

RYAN ROSSMANGO

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Work Experience

HRL Laboratories • Cryogenics, Thermal, Mechanical Engineer

Jul 2023 - present

Developing two-phase, one-directional heat pipes (stainless steel-copper brazed thermosiphons filled with ethane or oxygen) with high on-state conductance and negligible heat leak (<5uW into MXC plate), to reduce XLD-1000 cooldown time from 24-32 hours to overnight.

- Conducted trade studies (ran over **50 FridgeSim studies** and used **Figure of Merit charts**) to identify the best thermal solution.
- Performed **preliminary structural analysis**, designs, and material selection by hand and with Python to scope out feasible geometries within trade space and **identify manufacturing risks**. Tradeoffs include hoop stress, fill/burst pressure, heat leak, and internal volume.
- Wrote an **11-page Statement of Work** with Gantt chart, enumerating the geometric, **material, performance**, and **safety requirements**.
- Drafted an **Interface Control Document**, calling out the geometric envelope (9.25" long, 1.5" diameter), bolting patterns, and GTOLs.
- Selected ITAR-certified vendor; used Pugh charts to judge cryogenics experience, brazing expertise, design decisions, & **expected schedule**.
- Performed **CTE thermal stress studies** with **Excel hand calcs** and **ANSYS model** to determine tensile force imparted on thermosiphon (~**100 lbs**) after installed and cooled, due to **differential shrinkage with other beam elements** that join the semi-rigid stage plates.
- Investigated materials to minimize stainless steel heat leak (without hindering heat transfer), with **JAHM/NIST/HRL superconducting data**. Drew up a thermal resistance network; sized BeO spacer (0.25" thick, <1" diameter) to reduce heat leak from **3.6 to 2.1uW** if placed in series.
- Measured bulk conductance and contact resistance of BeO parts, using cartridge heaters, temperature sensors (RuOx, Cernox), Berkshire power supply, Lakeshore Temperature Controller, and Python. Input heat (**1-500uW, <.016mA**) into rod with **one end fixed** to 20mK plate.
- Designed **copper shaft collars** and slotted rigid attachments, with scratch lines and **stainless steel helicoils** to prevent stripped threads.
- Drafted a **3-week thermal validation plan**: low-power heat leak test (uW heat leaks from 1K, mW heat leaks from 4K), high-power heat transfer test (**>20W of heat** sent in on 50K plate to **achieve 20K temperature delta**), and full cooldown with **6 thermosiphons**.

Overseeing hardware integration (mechanical parts, PCBs, electrical signal chains, coax cables, PXIe cards, electronics boxes) and handoff of 5 cryostats as Mechanical REA for MUX fridge architecture, with technical documentation, BOM revisions, and project management.

- Managed kitting process for ~**55 internal hardware** and ~**30 room temperature electronics** line items; delegating kitting tasks.
- **Compiled Jira project** to track procurement and provide kitting instructions against a **5-month schedule**; driving weekly status updates.
- Mastered SolidWorks Composer to create **visual assembly instructions (100 pages)**, guiding MUX fridge builds. Showed wiring diagrams, torque specs, tools, flag notes, highlighted part callouts, transparent views, explode lines, and standard operating procedures (SOPs).

Standing up, operating a fleet of 7 He-3/He-4 dilution refrigerators (cryostats cooled by pulse tubes, pumped to vacuum with turbopumps and scrolls) under accelerated 2-month timeline. Diagnosing fluid clogs, cooling systems, and safely handling precious fluid.

- Performing acceptance testing (7mK base temp, 1000uW cooling at 100mK) and cooldowns, with Bluefors control cart or automated scripts.
- Filling **40L of He-3** with regulator, 1L bottle, and Swagelok valves; fixing blockers (such as **air/nitrogen clogs, leaks, broken O-rings**).

Delivering quick-turnaround mechanical trinkets to increase production capacity, remove testing blockers, and lower failure rates.

- PCB stiffening frames, wirebonding vacuum fixtures, amplifier brackets, variable temperature stages, cable alignment fixtures, etc.

Teddyne Relays • Mechanical Engineering Intern

Jun 2022 - Sept 2022

- Conducted **root cause analysis** with Pareto, scatter, and Weibull charts to lower reject rates of magnetic latching relays **by 16%**.
- **Redesigned a relay spring mechanism** which was overstressed at solder reflow temperatures. Executed an iterative CAD design process involving **100 simulation studies** to lower max stress by **factor of 5.5** and achieve contact force targets (**1-2 gram-force**).
- Developed **testing equipment** and test procedure for **magnet quality validation**, with Helmholtz coil, fluxmeter, and 3D-prints.

UCLA Engineering Transfer Center • Undergraduate Mentor

Jun 2021 - Sept 2021

- **Led technical team of 6** to create transfer bridge program. **Made, led 8 workshops** on CAD, FEA, circuits, 3D-printing, and MATLAB.
- Spearheaded **project development of a successful 10-team, 30-person hackathon** under accelerated 5-week timeline.
- Built, wired, and programmed the **proof of concept** (an Arduino-scripted car driven by Bluetooth pySerial, an IR emitter controller, and autonomously), troubleshooted problems, procured **list of 50 parts**, designed 3 new parts, and 3D-printed/laser-cut 150 parts.

Technical Skills

CAD/CAM/3D-Modeling: SolidWorks (CSWA), ANSYS SpaceClaim, AutoCAD, Autodesk Inventor, Fusion360, SolidCAM, very adaptive

Engineering: Low-temperature measurement, vacuum systems, hardware assembly, DFM/DFA, technical docs, data visualization, GD&T

FEA/CAE: ANSYS Mechanical, ANSYS Transient and Steady-State Thermal, SolidWorks Thermal, SolidWorks Simulation

Manufacturing: Rapid prototyping (3D-print, laser cutter, Waterjet), composites fabrication, machining, hand tools, sheet metal, soldering

Software: Python, Git, CoolProp/NIST/JAHM, Mathematica, MS Windows/Excel/PowerPoint/Word, Bash, Git, Jira, Arduino, C++, OpenRocket

Education

University of California, Los Angeles (UCLA) • B.S. Mechanical Engineering • GPA 3.872

Sept 2019 - Jun 2023

Classes: Thermodynamics, Heat Transfer, Fluid Mechanics, Advanced Strength of Materials, Dynamics, Manufacturing Processes, Astronautics