M2.04 Car Braking System Design & Optimization

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Sponsor: Abhimanyu Sharotry – Bobcat Racing

TEXAS STATE UNIVERSITY

The rising STAR of Texas

BOBCAT RACING

BACKGROUND

The Formula SAE competitions challenge teams of university undergraduate and graduate students to conceive, design, fabricate, develop and compete with small, formula style vehicles. The competition is an engineering education competition that requires performance demonstration of vehicles in a series of events, both off track and on track against the clock

GOAL

To optimize the braking assembly of the Bobcat Racing Formula Car. Through Design, Manufacturing, and implementation , we will be able to supply a functioning and optimized brake assembly for Bobcat Racing to use in their formula car.

OBJECTIVES

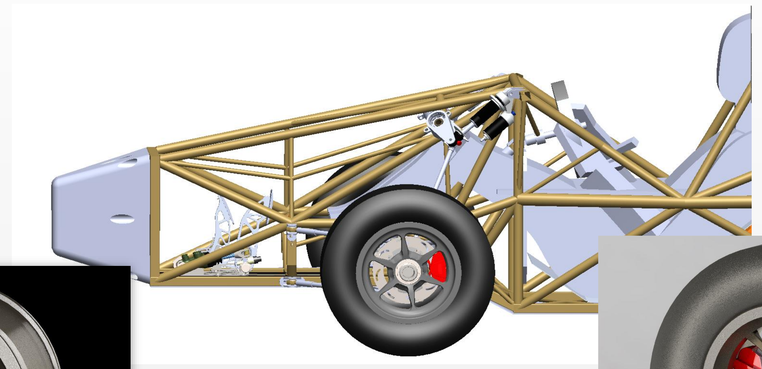
- Functionality between Brake Components
- Optimized Design for reliability and performance
- Reliability that supports the driver and car
- Able to integrate brake system with other sub systems

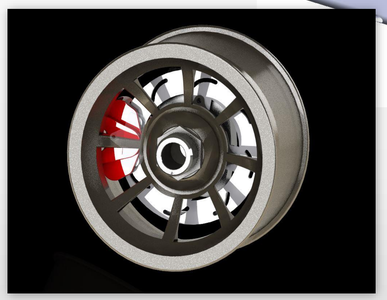
SPECIFICATIONS

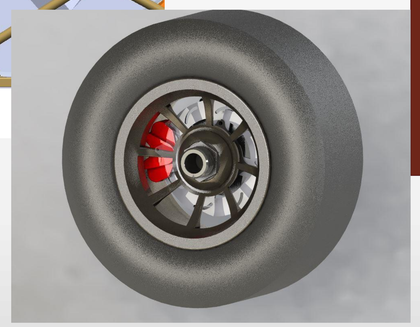
- 1045 Carbon Steel Spindles
- Be able to fully stop a 400lb Car with driver
- Dual piston Willwood PS-1 Brakes
- A36 Carbon steel (7 gauge) brake rotors
- 7.25 in brake rotor diameter

PROTOTYPES

DESIGN







The team used SolidWorks to design the components in the assembly. Implementing knowledge from previous courses taken here at Ingram School of Engineering

SPRING 2024 STATUS

- Design process is completed
- Assembly for one wheel completed
- Manufacturing process for one wheel completed
- Mounted on to a Bobcat Racing (BR) car and tested.

FALL 2024 STATUS

- Brake rotor adjustments
- Facing Rotors
- Brake line layout
- Full wheel assemblies
- Spindle back plate redesign
- Spindle back plate fabrication
- Mounting lcoation for master cylinder reservoirs

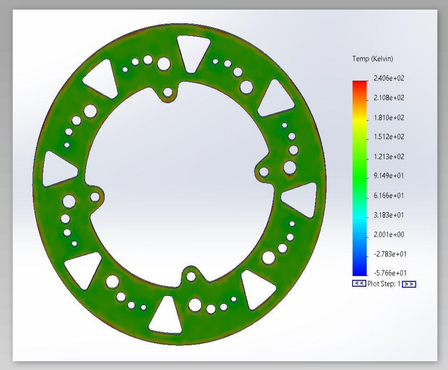
THERMAL ANALYSIS

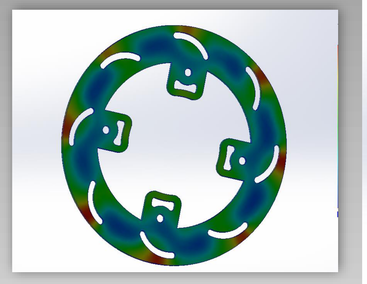
OUR PARAMETERS-

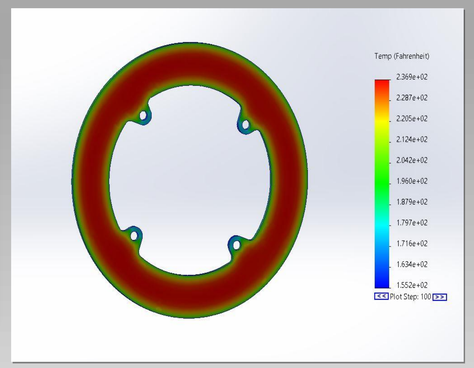
- CONVECTION- 90 W/M^2
- HEAT POWER= 6660W
- INITIAL TEMP =72°F

THERMAL ANALYSIS BENEFITS-

- Test operating temperatures
- Visual representation on heat points
- Data prior to manufacturing parts







KEY OPTIMIZATION POINTS

- Material Selection
- Brake rotor design
- Design Enhancements on Spindle
- Heat dissipation on brake rotors

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