

Patrick Watson

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EDUCATION

B.S. Mechanical Engineering, **University of Colorado Boulder**
GPA: 3.60

Expected Dec 2023

WORK EXPERIENCE

E2 Mechanical Engineering Intern, Launcher Space, Hawthorne, Ca June 2021-Current

- Led part of the design of the E2 turbopump test stand at the NASA Stennis Space Center. Calculated pressure drops in run lines using Liquid Rocket Engine Simulator design software.
- Designed restriction orifices from literature and validated with Ansys Fluent.
- Assisted in testing and assembly of E2 Turbopump at NASA Stennis Space Center including 2 min long duration test.
- Worked on a three-person team to create a 3D printed copper heat exchanger for steady state pre-burner testing and worked to validate empirical model in ANSYS Fluent to ensure design performance.
- Assisted in TCA and Pre-burner testing campaigns at NASA SSC. Built test articles, built run lines, installed instrumentation, and conducted high speed data acquisition operations.
- Led manufacturing of SN #2 E2 turbopump to meet integrated TPA/TCA testing schedule. Created and updated drawings for turbopump as well as improved tooling for building of the TPA.
- Designed and created individual turbopump component testing for inter-propellant seal.
- Revamped fuel IPS mating to insure no leakage above 2x nominal inlet pressure.

Bike Shop Technician, Pasadena Cyclery, Pasadena, Ca

April 2015-Aug 2017

- Trained to service high end mountain bikes and road bikes.

PROJECT EXPERIENCE

Sounding Rocket Lab - University Rocket Team

Turbopump Team Lead

Nov 2021-Current

- Worked on a small team to design and create a turbopump for our Reaper liquid rocket engine.
- Conducted ANSYS CFX simulation for flow performance and transient cavitation modeling of the liquid oxygen pump with 70 million elements. Built 128 core dual CPU AMD Epyc workstation for simulations.
- Conducted FEA simulations in ANSYS Static Structural to validate materials and design.
- Performed stepped labyrinth seal simulations in ANSYS Fluent to verify pressure drop performance of IPS leak path.
- Worked with manufacturing engineers at Velo3D to 3D print the Inconel 718 Reaper TPA. Entrusted by Velo3D to work with precision machining vendor to make the Reaper TPA section model that they are using as a product demonstration model for major trade shows.
- Created over 100 pages of drawings for the Reaper Turbopump using GD&T and assembly tolerance stack up.

Baja SAE Racing Team - University Baja Team

Chassis Design Lead

Aug 2022-June2023

- One of two chassis design leads in charge of making a rules compliant frame to race in the 2023 Baja SAE Oregon competition. Chassis performed flawlessly.
- Led FEA analysis of suspension and chassis in ANSYS static structural to validate design and insure reliability.
- One of three welders on the team tasked with fabrication of the car.
- Designed and built the hydraulic braking system. Designed with 3/16" 304 stainless tubing and AN fittings.
- Optimized continuously variable transmission using collected data from Motec to increase top speed and acceleration.

Airfoil Mounting: Lift in Planes, Down Force in Race Cars - Class final project

Co-Writer and Flow Analysis - Fluid Dynamics

Aug 2020-Dec 2020

- Completed a write-up and analysis on how race cars use airfoils for downforce and airplanes use airfoils for lift.
- Conducted an analysis, using ANSYS Fluent, on a model made in SolidWorks.

SKILLS

- **Software:** Siemens NX, Ansys structural, MATLAB, C++, Simerics MP.
- **Manufacturing:** Personal 3D Printing, Power Tools, Drill Press, Bandsaw, TIG welding, tube flaring.