

Calvin DeKoter

Mechanical Engineering, Term 3A
University of Waterloo

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Phone: 226-627-9406

Summary of Qualifications

Mechanical Design and Fabrication

- Skilled in the mechanical design of precision metal parts for power transmission, structural components, and fixturing
- Adept at solid modelling and metal component design using **SolidWorks** to create parts and larger assemblies
- Experienced with the metal lathe and mill, **MIG welder**, and precision tools such as the coordinate measuring machine
- Proficient with **carbon fibre** composite manufacturing methods like **resin infusion**, vacuum bagging, and wet-layups

Simulation and Analysis

- Experienced with **Star-CCM+**, a finite element analysis software, modelling fluid flow, heat transfer, and electricity
- Capable of thermal and structural analysis using Excel and SolidWorks to validate mechanical and electrical designs
- Skilled with data analysis and visualization using **Microsoft Excel and VBA**, Matlab, GNU Octave, and **Artemis Suite**

Education and Personal Profile

- Candidate for Bachelor of Applied Science at the University of Waterloo, Honours Mechanical Engineering, Term 3A

Work Experience

Richard Childress Racing

Junior Aerodynamics Engineering

Jan. 2020 – Mar. 2020

- Accurately evaluated NASCAR aerodynamic devices in full-scale wind tunnels with an uncertainty of only 0.5%
- Analyzed 3D scan data with GOMInspect software to produce templates and inform aerodynamic design decisions

Ontario Drive and Gear

Quality Engineering Assistant

Gear Division

May 2019 – Aug. 2019

- Precisely measured machined parts using calibrated tools in an ISO 9001 environment while applying GD&T principles
- Automated collection of data from computerized measuring tools to minimize paper use and prevent data entry errors
- Programmed a CNC contour tracer to measure and evaluate turned features, reducing measurement time by 50%

Schukra of North America

New Product Development Co-op

Leggett and Platt Inc.

Sept. 2018 – Dec. 2018

- Methodically designed and tested actuator prototypes to improve noise and durability while maintaining part costs
- Organized and analyzed noise data to objectively grade actuator sound quality with Artemis Suite and Microsoft Excel
- Reduced the time taken to process and visualize oscilloscope measurement data by 80% with an analysis template

Hastech Manufacturing

Quality Co-op

Linamar Corporation

Jan. 2018 – April 2018

- Organized paperwork and quality data to complete the monthly statistical quality report using Minitab 2017
- Used Excel and VBA to automate the collection and analysis of measurement data from in-line process gauges

Extracurricular Activities

Waterloo Formula Electric

Technical Lead and Mechanical Team Member

Sept. 2017 - Present

- Eagerly accepted leadership duties managing mechanical design and team finances during the Fall 2019 school term
- Designed and simulated high current cell protection fuses conforming to a specific fusing curve using Star-CMM+
- Analysed airflow through radiators to correlate simulation data from Star-CCM+ with tested cooling performance
- Developed and fabricated steel punch and die tooling to cut the designed fuse into cell tabs for the car's battery
- Machined a variety of tight-tolerance parts on the lathe and mill, including 80 spacers using custom HSS tooling
- Used SolidWorks and GrabCAD to manage CAD files and collaborate with a team of more than 50 people

