Technion FSAE Racing

Drivetrain System

Design of a New Project Course# 034353/4

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Abstract

The **Formula SAE** teaches university students to design and manufacture a marketable vehicle for racing. The Technion Formula consists of 7 subgroups whom, together, designed and built this vehicle.

The **Drivetrain team** of the Technion Formula conducted comprehensive research of drivetrain systems and vehicle dynamics for preliminary modeling. Simplicity, manufacturability, maintenance, performance, and system integration were essential elements in design.

Project Objective and Requirements

The **Technion Formula Teams'** objective is to design, manufacture, market and race a vehicle according to the Formula SAE guidelines.

The **Drivetrain Teams'** objective is to design and develop drivetrain system that will optimize performance and reliability whilst minimizing cost and weight.

Product Description

HOW THE SYSTEM WORKS

Drivetrain system is a mechanical system which delivers the power generated from the engine to the wheels.

1. The power is transmitted from the engine to the rear axle by a sprocket chain combination as shown in Figure 1.

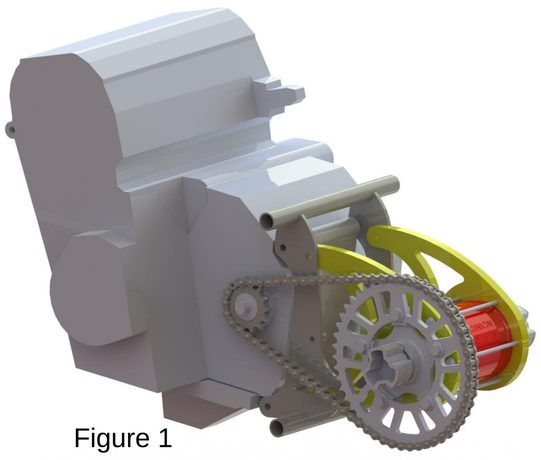


Figure 1

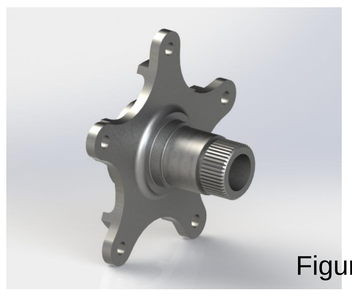
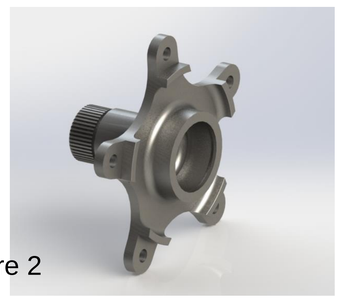


Figure 2



2. The power is transmitted from the rear Sprocket to the differential through the sprocket-Differential Adapter (Figure 2)

3. The differential (Figure 3) transfer torque to both rear drive axles whilst also allowing them to spin at different speeds (transfer different torque).

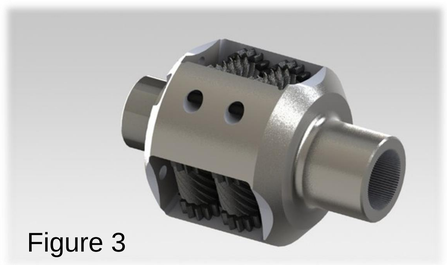


Figure 3

Figure 4

4. RCV Formula SAE Driveshafts (axles Figure 4) deliver the power from the differential to the wheels.

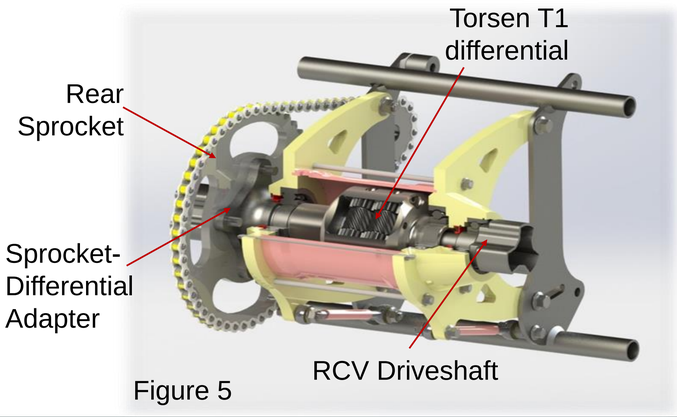


Figure 5

Analysis

SRR - System requirement review:

System Requirement Review used to define fundamental requirements from the complete system.

