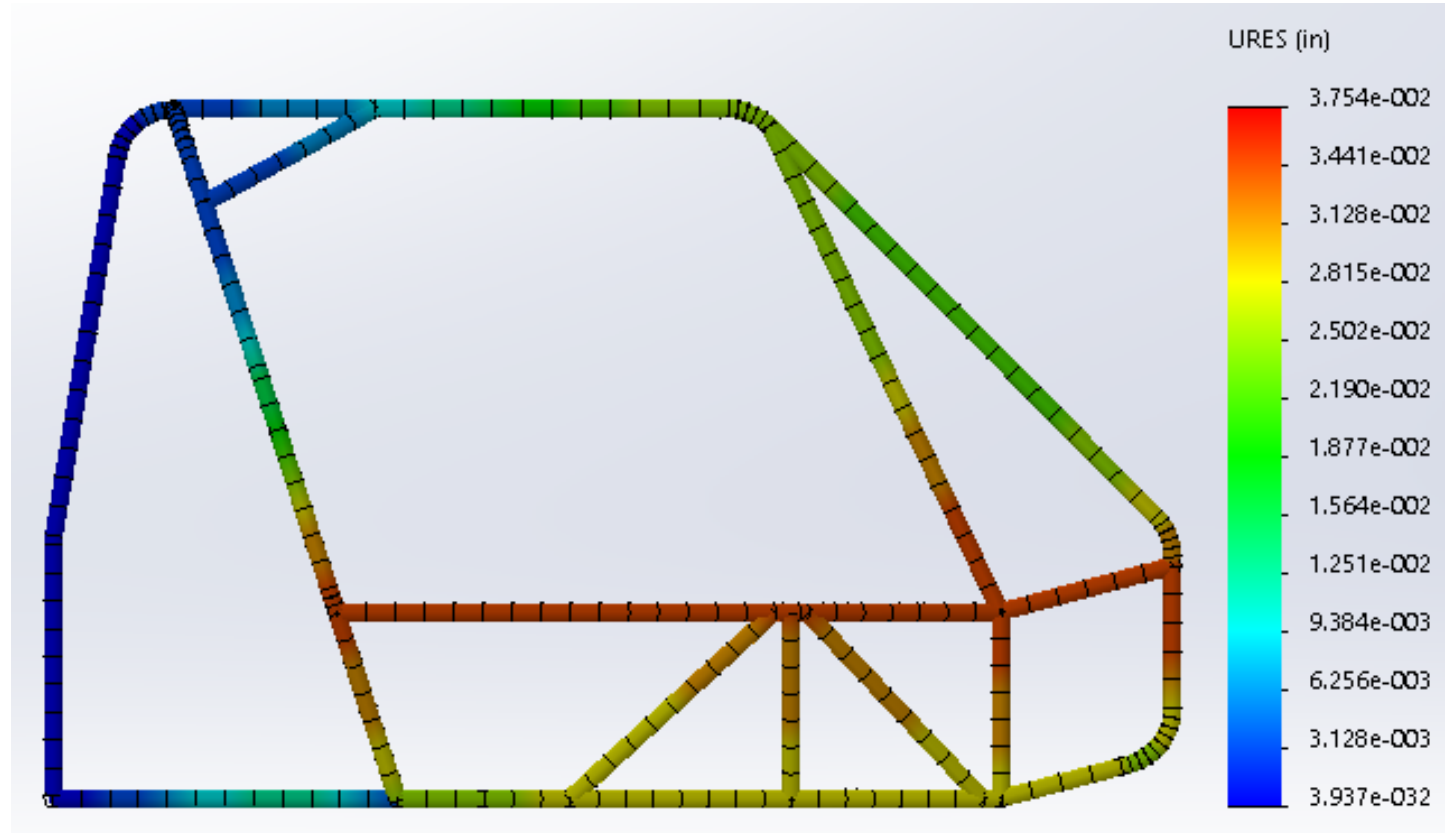


F.O.S. = 2.2

Max Stress = 30.3 ksi

Front Impact Test

Displacement

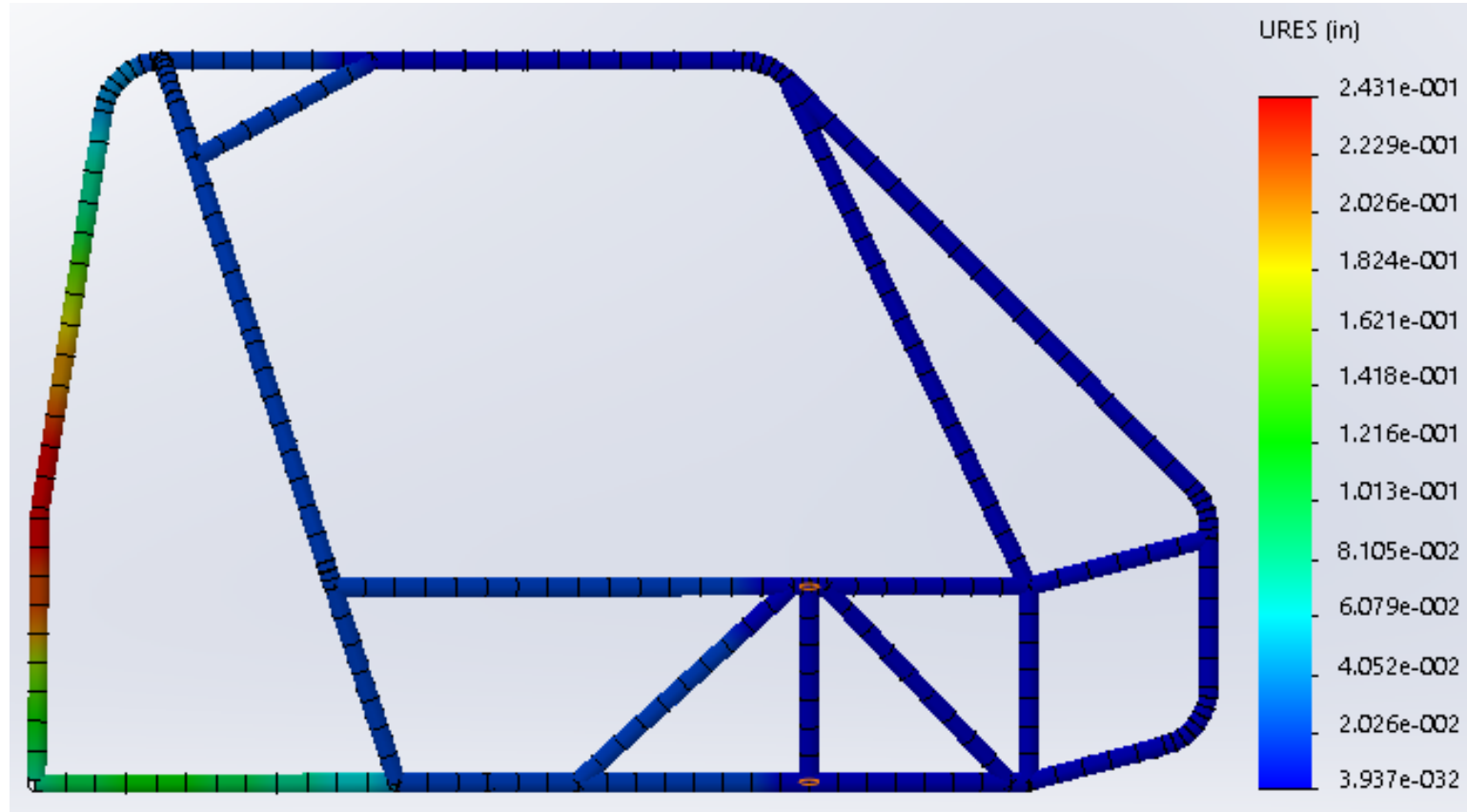


F.O.S. = 3.9

Max Stress = 17.1 ksi

Rear Impact Test

Displacement

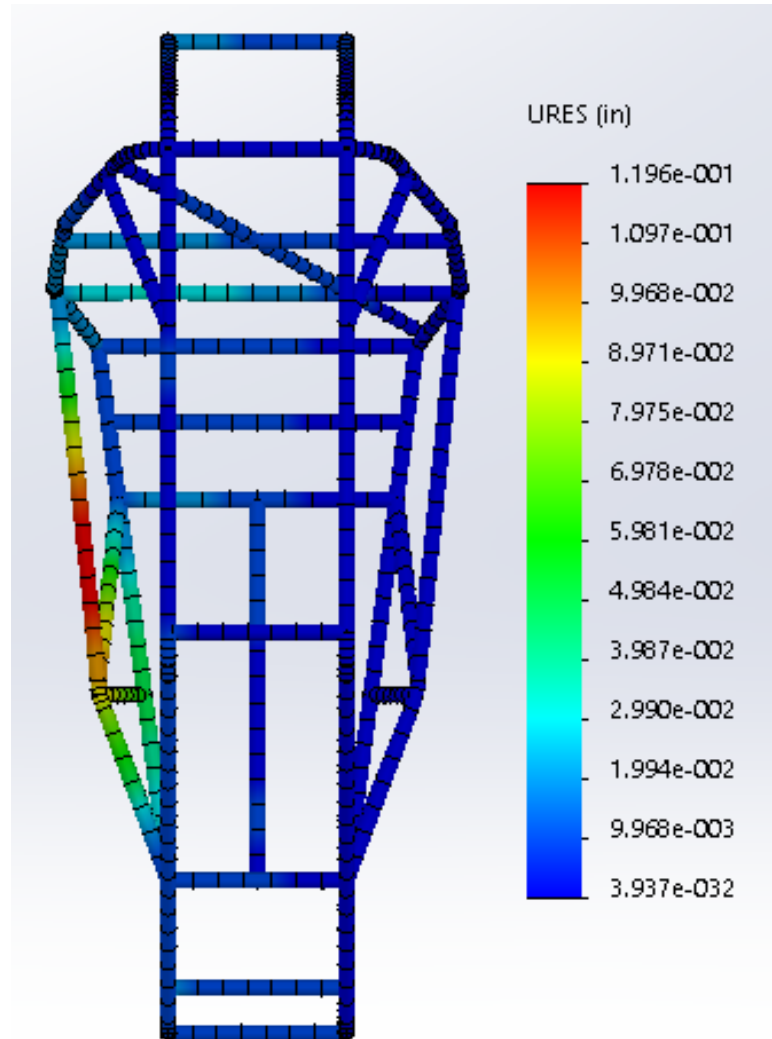


F.O.S. = 2.6

Max Stress = 25.7 ksi

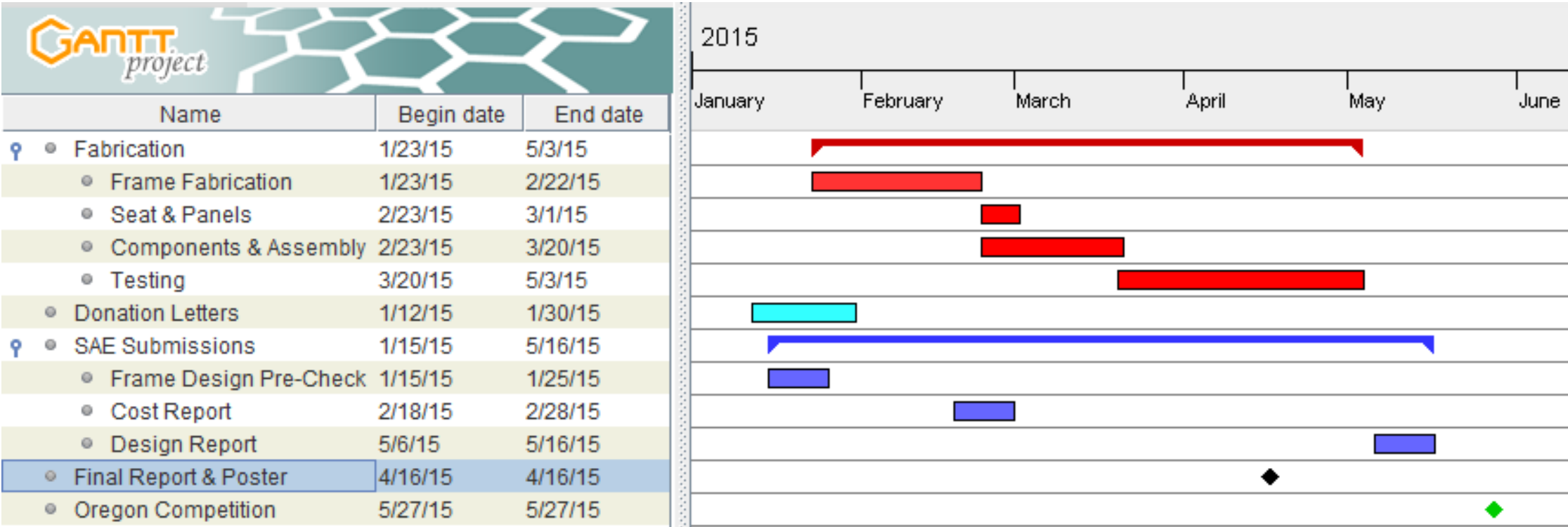
Side Impact Test

Displacement

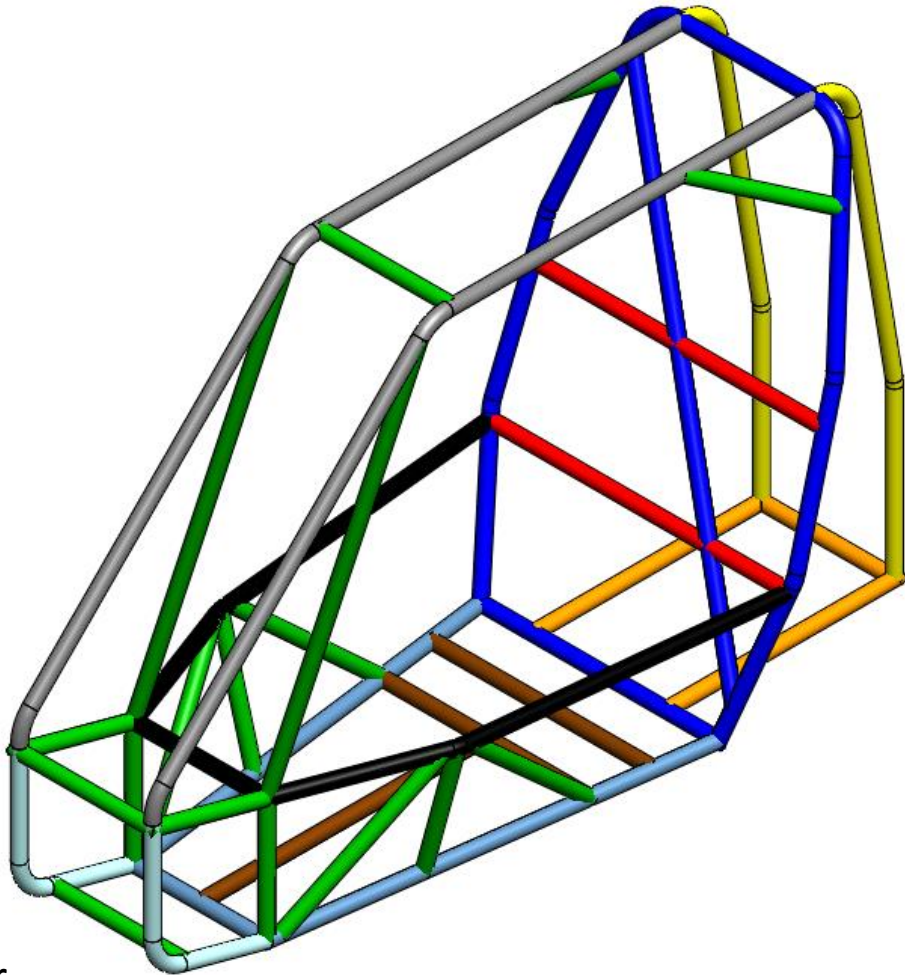


F.O.S. = 3.7
Max Stress = 18.0 ksi

