SAE Shell Eco-marathon

Progress Report

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Overview

- Project Background
- Frame Modifications
- Drivetrain Modifications
- Technical Tasks
- Project Timeline
- Conclusion

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

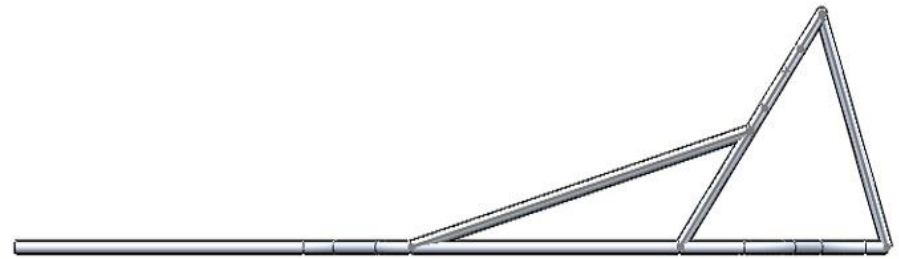
Technical Advisor

- Dr. Tester

Frame Version 1

Some issues encountered

- Rear triangle too tight for all necessary drivetrain components.
- Steering components theoretically could block driver visibility.
- Rear wheel mounting point raises vehicle COG too high.

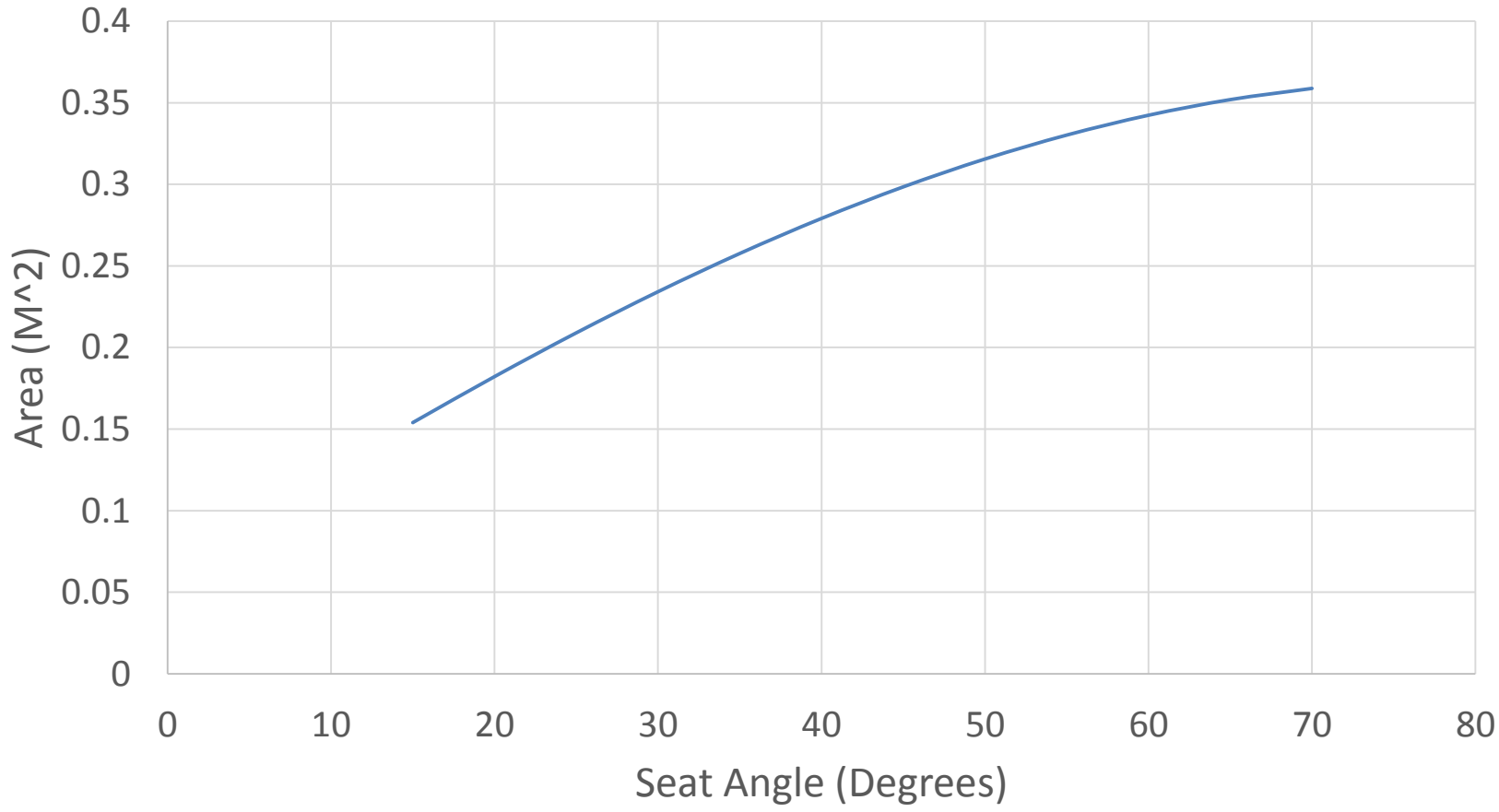


Frame Version 2

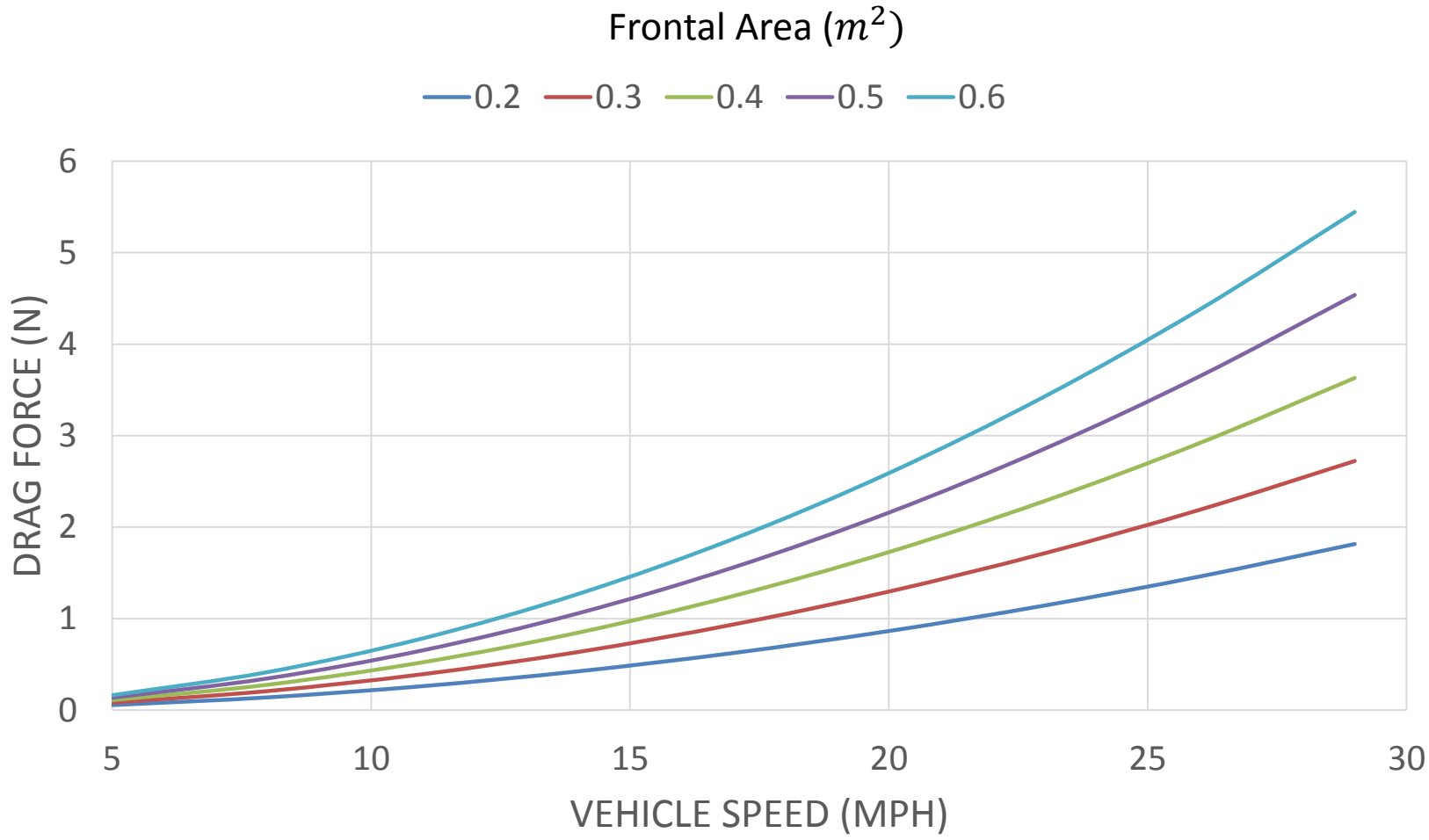
Frame Changes

- Rear triangle extended
- Roll bar mounted at a greater angle to increase driver visibility.
- Rear wheel axle mounting point raised

