



Jared Dempster

Candidate for B.E.Sc Mechanical Engineering
Western University

12-Months at Armatec Survivability Corp.
40-Months of Formula-SAE experience





2020 Technical Director

- Leading a team of 40 students through the challenge of major vehicle redesign, while combating the limitations imposed by Covid restrictions
- Conducting regular design reviews with all subsystem leads, providing constant feedback and guiding the direction of the vehicle
- Implemented high level keep out zone and mating assemblies for all major systems, easing collaborative design
- Created a vehicle wide decision matrix and utilized the team-developed lap time simulator to compare and finalize discrete vehicle architectures



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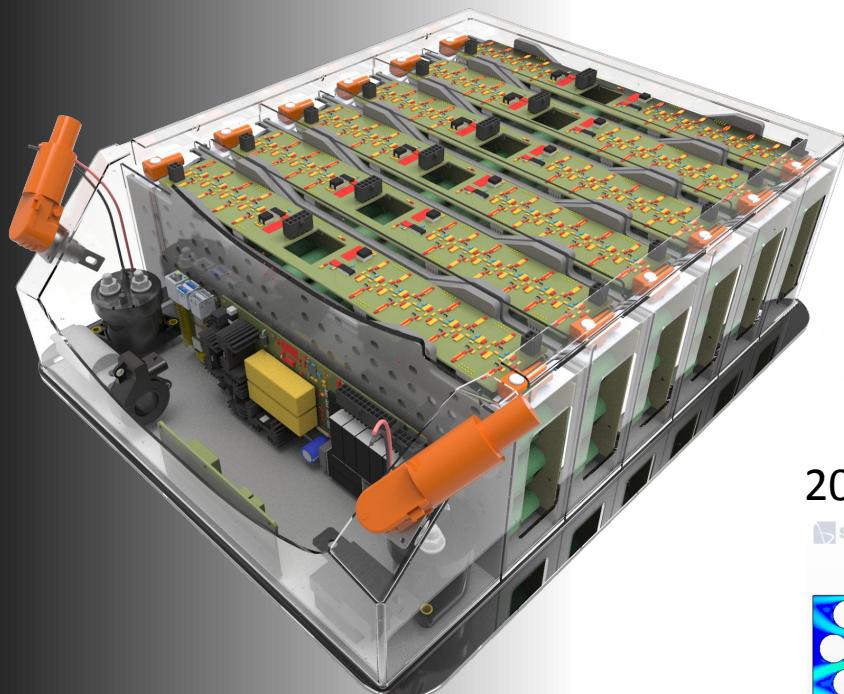
Subaru Barrie, Sales: 1-866-726-5351, www.benribarrie.com

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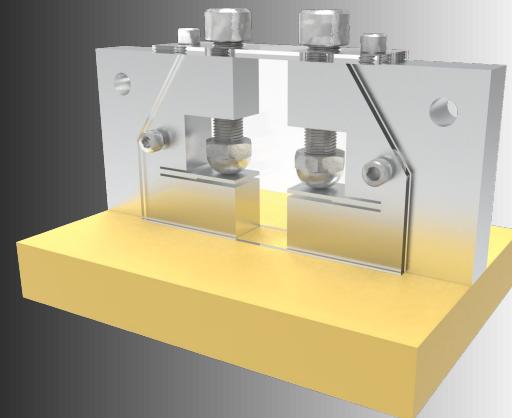
SUBARU
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2020 Battery Design 2020

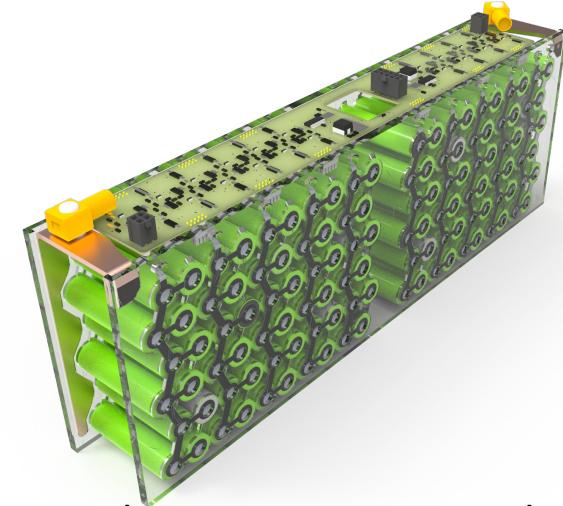
- Currently designing our teams first ever custom battery modules.
- Conducted transient thermal analysis on fuse blow characteristics. Final material selection and fuse dimensions pending physical testing
- Designed fuse testing jig
- Created a position sensitive cooling model from CFD results, integrated with current profiles within the teams quasi-static lap time simulator
- Designing battery enclosure for maximum serviceability, detailed preliminary packaging of components conducted to ensure smooth assembly.
- Designing or selected all components within the high current path of the battery
- Packaged all high current cables in the vehicle



