SHELL ECO-MARATHON PROTOTYPE STEERING SYSTEM

KEY REQUIREMENTS

- System allows the vehicle to complete an 8-meter radius turn at minimum
- Does not limit driver visibility
- Allow driver to exit vehicle in under 10 seconds
- Brake and wheel isolation mounts present

INITIAL PROTOTYPE KEY FEATURES

- Adjustable Ride Height
- Adjustable Caster
- Adjustable Camber
- Adjustable Toe
- Proper King-Pin inclination angles
- Ackermann Steering Geometry

Initial Prototype

TEST FINDINGS

- Final design should be composed of the least number of parts possible to mitigate unwanted system deflection.

Final Geometry Angles:

- Toe: 0 Degrees
- Caster: 4.5 Degrees
- Camber: -7 Degrees
- Kingpin Inclination: 75 Degrees

Oregon State University

Project Description

OSU Competing in the Shell Eco-Marathon

The Shell Eco Marathon Prototype car is a student-built vehicle that competes in an efficiency-based competitio n. Each participating team completes a set number of laps and the team who consumed the least amount of fuel wins the competition.

The goal of our capstone project is to redesign the steering and suspension system for the Shell Eco-Marathon Prototype car. Our team's objective was to redesign the steering and suspension system for the prototype car. The key features of the design are a water jet frame, custom wheel brackets, and a lightweight steering arm. A significant improvement from the previous system was the addition of suspension geometry. Allowing for better stabilization and handling.

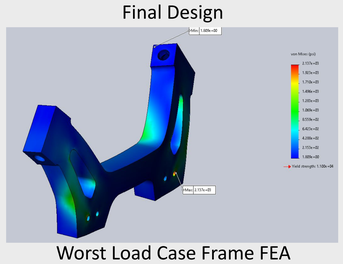
FINAL DESIGN

The final design was largely designed to include optimal suspension geometry angles that would allow the vehicle to be easily controllable while also remaining efficient. Finding the balance between these two is critical for win the competition.

It was also vital to have the system be easily manufacturable as time was of the essence.

With the initial prototype deflection, the team also conducted Finite Elements Analysis' (FEA) on parts that would sustain substantial load to design them to withstand the estimated loads.

Final Design



Worst Load Case Frame FEA

MIME.120

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POTENTIAL IMPROVEMENTS

Weight Savings

- Current final frame was designed to withstand forces.
- Frame can be redesigned or altered to save weight

Bearing Longevity

- Current bearings are not enclosed, allowing debris inside and decreasing the lifespan of the part
- Enclosed bearing would likely extend their lifespan

Ease of Removal

- The current design is tedious and difficult to remove from the vehicle
- King-Pin Brackets could be redesigned to allow the wheel to be removed with the axle