-Intro:Max
-Design:All
    Shifter:Max$
    Transmission:Sean$
        Fuel Catchment:Fahad$
    Suspension:Auston$
    Muffler:Peng
-Frame Design:Peng and Jing
        *Precheck:Peng
        *F.E.A. , Cost, Website: Jing
-Goals For March 31st
-Overall Conclusion:

$=Goals at beginning, progress report,Goals for rest of semester

SAE Baja

Pre-Proposal

Fahad Alajmi, Sean Collins, Peng Li, Auston Solway,
Maximillian Whipple, Jingyuan Zhang

Srinivas Kosaraju
Mar. 10, 2016

NORTHERN ARIZONA UNIVERSITY

SAE INTERNATIONAL

Introduction

The expectations for individual design components at start of semester

Progress report of individual components to date

Goals for individual components: completion, testing, and assessment

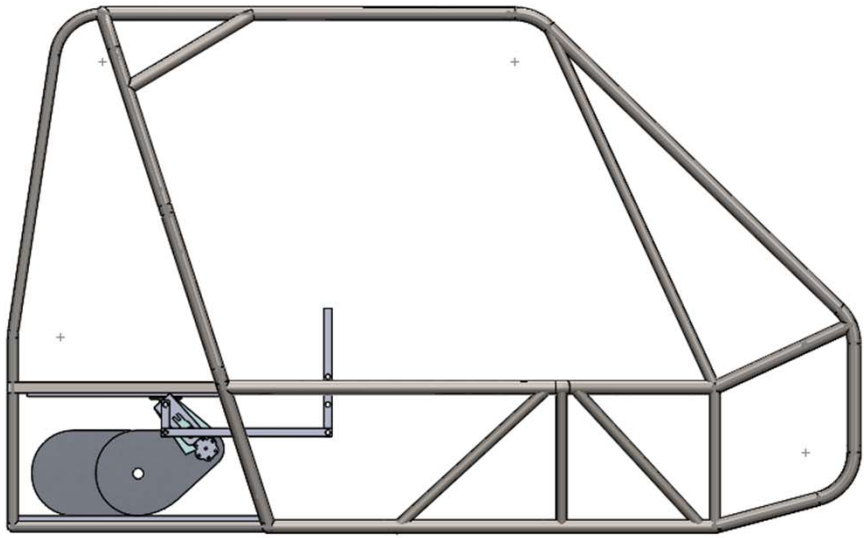
Analysis of frame, results of the pre-check reports, and the possibility for competition

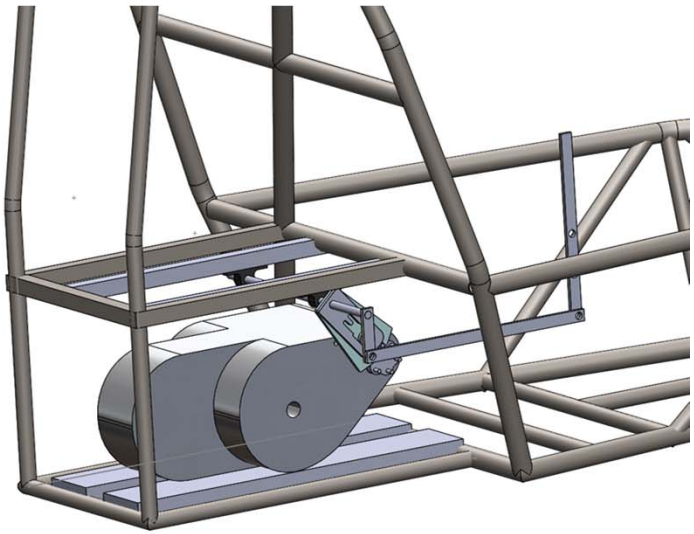
Overall goal: have a driveable Baja by April 1, leaving time to test and re-evaluate

Design: Shifter

- End of last semester 3D print of the shifting mechanism was complete
- Major components of the shifter have been machined and fit to the shifting shaft
- Goal is to have shifter and mechanism installed and assembled by April 1st