2021 Preliminary Accumulator

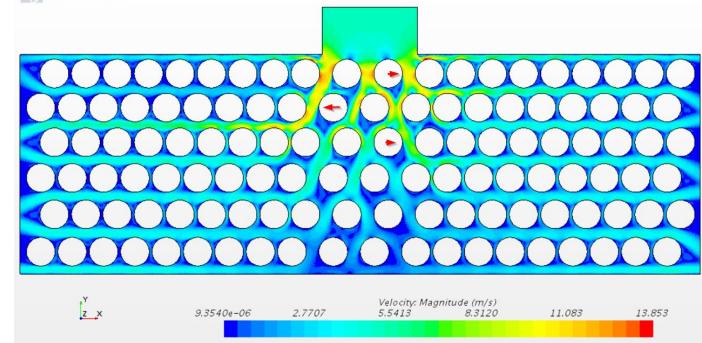


Fuse Testing Jig

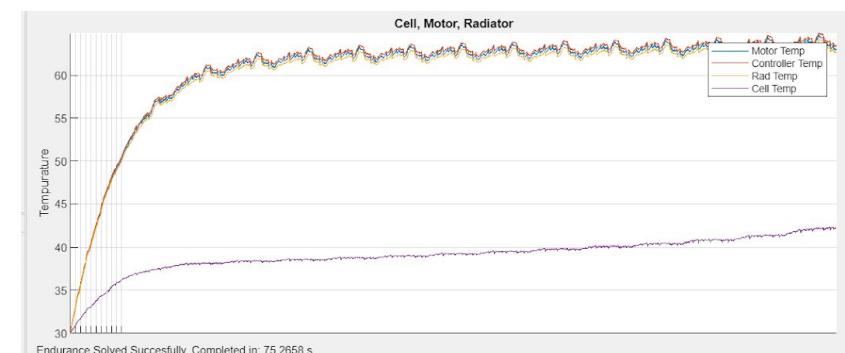


2021 Preliminary Battery Modules

STAR-CCM+



2021 Preliminary Module CFD



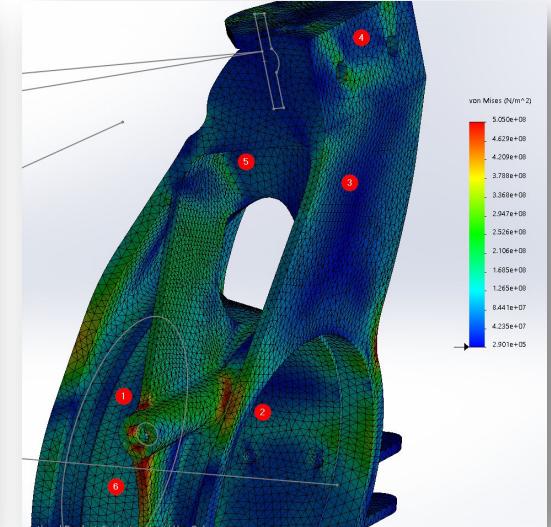
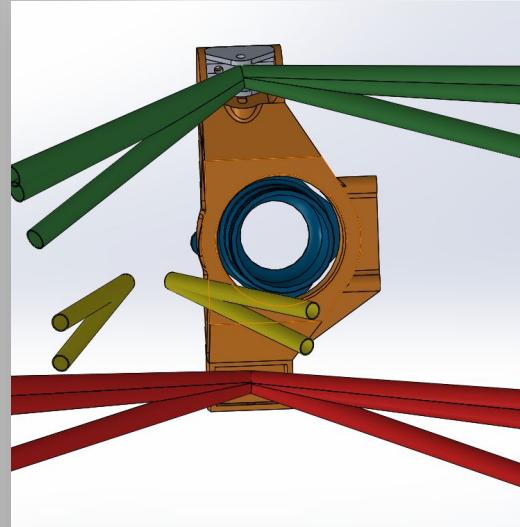
Endurance Event Cooling Model

