

ME, ECE, BE Capstone Design Programs

# Team 13: LSU Formula SAE Corner Design for 10 Inch Wheels and Tires

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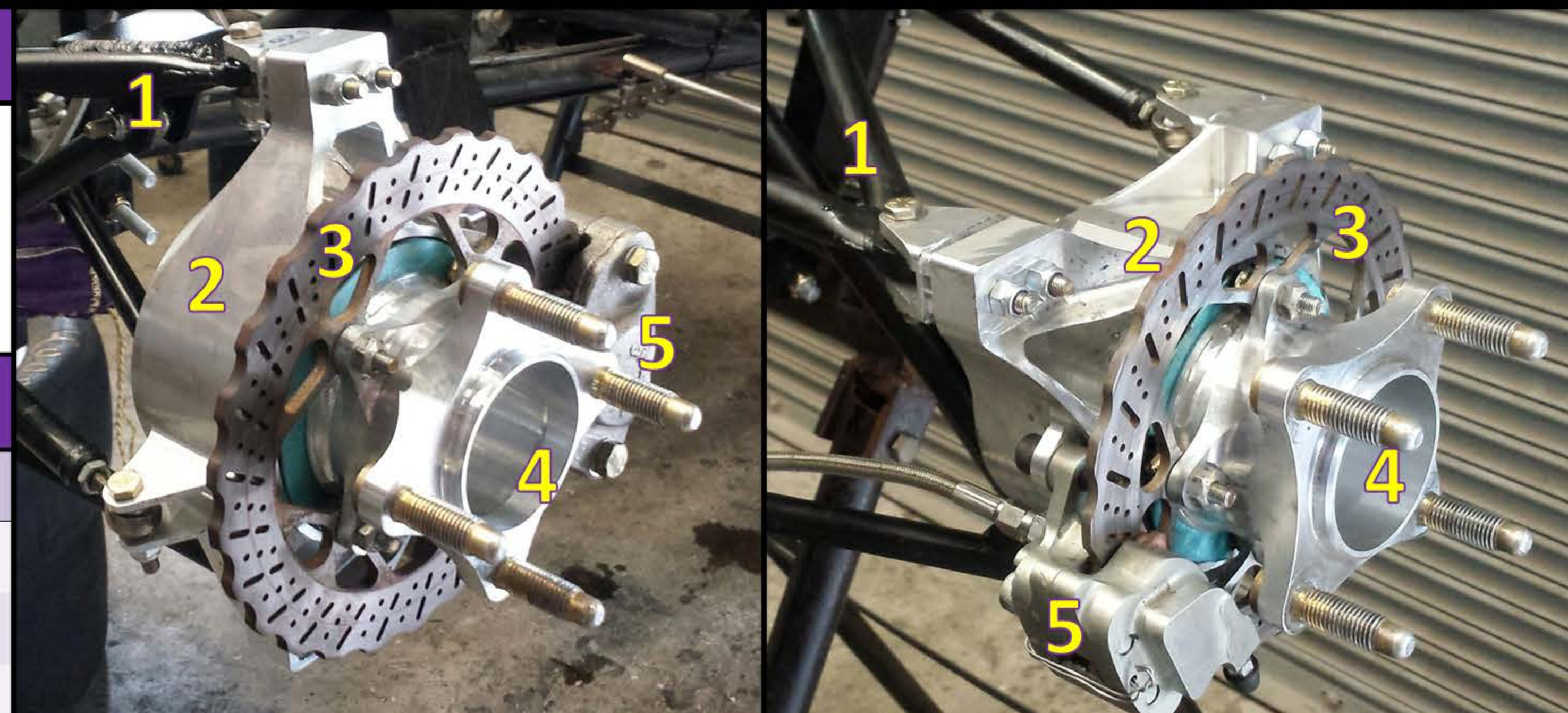


### Objective Statement

Design, manufacture, and test a set of outboard suspension components and an accompanying brake system so the 2017 LSU Formula SAE team can race with 10 inch wheels.