Design: Shifter



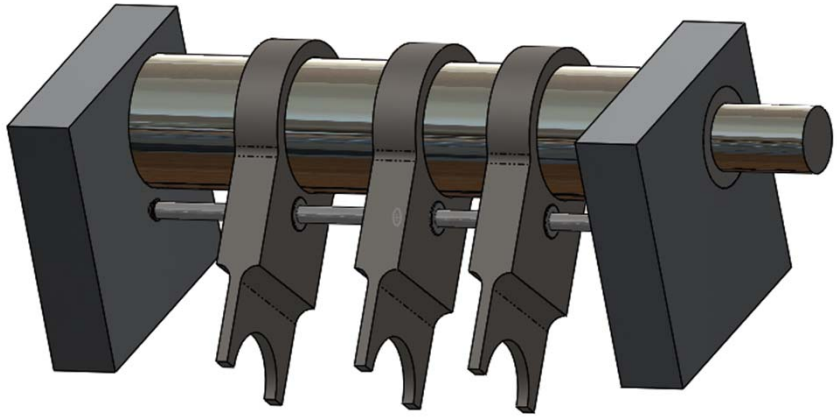


Design: Transmission

- Expectation: Fully operational by Hardware Review 3 (March 2)
- Progress of transmission:

Design: Transmission

- Progress of Transmission (cont.):



Addition of Guide Shaft & Linear Bearings

Design: Transmission

- Goal for completion:
  - Modify shift fork for reverse gear
  - Break in gears
  - Order a clutch

