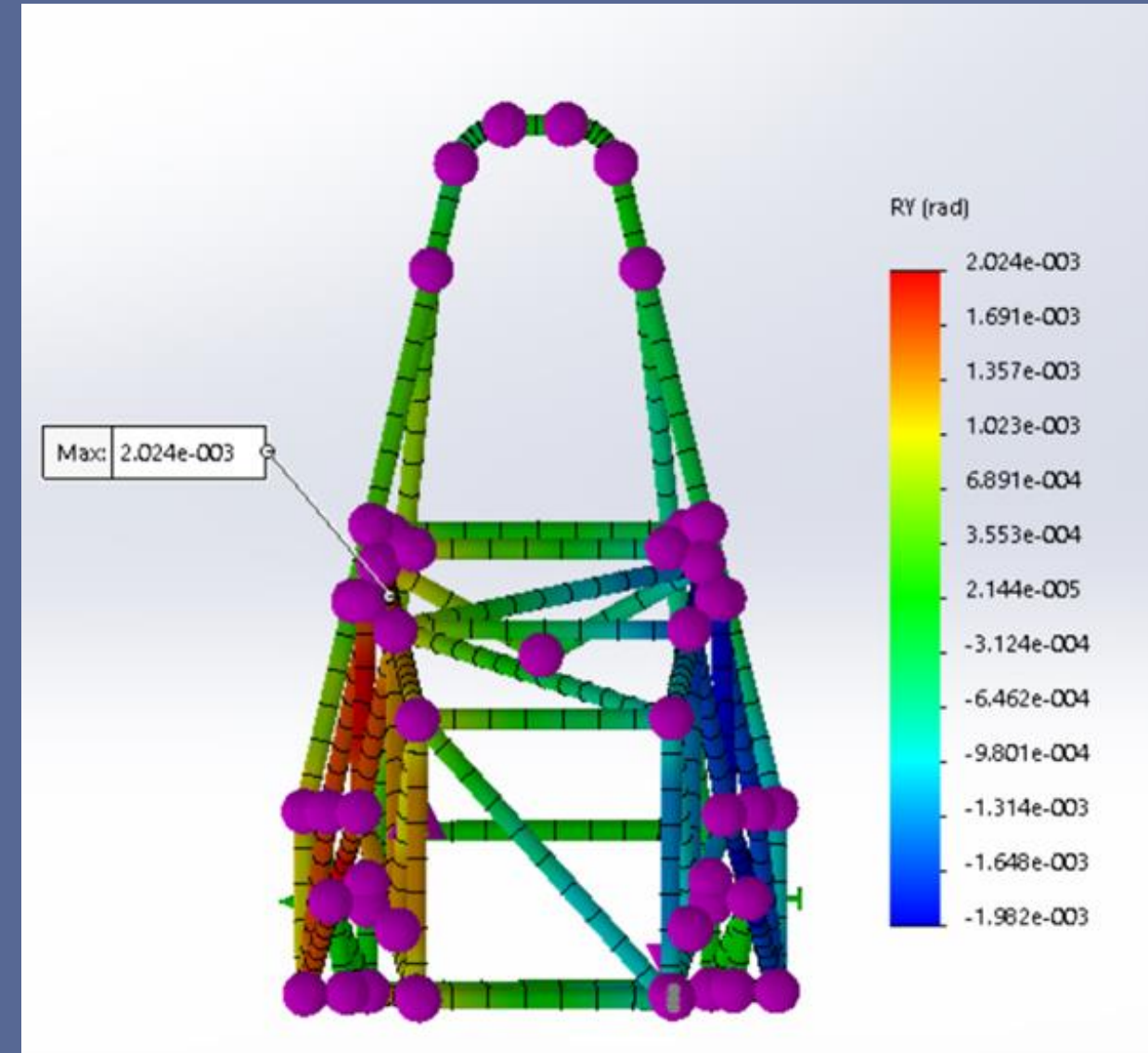
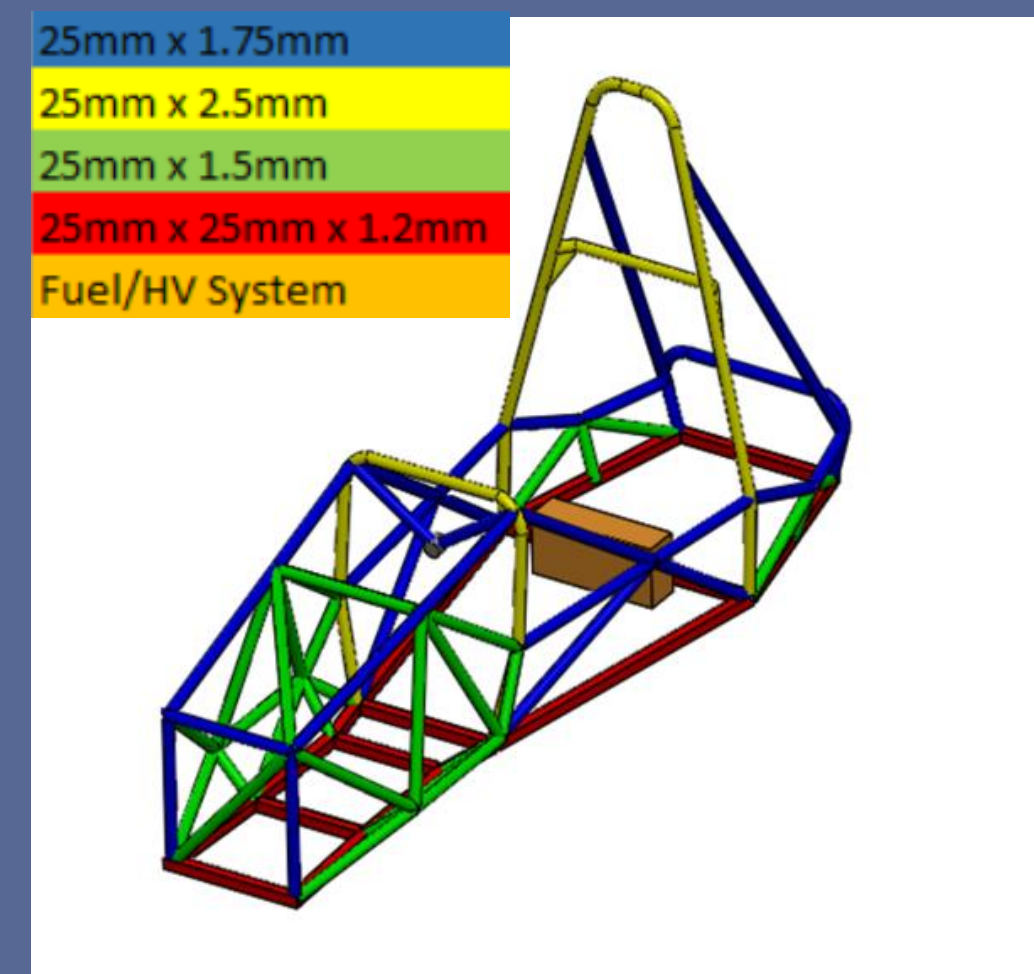


