Wheel Assembly - Objectives & Requirements

- Choosing optimal tires for the car, while emphasizing coefficient of friction and performance on a skid-pad track.
- Increase reliability and strength of uprights and wheel hubs, that failed at the '14 car.
- Reduce total weight of the wheel assembly.
- Adjustable camber angle and adjustable axial position of the brake caliper.

Wheel Assembly - Tires

- Analysis of the tire testing raw data, which was supplied by Calspan to the FSAAE.
- Tire selection emphasized the friction coefficient, especially lateral friction, to improve tire performance during turning.
- The chosen tires are Hossies 20.0 x 7.5-13.
- Results of testing – used while designing the suspension system: 1. Preferred Camber (Inclination) Angle: (-1°) to (-2.5°). 2. Preferred tire air pressure: 12 psi. 3. Average radial stiffness: 118,580 N/m.

Steering System - Objectives & Requirements

- Design a steering mechanism with high reliability to maintain high performance throughout its lifetime.
- Allow the car to preform a turn with radius of 3 meters.
- Reduce total weight of the steering system.
- Reduce play between components, and its increase over time.
- Steering system based on Rack & Pinion mechanism.

Steering System Description

The system is composed of three sub-systems:
1. Steering column – containing the steering wheel, quick-release mechanism, U-joints and the shaft.
2. Steering column bearings – containing the upper bearing assembly and the intermediate ball joint.
3. Rack and pinion system – composed of rack assembly, radial and linear bearings, pinion and housing.

Wheel Assembly – Wheel Hubs & Uprights

Wheel hubs:
- Wheel hubs are CNC fabricated from Aluminum 7075-T6.
- Extensive, high quality SolidWorks Simulation® analyses were performed for the wheel hub. These assembly simulations included the wheel rims, bearings, brake disc, and fasteners.
- Static and fatigue strength were evaluated for various driving scenarios.

Uprights:
- Shim-Adjustable Caliper Axial Position and Camber Angle (1 Shim = 1 camber deg.).
- In-Assembly Stress Analysis, for various scenarios. Minimal FOS: 1.8.
- Universal Spacers for all Rod Ends and Ball Joints.
- CNC fabricated from Aluminum 7075-T6.