Projects and Hobbies

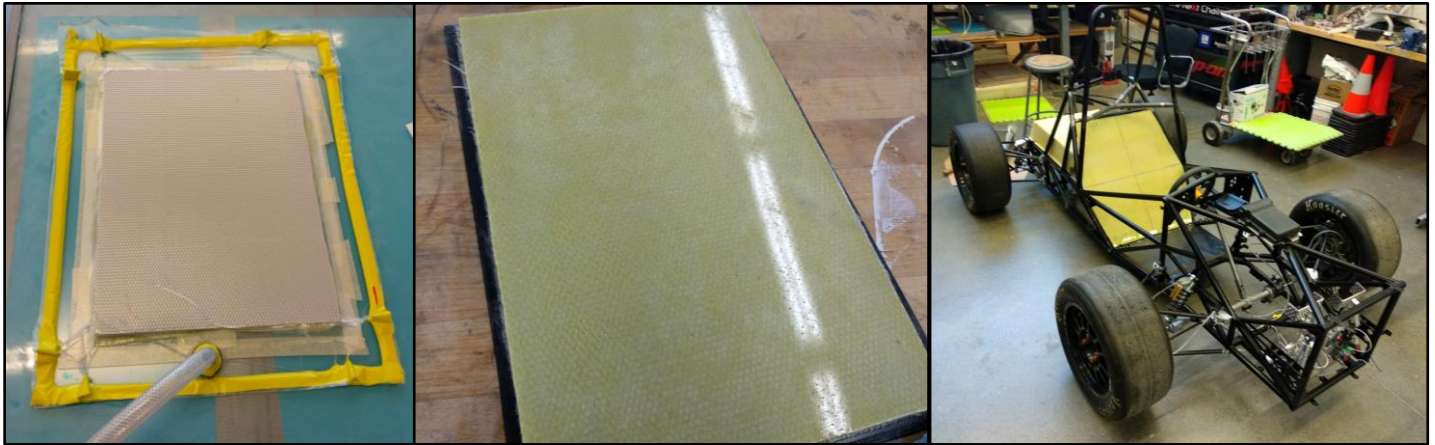
- Used the metal lathe and mill to make functional parts from metal and wood, create useful tooling, and make repairs
- Played intramural competitive dodgeball and volleyball to exercise and relax

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Design and Manufacturing of a Kevlar Firewall for WFE's FSAE Electric Vehicle



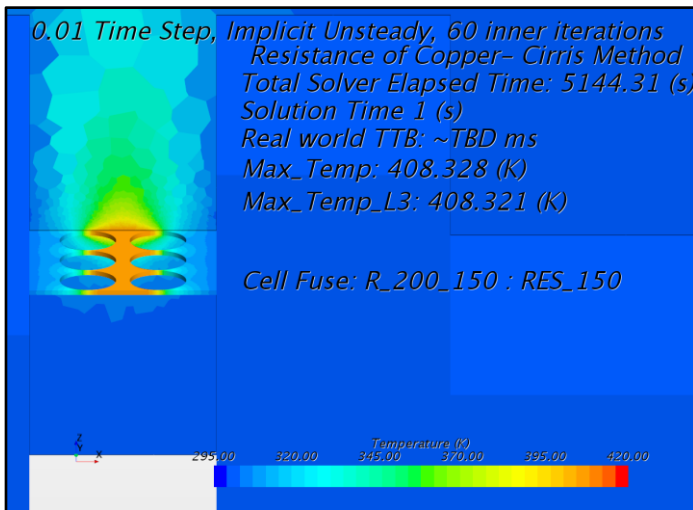
Kevlar and FR Resin Test Samples

Vacuum bagging the laminate ensured strong, stiff panels.

Finished Firewall

Kevlar, Nomex, Aluminum Sheet

Design of a Copper Cell Protection Fuse for Waterloo Formula Electric's Battery Pack



Fuse Design and Analysis

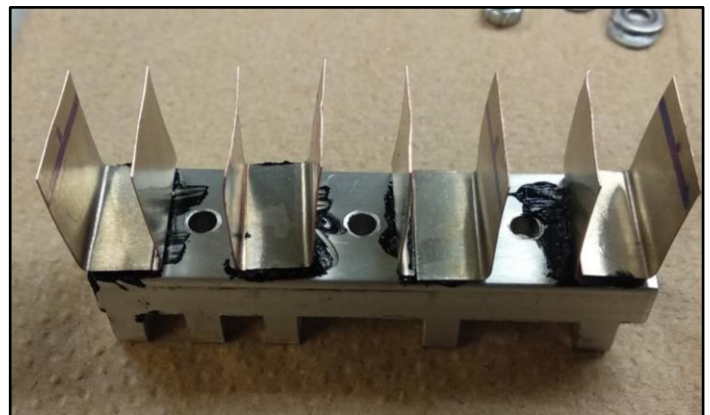
All 288 cells in the battery pack were to be protected by a fuse cut into the cell tab. Thermal and electrical design was completed in Star CCM+, then the fuse pattern was cut into material identical to the battery cell tabs.

The fusing time vs. current curve was shaped to fit between the cell thermal limit and pack fuse curve after extensive simulation and physical testing. Testing was completed on a custom high current test fixture up to 300 A.



Finished Cell Tab Produced by Custom Die

After the fuse design was complete, all 288 cell tabs were cut without scrapping any cells.



Cell Tab Contact Resistance Study

Cell-to-busbar resistance was measured at $\approx 300 \mu\Omega$ after conductive grease application.