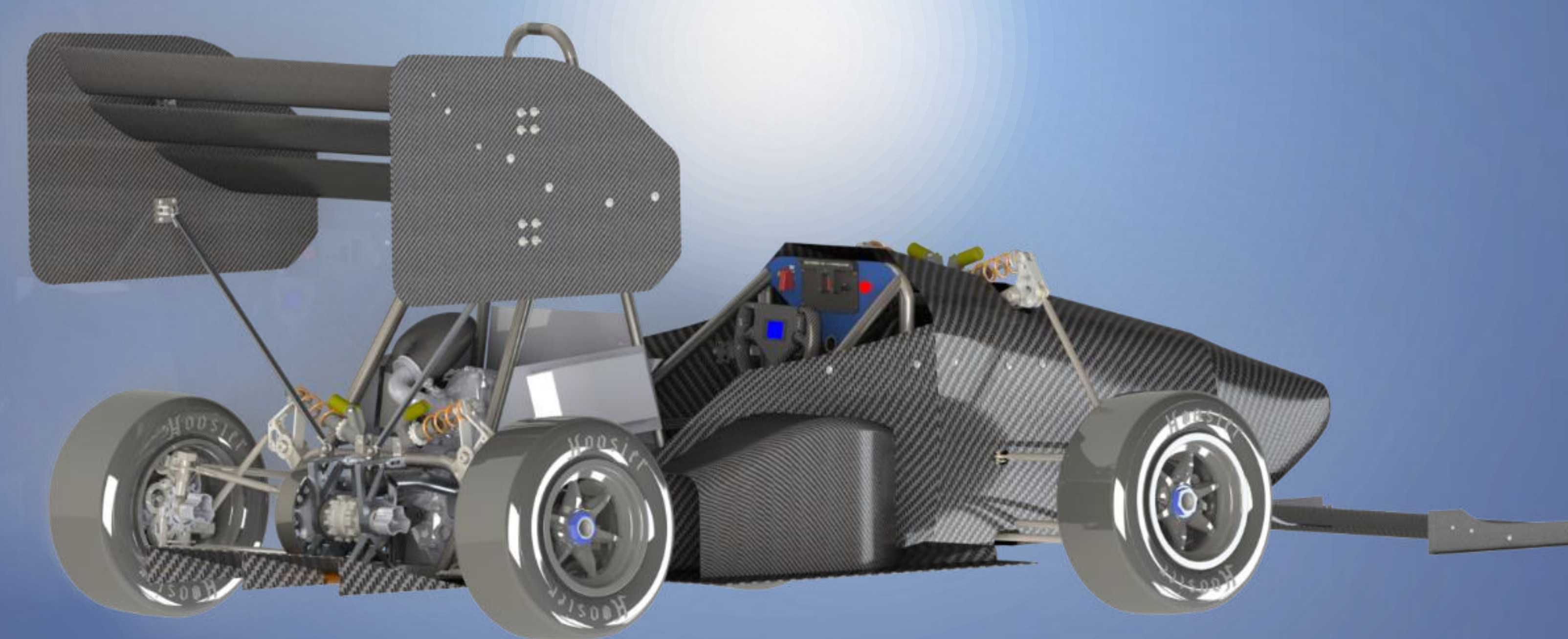
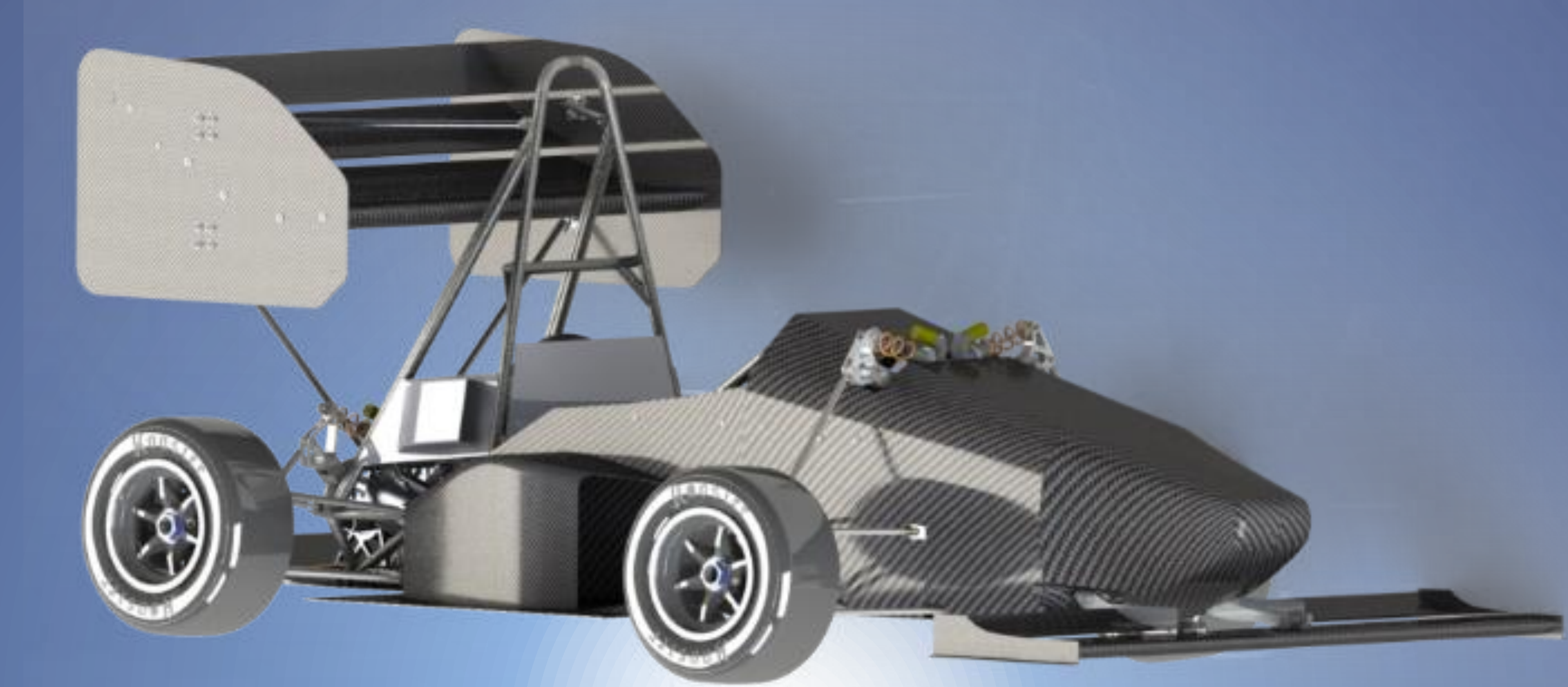
Frame

