Shell Eco-marathon

Midpoint Presentation

March 4, 2014

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Overview

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Project Background

Design a vehicle that maximizes fuel efficiency for the Shell Eco-marathon competition

Competition Information

- Competition hosted by Shell
- Capstone project representing SAE NAU

Technical Advisor

- Dr. Tester

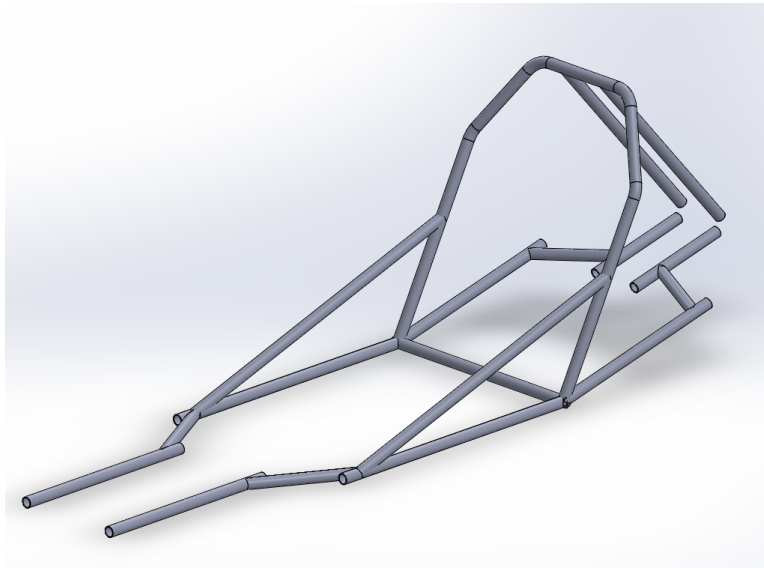
Frame Status

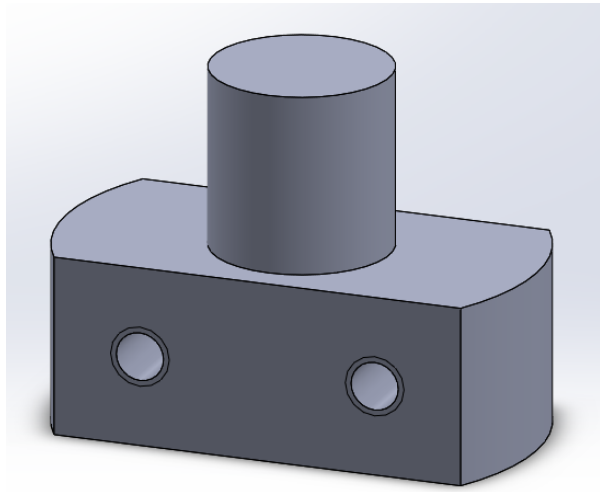
The skeleton of the frame has been completed, but the following issues are limiting the team from full completion:

- Fabrication and install of rear wheel dropouts
- Fabrication and install of front wheel steering mounts
- Fabrication and install of motor mounts
- Fabrication and install of intermediary drive shaft mounts
- Fabrication and install of frame floor

Frame Status

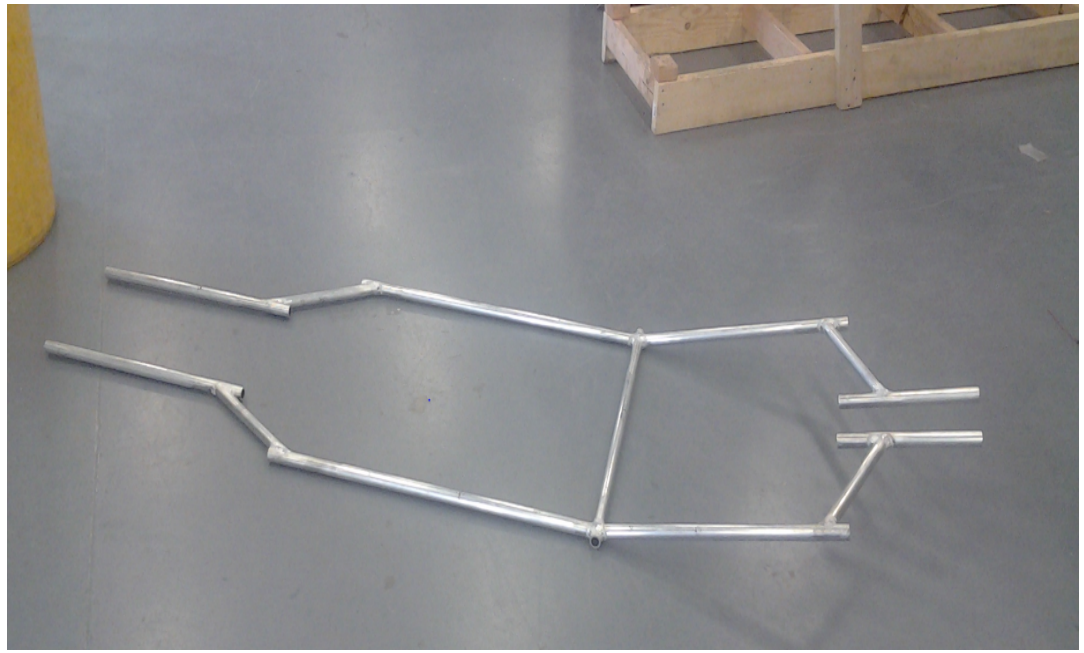
Frame Skeleton Progress: CAD design to current fabrication status