Current Design

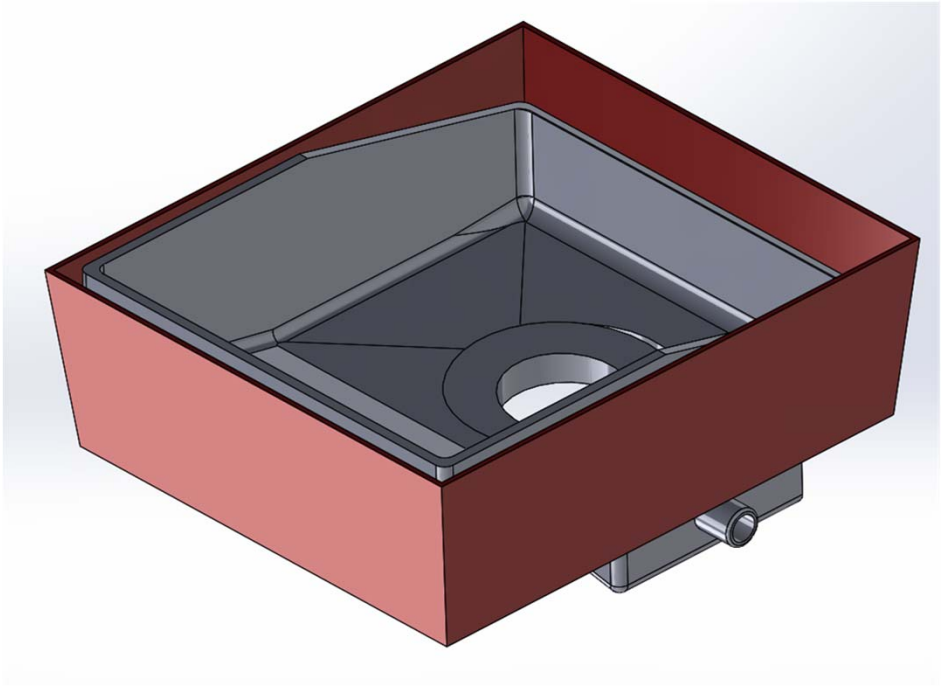
Offset Design

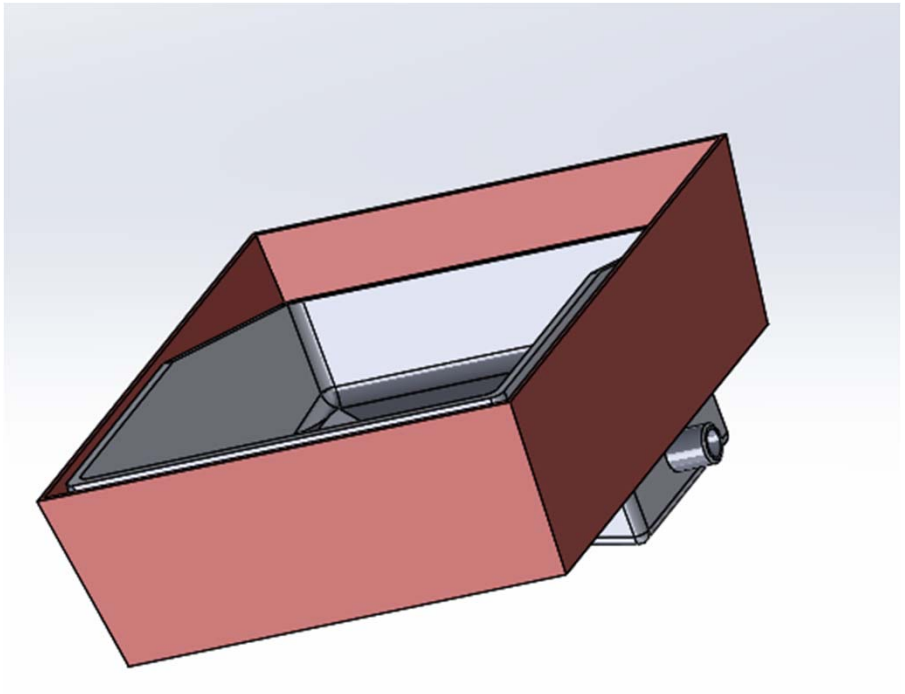
Design: Transmission

Design: Fuel Catchment

- Expectation: Revise fuel catchment design, and make it agreed with the project requirement.
- Progression: Making side shield of sheet metal, to protect the catchment of the heat from the muffler.
- Final step(fabrication): Fabricate the fuel catchment to be as the new design.

Design: Fuel Catchment





Suspension: Initial Goals

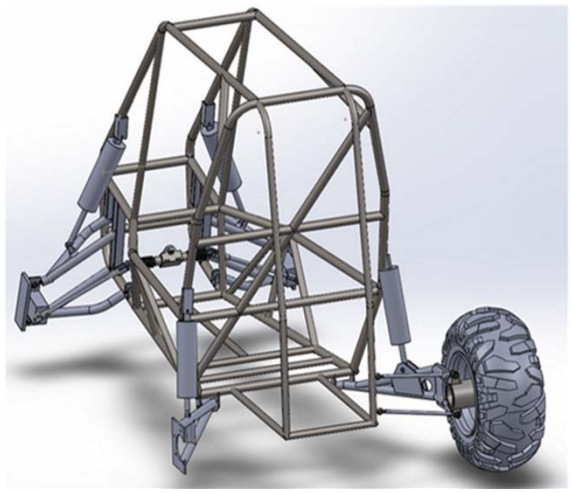
Old Single Trailing Arm Design

This design acts as a cantilever when coming into a turn which causes a large moment at bushing.

Desired Three Link Design (Representation)

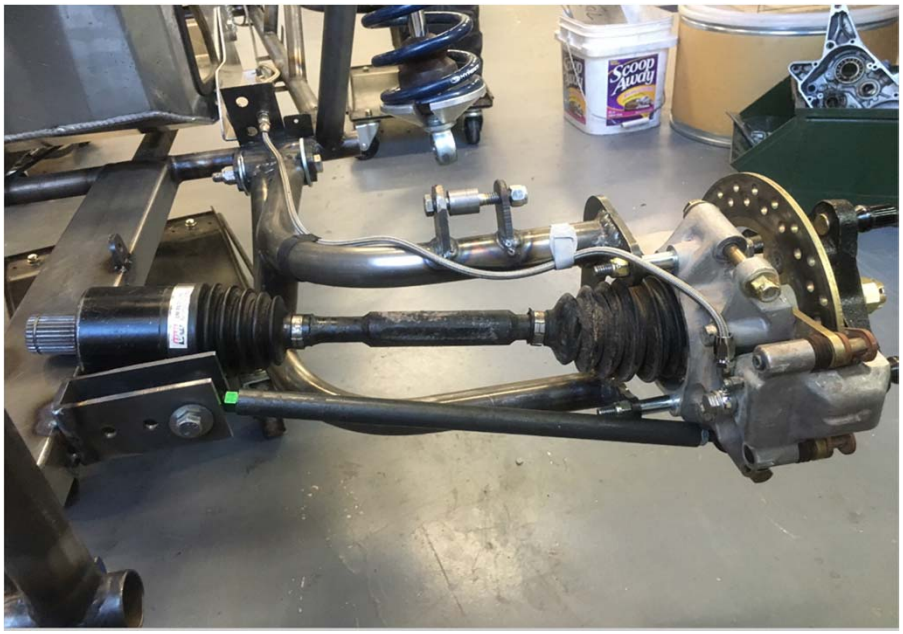
Additional linkages allow for support during horizontal loading.