- Tubular Space Frame Chassis
 - 1020 Cold Drawn 1" Steel Tube (0.049", 0.065", 0.095" Thick)
 - Manufactured Using Tig Welding
- Performance
 - Torsional Rigidity: 1930 Nm/deg
 - Weight: 75lbs



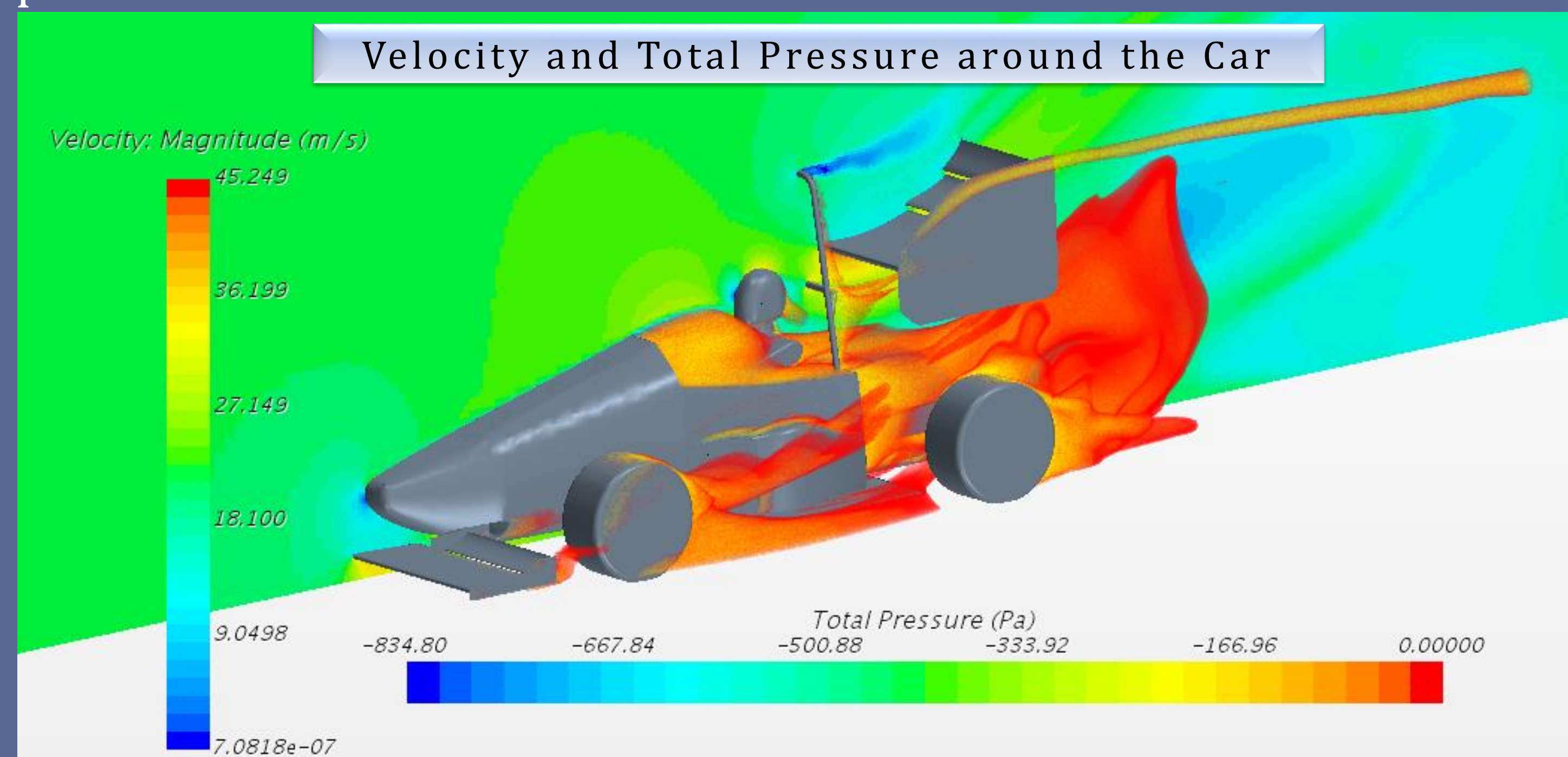
College of Engineering and Physical Sciences Mechanical Engineering Department

Team Captain: Nick Andrade
 Aerodynamics: Jay Lamphier, Phil Bangma, Ryan IntVeld
 Controls: Sean Petersen, Noah Diggins
 Electrical: Brian Rainville
 Frame: Eric Krueger, Regan Beaudreau, Sebastian Gazzara, Matt Mroz, Kyle Preble, Clay Greig
 Powertrain: Alex Gialluca, Sawyer Blais, Ian Baker, Sean Lahey, Matt Kuba
 Suspension: Mitchell Conley, Shelby Chapman, Jessi Frechette
 Faculty Advisor: Todd Gross