### Engineering Specifications

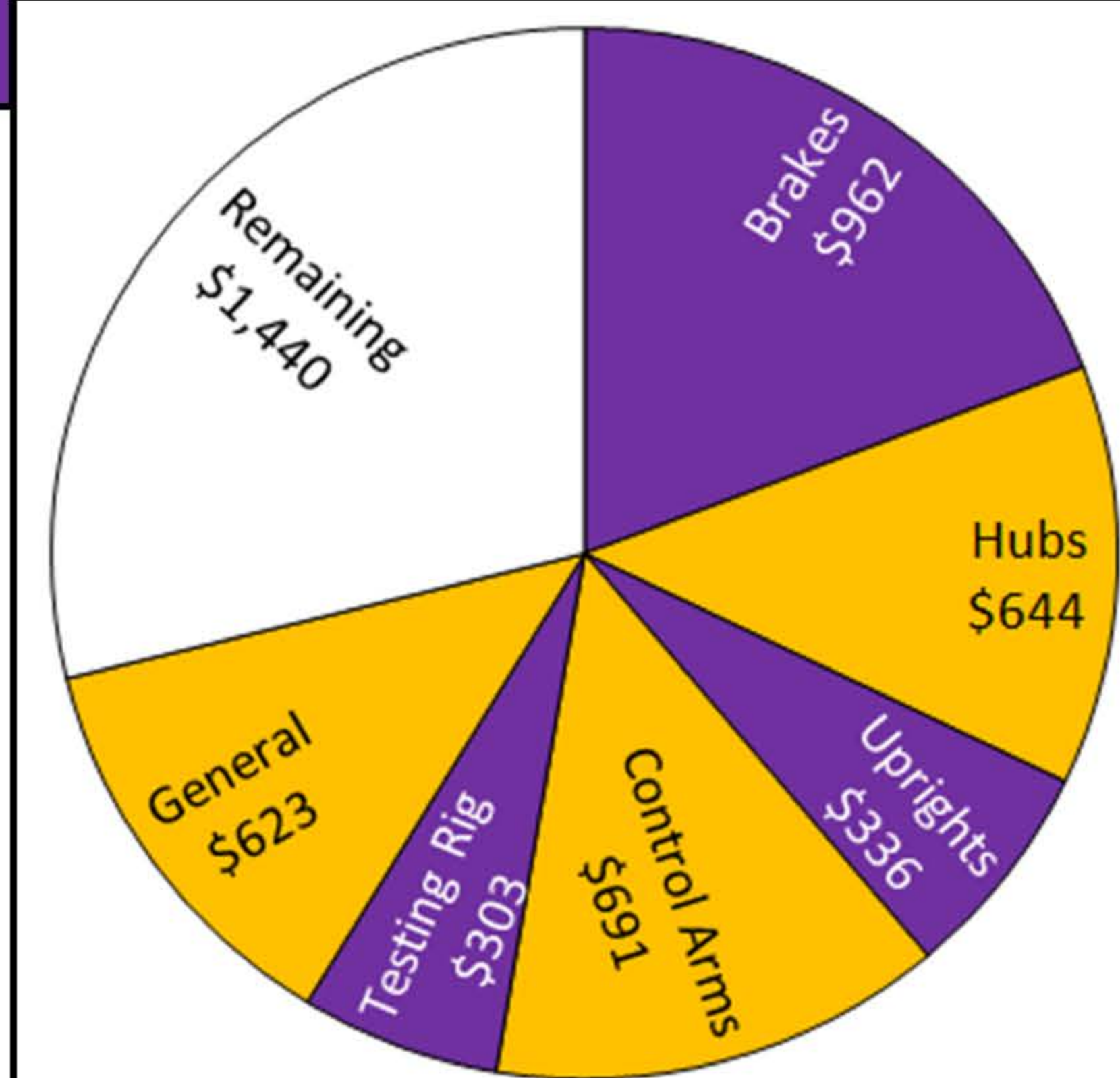
Specification	Target	Result
Weight Loss	≥ 16lb	25.5lb
Outer Diameter	≤ 9.25in	9.25in
Support Car and Driver	≥ 640lb	700lb
Wheelbase	≥ 60in	61in
Front and Rear Track	75% to 100%	98%
Vertical Travel	≥ 2in	3in
Rear Toe	≥ 4.5° out to 1.0° in	5.8° out to 6.1° in
Camber	0° to -3.5°	-1.5°
Caster	3° to 5°	4.8°
Front Scrub Radius	≤ 1in	0.375in
Wheel Lock-up Ability	4 wheels	4 wheels
Rotor Temperature	≤ 800° F	≤ 400° F
Withstand Track Forces from Accelerations	Designed to: Longitudinal of 1.4g Braking of 1.5g Latitudinal of 2.2g Vertical of 3g	Achieved: Longitudinal of 0.9g Braking of 1.43g Latitudinal of 1.73g Vertical of 4.9g