General Team Member 2020

- Designed camber adjustable front uprights, massively reducing setup change time
- Conducted FEA with multiple load cases and varying studies including Modal, Buckling, Static and generative design which ultimately inspired the “archway” concept at the upper pickup point
- Utilized a parametric model which represented the travel limitations of the suspension and steering to accelerate the interference checking process
- Verified deflections with an excel model
- Concluded that deflections were negligible when compared to the camber characteristics of our tires and pursued a stress driven optimization

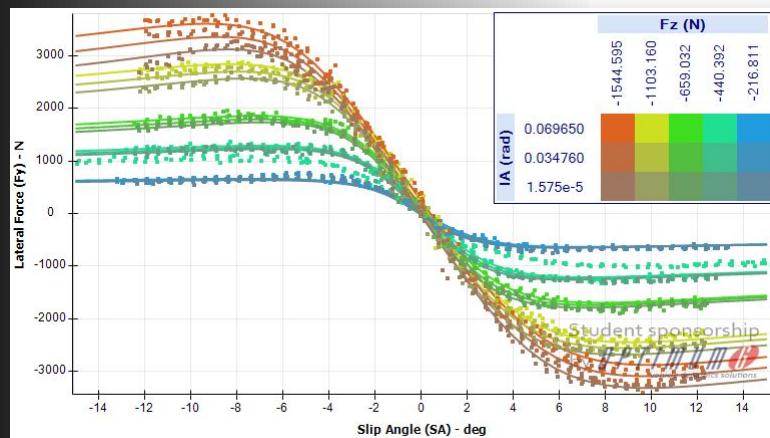
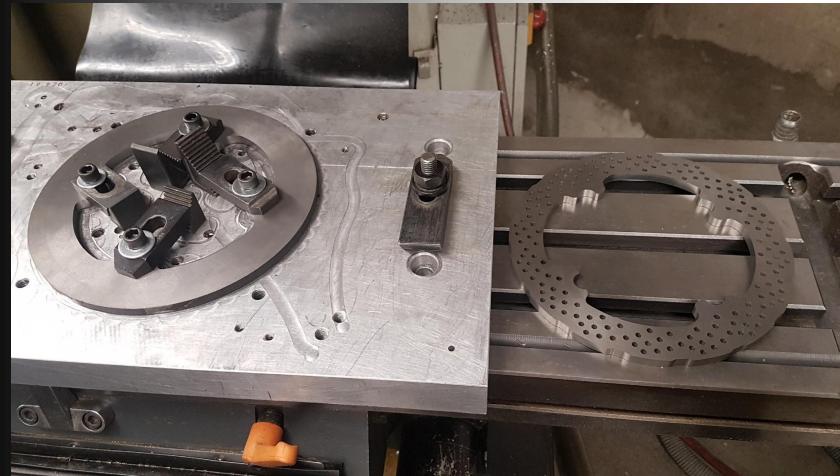


X	Component 1	Component 2	Component 3	Comp Feed	Component 5	Component 6	V	M	M/EI	Theta
0	5298	0	0	0	0	0	0	0	0.00E+00	-8.00E-02
0.001	5298	0	0	0	0	0	5298	5.298	4.62E-04	-8.00E-02
0.002	5298	0	0	0	0	0	5298	10.596	9.24E-04	-7.99E-02
0.003	5298	0	0	0	0	0	5298	15.894	1.39E-03	-7.98E-02
0.004	5298	0	0	0	0	0	5298	21.192	1.85E-03	-7.97E-02
0.005	5298	0	0	0	0	0	5298	26.49	2.31E-03	-7.96E-02
0.006	5298	0	0	0	0	0	5298	31.788	2.77E-03	-7.94E-02
0.007	5298	0	0	0	0	0	5298	37.086	3.23E-03	-7.93E-02
0.008	5298	0	0	0	0	0	5298	42.384	3.69E-03	-7.90E-02
0.009	5298	0	0	0	0	0	5298	47.682	4.16E-03	-7.88E-02