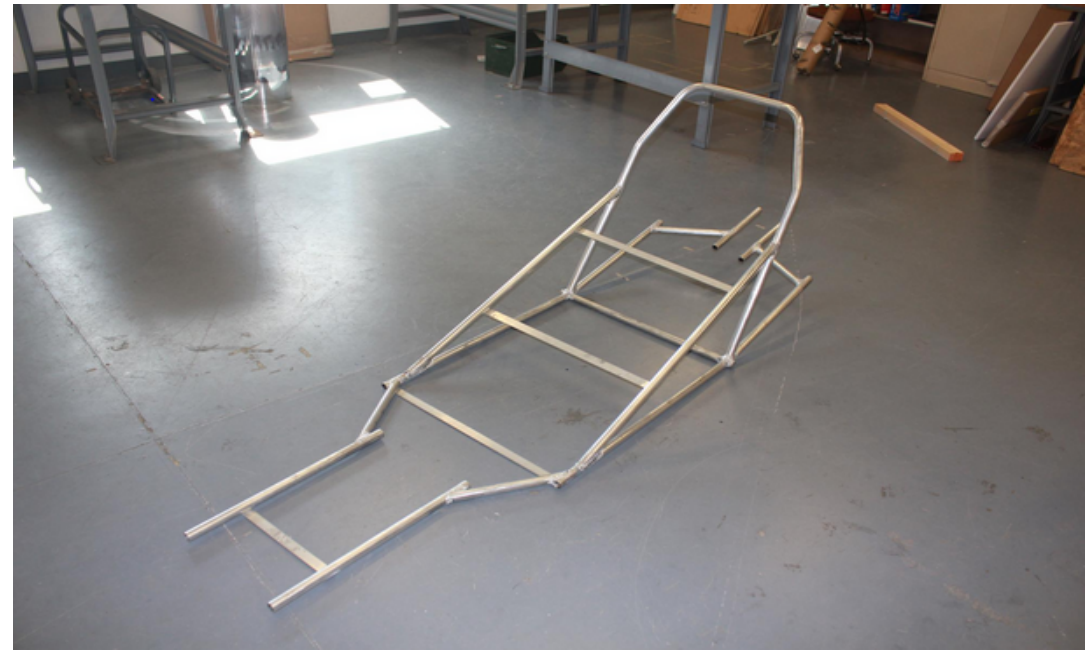




Frame Status

Frame Skeleton Progress: CAD design to current fabrication status





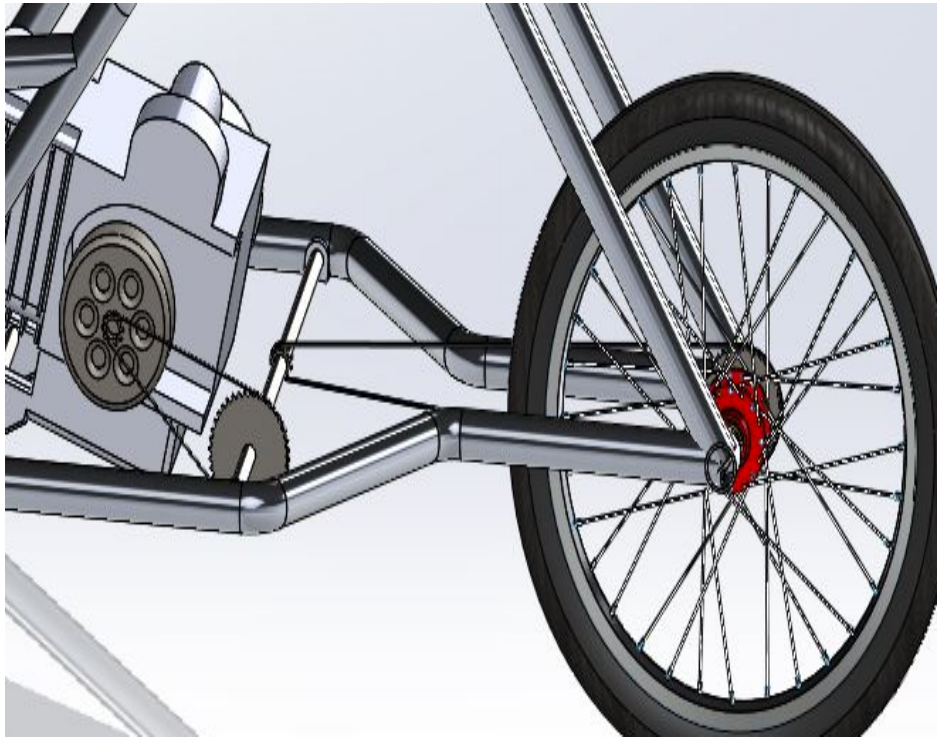
Drivetrain Status

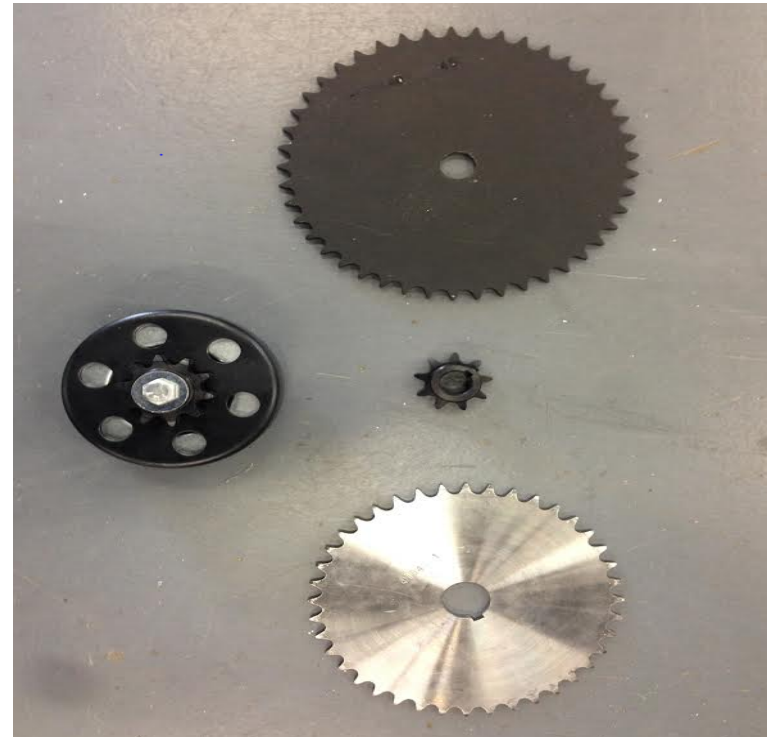
The drivetrain has been fully designed, but the following issues are limiting the team from full completion:

