OWEN FREY

MECHANICAL ENGINEERING STUDENT

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PROFILE

I am a driven and motivated mechanical engineering student at the University of Guelph who is passionate about motorsport and automotive innovation. One of 6 interviewees for Red Bull Racing F1 suspension design placement out of 280+ candidates. Currently seeking a co-op in motorsport.

SKILLS

- SolidWorks mechanical design certified - associate level
- Proficient with Matlab, MasterCAM, and RapidHarness
- Soldering PCBs and assembling wiring harnesses
- Engine rebuilding and general experience working on cars

EDUCATION

BENG - MECHANICAL ENGINEERING

University of Guelph

2021 - 2026

76% GPA

SECONDARY SCHOOL

Listowel District Secondary School

2017 - 2021

EXPERIENCE

MECHANICAL DESIGN ENGINEER CO-OP

Restoration Design, Guelph ON

May 2023 - September 2023 and January 2024 - Present

- Automotive wiring harness design and manufacture for vintage Porsche and BMW models
- 3D CAD and manufacturing of bespoke electrical connectors, custom fuse panels and power distribution modules
- Supervised department for 2 weeks while manager was on vacation

SUSPENSION LEAD

Gryphon Racing FSAE, Guelph ON

September 2022 - Present

- Manage overall suspension design and manufacturing for an open wheel race car, applying vehicle dynamics concepts and FEA to create competitive suspension designs
- Schedule tasks and meetings to ensure parts are designed, verified, and manufactured on schedule

SUSPENSION TEAM MEMBER

Gryphon Racing FSAE, Guelph ON

September 2021 - 2022

- Designed front and rear suspension uprights for an open wheel race car using SolidWorks
- Utilized FEA to verify designs
- Designed steering geometry to reduce bump steer

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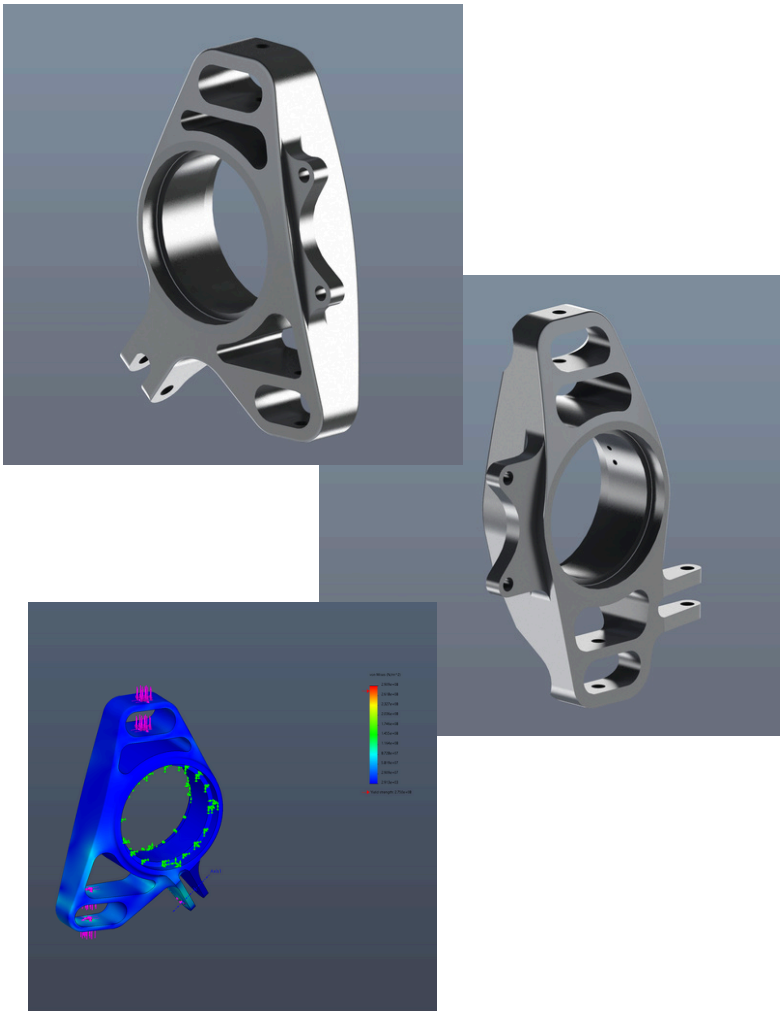
FSAE SUSPENSION UPRIGHTS

OBJECTIVES

My objective for this project was to design suspension uprights for the Gryphon Racing FSAE team's open wheel race car. They needed to be strong, lightweight, and manufactured out of 6061 aluminum on a 3-axis CNC mill.

DESIGN PROCESS

The first part of the design process was creating the reference geometry in SolidWorks to locate important features of the uprights including the upper and lower pivots. Then the bearing races were modelled according to specifications from the bearing datasheet. The other features were created in order to mount the uprights to the controls arms, toe link, and brake caliper.



RESULTS

Once I was happy with the CAD of the uprights and ensured that they would fit together with the required components, I used FEA to verify that the designs were strong enough to ensure safe operation. Then they were machined at the University using a 3-axis mill. The end results were beautifully made and were most importantly functional and lightweight.