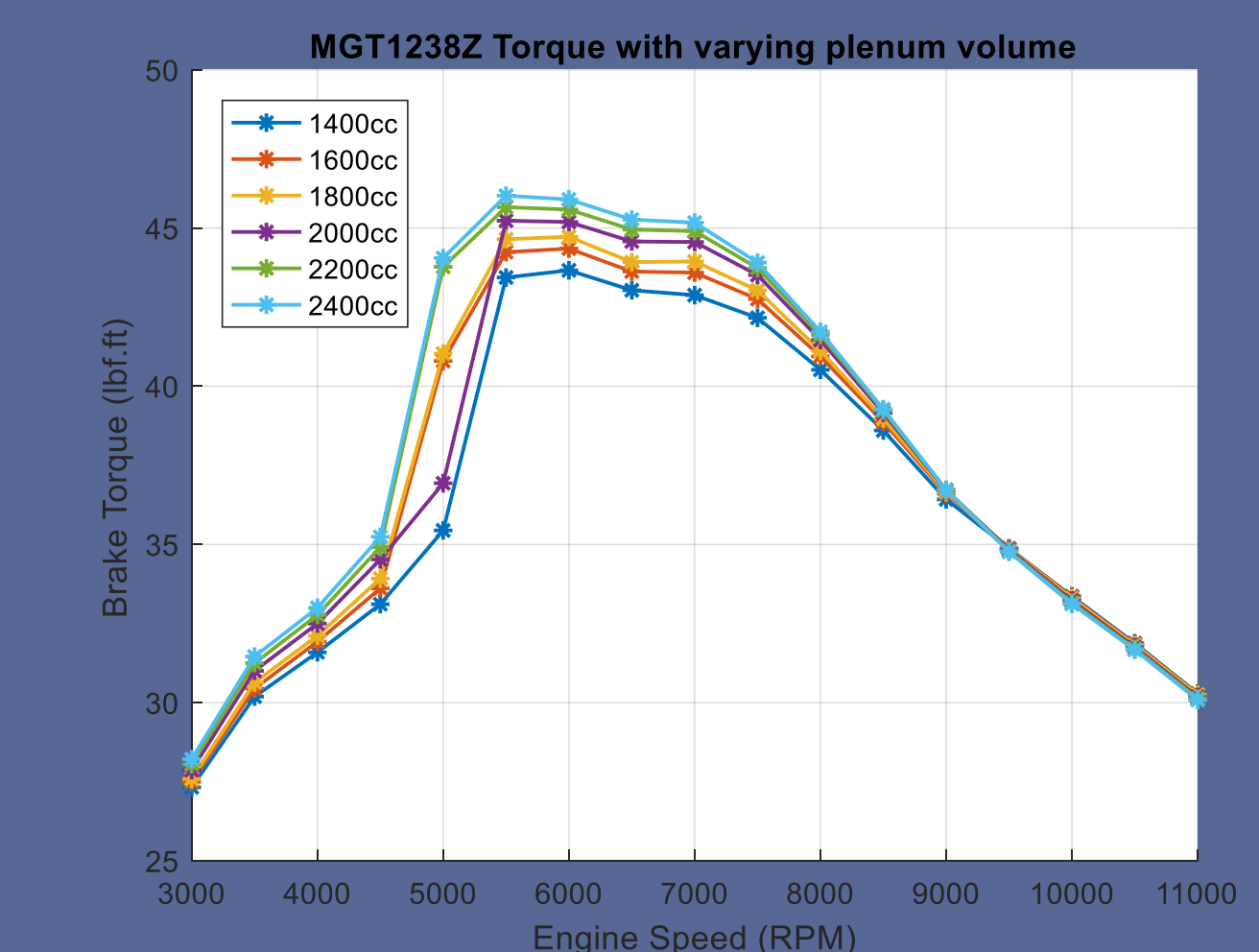
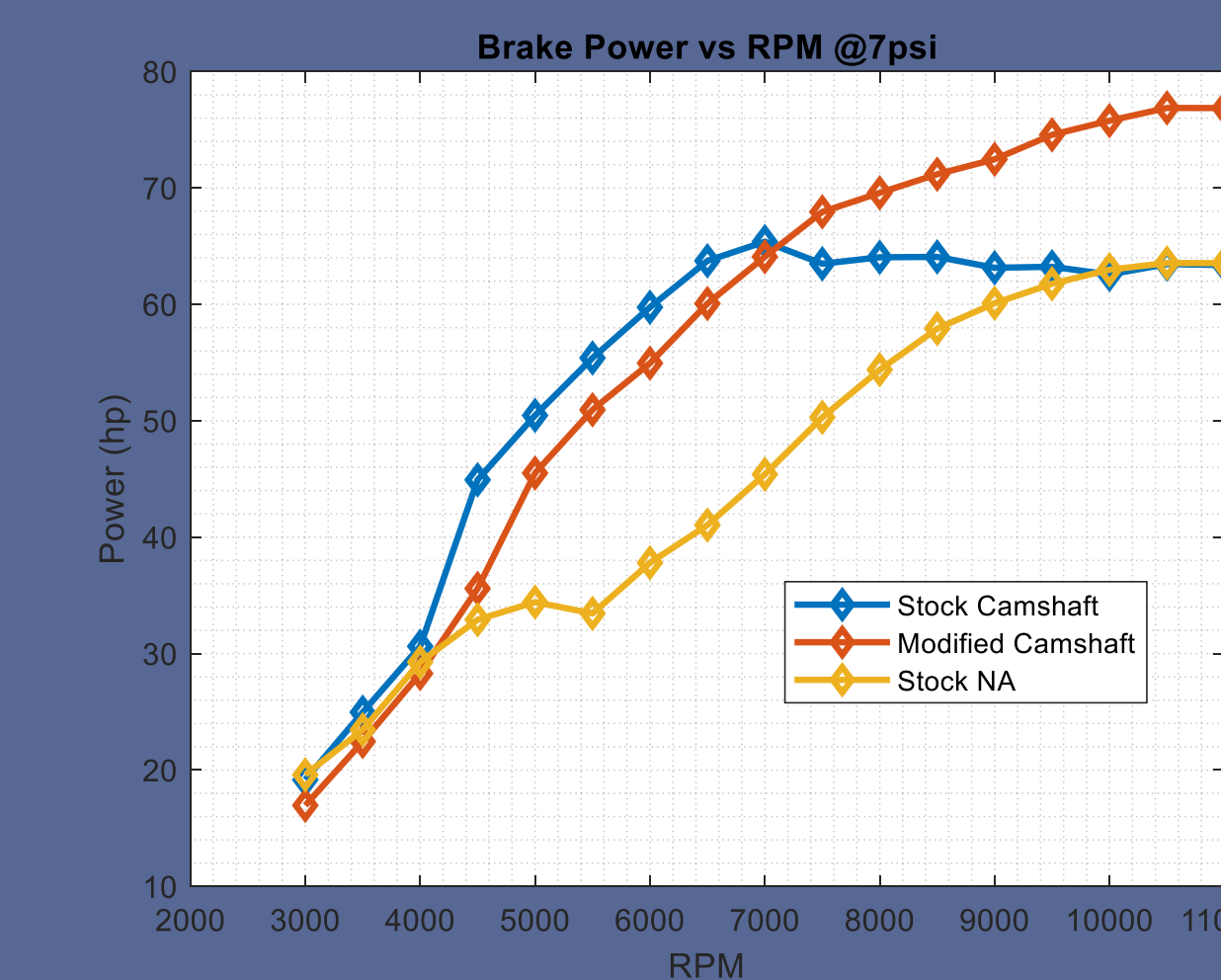
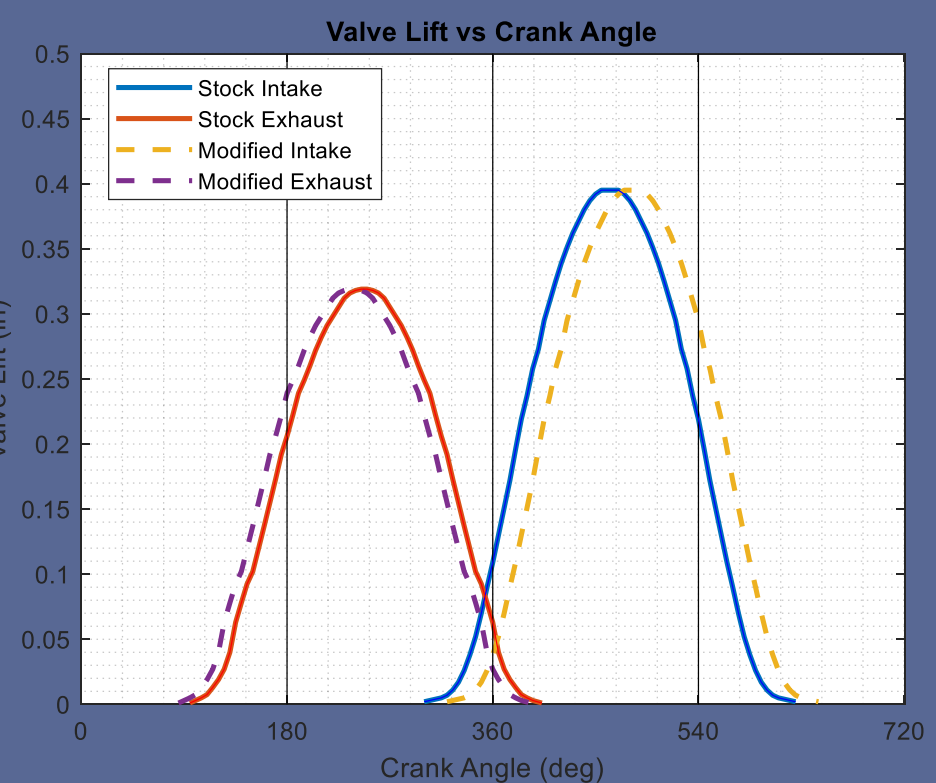
Aerodynamics

