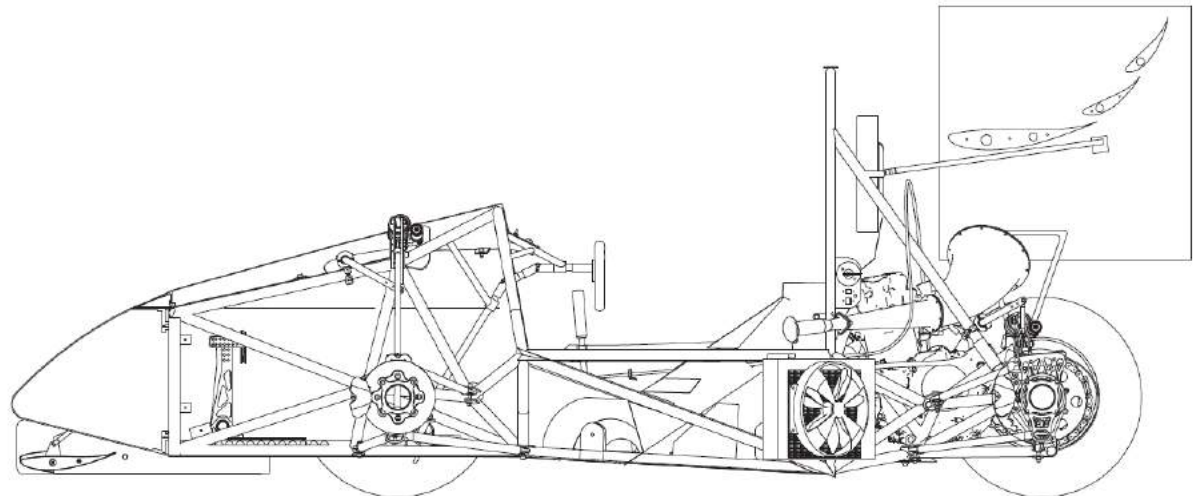


# RAVENS RACING

CARLETON UNIVERSITY FORMULA SAE

## Formula Student 2022/23



### Overview

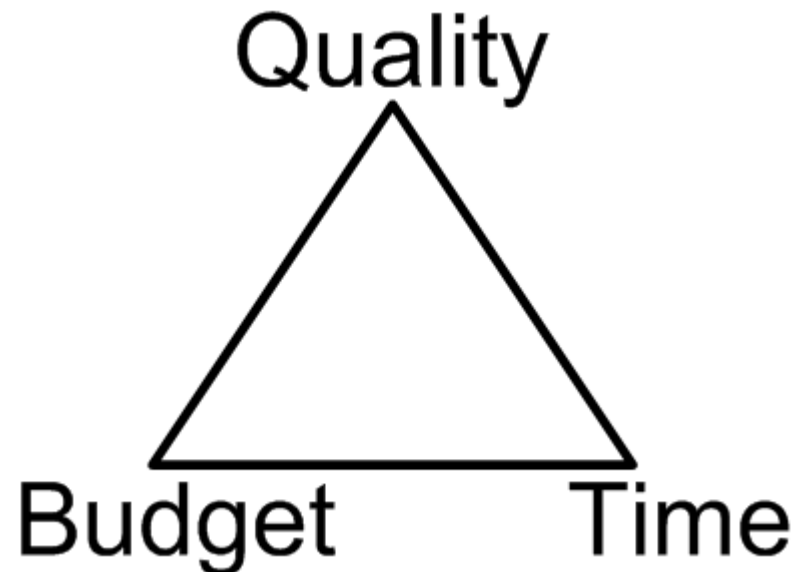
# What is Formula Student (FSAE)

- Engineering Program
- Design, Build, Test and Compete
- International Design Competition (700+ Schools)
- Carleton's World Ranking: 11<sup>th</sup> (2019)



# Program Objectives

- Focus on Real World Industrial Projects
- Learn Engineering Project Life Cycle
- Learn About Engineering Process
- Learn About Business – Project Realities
- Take Responsibility
- Develop Team Work
- Make Mistakes and Learn



# Expectations

- Design/Manufacturing/Testing
  - Understand the Challenge
  - Meet Customer Requirements
  - Use Creativity
- Prepare Reports
  - Specification Report
  - Design Report
  - Manufacturing Report
- Effort/Commitment