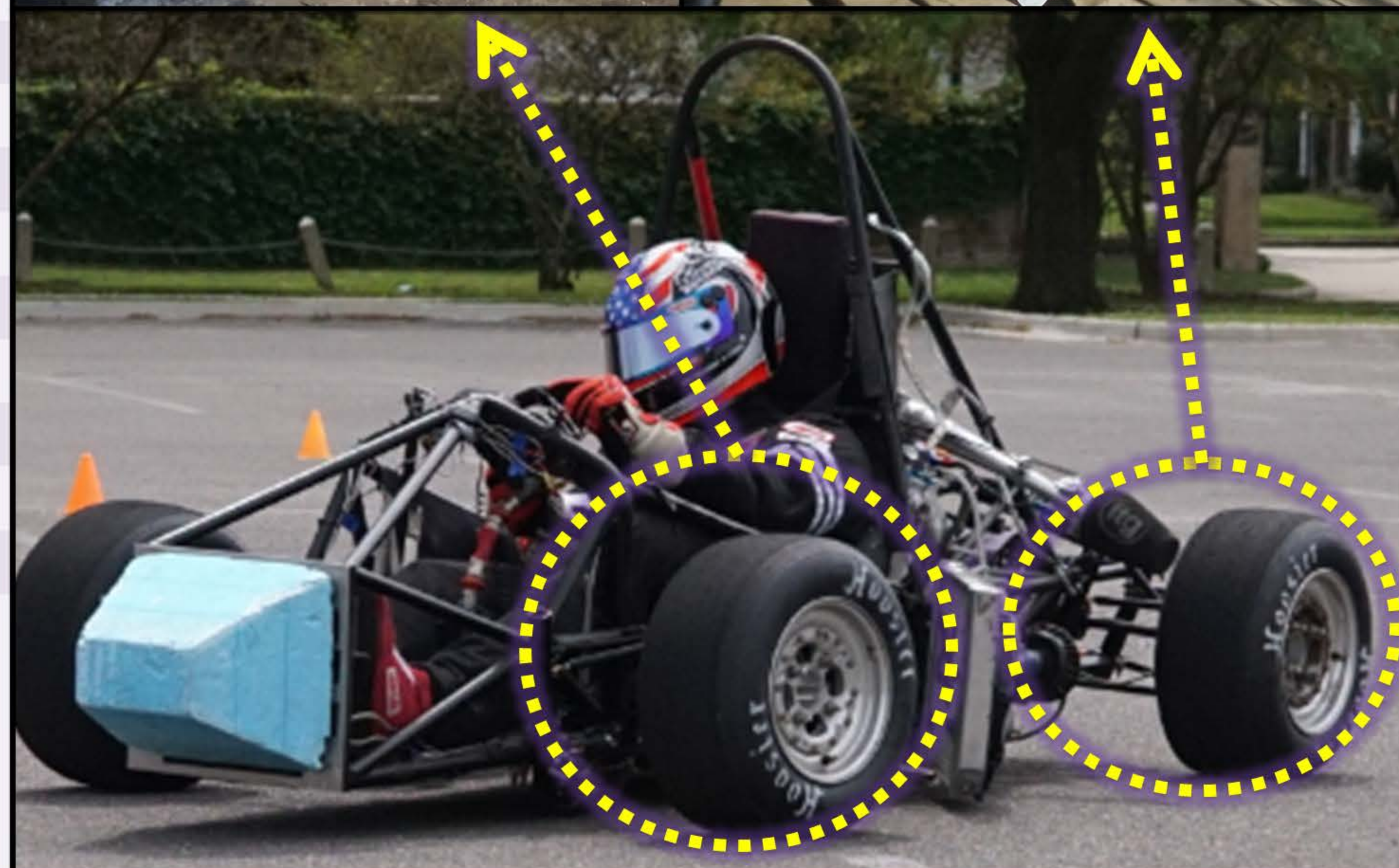