Suspension: First Iteration Of Design



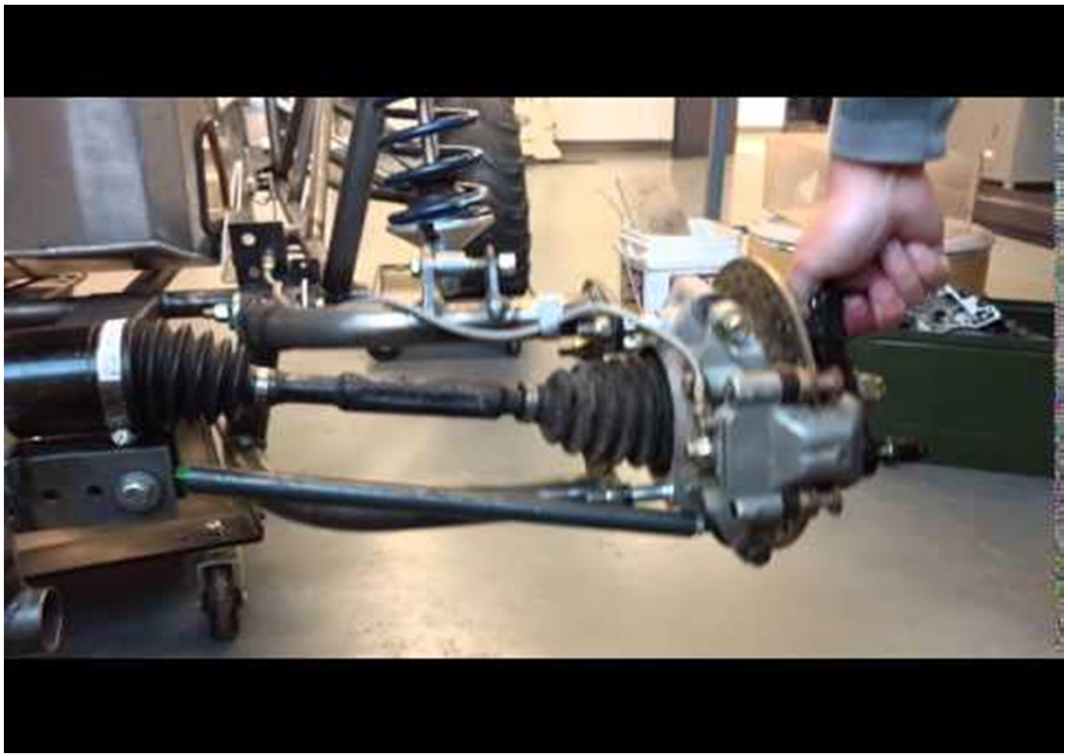
The original design change included two additional links but due to an issue with the upper link mounting location the design was simplified to a single link.

Suspension: Second and Current Design & Analysis



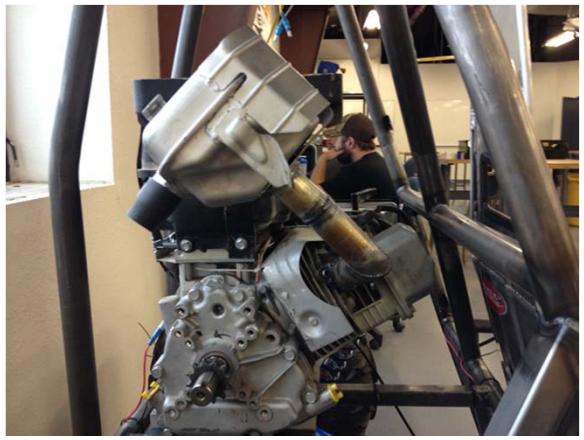
The decision was made to only as one additional link onto the baja and access the situation as the build became drivable.

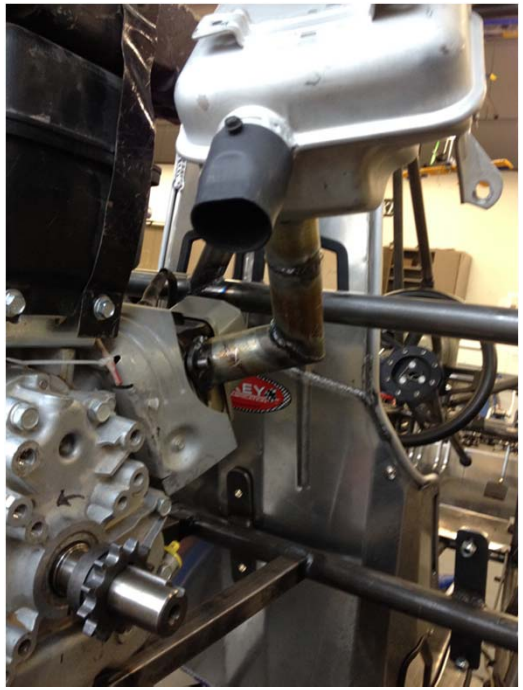
Suspension: Second and Current Design & Analysis



- The next step is to analyze the rear suspension travel under load.
- How will the bushing hold up with an arc due to the additional member?
- Will the cv shafts still attempt to pull from the transmission?