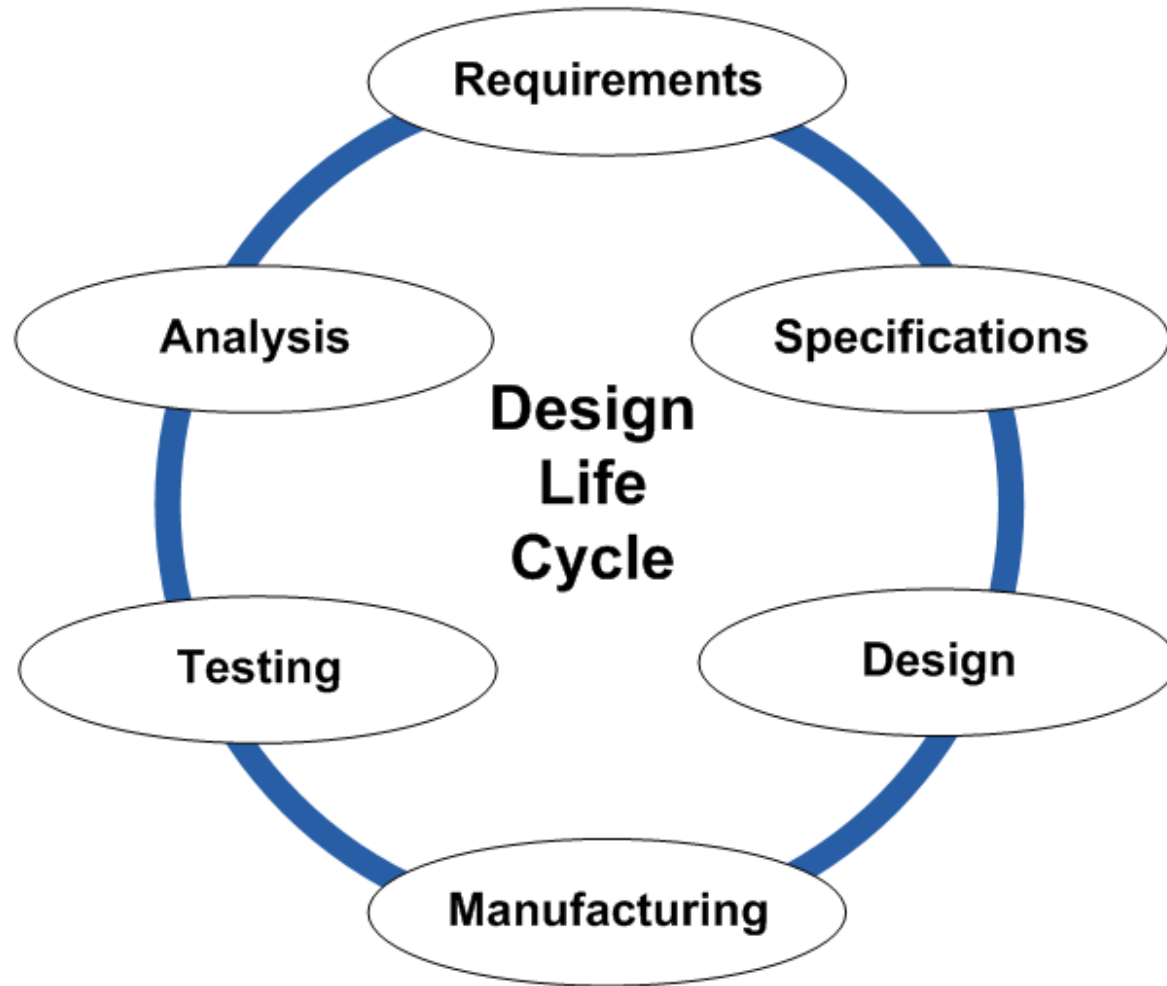


# Communications

- Presentations
- Progress Reports
- Specifications
- Validation Plan
- Design Reports
- Manufacturing Reports
- Test/Analysis Reports
- Drawings