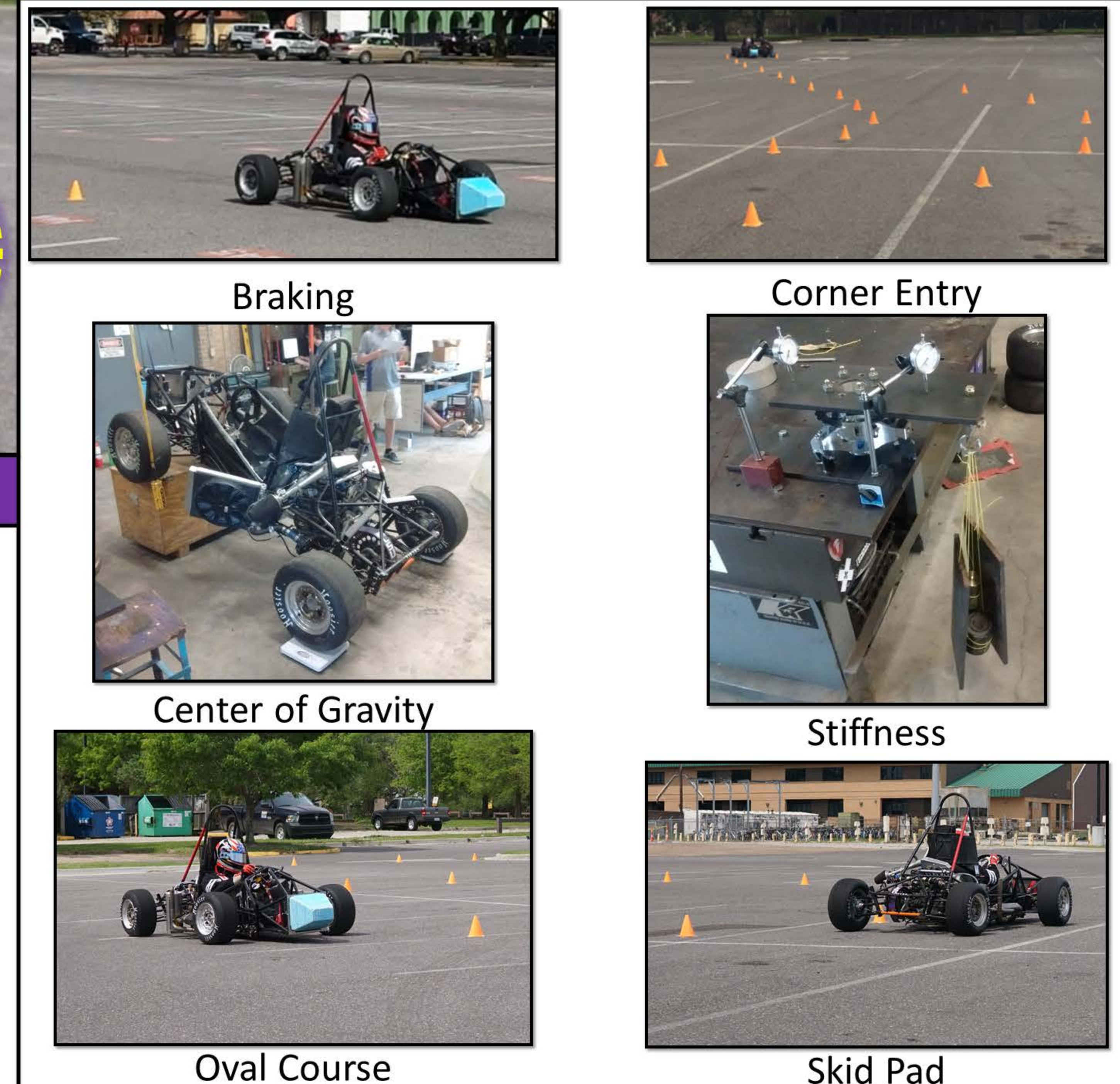
### Main Component Analysis