Old Muffler

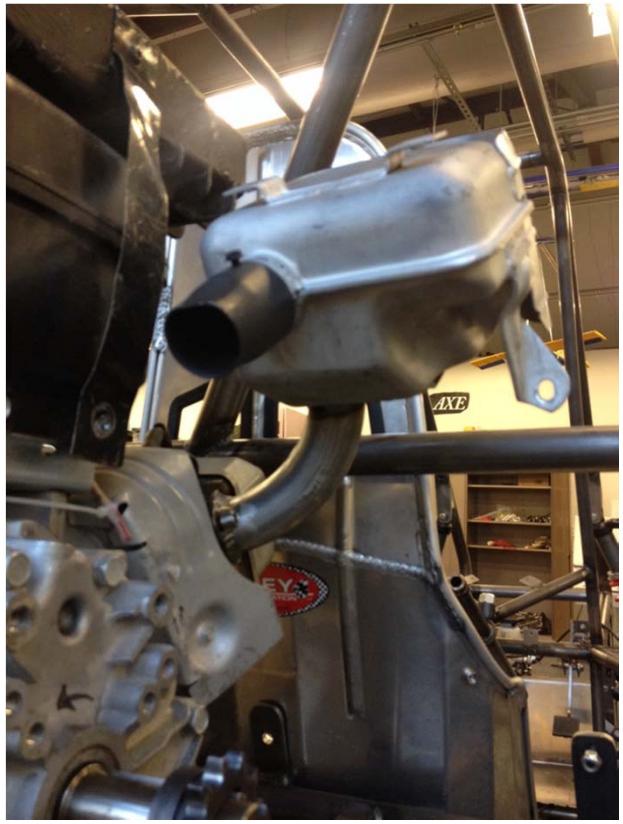


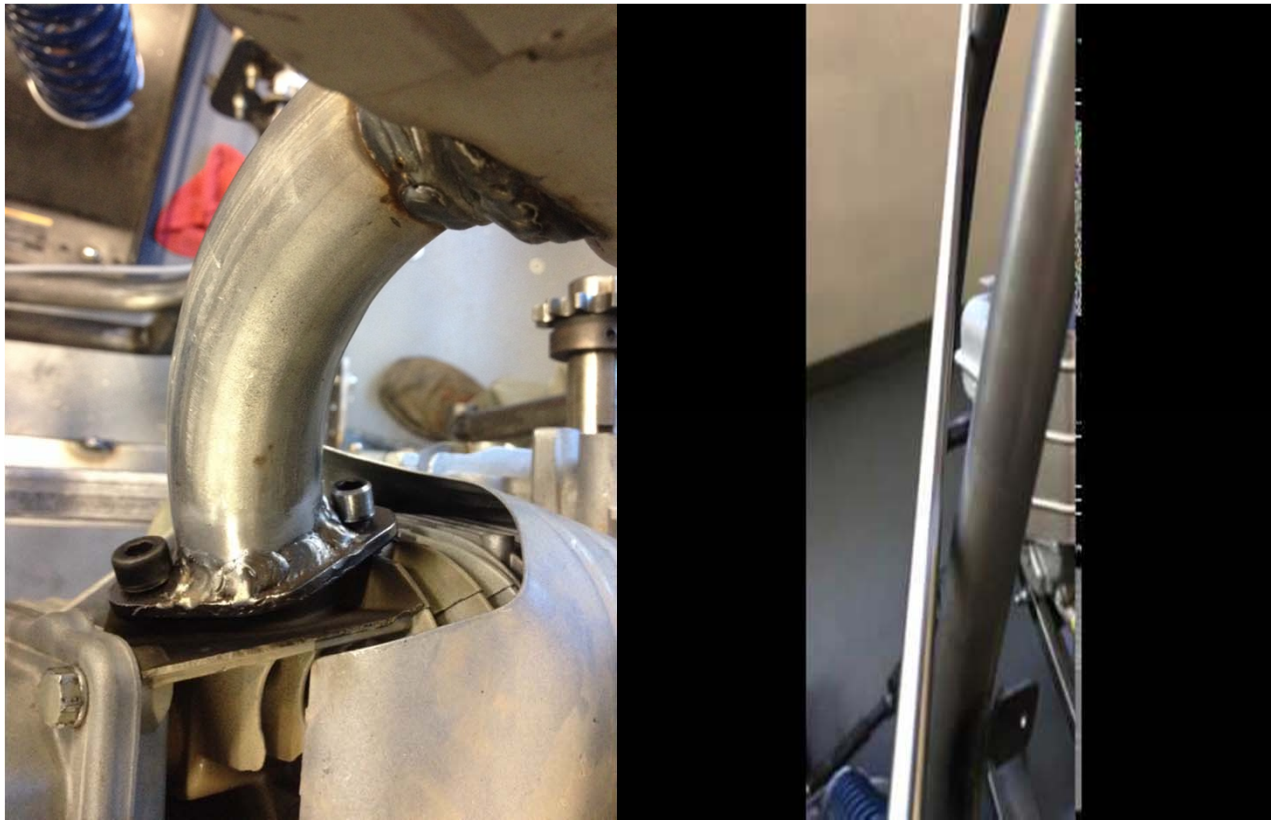


Muffler: Design Requirements (SAE)

