

SAE Baja Competition

Problem Formulation and Project Plan Team Drivetrain

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1. Introduction

- Sponsored by SAE
- Project description
- Participants
- The engine is provided
- The Baja competition project in NAU:
 1. Frame design
 2. Suspension design
 3. Drive-train design

2. Goal Statement

- To build a rigid and durable Baja vehicle that can successfully complete all of the SAE competition events.

3. Objectives

- Satisfy the client and stakeholder needs and requirements
- Build a drive-train for the Baja vehicle so that it can complete the following tests successfully:
 1. Acceleration
 2. Traction
 3. Maneuverability
 4. Specialty
 5. Endurance

4. Needs Identification

- Customer Needs
- Engineering requirements
- Quality Function Deployment (QFD)

Customer Needs

- Six most important customer needs
 - Ability to climb the hill
 - Ability to pull an excess load
 - Able to reverse
 - Large max Velocity
 - Durability
 - Inexpensive
- Customer Needs described by Engineering Requirements

Engineering requirements

- Material strength(Kpa)
- Torque(N.m)
- Power efficiency(%)
- Velocity(m/s)
- Cost(\$)

Quality Function Deployment (QFD)

	Engineering Requirements for Drive-train							
Customer Needs	Customer Weights	Cost	Size	Torque	Weight	Velocity	Material strength	Power efficiency
Safety	7	3			3	1	9	
Accelerate fast	8	1	3	9	3	3		9
Able to climb the hill	10	1		9	3	3		3
Able to pull an excess load	10	1		9	3	1		3
Durability	9	3					9	
Long maintenance period	5	3	3				9	
Drive fast	10	1		3	3	9		3
Able to reverse	8			9				
Inexpensive	7	9	1		1		3	
	Raw score	164	46	354	142	161	210	162
	Relative Weight	13%	4%	29%	11%	13%	17%	13%
	Unit of Measure	Dollors	m ³	N.m	kg	m/s	Kpa	ul
*ul--> Unitless by method								

5. Project Specification

- Introduction
- Requirements
- Constrains

Introduction

- 2014 Collegiate Design Series Baja SAE rules govern the requirements and constraint of our design.
- This was provided to us through SAE and explicitly states what is legal and illegal.

Requirements

- All requirements were implied not stated
- Select and Design a transmission given a specific motor that will allow you to complete multiple strenuous tasks.
- This transmission should be able to withstand repeated performances of each task.

Constraints

- Because we are required to design for this part there were not too many constraints specifically for the drive-train
- The Briggs & Stratton motors are governed at 3800 RPMs