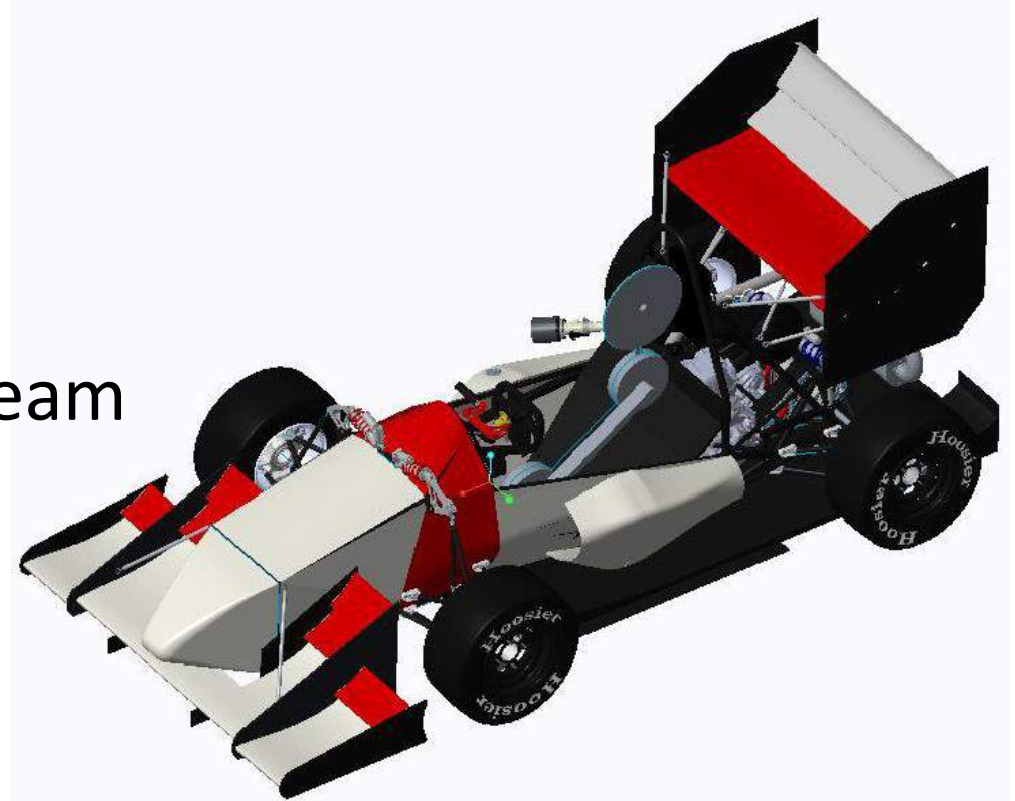


# Design Cycle

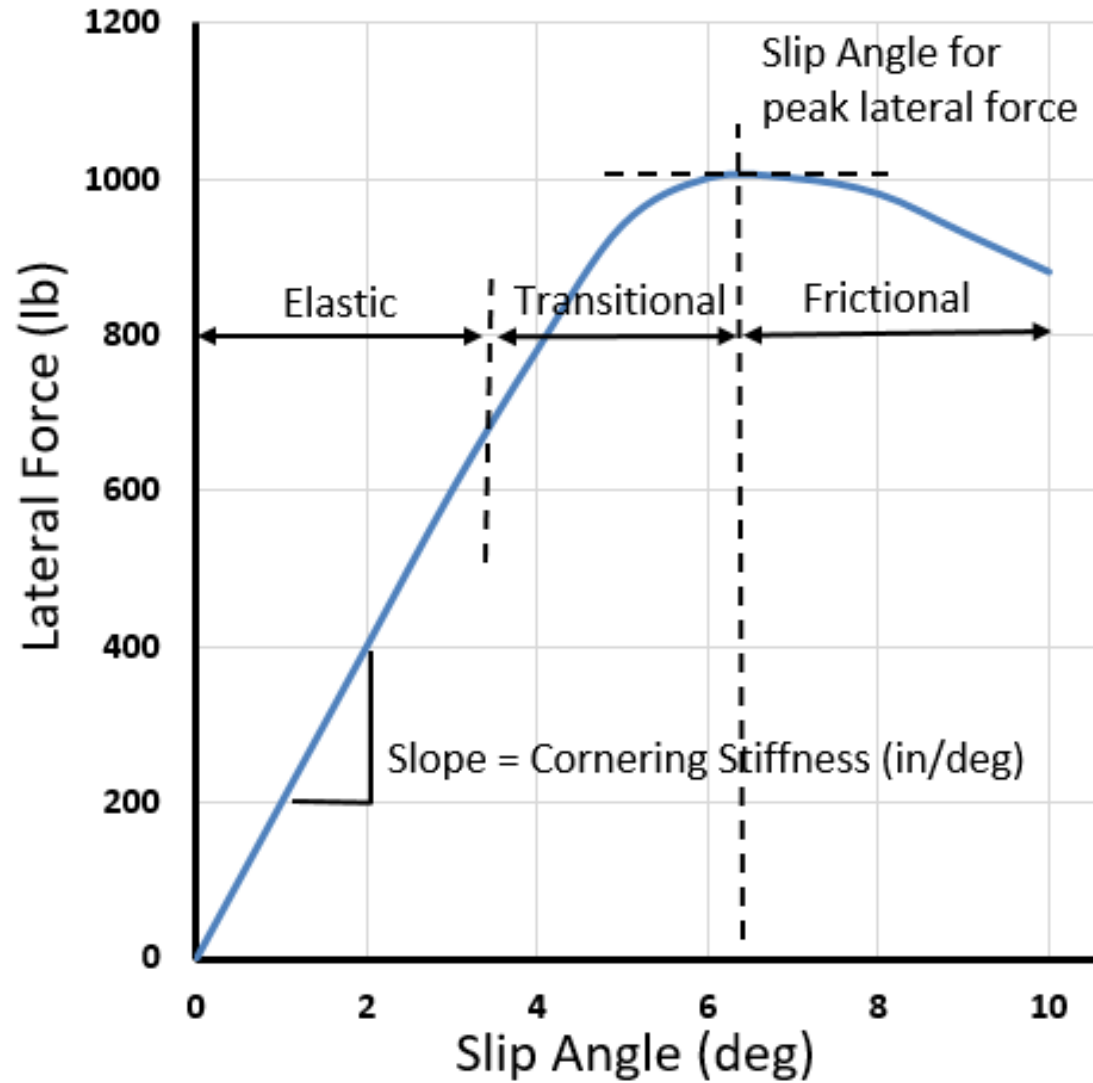
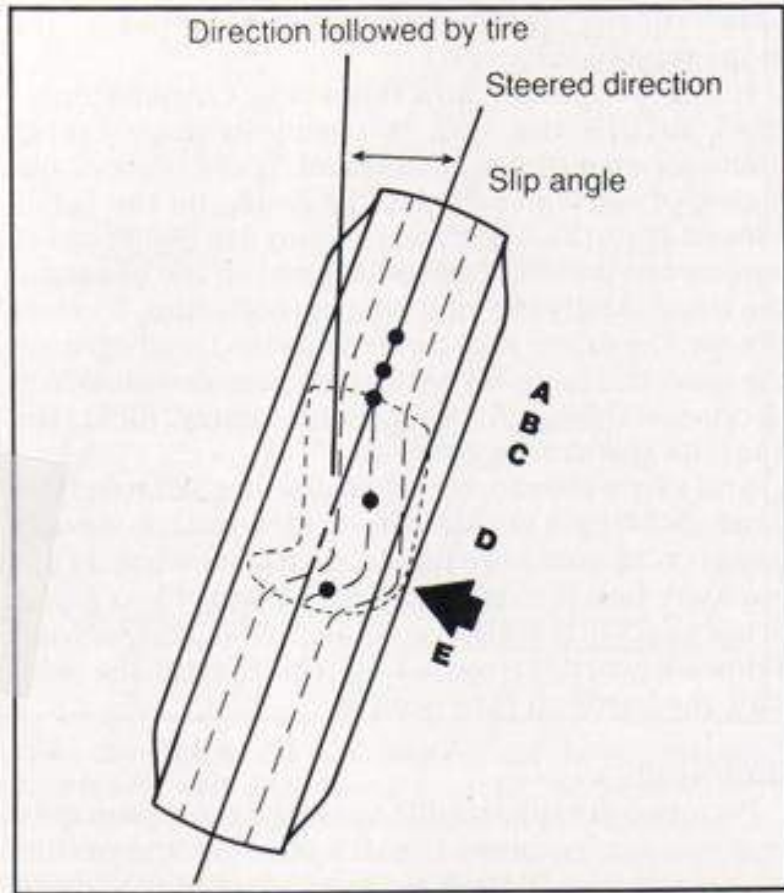


# Project Team Organization

- Integration Team
  - Project Engineering
  - Systems Integration
  - Manufacturing
  - Testing
- Body and Assembly Team
  - Structures
  - Dynamics
  - Aerodynamics
  - Ergonomics
- Power Train Team
  - Engine
  - Transmission, Final Drive
  - Electronics