- Muffler Relocation: ID of 32mm (1.25 in)
- Must use the original muffler
- Muffler Supports
- Exhaust Pipe – Length
- Exhaust Pipe – Holes & Tubes
- Exhaust System – Durability Required
- The exhaust exit must not exit towards the driver.

New Muffler

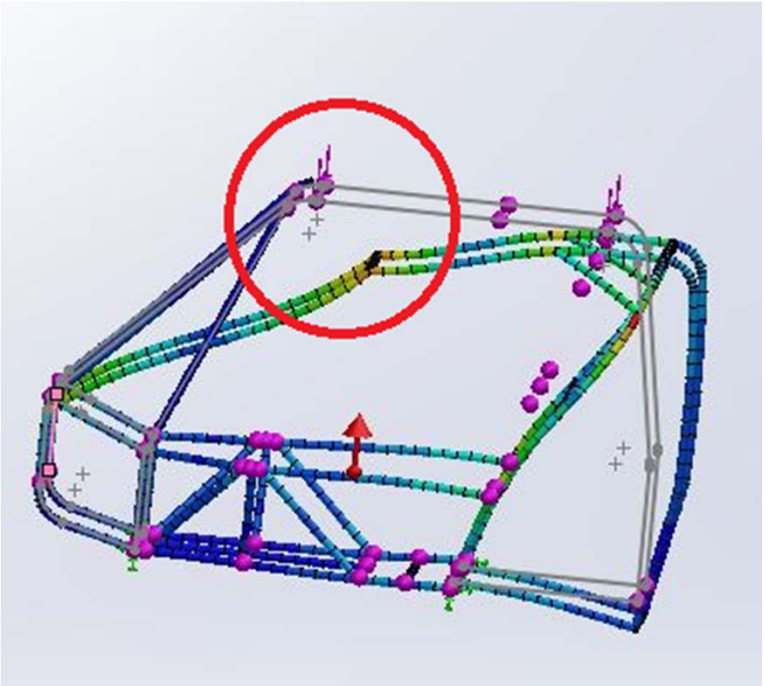


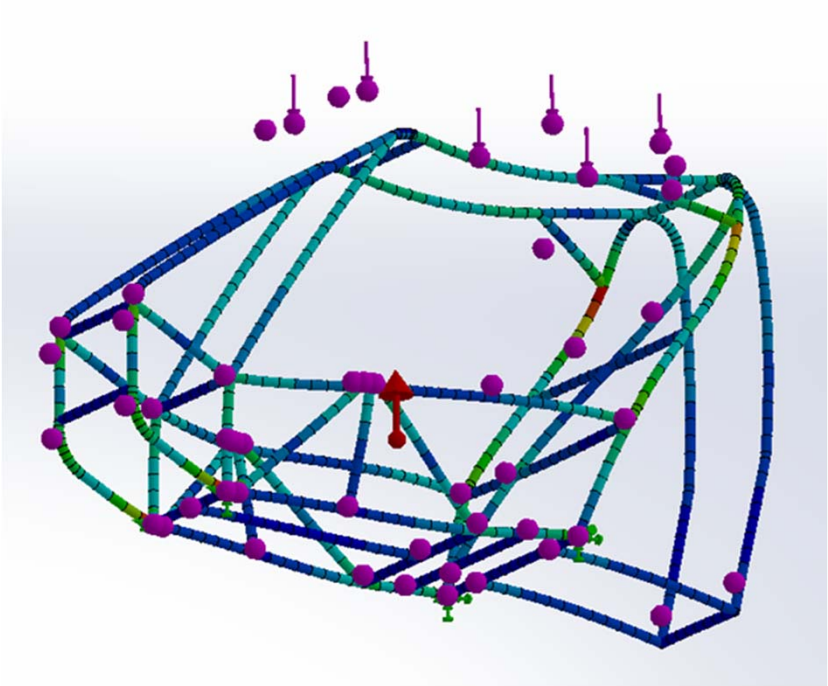


Frame Pre-check (Approved by SAE)

- Roll Cage Specification Sheet & frame material documentation (invoices, certifications, calculations, etc.)
- Engineering Drawings of the frame from several specific views