Fabrication Schedule



Manufacturing process



Dark Blue	1st
Light Blue	2 nd
Black	3 rd
Brown	4 th
Teal	5 th
Green	6 th
Grey	7 th
Red	8 th
Orange	9 th
Yellow	10 th

What we need to do

- Seeking out and sending funding donation letter requests
- Have frame built by February 22nd
- Install other components of vehicle
 - (Seat, Panels, Extra's, Tabs, etc..)
- Testing of the complete baja

Conclusion

- Designed frame for SAE Baja Competition
- Client is Dr. John Tester
- Modified frame that still meets requirements for a safety while cutting 10 lbs
- Need to have the frame built by Feb 22.

References

- <http://www.youtube.com/watch?v=gAwVya8AfyM>
- SAE Design and Analysis Project with SolidWorks Software
- 2015 Collegiate Design Series Baja SAE Rules
- Dr. Tester
- <http://www.superatv.com/Polaris-Ranger-XP-900-6-Lift-Kit-P8182.aspx>, access 2014.
- <http://socalbajas.com/>, access 2014.

State-of-the-Art Research

Introduction to Finite Element Analysis and Design

K. Nam-Ho, "Introduction to Finite Element Analysis and Design" 2008, Wiley.

2015 Collegiate Design Series Baja SAE® Rules

SAE International, "2015 Collegiate Design Series Baja SAE Rules" 2014, 2014.

Structural Considerations of a Baja SAE Frame

A. T. Owens, "Structural considerations of a baja SAE frame," 2006-12-05, 2006.

NAU SAE Baja 2013-2014

Any Questions?