Thomas Russell

AEROSPACE ENGINEERING AND SCIENCE STUDENT

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PROFILE

A passionate and experienced final year Aerospace Engineering and Science student at Monash University. Working towards a career in propulsion, fluids engineering and manufacturing. Exemplifying these goals leading a student engineering team of 150 students, an internship at Rocket Lab, various rocketry projects and working part-time in aerospace.

PROFESSIONAL EXPERIENCE

Rocket Lab Development Engineer, Neutron Thrust Module

Summer 2025 – 14-week internship

- Performed analysis on various structural components, reported on findings, proposed next steps discussions and subsequently iterated on designs as necessary.
- Designed and executed tests for large sub-systems of Neutron in pursuit of validation and qualification.
- Carried components from design to release and manufacture including concepts, CAD and drawing packages.

Monash High Powered Rocketry (HPR), Monash University

Since September 2022

- **Team lead (CEO).** Leading a team of over 150 students, both operationally and technically. Working to instil a positive and inclusive culture.
- Leading the team to a record altitude launch attempt in Australia (100k feet) and competing in the 10k feet SRAD category at the Australian Universities Rocket Competition.
- Developing and executing the team's long-term strategy, overseeing internal decision making and engaging with sponsors, faculty and media.
- **Propulsion lead**. Leading a team of propulsion engineers resulting in 2nd Place in category at the International Rocketry Engineering Competition (IREC) and the Jim Furfaro award for technical excellence out of over 140 teams internationally.
- Led designs for two **3kN and 12kN hybrid rocket engines**, the latter using cryogenic liquid oxygen
- Acquired $21000 AUD in funding for the team to travel to the UK to compete in the largest propulsion competition in the world, setting a thrust record.
- **Propulsion engineer.** Resultant experiences with fluidics, thermodynamic simulations, multiphase CFD.
- Design experience in composite over-wrapped pressure vessels, regeneratively cooled nozzles, injector design and structural design for the engines and a vertical test stand and oxidiser fluid systems such as custom pneumatic valves and fluid lines.

Hydrogen Jet Facility, Final Year Project

2026 – 2 semesters

- **Design, build and commission** of a hydrogen jet facility at Monash University. Responsible for implementing all fluids systems, control, data acquisition and safety measures for the facility.
- **Investigating supersonic hydrogen jet leaks with acoustics** involving the use of high speed schlieren imaging techniques and subsequent analysis.
- Key issue is making a safe and reliable system with appropriate emergency controls to account for all scenarios such that the facility can be used frequently by a variety of different researchers.

Liquid Rocket Engine Project

2026 – Personal project

- **Nitrous oxide fill GSE** Designed and built a nitrous oxide fill system including fluids, housing, custom PCB, complete networking with live data including pressure, temperature, load cell thrust, camera feed and logging.
- **Pyro actuated main valve** Urbanski-Colburn style valve but designed to use a single nitrous fill line and pyro charge to open fuel and oxidiser flow into a separate pintle style injector.
- **Valve and injector characterisation** Characterised valve and injector empirical discharges and iterated for optimal momentum ratios and spray angles. Developed a complete thermodynamic simulation for the entire engine to predict performance.
- **Hot fire test campaign** First components manufactured after extensive prototyping, initial valve testing begun before hot fire campaign takes place.

Summer Research Project, Shock Lab Research Group

Summer 2024 – 10-week program

- **Lab research and analysis.** Gained experience with experimental techniques such as high speed schlieren and analysis of the complex data through numerical methods (e.g. Spectral Proper Orthogonal Decomposition).
- **Overexpanded Glass Planar Rocket Nozzle.** Designed a planar glass rocket nozzle to investigate Free Shock Separation (FSS) in rocket engines. Personally manufactured and tested the entire system. Gained key experience in CFD, design, manufacturing, high speed schlieren and analysis techniques.

Assistant Robot Operator, Titomic

Since 2024

- **Metallurgy.** Supported research and development into material properties of new alloys created with cold spray additive manufacturing. Lab work involving cutting, polishing and analysing samples with a high-powered microscope to investigate material properties. Various materials testing.
- **Robot operator.** Experience operating 6-axis robots with cold spray heads, producing products for industry. Being involved with advanced contemporary manufacturing techniques adds to my design for manufacturing skillset, knowing the benefits and limitations of different technologies.
- **Machinist.** Extensive work machining various scaffolds for products, tensile coupons for material research and post-machining sprayed items. Developed my skills in design for manufacturing as well as manufacturing methods, which I have leveraged as a design engineer.

CERTIFICATES AND AWARDS

Jim Furfaro Award for Technical Excellence, IREC 2025 – June 2025

Runner up, 10k feet SRAD hybrid category, IREC 2025 – June 2025

Machining short course, Chisholm Institute – March 2023 – May 2023

ANSYS FEA and CFD Introduction course, Leap Australia – April 2023 – April 2023

SKILLS & ABILITIES

Software: Siemens NX and Teamcenter, PTC Creo and Windchill PLM, SOLIDWORKS Computer-Aided Design, Fusion 360 CAM, KiCad

Manufacturing: Welding, Fabrication, Manual and CNC Machining (lathe and milling machine), Additive manufacturing, Drawing (ASME Y14.5)

Programming Languages: MATLAB & Simulink, Python, C++, C#, JavaScript

Simulation: Ansys Finite Element Analysis and Computational Fluid Dynamics, NX Simcenter (NASTRAN)