Updated FEA

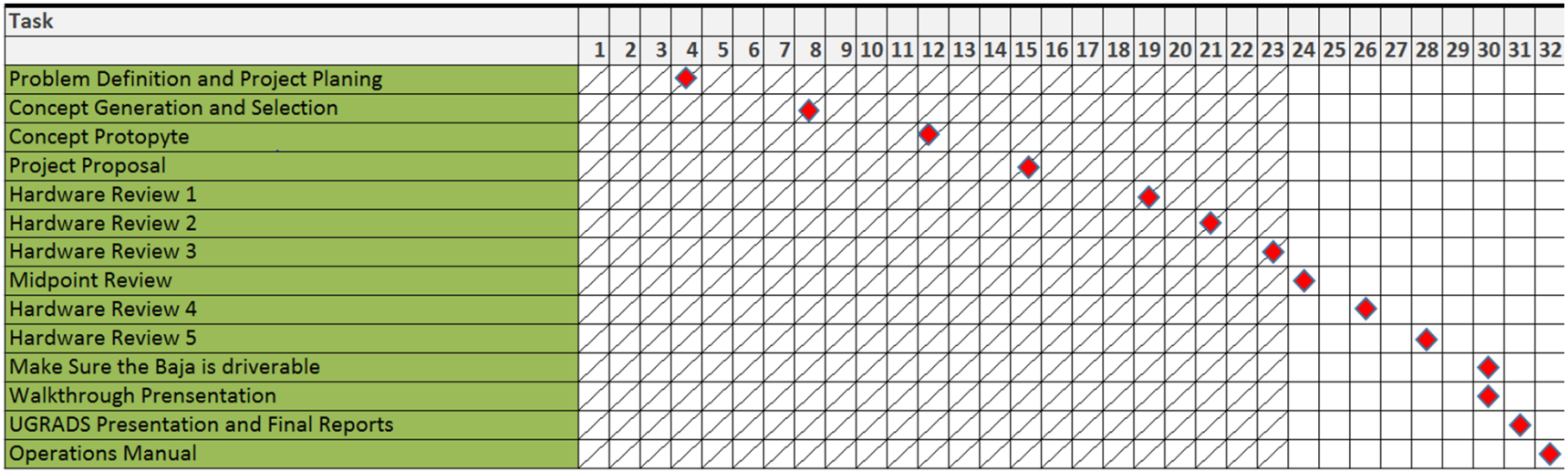




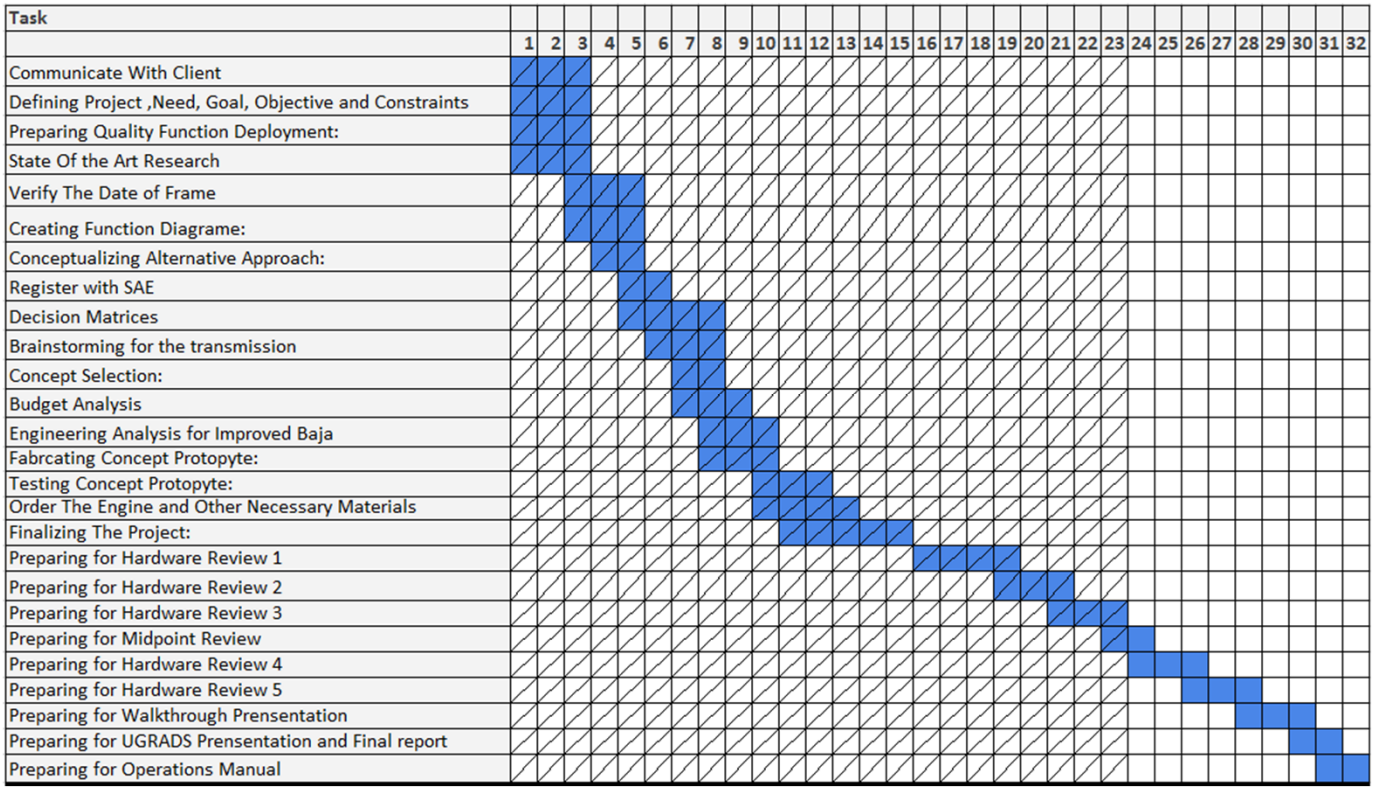
Updated FEA

	Maximum Stress *10^8 Pa	Yield Stress *10^8 Pa	Factor of Safety	Factor of Safety Requirement
Front impact	1.551	4.6	2.96	1
Side impact	3.972	4.6	1.158	1
Rear impact	4.092	4.6	1.124	1
Roll over	1.859	4.6	2.470	1

Gantt Chart: Milestones



Gantt Chart: Progress Plan



Conclusion

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References:

- Erickson, Wallace D. Belt Selection and Application for Engineers. New York: M. Dekker, 1987.

- Naunheimer, Harald. Automotive Transmissions Fundamentals, Selection, Design and Application. 2nd ed. Berlin: Springer, 2011.

20 Products

About Rod Ends

More

For technical drawings and 3-D models, click on a part number.

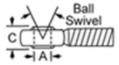
Super-Swivel Ball Joint Rod Ends

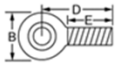

Male Threaded


Female Threaded

With at least 55° of ball swivel, these rod ends accommodate greater misalignment than any other rod end we offer. All have a black-oxide coated, alloy steel housing and a chrome-plated bearing steel ball that are heat treated for added strength. A PTFE liner allows smooth ball rotation and reduces the need for lubrication.