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TRACTIVE EFFORT GRAPH

PROJECT OVERVIEW

An interesting project that I've been working on recently is a tool for plotting tractive effort graphs for gearboxes, utilizing engine dynamometer data, gearbox and final drive ratios, and tire size.

OBJECTIVES

My goal for this project was to provide a better visualization tool for selecting gear ratios that takes into account the torque produced by an engine throughout its rpm range. Typical visualization tools available only provide the user with maximum vehicle speed in each gear ratio based on maximum engine speed, which is only part of the picture.

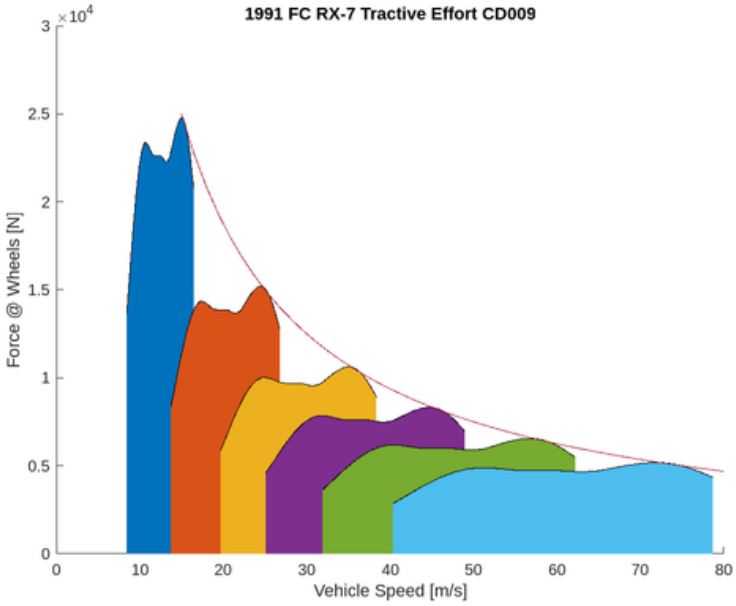
HOW IT WORKS

The visualization tool is written in MATLAB and reads a csv file containing dynamometer data, the user can input an array containing any number of gear ratios, as well as a final drive ratio and tire size. The program then plots the tractive effort graphs for each gear.

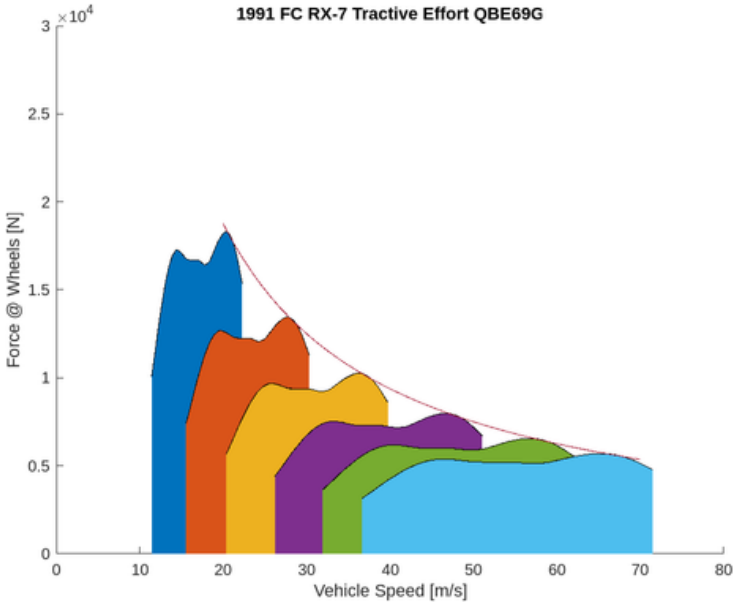
RESULTS

I successfully implemented all of my goals for this tool, and it proves to be extremely practical. Graphs generated by my tool were used to select a gearbox for a FC Rx7 time attack car, as shown on the right.

MODIFIED FC RX-7 W/ CD009



MODIFIED FC RX-7 W/ QBE69G



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MIATA ENGINE BUILD

PROJECT OVERVIEW

An ongoing project of mine is building an engine for my 1990 Mazda Miata. In order to provide a solid testing platform for performance modifications I have rebuilt the engine to stock specs.

CONSTRAINTS

Being a student at the moment means my budget is fairly limited, which became my main constraint. As such, everything except for the machine work was done by myself with the limited selection of tools I had at my disposal.

RESULTS

I am happy to report that the engine runs smoothly and makes good compression. I am confident that it will be able to handle the next round of modifications to the powerplant.

NEXT STEPS

I have some big plans for this car to give it a bit more power while maintaining its reliability and character. I have built a Speeduino ECU for the engine which will be necessary in order to control the fuel and ignition after I adapt throttle bodies from a Suzuki motorcycle onto the intake.

ENGINE WORK DONE

- Block decked and cylinders honed
- Rotating assembly installed with new bearings and rings
- Top end rebuilt with new valves and stem seals
- All new gaskets and seals throughout engine