Improving Vehicle Efficiency for Shell Eco-marathon Competition (Team 2)

Overview

The problem Shell Team 2 was tasked with was improving the overall efficiency and reliability of the Penn State vehicles. The vehicles must be prepared to compete in the Shell Eco-marathon Competition held in Houston, Texas. The efficiency of the vehicles is tested against 131 competing teams.

Objectives

- Select a new high speed electric hub motor to implement a new “coast and burn” driving method.
- Improve the ease of use and durability of the driver’s canopy.

Approach

- Electric Hub Motor
  - Identified customer needs
  - Researched and selected motor based on specifications
  - Modified vehicle mounting system to allow quick interchange of both old and new motors.
  - Modified driving strategy for the new high speed motor
- Driver Canopy
  - Evaluated current design and identified needed areas of improvement
  - Redesigned hinging and latching mechanisms
  - Modified nose cone to retain the vehicles aerodynamic shape
  - Fabricated hinges in house and modified an inexpensive latch to fit the vehicle

Outcomes

- The Prototype Vehicle was 12% more efficient over the last year’s vehicle.
- Prototype Vehicle Obtained 5,692 MPGe
- Placed 6th place out of 30 competing teams
- Would cost less than 1 penny to go a mile using the coast and burn technique
- Proved that the coast and burn technique can apply to electrical motors as well as combustion engines
- The canopy was sufficient for the required driver exit time
- The canopy did not fly open like in the past