For technical drawings and 3-D models, click on a part number.





Shank Thread Size	Ball ID (A)	Max. Ball Swivel	O'all Wd. (B)	O'all Thick. (C)	(D)	Thread Lg. (E)	Static Radial Load Cap., lbs.	Right-Hand Threads	Each	Left-Hand Threads	Each
Male-Threaded Shank											
3/8"-24	3/8"	55°	1 1/8"	7/8"	2 1/8"	1 3/8"	10,171	6960T61	$9.92	6960T62	$9.92
1/2"-20	1/2"	65°	1 1/2"	1 1/4"	2 5/8"	1 5/8"	15,038	6960T11	20.36	6960T12	20.36
5/8"-18	1/2"	65°	1 3/4"	1 1/4"	2 7/8"	1 3/4"	22,898	6960T21	26.18	6960T22	26.18
5/8"-18	5/8"	64°	1 3/4"	1 3/8"	2 7/8"	1 3/4"	19,394	6960T31	27.84	6960T32	27.84
3/4"-16	5/8"	64°	2"	1 3/8"	3 3/8"	2"	27,862	6960T41	29.38	6960T42	29.38
3/4"-16	3/4"	61°	2"	1 1/2"	3 3/8"	2"	27,010	6960T51	30.36	6960T52	30.36
Female-Threaded Shank											
3/8"-24	3/8"	55°	1 1/8"	7/8"	2 1/8"	1 1/16"	10,171	6960T71	9.92	6960T72	9.92
1/2"-20	1/2"	65°	1 1/2"	1 1/4"	2 5/8"	1 3/8"	15,038	6960T81	20.36	6960T82	20.36
5/8"-18	5/8"	64°	1 3/4"	1 3/8"	2 7/8"	1 9/16"	19,394	6960T91	27.84	6960T92	27.84
3/4"-16	3/4"	61°	2"	1 1/2"	3 3/8"	1 3/4"	27,010	6960T131	30.36	6960T132	30.36