# Slip Angle Sensors



# Slip Angle Sensors



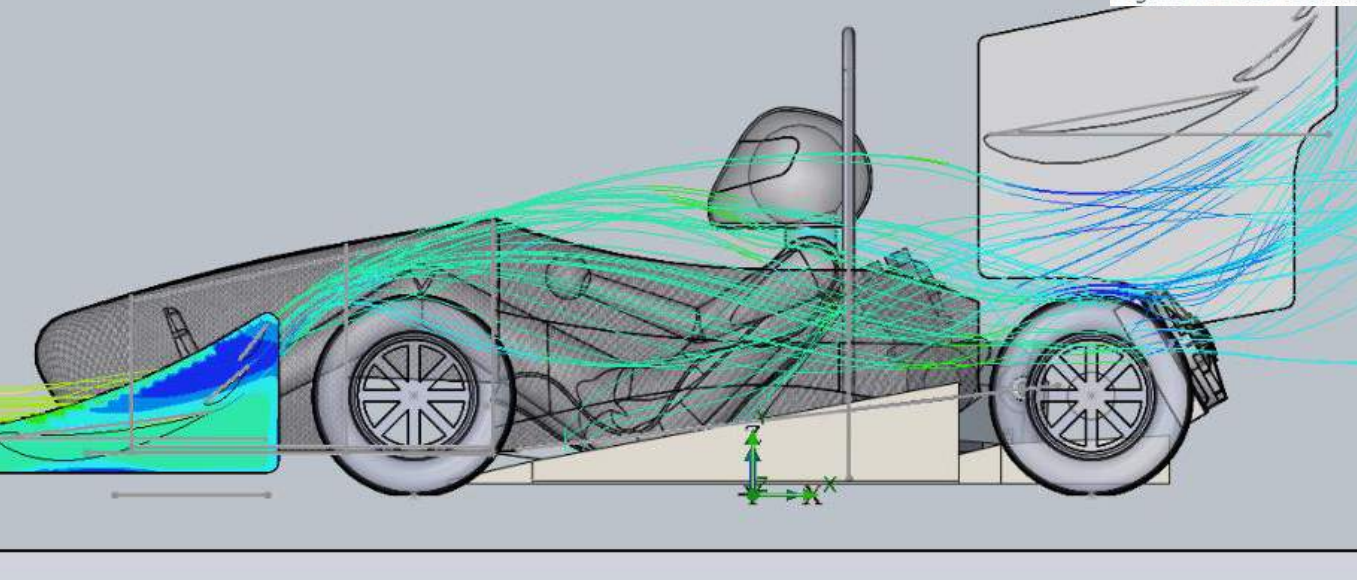
Figure 4: Preliminary Design Results

# Aero Mapping

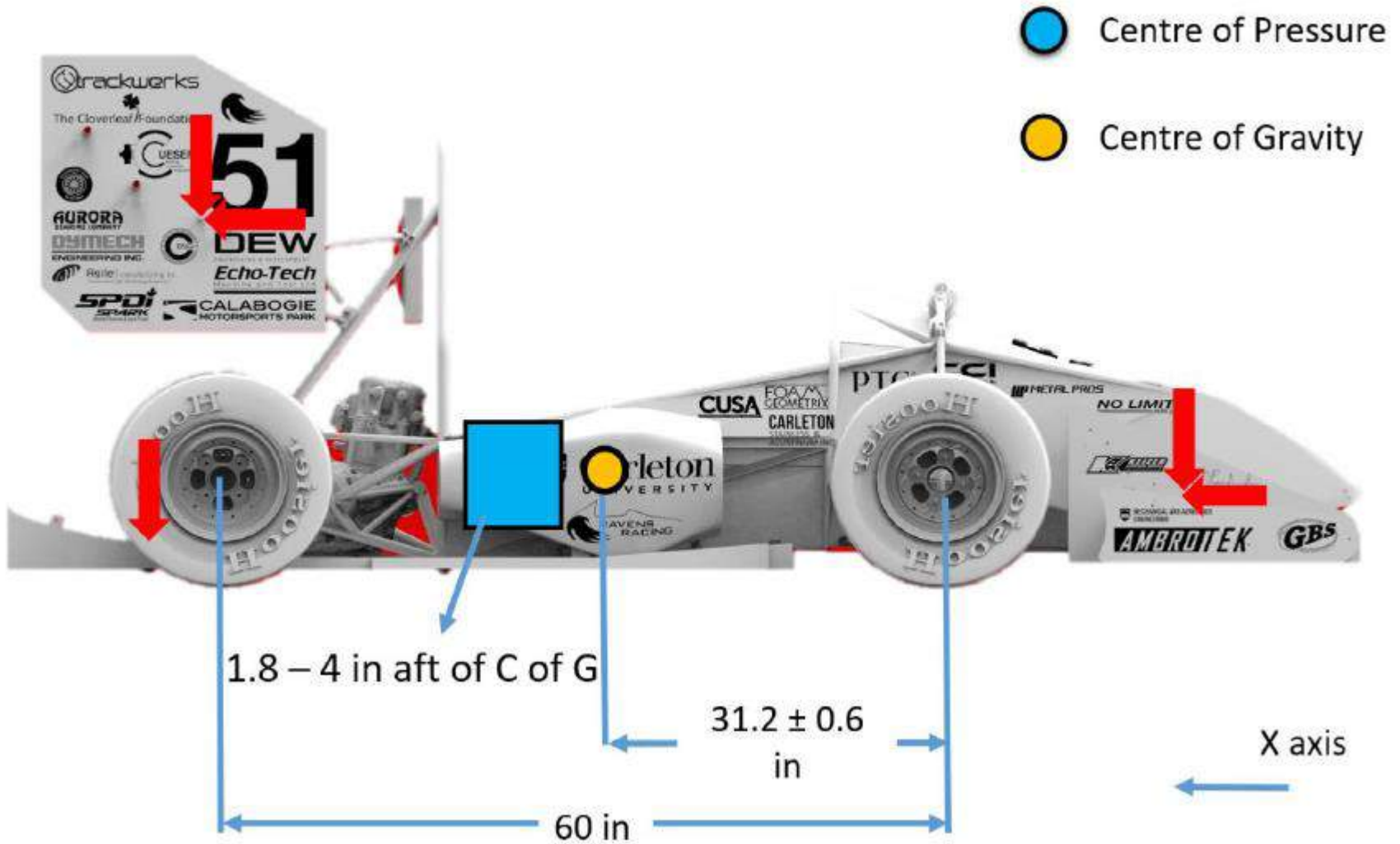
What is the impact of aero?