- Transmission connected via chain to the rear axle.
- Maximum speed of 130 [km/h].
- Acceleration 0-100 km/h: 4.0 [sec].
- Fitting to 2005 Suzuki GSX-R600 Engine.
- System weight not exceeding 18 [kg].
- Life duration : 3500 [km].

PDR - Preliminary design review:

Comprehensive research and study conducted in order to set primary design key-points.

- Torsen T1 differential with self designed housing.
- RCV Formula SAE driveshaft.
- Final reduction ratio: 48/14.

the following data (Figure 6) were received from the final reduction and engine performance

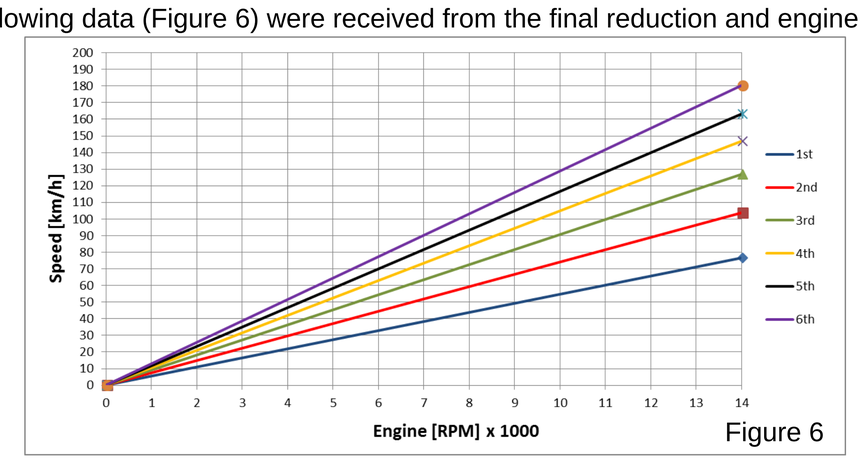
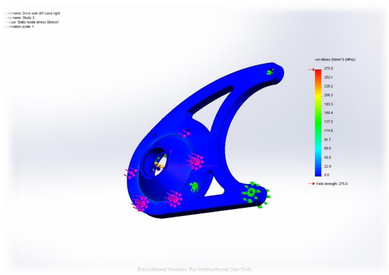


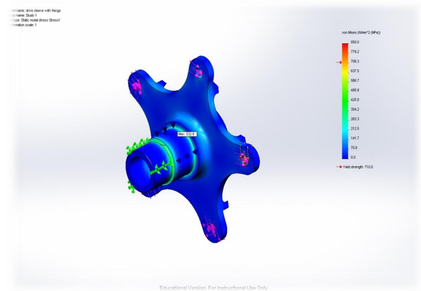
Figure 6

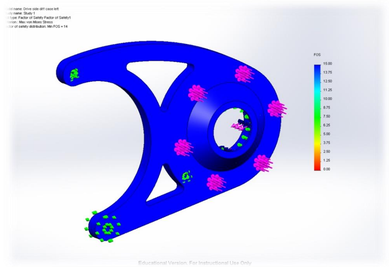
CDR - Critical design review:

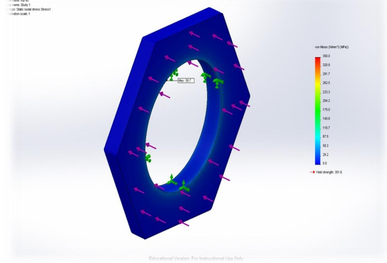
Thorough design and analysis, based on PDR primary key-points, conducted before fabrication and assembly of final system layout.

- Calculation of maximal forces applied on the Drivetrain system.
- Finite element Simulations for components designated for extreme loads.
- Final CAD modeling for the complete system.
- Fasteners, bearings and seals selection.









Final Product:

Acknowledgements

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