- 1 – Control Arms: Force Calculator & Hand Calculations
- 2 – Uprights: FEA
- 3 – Brake Rotors: FEA & Hand Calculations
- 4 – Hubs: FEA & Hand Calculations
- 5 – Brake Calipers: Hand Calculations

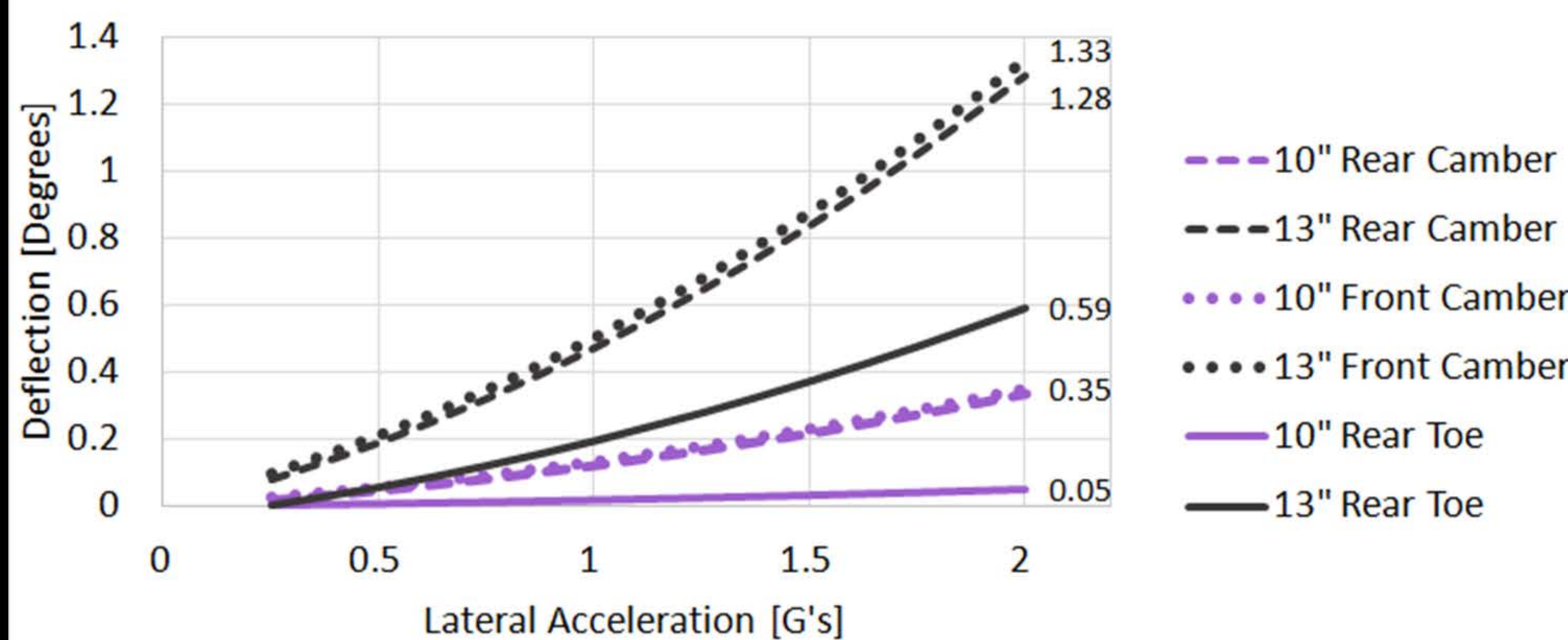
### Budget-\$5000



### Major Tests Performed



### 13 Inch versus 10 Inch Component Deflection



### 13 Inch versus 10 Inch Design

Stiffness (see deflection graph):  
 Front 10in components 3.8x stiffer in camber  
 Rear 10in components 3.8x stiffer in camber  
 Rear 10in components 12.7x stiffer in toe

Center of Gravity:  
 Car with 13in components: 12.4in  
 Car with 10in components: 11.5in

Skid Pad Time:  
 1% difference