General Team Member 2020

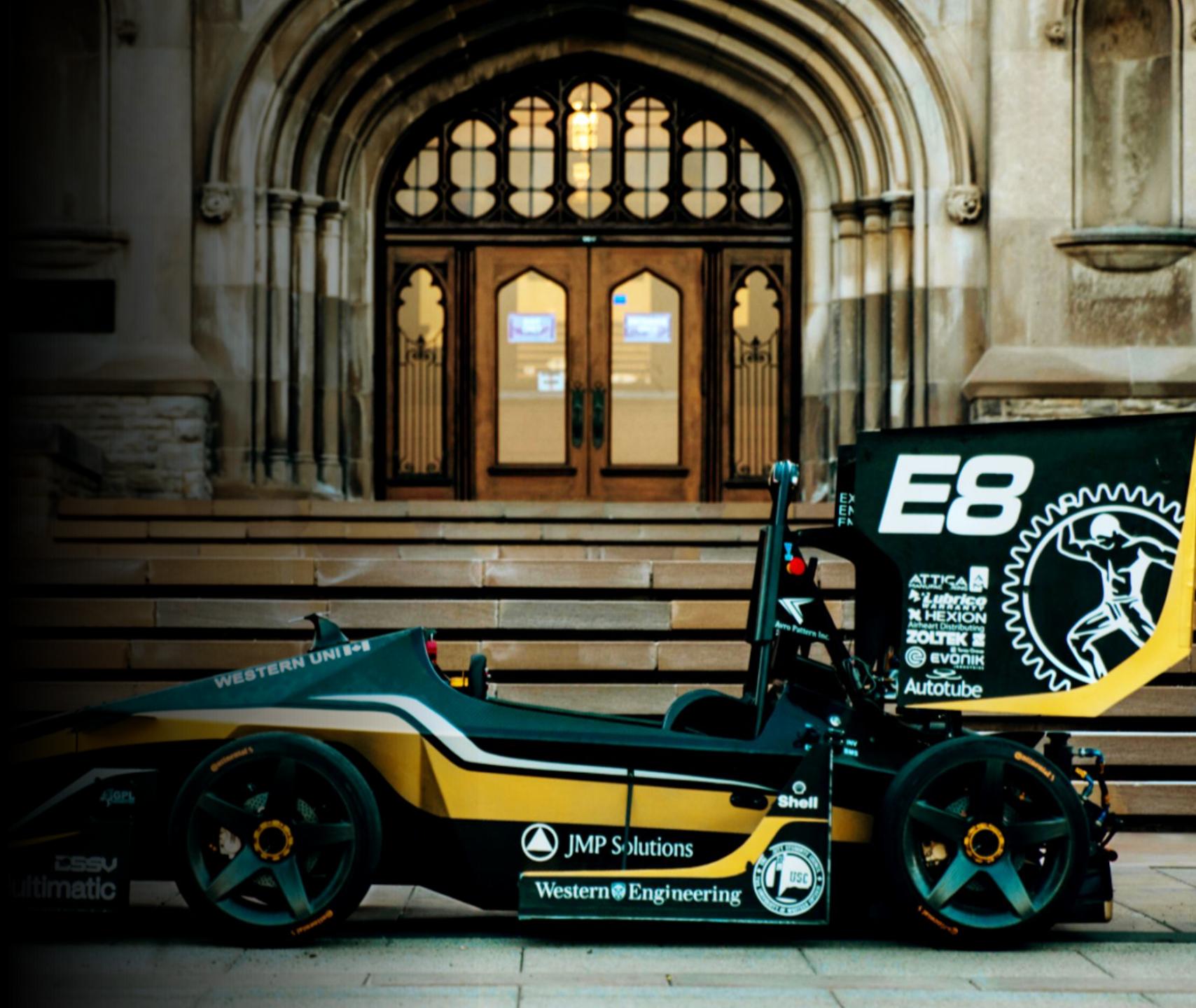
- Compiled physical testing of race tires to produce multivariable equations representing tire behavior, motivating the change to low profile continentals
- Mentored younger members through DFM reviews, CNC and CAM training
- Adopted an accelerated timeline to successfully manufacture all required components before restrictions prohibited shop access, contributing to our team being one of a few running vehicles in North America
- Machined many components, some shown here:
 - Brake Rotors
 - Differential Mount
 - Drivetrain Mount
 - Gearbox Mount
 - Pedal Rail Mount
 - Push / Pull Rod Turnbuckles
 - Spindle Bullets