- Intermediary drive shaft bearings need to be ordered and installed
- Sprocket gear skeletonization (i.e. remove excess material/weight)
- Install rear sprocket onto rear hub
- Design, fabrication, and install of chain guard
- Install all drivetrain components

Drivetrain Status

Drivetrain Progress: CAD design to current fabrication status





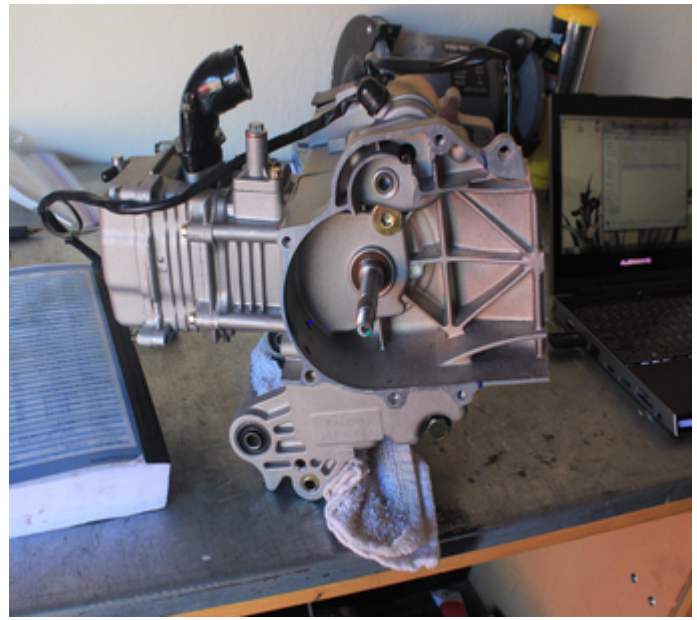
Engine & Fuel System Status

The engine and fuel system has been fully designed and mostly completed. The following issues are limiting the team from full completion:

- 80% engine tune completion
- New exhaust pipe design (vent outside vehicle)
- Possibility of acrylic pressure vessel
- Install all engine and fuel related components in final locations on the vehicle