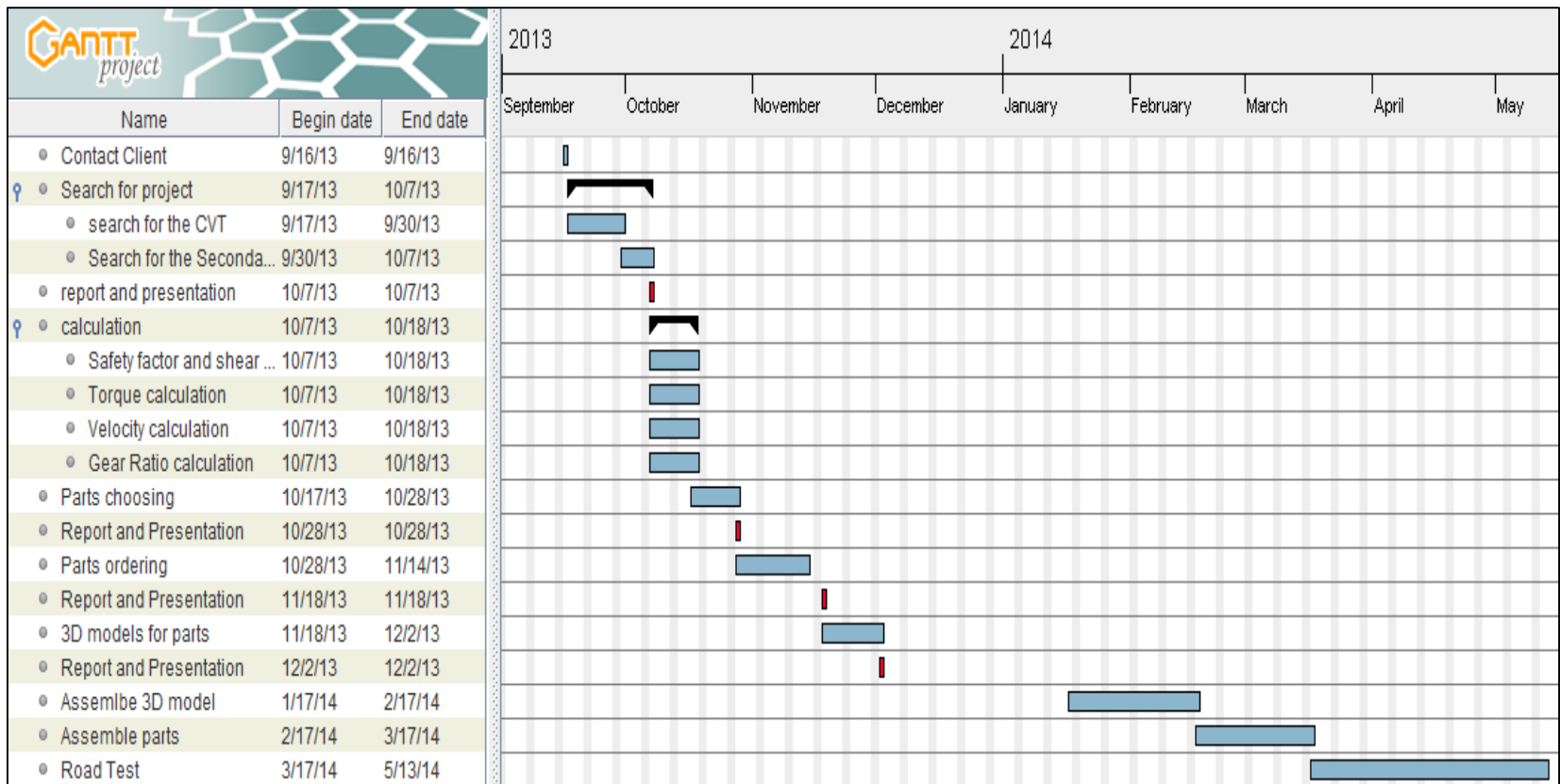
6. Project Plan

- Meet with the client 9/16/13
- Project research 9/17/13---10/7/13
- Calculations 10/7/13---10/18/13
- Final analysis 10/17/13---10/21/13

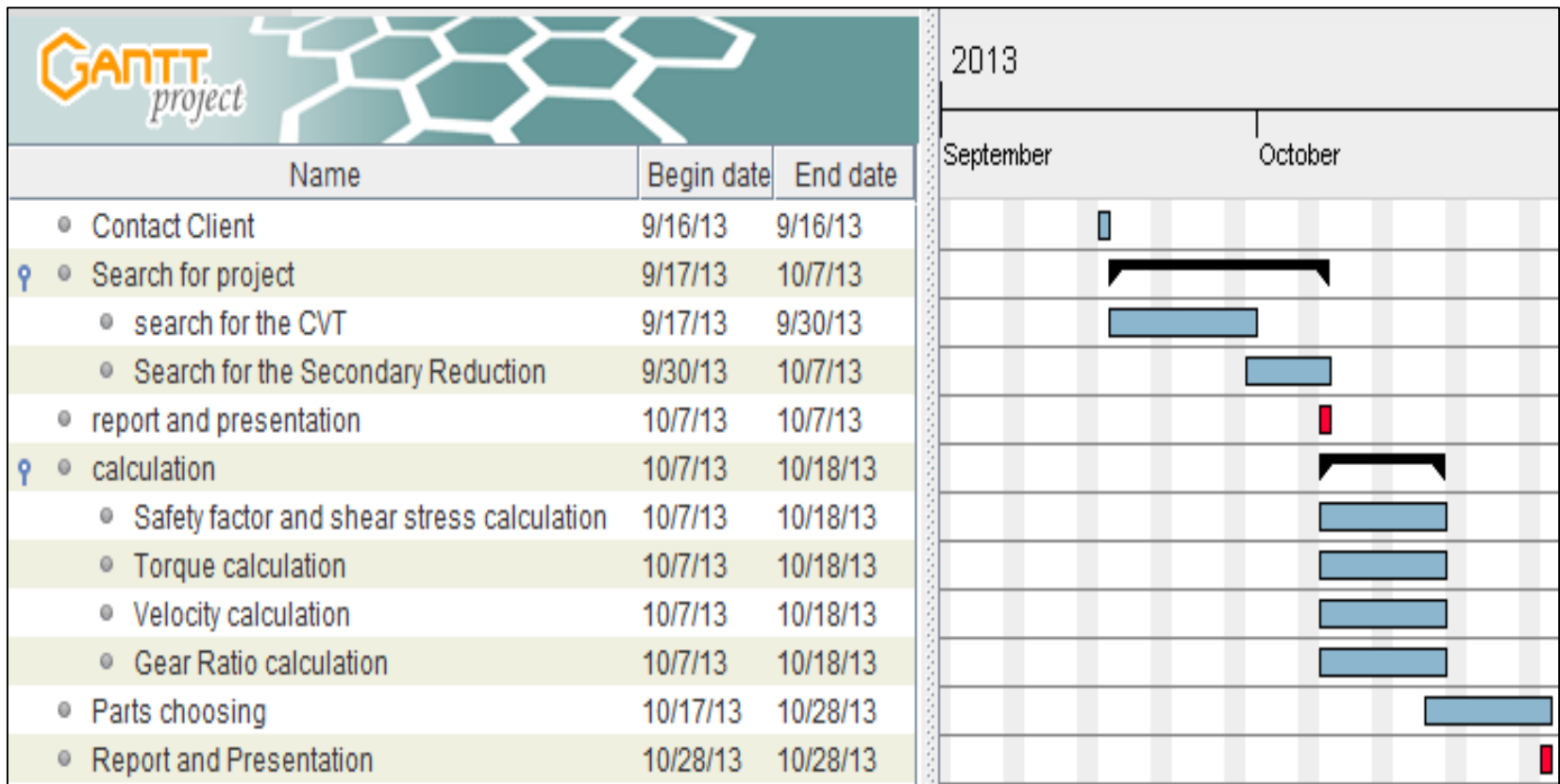
6. Project Plan

- Parts choosing and ordering 10/21/13---11/7/13
- 3D models 11/4/13---11/15/13
- Build 11/15/13---3/5/14

Gantt Chart



Gantt Chart



7. Conclusion

- Needs identification: customer needs, engineering requirements, and QFD
- Project specification: requirements and constraints
- Project plan: Gantt chart

7. References

1. **2014 Collegiate Design Series: Baja SAE®Rules**
http://www.sae.org/students/2014_baja_rules_8-2103.pdf

QUESTIONS?