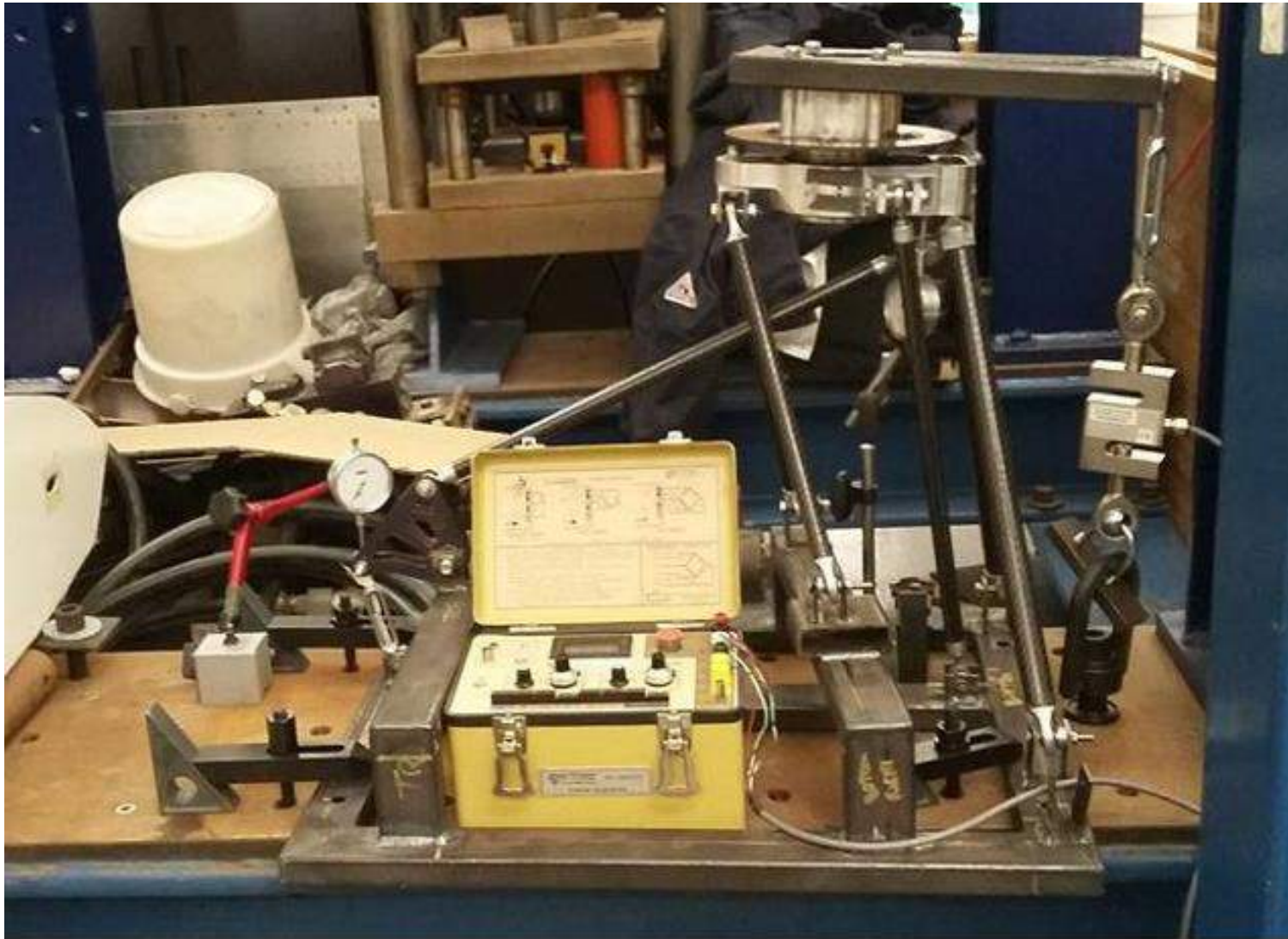
Figure 6: Flow visualization for rear wing



