FORMULA TECHNION 2016

Suspension & Steering Teams

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Wheel Assembly - Objectives & Requirements

- Choosing optimal tires for the car, while emphasizing coefficient of friction and performance on a skid-pad track.
- Reduce total weight of the wheel assembly.
- Adjustable camber angle and adjustable axial position of the brake caliper.

Wheel Assembly - Objectives & Requirements

- Choosing optimal tires for the car, while emphasizing coefficient of friction and performance on a skid-pad track.
- Reduce total weight of the wheel assembly by using Magnesium rims.
- Adjustable camber angle and adjustable axial position of the brake caliper.

Wheel Assembly – Magnesium Rims

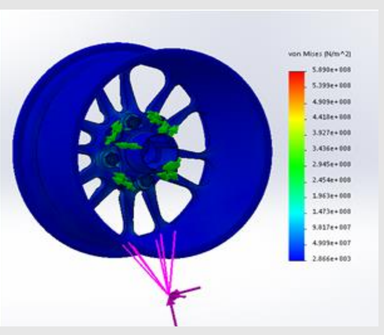
We acquired O.Z. magnesium rims This resulted in a weight saving of 1kg of unsprung mass per wheel and a 30% lower polar moment of inertia, which greatly improves the performance during acceleration.

Using O.Z. magnesium rims (rather than aluminum), saves more than 0.02 seconds in the acceleration event, deeming them cost-effective.

Wheel Assembly – Wheel Hubs & Uprights

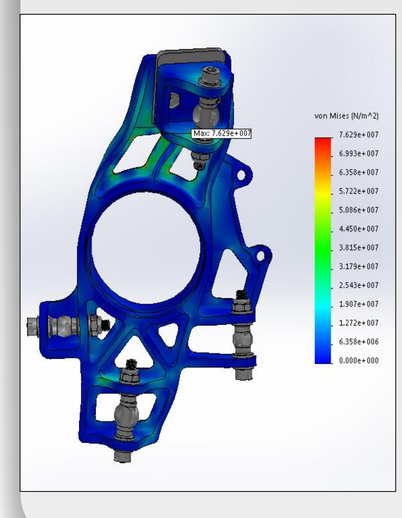
Wheel hubs:

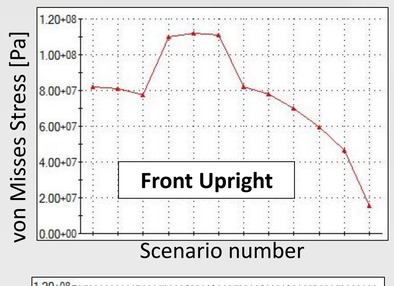
- Wheel hubs are CNC fabricated from Aluminum 7075-T6.
- Extensive, high quality SolidWorks Simulation® analyses were preformed for the wheel hub. These assembly simulations included the wheel rims, bearings , brake disc, and fasteners.
- Static and fatigue strength were evaluated, for various driving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

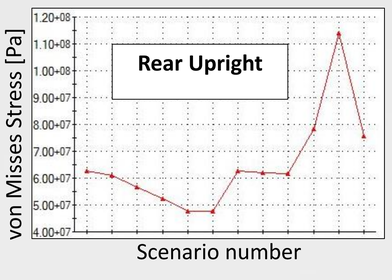


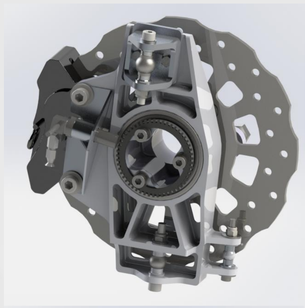
Uprights:

- 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.









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 backlash between components, and its increase over time.
- Steering system based on Rack & Pinion mechanism.
- Reduce the force required for the driver to steer the vehicle.

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 – this year we used an off the shelf steering rack and pinion.

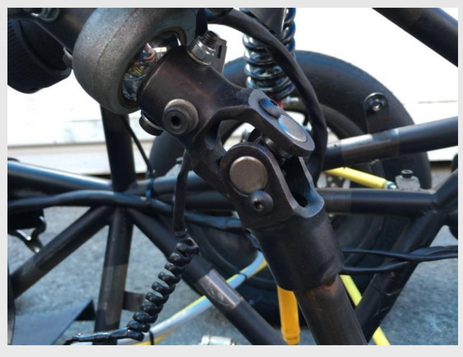
Steer ratio	**5.3**
C-Factor	80[mm]
Steer Arm Length	70[mm]

Design Process:

- In order to reduce backlash between the U-joins we used more reliable ones, the new U-joints are more robust.
- The new steering system has 20% lower steering ratio, which decreases 20% of force that the driver needs to steer the vehicle.
- The connection between the U-joints to the shafts has to be done with shoulder
- screw s.
- In this year we change the place of the steering bracket , that broke last year. We placed the bracket in the direction of the force which decrease the moment acting on the bracket.
- To preserve last year steering angles we manufacture a special spacer that adjusts the steering system to last year geometry.

Design achievements:

- With the new system we managed to reduce 20% from the force that the driver needs to steer the vehicle.
- The new U-joints increase the reliability and robustness of the system.



Acknowledgments

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