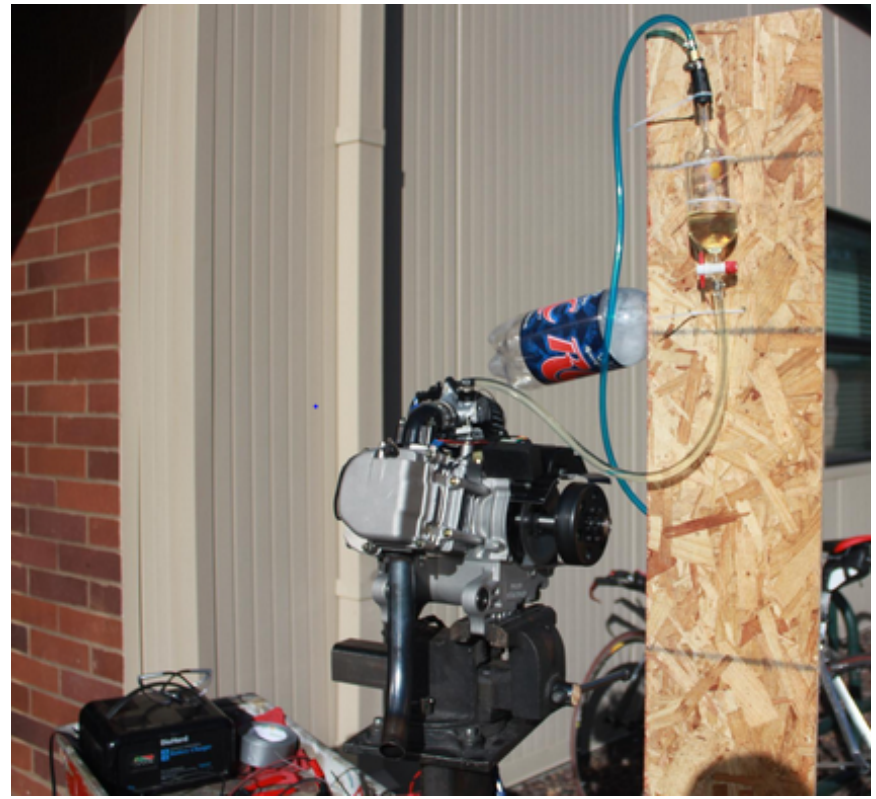
Engine Status

Engine Progress: Original to current fabrication status



Engine Status

Engine Progress: Original to current fabrication status

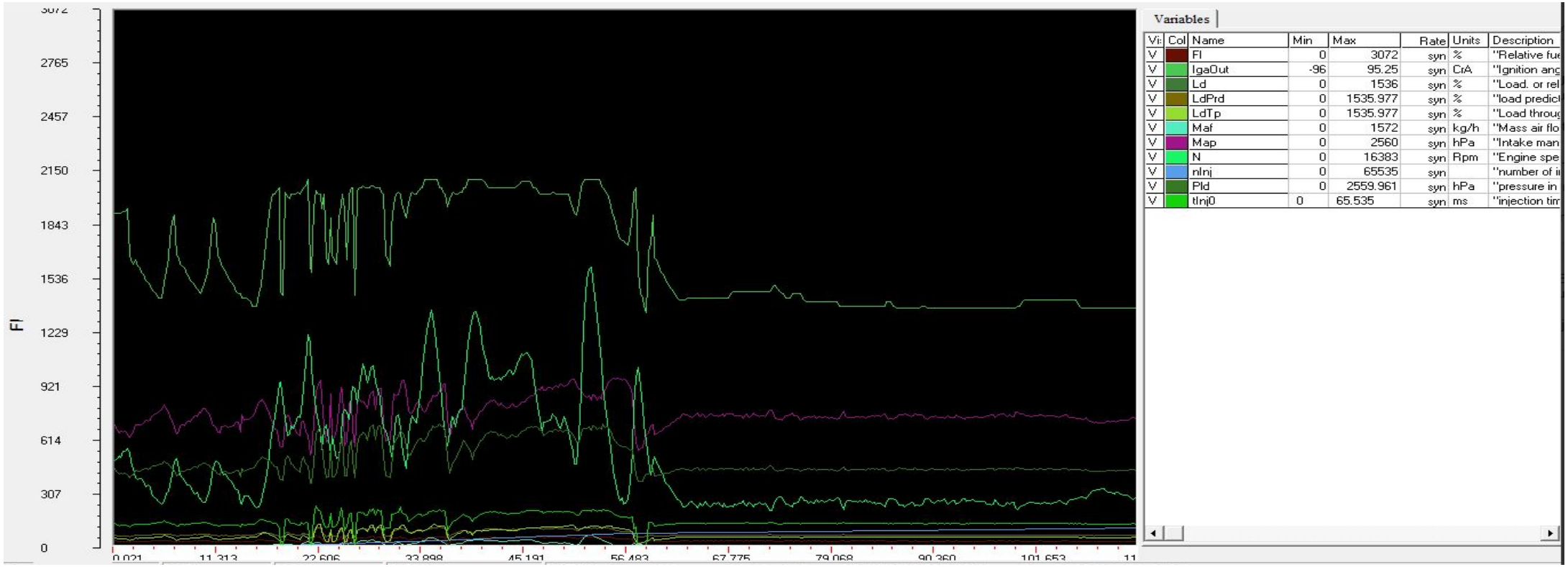


Engine Status

Engine Progress: EcoTrons User Interface for tuning

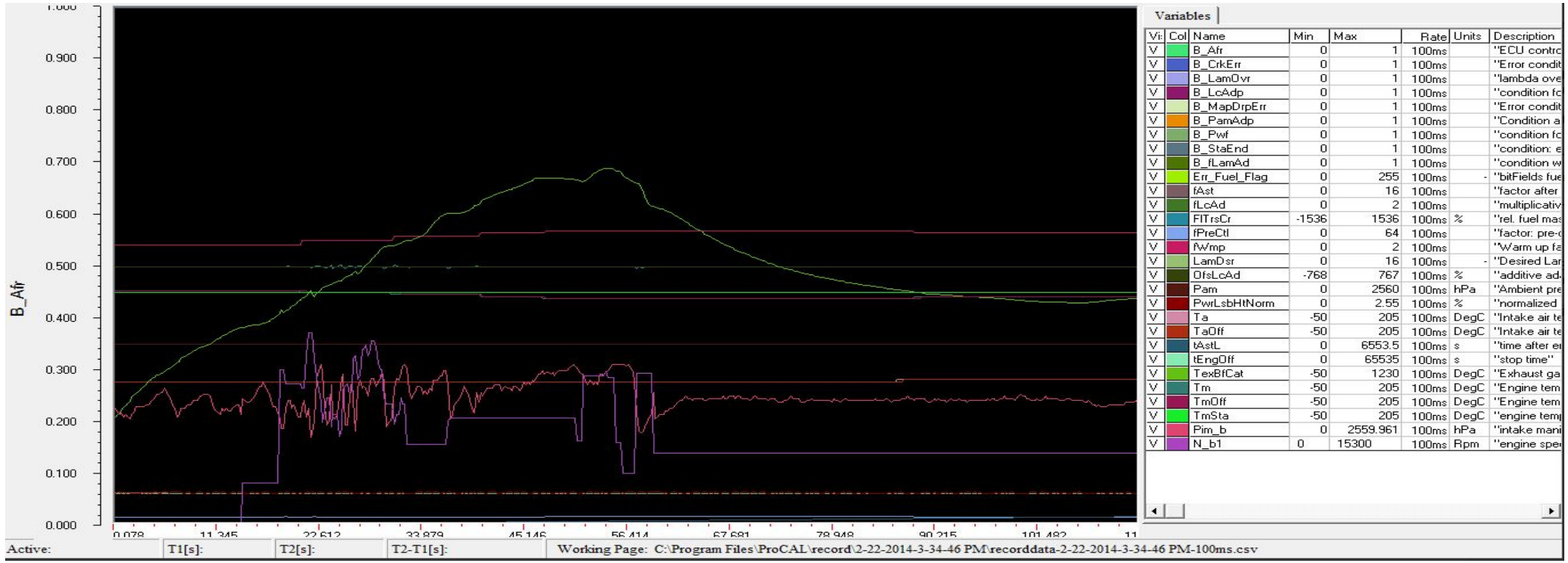
Engine Status

Engine Progress: Continuous Sample Parameter Plot



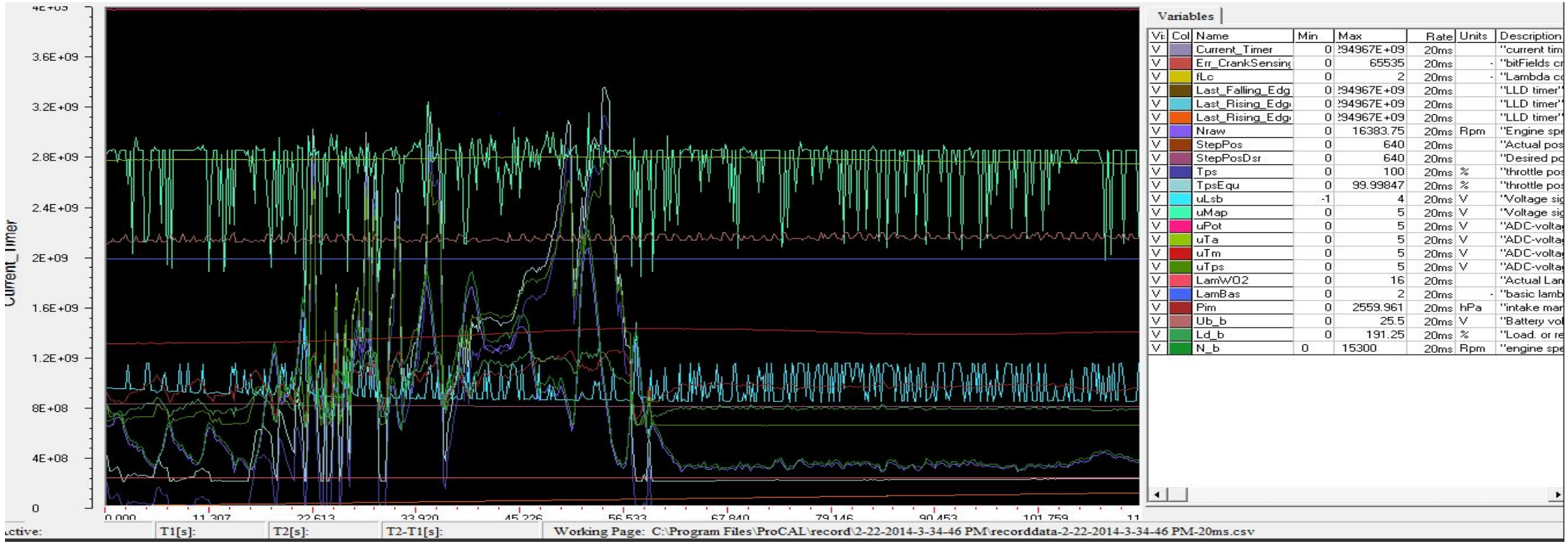
Engine Status

Engine Progress: 100ms Parameter Plot