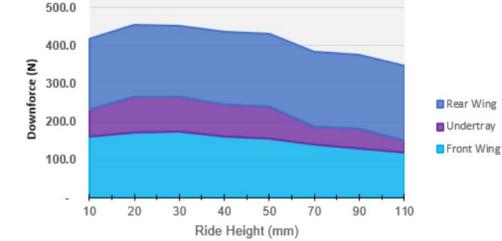
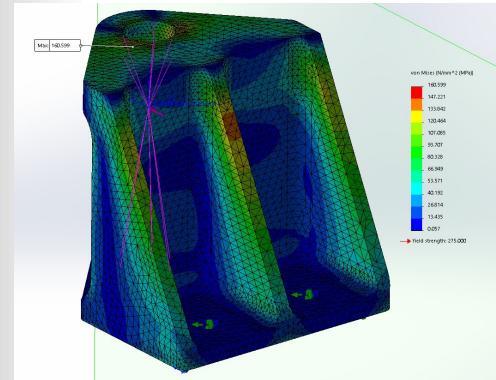
2020 Testing Season

- [PMSC Autocross on board footage](#)
- [WOSCA Autocross on board footage](#)
- The 2020 testing season was a huge success. The car ran more reliably than ever and while we were not able to attend competition due to the pandemic, we attended 2 local autocross events
- Fastest car in team history
- 5.0 seconds on FSAE spec skid pad
- 0-75m in 3.8 seconds

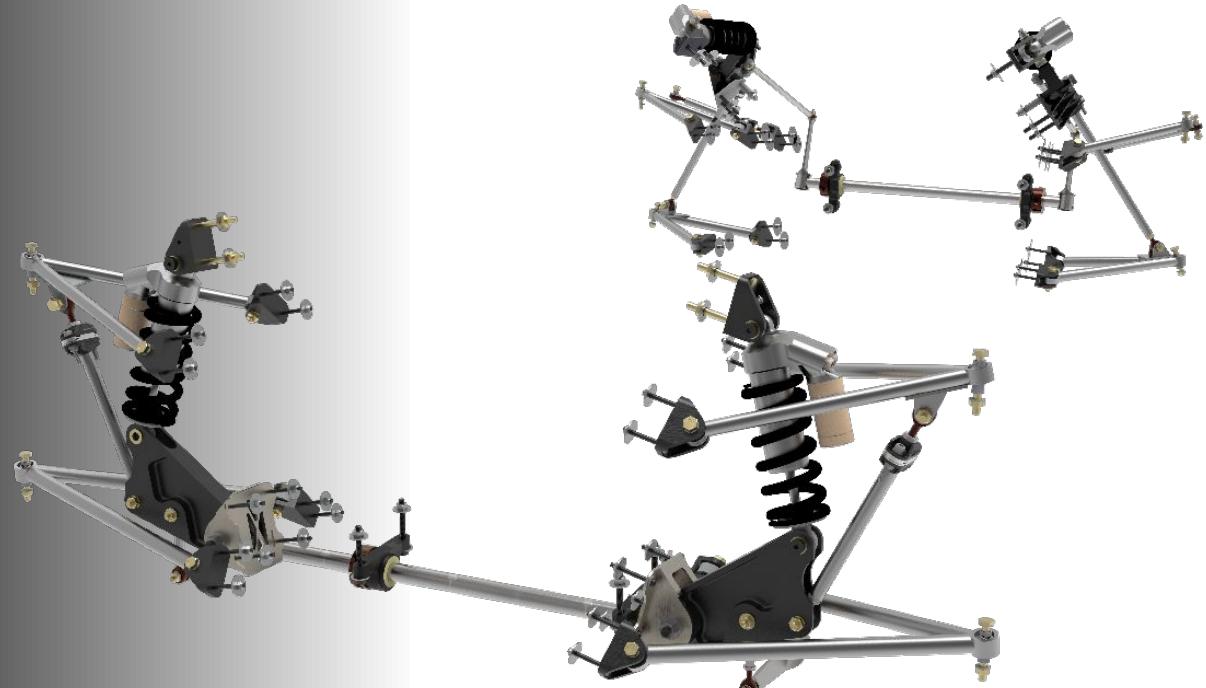


2019 Suspension Lead

- Developed numerical vehicle dynamics simulations and analyzed historical data to determine key vehicle attributes including motor selection, final drive ratio, and battery capacity of the team's first electric car.
- Designed rear suspension package for the team's first full carbon fiber monocoque
- Finalized the mechanical design of the entire system with respect to loads and interferences



