Schulich Racing Brake System

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DESIGN PROCESS

Calculations

- Model the forces acting on the car
- Derive equations to predict expected forces during maximum braking
- Predicted internal pressure of the system

Simulation

- Model the system in SOLIDWORKS and perform stress analysis
- Generate heat maps across the rotor face and determine maximum thermal stresses

Component Selection

- Select the master cylinders, calipers, brake routing and fittings
- Select suitable material for rotors and brake pads

Fatigue

- Analyze fatigue on individual components

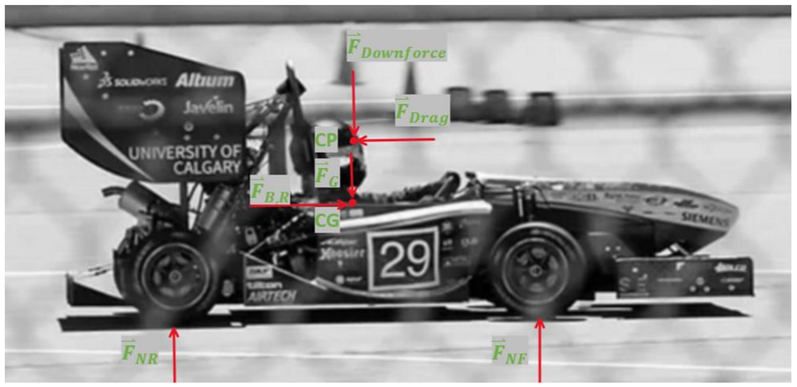

Figure 1. Force-moment Diagram

ASSEMBLY

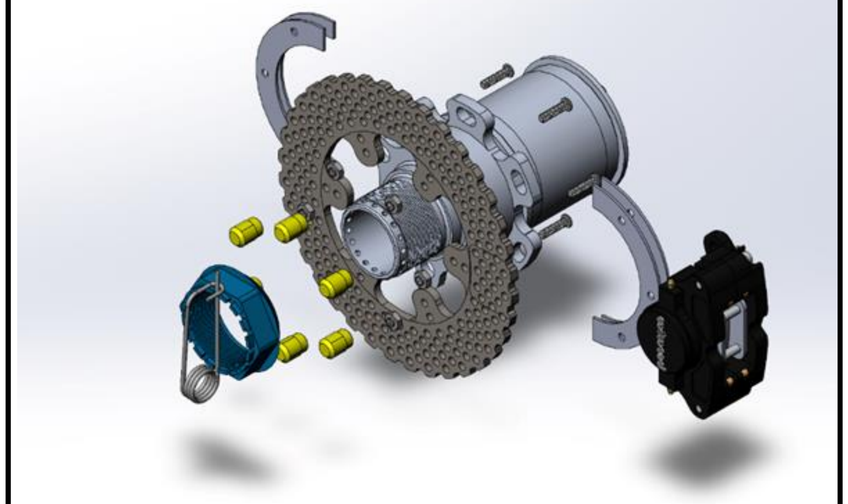

Figure 2. Wheel hub assembly

TESTING

Determine the best combination of materials and designs to optimize temperature control, brake fade, pad wear, and line pressure.

Temperature Rise: Measure rotor surface temperature during braking

Brake fade: Temporary reduction in braking power due to overheating

Pad Wear: To estimate pad and rotor life expectancy

Line Pressure: How much pressure is required to generate adequate braking force

PERFORMANCE

Lightweight: Our design is 100 grams lighter than the original

Minimal brake fade: Braking force remains consistent even under hard braking conditions

Consistent braking feel: Stopping force is equally distributed on both side of the car

Responsive: Braking and release occur instantaneously

Robust design: The design is resilient to environmental conditions

Economical: Final design was built within budget

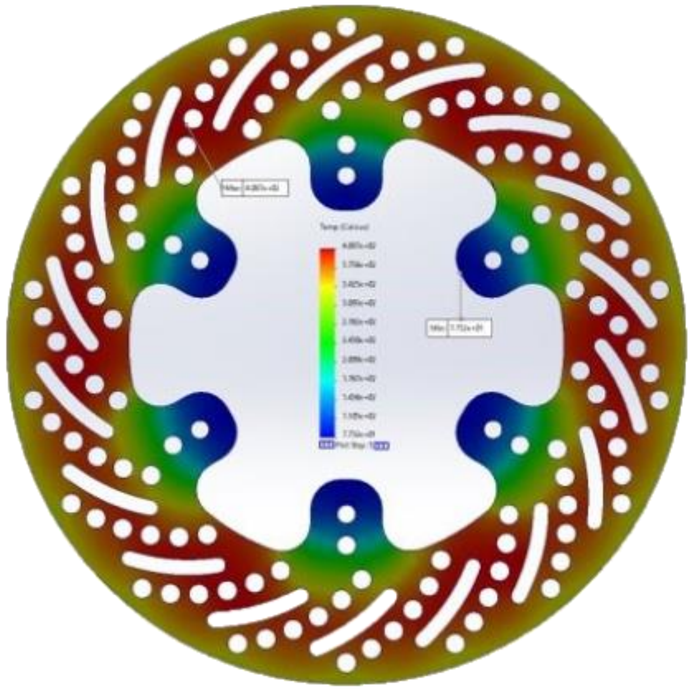

Figure 3. Rotor thermal simulation