

SAE Mini Baja: Suspension

Problem Definition and Project Plan

Zane Cross, Kyle Egan, Nick Garry, Trevor Hochhaus



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Overview

- Introduction
- Customer Needs
- Project Goals
- Objectives
- Constraints
- QFD
- HOQ
- Gathering Information
- Project Planning
- Conclusion

Introduction

Design, build, and test suspension and steering components to compete in Mini Baja SAE competition.

Client: Dr. John Tester

SAE Mini Baja Competition Environment:

- Portland, Oregon
- Rough, natural terrain and wet weather

Customer Needs

The previous car was too large, heavy, and lacked maneuverability.

Project Goals

- **Need:** Approach angle is too shallow reducing maneuverability
- **Need:** Current suspension mounts were an after thought for the frame increasing weight
- **Need:** Existing turning radius is too large limiting maneuverability

Project Goals cont.

- **Need:** Current car is too bulky in overall dimensions
- **Need:** There were too many bought components with no analytical justification
- **Need:** Most components are over engineered and too heavy

Objectives

Objective	Measurement Basis	Units
Increase Width	Track width of Mini Baja	in
Lower Weight	Weight of all steering and suspension components	lb
Increase Maneuverability	Turning radius	in
Increase Approach Angle	Ride Height	in
Increase Reliability	Repetition of suspension and steering components	reps

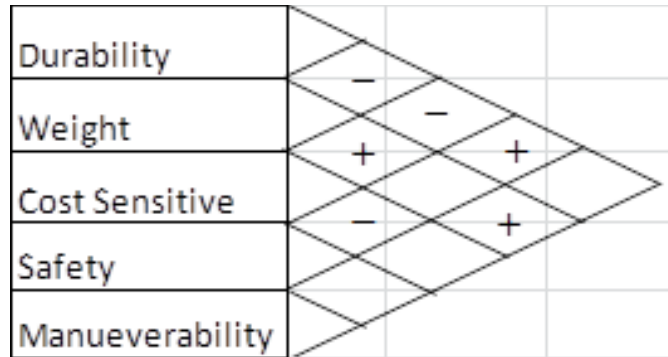
Constraints

- Track width must be 59" or less
- 2 lane width turning radius
- All suspension mounts integrated into frame
- Entire Mini Baja must weigh less than 450 lbs
 - Suspension and Steering components need to weigh no more than 150 lbs
- Conform to SAE Baja competition rules

QFD

		Engineering Requirements						
		Weight	Yield Strength	Turning Radius	Ground Clearance	Suspension Travel	Weight	Cost
Customer Needs	Durability	0.2	9		3	3		
	Weight	0.3					9	3
	Cost Sensitive	0.125					3	3
	Safety	0.125	9		3	3		
	Manueverable	0.25		9	3	3		
Units			kpsi	ft	in	in	lb	\$
Score			2.93	2.3	1.7	1.7	3.1	1
Weighted %			23	18	14	14	24	8

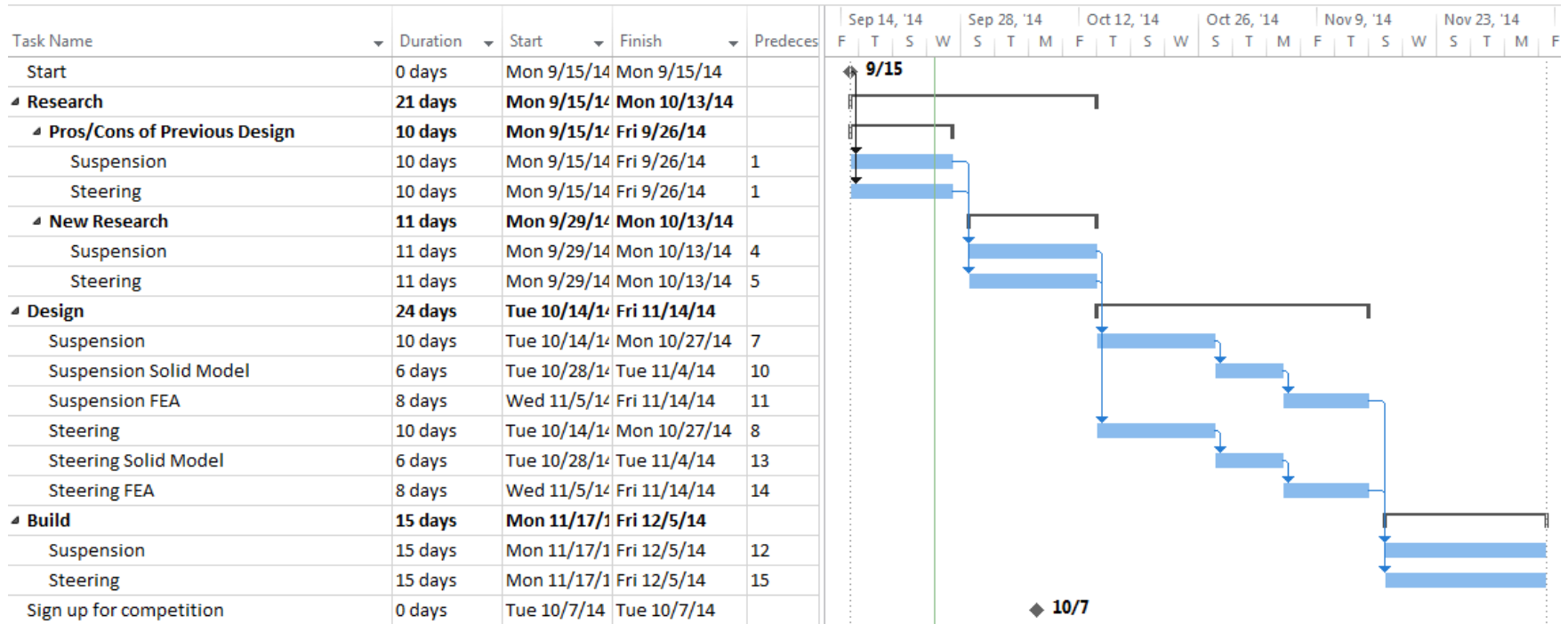
House of Quality



Gathering Information

- State-of-the-art Research
 - Previous NAU SAE Baja Projects
 - Previous SAE Baja Projects from other schools
 - Suspension Systems
 - Steering Systems
- Resources
 - SAE 2015 Rules and Regulations
 - Technical Suspension Books
 - Technical Steering Books
 - Previous SAE Baja Projects

Project Planning



Conclusions

- Design, build, and test Mini Baja Suspension and Steering
- Previous Baja too large, heavy, and lacked maneuverability
- Increase track width, maneuverability, approach angle, reliability
- Conform to constraints given by client
- Examine engineering requirements with respect to constraints
- Determine how customer needs will affect each other
- Perform state-of-the-art research from resources
- Assign dates for research, design, and building

References

- Dr. John Tester
- <http://bajasae.net/content/2015%20BAJA%20Rules%20.pdf>

Questions?