- Aerodynamic package consisting of:
 - Front Wing, Sidepods, Underbody Diffuser, and Rear Wing
- Components are designed with adjustability and manufacturability in mind
- Coefficient of lift: -4.16 Coefficient of drag: 1.52
- Lap time reduction of 2.35 seconds



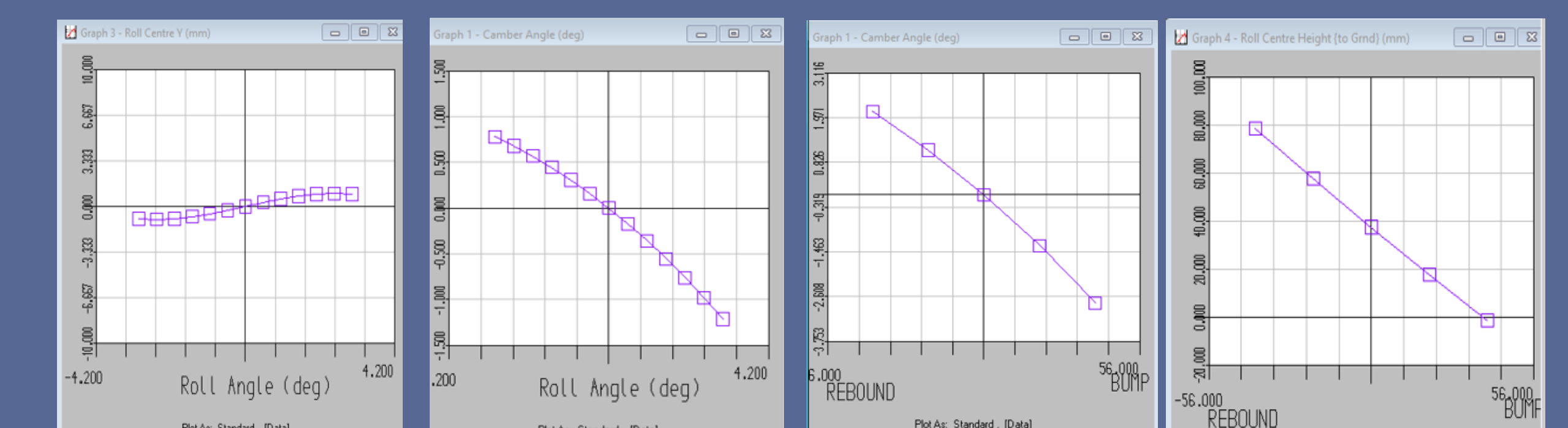
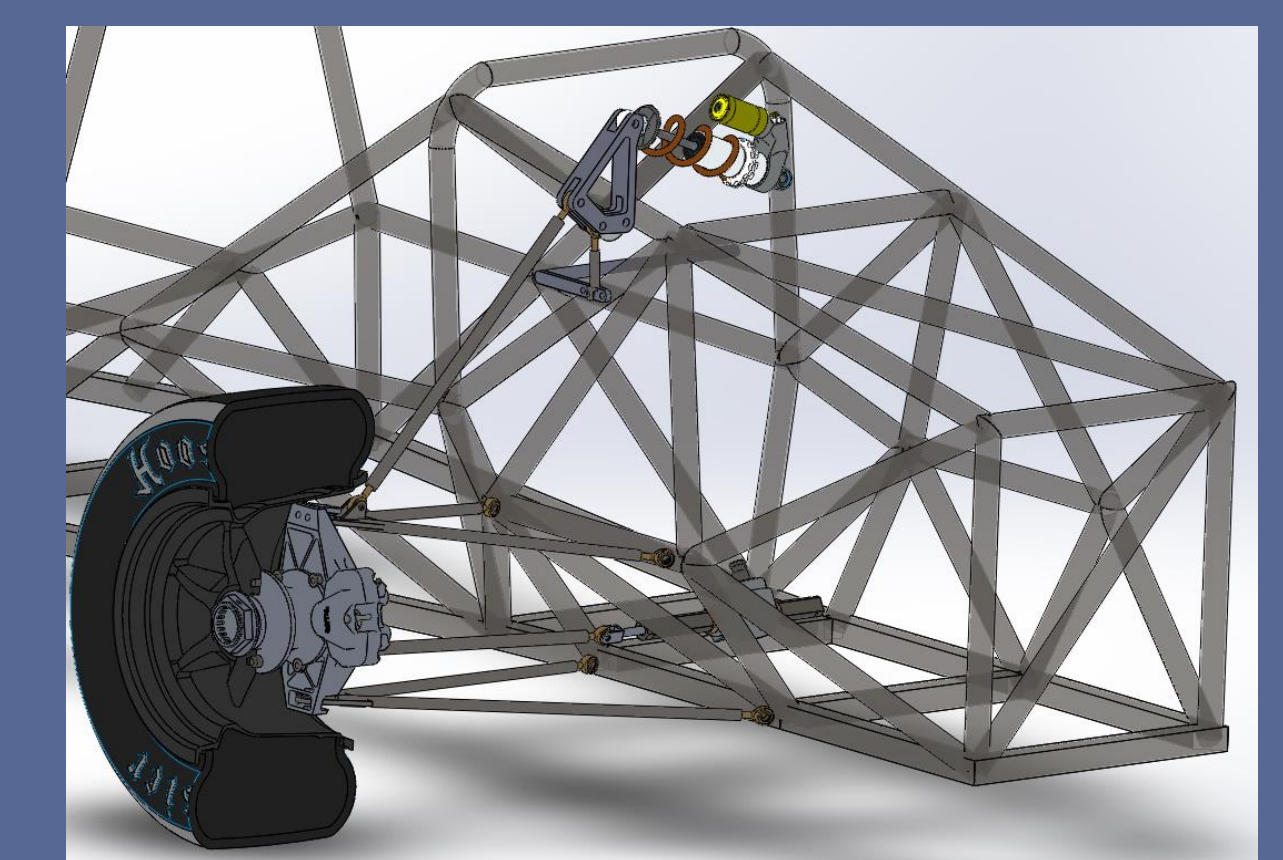
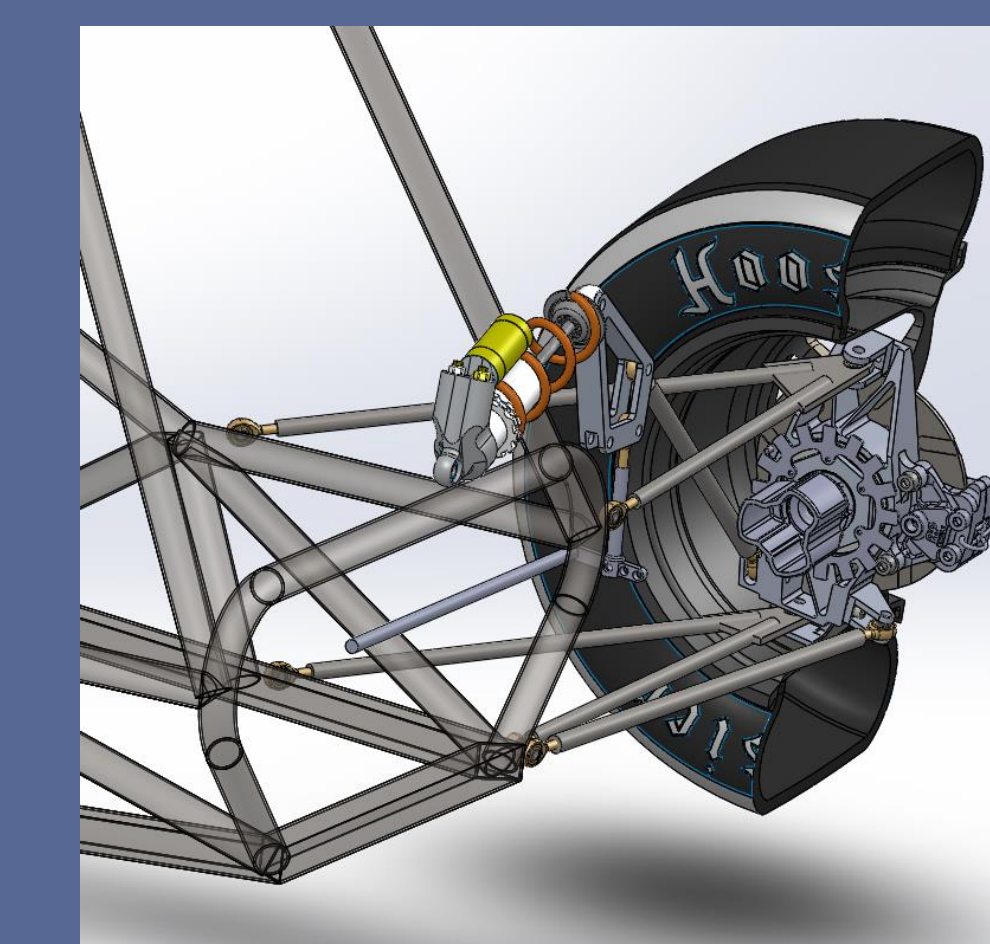
Powertrain

- Engine: Turbocharged 2016 KTM 450-SXF:
 - Garrett GT 12-41 Turbbocharger
 - 150W Output Stator
 - Microsquirt ECU with Custom Hall Effect Sensor
 - 75hp, 45ft-lb, 6-Speed Sequential Gearbox
 - 25in² Intercooler to 2.0L Carbon Fiber Plenum
- Drivetrain:
 - Chain Drive Drexler Limited Slip Differential
 - Front Sprocket 13T, Rear Sprocket 36T
- Ricardo Wave Engine Mapping:
 - Full Engine Model to Simulate Power Curves, Fuel Consumption, Intake Mapping, Compressor Response, Intake Temperatures etc.
- Dynamic Testing
 - Complete Engine Package Setup and Run on Engine Dyno
 - Experimental Numbers Compared to Theoretical
 - Engine Fully Tuned Before Being Placed in Car
 - Dyno Engine Package Matches Final Car Exactly