# Aero Mapping



# Suspension Mapping



*Figure 9: Complete set up of compliance jig*

# Suspension Mapping

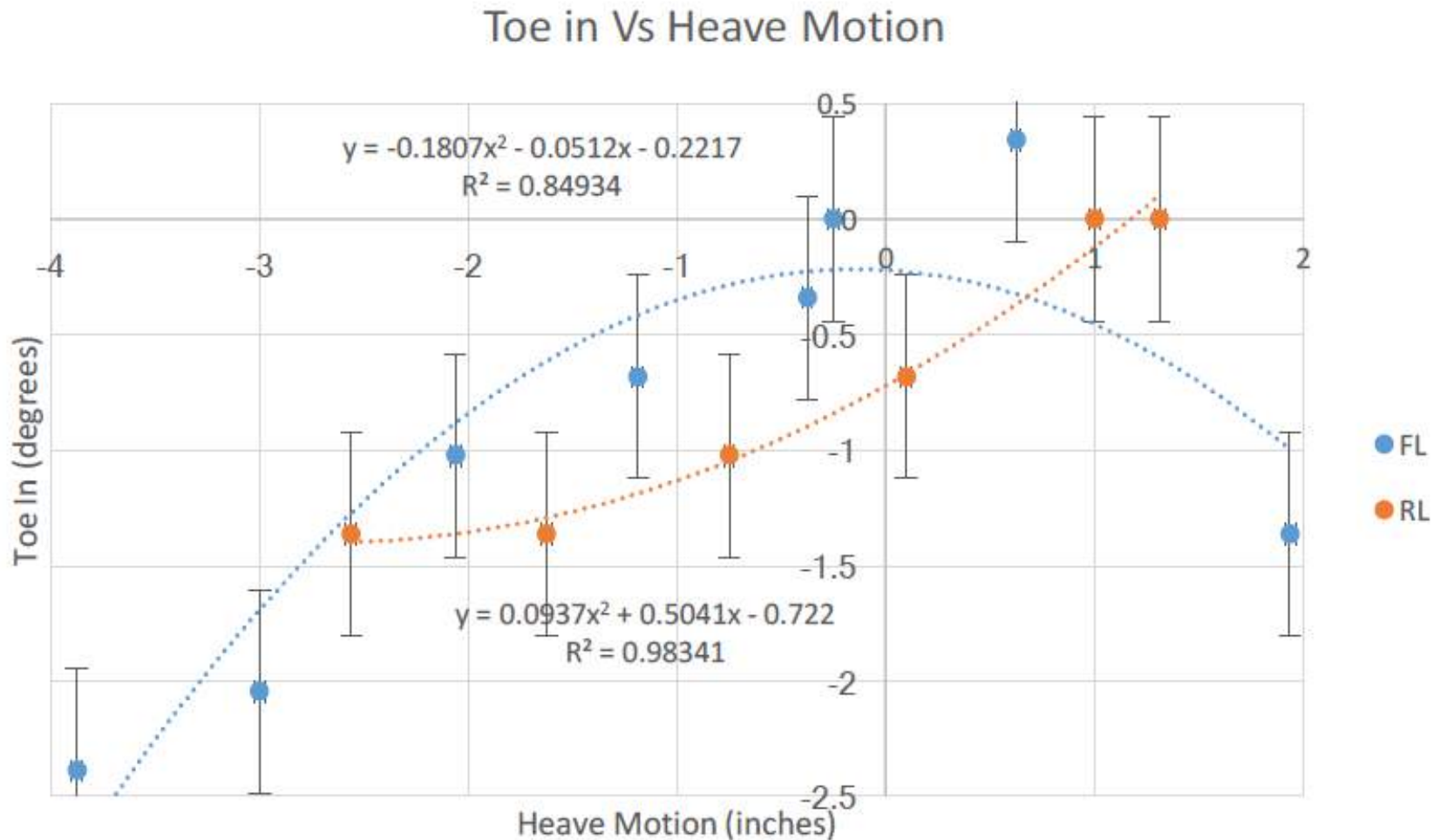
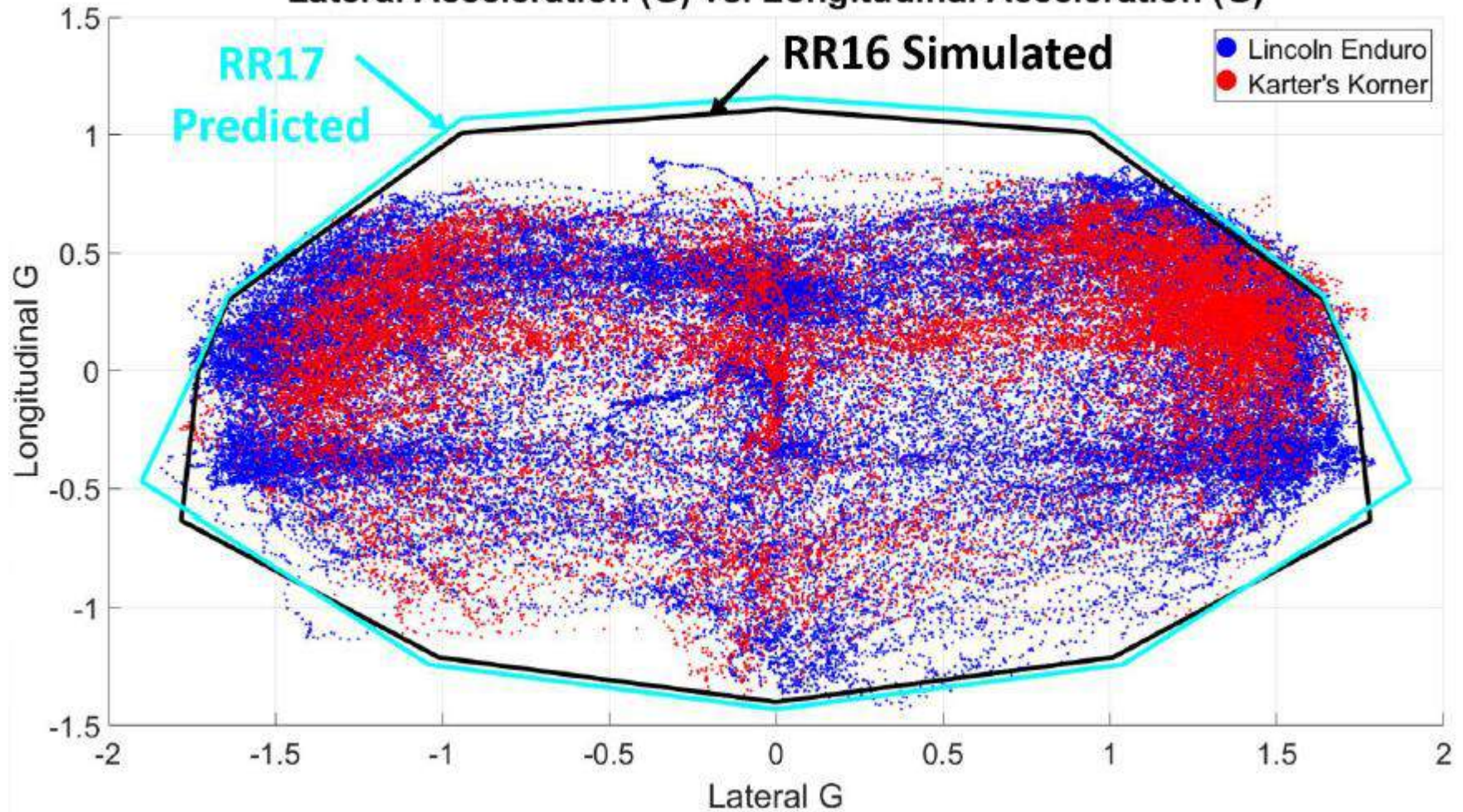


Figure 6: Experimentally determined toe-in vs. heave motion.