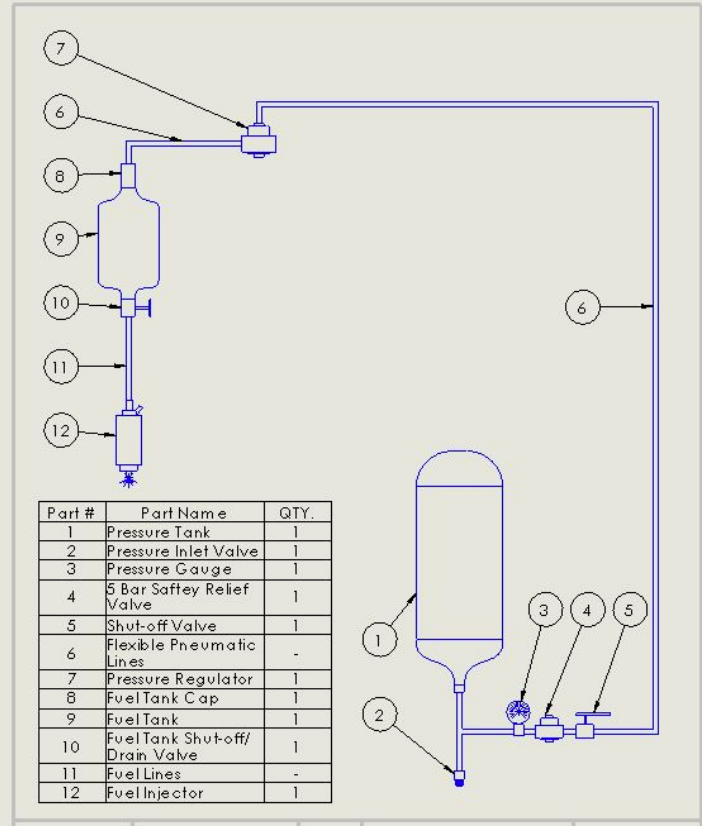
Engine Status

Engine Progress: 20ms Parameter Plot

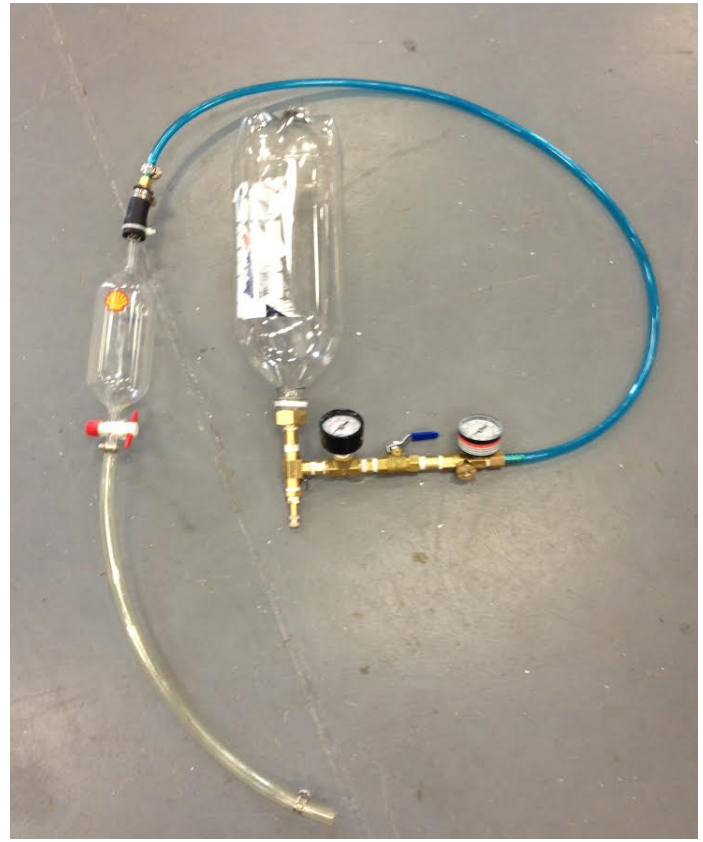


Fuel System Status

Fuel System Progress: Fuel schematic to current fabrication status



Part #	Part Name	QTY.
1	Pressure Tank	1
2	Pressure Inlet Valve	1
3	Pressure Gauge	1
4	5 Bar Saftey Relief Valve	1
5	Shut-off Valve	1
6	Flexible Pneumatic Lines	-
7	Pressure Regulator	1
8	Fuel Tank Cap	1
9	Fuel Tank	1
10	Fuel Tank Shut-off/ Drain Valve	1
11	Fuel Lines	-
12	Fuel Injector	1