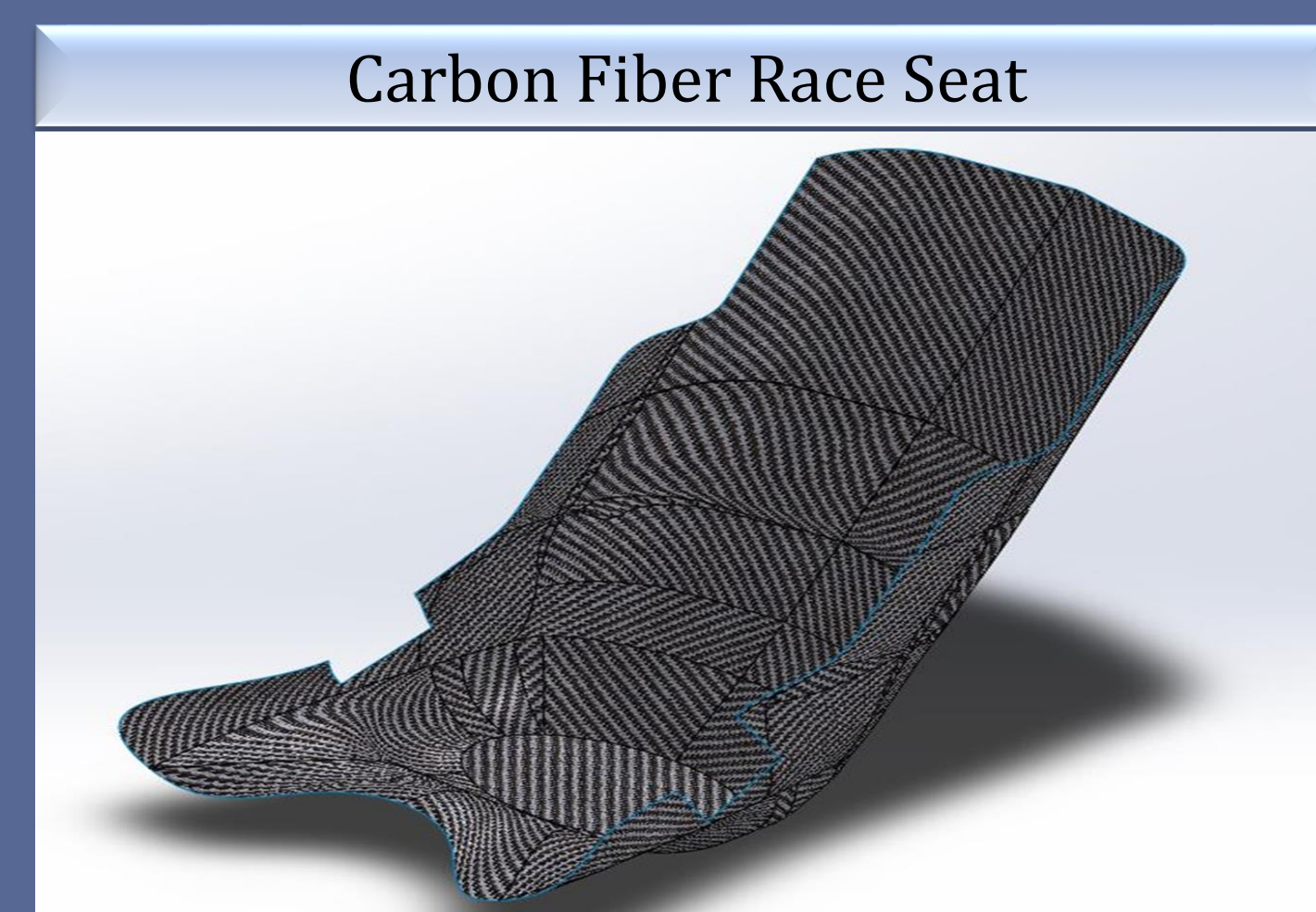
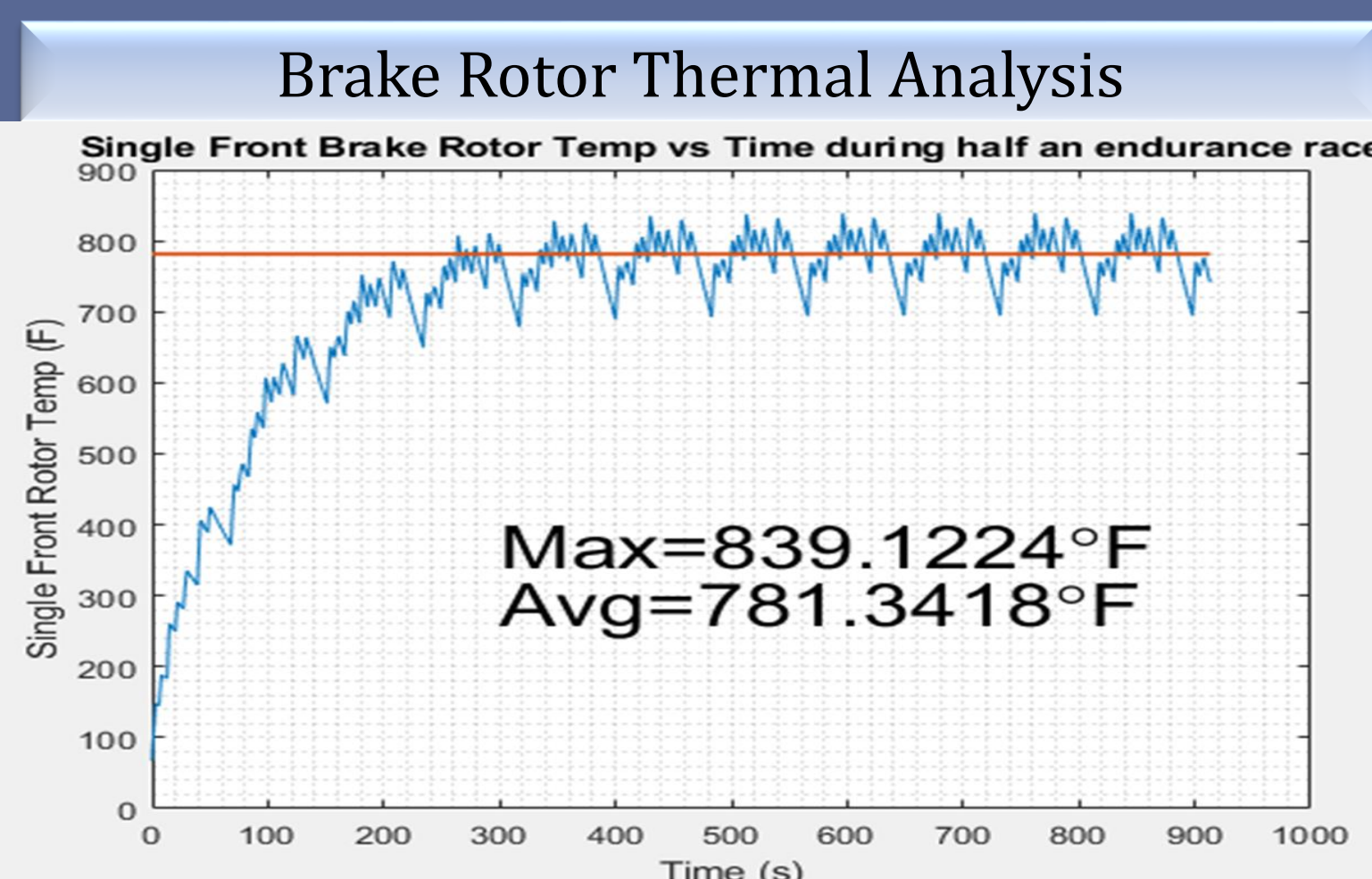
Suspension