Frontal Area/Seat Angle



Aerodynamic Drag



Plug/Fairing Construction

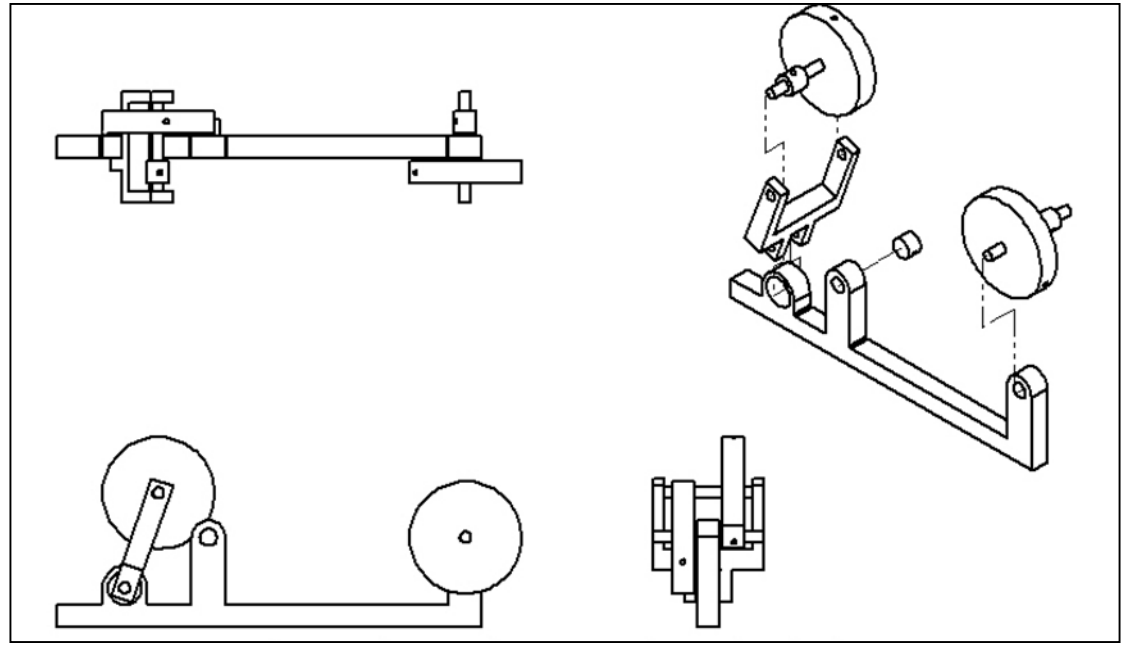
1. http://www.jcrocket.com/flashgordon.shtml

Drivetrain Modifications

The team decided to modify the purposed custom 2-stage drivetrain by making the following changes:

- Abandoning the “power shift” clutch design
- Implementation of a centrifugal clutch
- Retaining the 2-stage drivetrain to obtain the overall gear ratio of 20:1

Previous Clutch Design



Centrifugal Clutch

2. http://www.heeters.com/kartclutches.shtml

Drivetrain Modifications

Centrifugal clutch design drivetrain advantages:

- No need for manual clutch engagement
- Significant reduction in gear teeth wear
- Increased reliability in drivetrain
- Reduction in drivetrain noise
- Elimination of vehicle lunging
- Reduction in weight