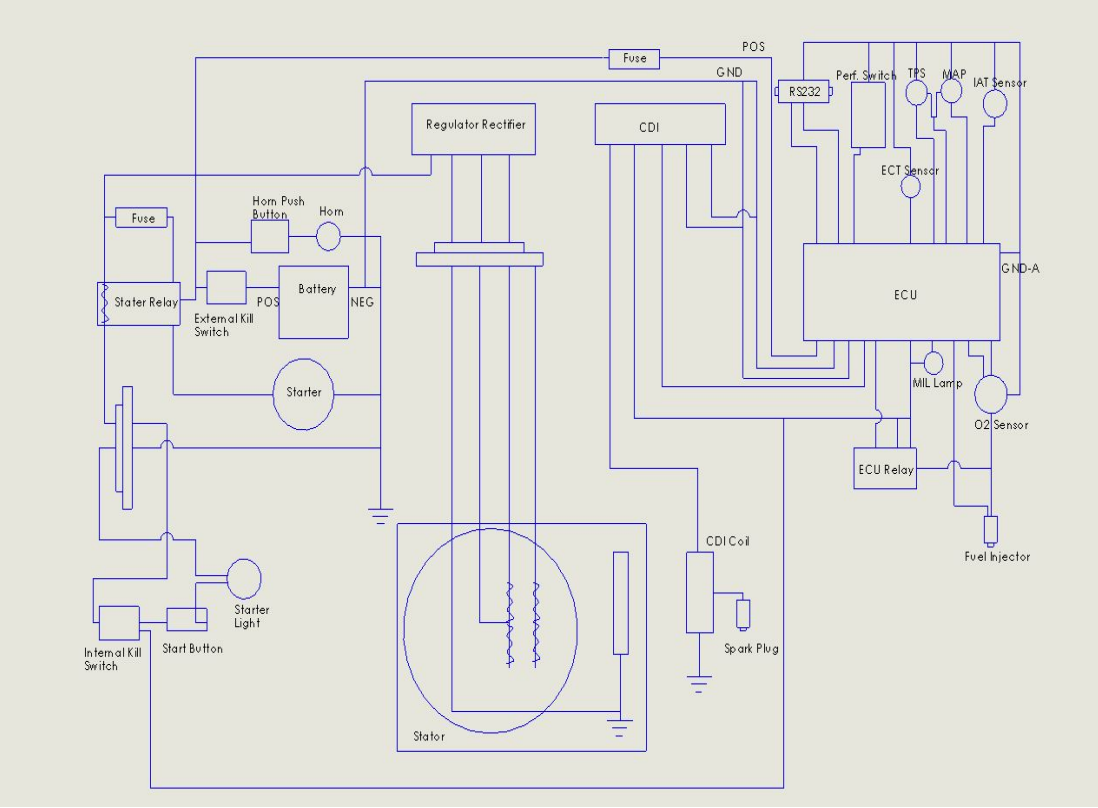
Electrical System Status

The electrical system has been fully designed and mostly completed. The following issues are limiting the team from full completion:

- Integrating the horn, external safety switch, starter light, and additional driver accessories
- Re-wiring the electrical system once all components are mounted in final locations

