

# Steering Optimization Through Geometric Variation

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## **Background**

The Embry-Riddle Aeronautical University Women's Baja team races an off-road vehicle in a competition hosted annually by the Society of Automotive Engineers. Due to time constraints, the team often does not sufficiently evaluate the performance of the Baja car through testing prior to the competition. In particular, the steering and front suspension sub-system has been a challenge for the team to test and optimize. The design of an easily variable steering geometry will allow for more in-depth testing prior to competition.

## **Purpose**

To find a steering geometry that allows for the best steering and handling of the Baja vehicle through analysis of the results obtained during testing.

## **Design/Method**

The location of the pivot point of the tie-rod at the steering knuckle, among other factors, defines the percentage of Ackerman. A piece has been designed to attach to the steering knuckle allowing for the tie-rod pivot point to easily be moved, changing the percentage of Ackerman. The location of the rack and pinion also contributes to the percentage of Ackerman. A frame has been designed that will attach to the rack and pinion allowing simulating the fore/aft movement of the rack and pinion. Combinations of the various rack and pinion and tie-rod pivot point locations will be tested while other vehicle characteristics are controlled.

## **Results**

Quantitative results measuring the turning radius will be collected. Also qualitative results will be included in the analysis based on the driver's perception of the vehicle's handling.

## **Conclusions**

Conclusions and recommendations will be presented at the ASEE-SE conference in April.