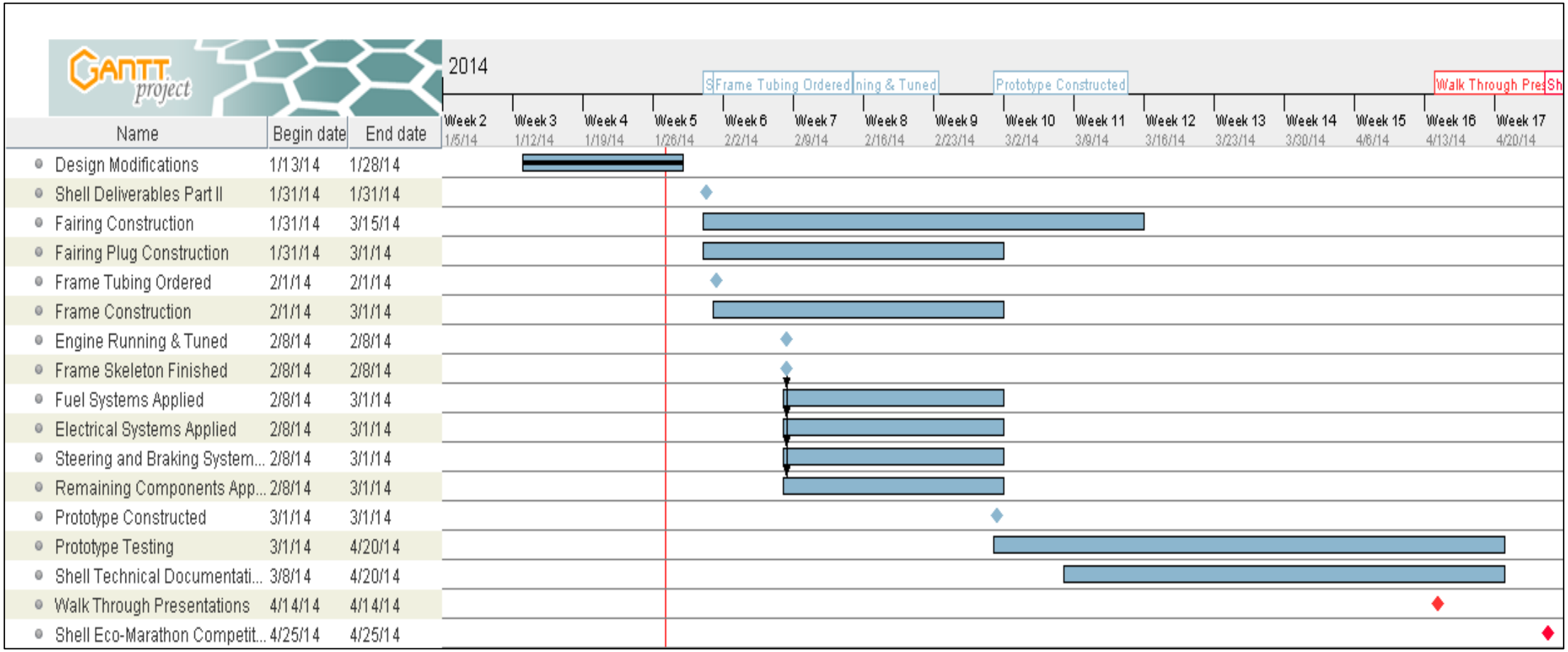
Disadvantages

- Idle speed must be below 1600 RPM for drivetrain to be disengaged

Technical Tasks

- Frame - Jericho, Nik, Travis
- Fairing - Jericho, Nik, Ben
- Fuel, Engine, Tuning - Travis, John
- Electrical - Travis, John, Ben
- Drivetrain - Abdul, Travis, John
- Steering & Braking - Moneer, Ben, Jericho

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	1/31/14	3/15/14
Fairing Plug Construction	1/31/14	3/1/14
Frame Tubing Ordered	2/1/14	2/1/14
Frame Construction	2/1/14	3/1/14
Engine Running & Tuned	2/8/14	2/8/14
Frame Skeleton Finished	2/8/14	2/8/14
Fuel Systems Applied	2/8/14	3/1/14
Electrical Systems Applied	2/8/14	3/1/14
Steering and Braking System...	2/8/14	3/1/14
Remaining Components App...	2/8/14	3/1/14
Prototype Constructed	3/1/14	3/1/14
Prototype Testing	3/1/14	4/20/14
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

- Frame revisions will allow for greater flexibility in drivetrain and steering designs which have not been finalized.
- The new clutch design will eliminate the biggest problems that were created by the old design. These problems include tooth wear, possible tooth shearing, and vehicle lunging.
- Technical tasks are divided up with at least 2 people on each task. The next steps of the project are ordering materials for the frame and building it along with the start of fairing construction.

References

1. John's Rocket Site, "Flash Gordon," http://www.jcrocket.com/flashgordon.shtml, Jan. 2014.
2. Heeters Performance Center, "Centrifugal Clutches for Go-Karts and Mini Bikes," http://www.heeters.com/kartclutches.shtml, Jan. 2014.

Questions