# Chassis Mapping

Lateral Acceleration (G) vs. Longitudinal Acceleration (G)



# Structural Integrity

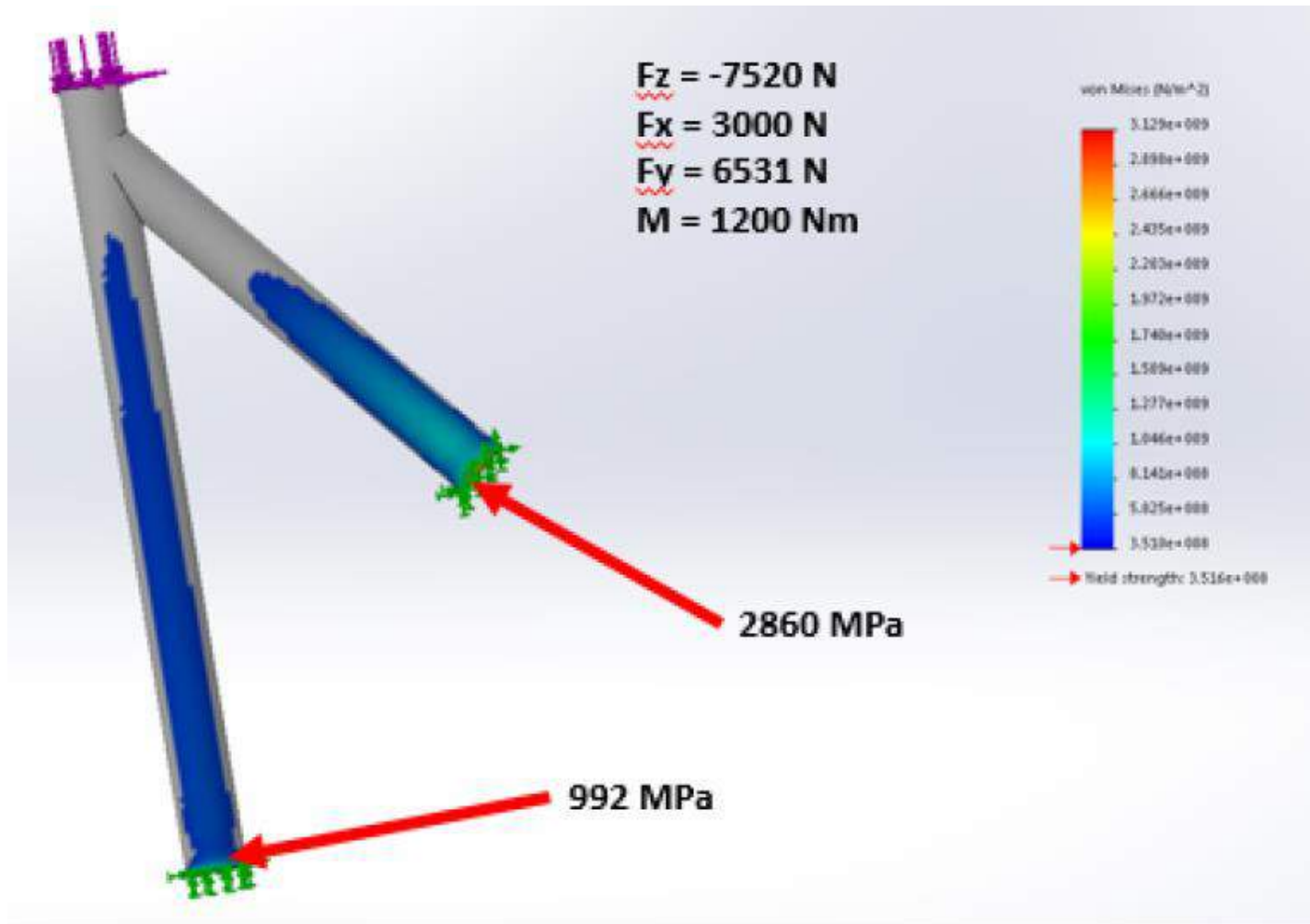


Figure 38: Localized hoop brace with extended body

# Engine Design

- Packaging
- Additive Manufacturing
- Pneumatic Valves
