Justin Dewey

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Education

University of Toronto — Toronto, Ontario
Bachelor of Applied Science in Mechanical Engineering — *Expected 2028*

Experience

Thrust Chamber Specialist — June 2025 – Present
University of Toronto Aerospace Team (UTAT) — *Toronto, Ontario*

- Oversee the **design, fabrication, and testing** of the thrust chamber assembly for a bi-propellant rocket engine.
- Designed and machined graphite-phenolic nozzles for engine using CNC and manual processes, tolerances of 0.005".
- Designed, machined, and tested high-flow **1" nitrous oxide valve** for engine using coaxial poppet design, tested at 800 psi in 2+ cold flow events, machined entirely in-house on CNC mill and lathe.
- Used **Solidworks, Ansys Mechanical, Fusion 360 CAM** to simulate and manufacture parts.

Operations Assistant — April 2025 – Sep. 2025
Trail Hub — *Uxbridge, Ontario*

- Supported daily operations for a **100-acre outdoor facility** and bike shop.
- Conducted preventative maintenance and diagnostics on e-bike fleet of 20+ units, improving uptime by 25%.
- Designed and fabricated custom ATV shifter assembly using Arduino Nano, improving reliability for trail work.
- Performed trail upkeep and landscaping to maintain the property.

Projects

Liquid Bi-Propellant Rocket Engine | *Solidworks, CAM, CNC Machining, FEA*

- Designed and built **liquid bipropellant rocket engine**, with 5500N of thrust and 5 second burn, conducted successful hot-fire test in remote location.
- Designed (using hand calculations and FEA) and tested **bulkhead propellant tanks** to 1.2x MEOP (1200 psi).
- Produced CAD and toleranced drawings to machine all components in-house, on **personal CNC mill and lathe**.
- **TIG-welded** engine test stand to gather mass flow and thrust data, capable of hosting engines up to 10kN thrust.
- Performed 2+ cold flow tests to gather mass flow data, check procedures, and test integrity of tanks.

Data Acquisition Device (DAQ) | *C++, Circuit Design*

- Designed and built a **20-channel telemetry DAQ** sampling sensors at 100 Hz for engine test campaign.
- Programmed microcontroller firmware in C++ to package data and transmit over 900 MHz radio link.
- Designed **custom PCB** with STM32 microcontroller to reduce size compared to commercial options.
- DAQ was tested in cold-flow and hot-fire tests of rocket engine, and performed as expected.

Coaxial Poppet Valve | *Fluid System Design, CNC Machining, CAM*

- Designed and machined an 800 psi, **1-inch coaxial poppet valve.**
- Calcuated actuation force and flow coefficient (Cv), selected materials and seals for pressure duty.
- Produced Fusion 360 CAM toolpaths and **machined parts on Tormach CNC mill** to 0.005" tolerances.
- **Machined valve fully in-house** with toleranced drawings + GD&T on garage CNC mill and lathe.
- Conducted 5+ pressure and cycle tests, to validate flow rate, valve integrity, and cycle repeatability.

CNC Machining Service | *CAD, CAM, DFM*

- **Ran small-batch machining service** for customers including U of T design teams and hobbyists.
- Created and toleranced mechanical drawings using GD&T for customers who supplied CAD files.
- Programmed CAM toolpaths to work with materials such as graphite and aluminum.

Technical Skills

Software Tools: SolidWorks, Onshape, Fusion 360, Finite Element Analysis (Ansys Mechanical), Altium, AxSTREAM.SPACE
Manufacturing: CNC Machining, Manual Machining (lathe and mill), CAM Programming, 3D Printing, Li-ion Battery Assembly, GD&T, TIG Welding
Programming: Python, MATLAB, Arduino/Teensy/STM32 Microcontrollers