Electrical System Status

Electrical System Progress: Electrical schematic to current fabrication status



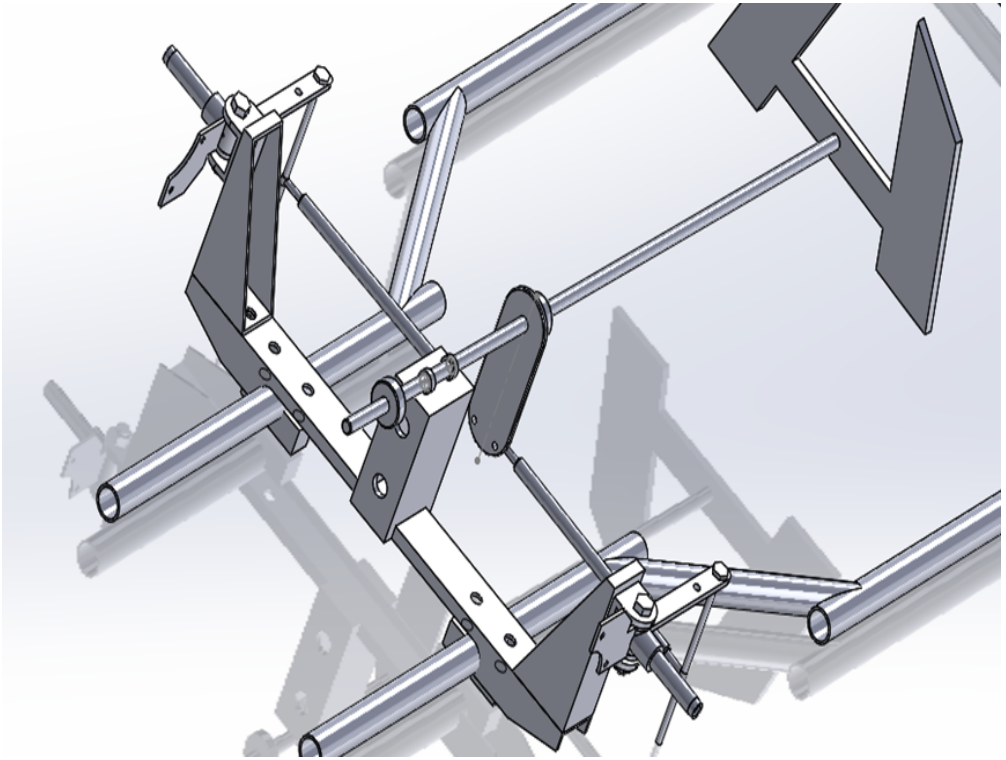
Steering & Braking Status

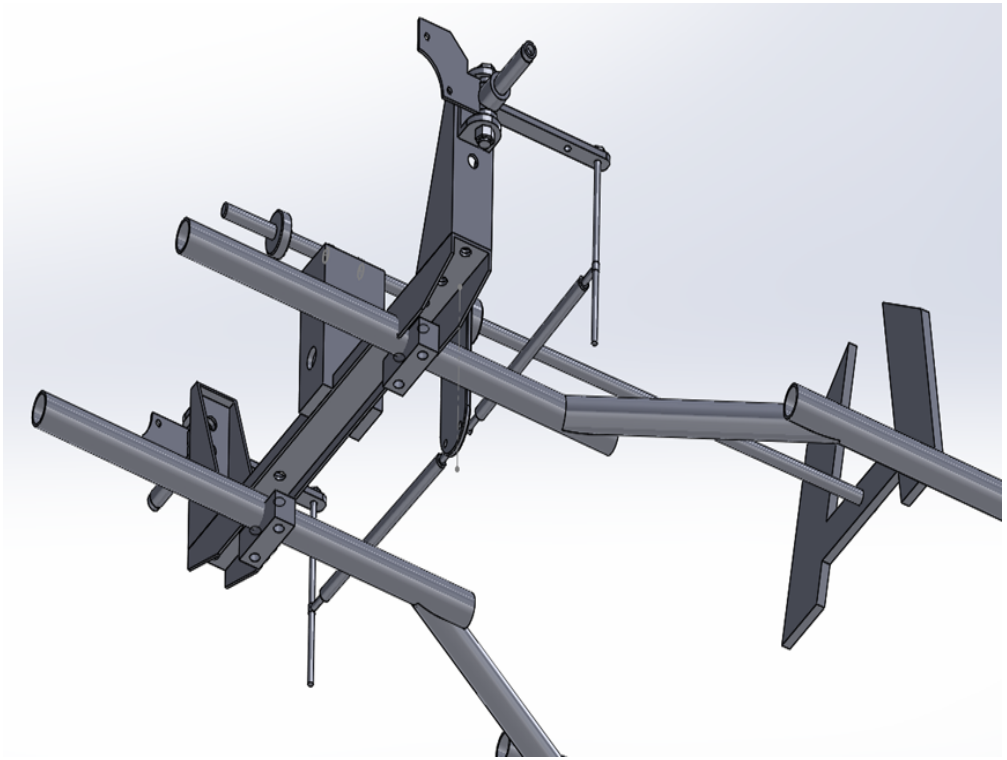
The steering has been fully designed. The following tasks are necessary in order for full completion:

- Fabricate and install steering uprights
- Fabricate and install steering column
- Install front and rear wheels
- Install front and rear brakes

Steering & Braking Status

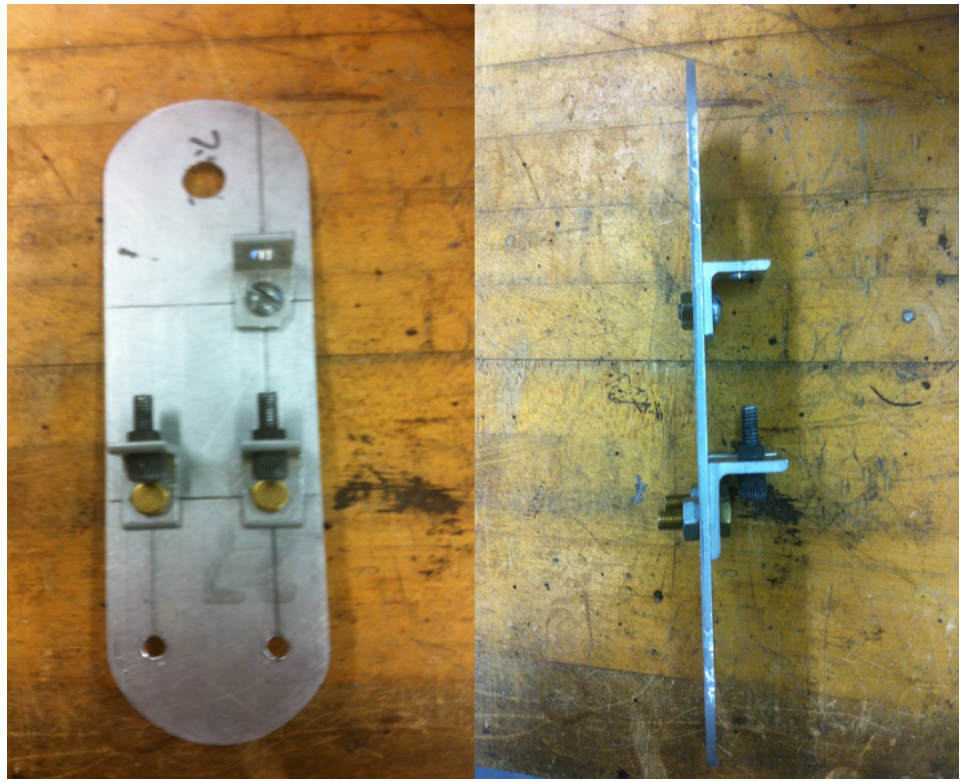
Steering Progress: CAD design to current fabrication status