- “Short-Long Arm” Double Wishbone Push-Rod Actuated Geometry
 - Optimum control to balance lateral and longitudinal acceleration
 - Maintain constant roll moment by minimizing roll center migration
 - Lotus Shark suspension software utilized to evaluate kinetics
- Kinetic and Dynamic Parameters Derived Using Experimental Data
 - Tire traction data used to predict forces throughout system
 - Spring and damping rates determined using desired frequency response characteristics
- Components Modeled, Optimized, and Manufactured
 - Solidworks CAD Software utilized to model and perform Finite Element Analysis Simulations
 - AutoDesk Fusion 360 used to write all toolpaths for machining
 - Parts manufactured in Cepr machine shop, John Olson Advanced Manufacturing Center, and outsourced to sponsors



Controls

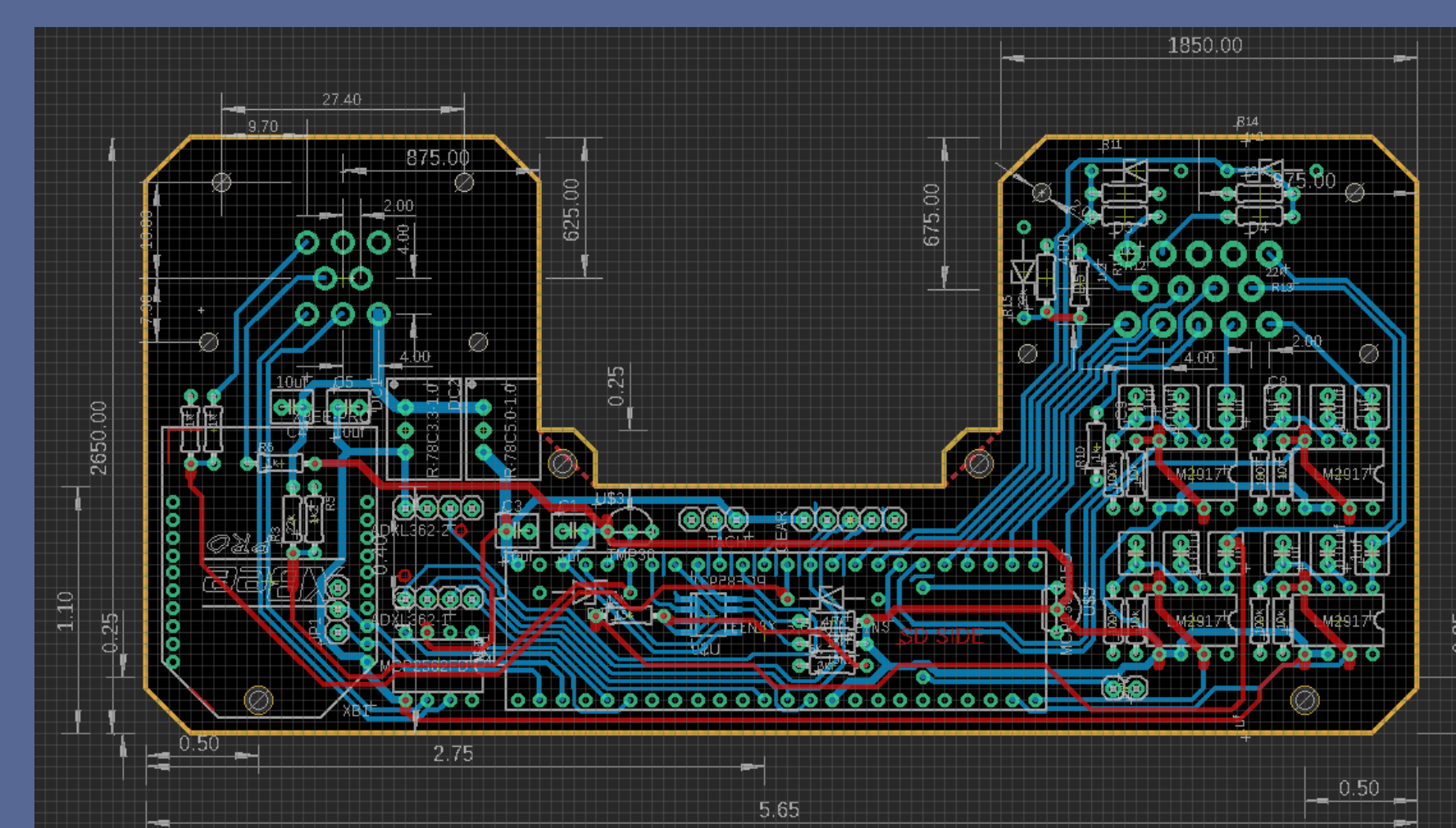
- Student Made Carbon Fiber Seat:
 - Reverse engineered mold from a karting seat
 - Modified mold to meet regulation and fit larger drivers
 - ~2.5lbs lighter than last years seat
- Paddle Shifting System:
 - Purchased Mechatron-Kart paddle shifting kit to increase reliability
 - Electronically actuated motor changes gear quickly, [.05 seconds]
 - Allows driver to keep 2 hands on the wheel at all times
- Brake System
 - Durabar-G2 pearlitic gray cast iron brake rotors
 - Approximated brake temperature through endurance lap
 - Increased master cylinder sizing to ensure wheels lock under full brake



Electronics

- Custom microcontroller based dashboard
 - Datalogger – records data from all sensors
 - Remote Connection – Streams data to Windows software over RF
- LCD screen embedded in steering wheel
 - 2.2" color display, can show real-time data
- Custom wiring harness interfaced to sensors, paddle shifters, ECU, etc.

Dashboard Printed Circuit Board



Dashboard Front with Gear and Tach Lights