- Atkinson Cycle
- ECU



# Engine Mapping

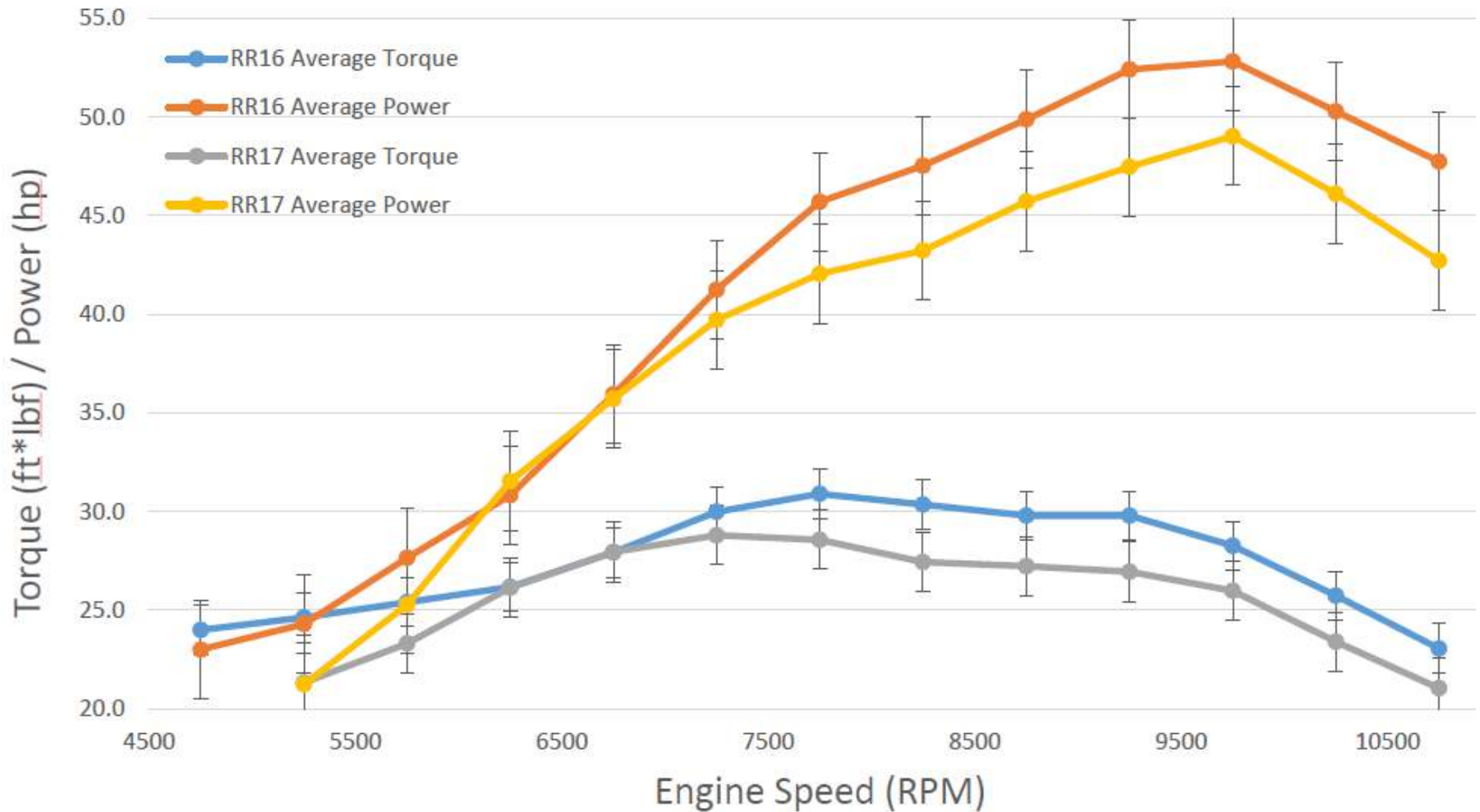
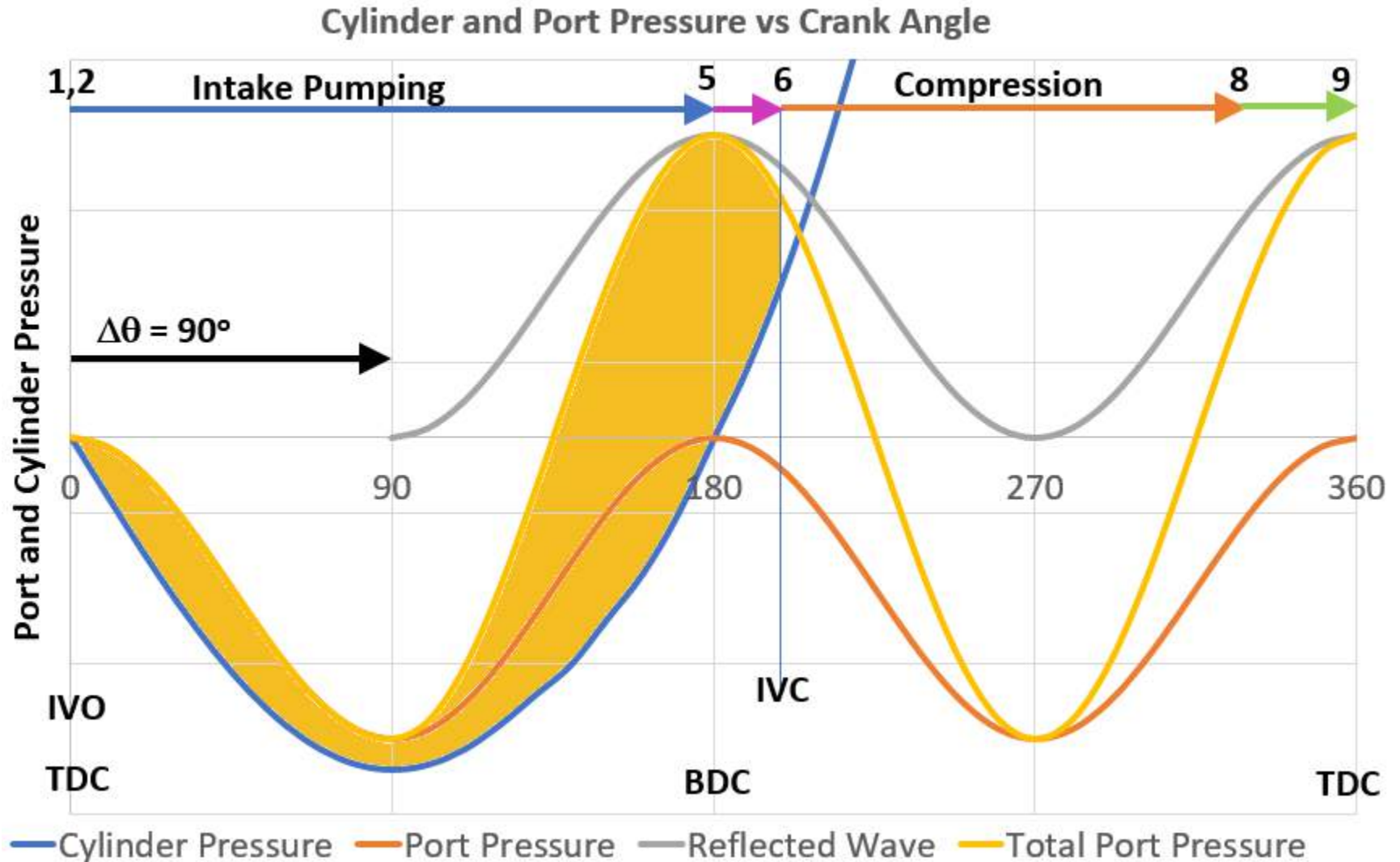


Figure 6: KTM 450 SX-F (RR16 vs RR17) 100% Throttle Average Power Runs in 2nd Gear

# Engine Mapping



# Fit and Finish



# Professionalism



# Questions