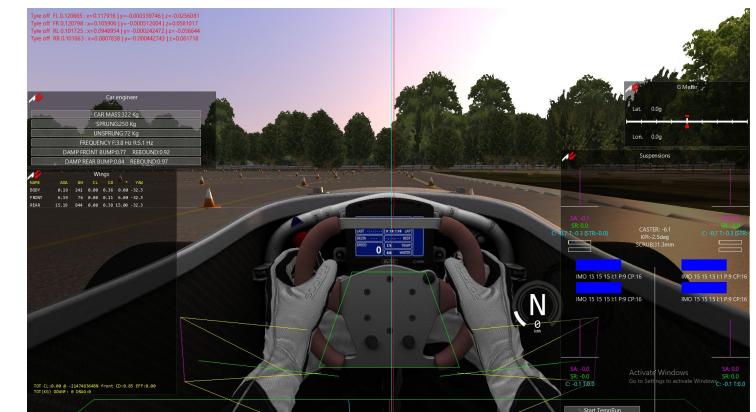
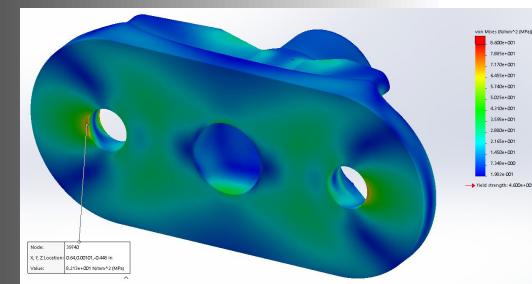
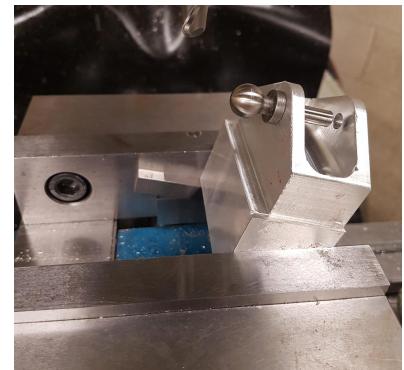
Downforce vs. ride Height at 60 km/h for entire aero package





2018 Suspension Member

- Designed welding jigs for suspension A-arms
 - Designed and machined discrete adjusters to rapidly modify ride heights. Conducted FEA analysis and hardware selection.
 - Implemented a driver training simulator in Assetto Corsa that allows the team to match an extensive number of vehicle parameters and build 1:1 scale replicas of competition tracks
 - Machined a intricate die for CNC training
 - Machined suspension clevises

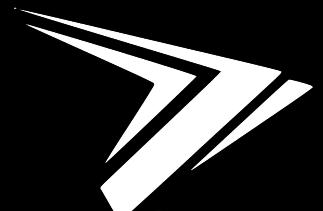




Design Engineering Internship

- Designed a vehicle hull welding fixture to support the X000kg hull through an unlimited roll motion
- Designed spaceframe castor legs that rapidly retrofit onto vehicle hull during fabrication.
- Conducted tolerance stack up analysis of mine blast protective seat assemblies to identify root cause of installation issues
- Drafted engineering reports and facilitated testing to prove compliance with military standards
- Implemented red line corrections on internally identified and customer requested changes





Avro Pattern Inc.

Shop Assistant

- Assisted in the manufacturing of aerospace casting patterns.
 - Manufactured rear gunner turret mounts for Lancaster Bomber
 - Conducted set-up and operation of CNC mills
 - Lathe
 - Cylindrical grinder
 - Radial arm drill press
 - MIG welding
 - Table saw
 - 30" circular sander





Shop Assistant

- Conducted my high school internship at DJH Designs which profoundly impacted my drive to pursue mechanical engineering. They are a small family business with an incredible product line and work atmosphere. It is thanks to my experiences here that I was able to integrate seamlessly with the Formula SAE team.
- Assisted in the manufacturing and assembly of laser measurement and film thickness systems
- Conducted set-up and operation of CNC mills
- Lathe
- Pneumatics assembly
- Wiring harness assembly
- Machine maintenance
- Kept the shop clean!

