SAE Mini Baja

Frame Team

Problem Statement & Planning

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9-24-14

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SAE®

Overview

- Problem Statement
- Customer Needs
- Goals
- Constraints
- Objectives
- Gantt Chart
- QFD with House of Quality
- SOTA

Problem Statement

- Design and build a single-seat mini baja frame that a fictitious firm would want to manufacture. The frame will be put through a series of dynamic events that will test the structural integrity.

Customer Needs

Customer: Dr. John Tester

- 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
- Weight reduction

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
- Inexpensive to manufacture
- Outperform previous NAU Baja team in competition(s)

Constraints

- All major constraints are within SAE Baja Rules
  (such as dimensions, materials, support members)
- Width of vehicle must not exceed 59 inches.
- Total weight cannot exceed 450 lbs

Objectives

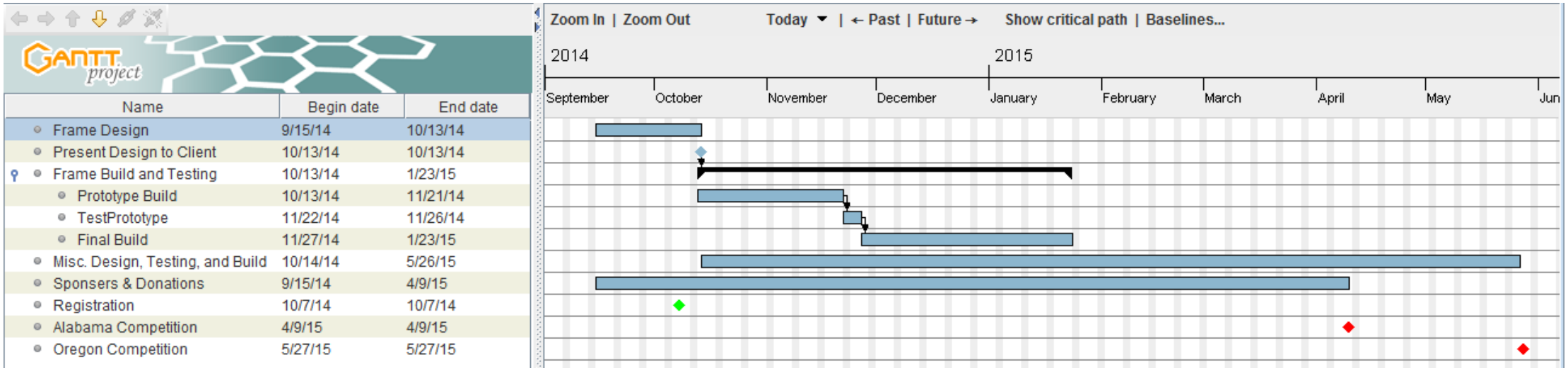
- Design and build a light weight frame (under 150lbs and a total vehicle weight under 450 lbs)
- Build within a short amount of time (time)
- Strength, via compression testing (lbf/N)
- Dimensions of frame allow vehicle to be transported to competition(s) with ease (in)

QFD and House of Quality

Relationships	
Strong	●
Moderate	○
Weak	▽

Column #	1	2	3	4	5	Bench Marks	
Customer Requirements (Explicit and Implicit) \ Engineering Requirements	Weight	Strength	Build Time	Cost	Dimensions	NAU Baja 2013-2014	ASU Baja 2013-2014
Overall Weight	●	○		▽		−	+
Dimensions	○			○	●	−	+
Weight Distribution	●	○		▽		+	+
Safety & Ergonomic		●		○	○	+	−
Units	lbs	lbf/N	Days	$	in.		
	450	5,000	30	10,000	59		

Gantt Chart



Name	Begin date	End date
Frame Design	9/15/14	10/13/14
Present Design to Client	10/13/14	10/13/14
Frame Build and Testing	10/13/14	1/23/15
Prototype Build	10/13/14	11/21/14
TestPrototype	11/22/14	11/26/14
Final Build	11/27/14	1/23/15
Misc. Design, Testing, and Build	10/14/14	5/26/15
Sponsers & Donations	9/15/14	4/9/15
Registration	10/7/14	10/7/14
Alabama Competition	4/9/15	4/9/15
Oregon Competition	5/27/15	5/27/15

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

Conclusion

- Problem Definition
    - Needs
    - Goals
    - Objectives
    - Constraints
    - Testing Environment
    - Quality Function Deployment
- State-of-the-art Research
- Project Planning

References

- 2015 Collegiate Design Series Baja SAE Rules

- Dr. Tester

Questions?