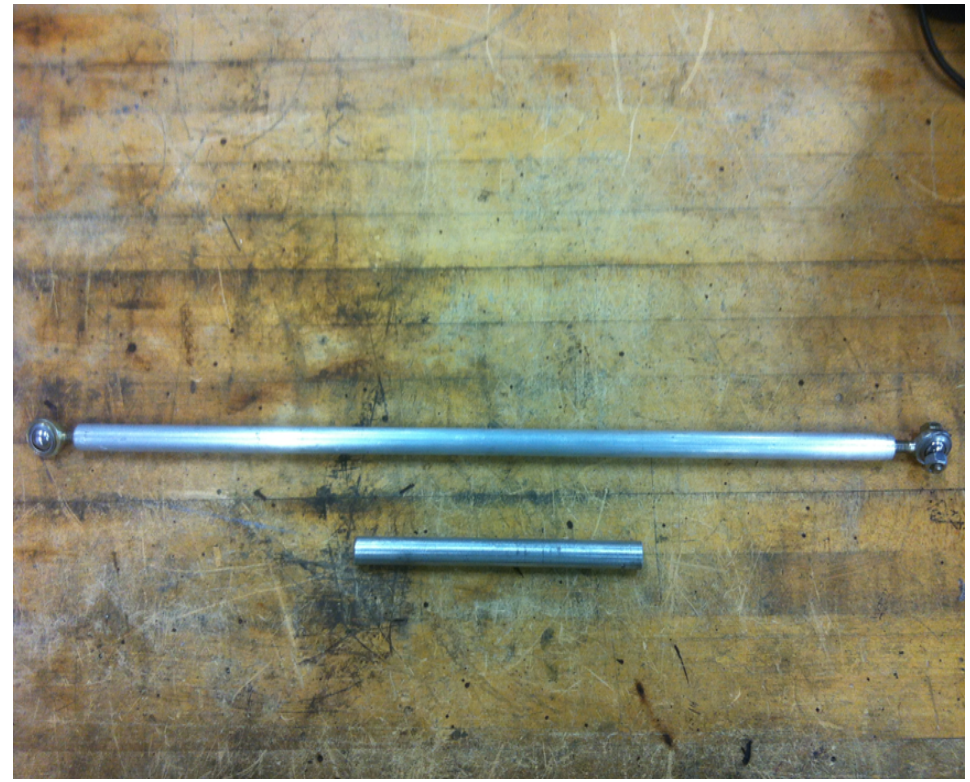




Steering & Braking Status

Steering Progress: CAD design to current fabrication status



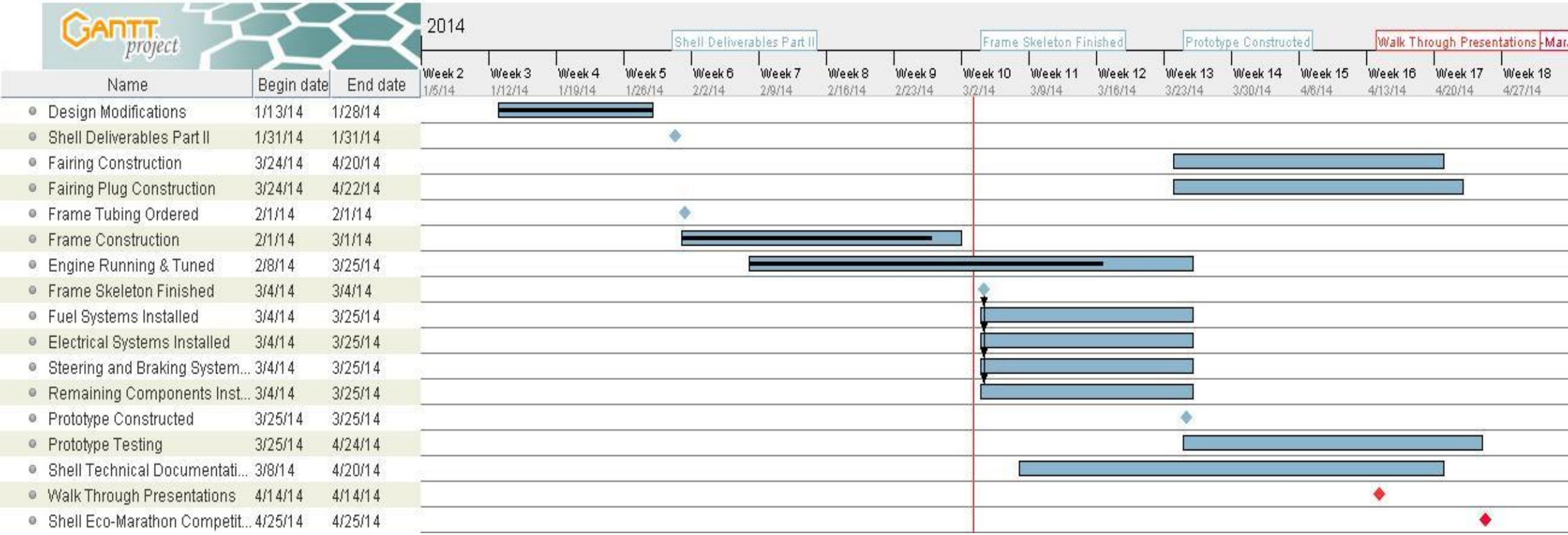


Project Update/Changes

Due to certain circumstances, the team had to make the following changes to the project:

- Fairing construction delayed 1/31 to 4/24
- Functioning vehicle delayed to 3/25
- Frame skeleton delayed to 3/4
- Prototype testing start 3/25 to 4/20
- Electrical system delayed to 4/6

Project Timeline



Name	Begin date	End date
Design Modifications	1/13/14	1/28/14
Shell Deliverables Part II	1/31/14	1/31/14
Fairing Construction	3/24/14	4/20/14
Fairing Plug Construction	3/24/14	4/22/14
Frame Tubing Ordered	2/1/14	2/1/14
Frame Construction	2/1/14	3/1/14
Engine Running & Tuned	2/8/14	3/25/14
Frame Skeleton Finished	3/4/14	3/4/14
Fuel Systems Installed	3/4/14	3/25/14
Electrical Systems Installed	3/4/14	3/25/14
Steering and Braking System...	3/4/14	3/25/14
Remaining Components Inst...	3/4/14	3/25/14
Prototype Constructed	3/25/14	3/25/14
Prototype Testing	3/25/14	4/24/14
Shell Technical Documentati...	3/8/14	4/20/14
Walk Through Presentations	4/14/14	4/14/14
Shell Eco-Marathon Competit...	4/25/14	4/25/14

Conclusion

- The team has completed about 40% of the vehicle fabrication and install process.
- The team has documented each sub-system with CAD files and pictures of the fabrication and install processes.
- The team will have a rolling chassis by 3/14.
- The team will have a functioning vehicle and begin final prototype testing by 3/25.
- The engine and fuel tuning is at 80% completion.
- The team’s new estimate of the average fuel economy is 650 mpg based on a conservative estimate with cycling the motor.

Questions?