

## Summary

I have 8+ years of experience as a technical / project lead on advanced manufacturing R&D projects and production programs for aerospace, automotive, power generation, robotics, and medical applications. With a PhD in physical and mechanical metallurgy, and several years of industry experience, I have become highly versed in metal additive manufacturing and welding process development, material selection studies, statistical process control, and managing both research and production teams.

## Process Experience

- metal and polymer additive manufacturing
- heat treatment
- resistance welding
- electrospark deposition
- laser cladding
- UV laser micro-machining
- hot pressing

## Software Experience

- CAD: Fusion 360, SolidWorks, Netfabb, AutoCAD/LibreCAD
- Statistics: Develve, Jamovi, Minitab
- Simulation/Math: COMSOL, MATLAB/Octave
- Other: Arduino IDE (C++), Javascript, ImageJ, Veusz

## Characterization Experience

- metallurgical sample preparation
- SEM
- EDX/EDAX/EDS
- EBSD
- XRD
- AES
- DSC
- TGA
- optical/laser profilometry
- optical microscopy & 3D scanning
- CT scanning

## Testing Experience

- tensile
- fatigue
- creep/stress rupture
- shear
- impact
- hardness
- T-peel
- wear
- oxidation
- humidity

## Work Experience

### Research Associate, MSAM (*full time, contract*)

July 2023 to Present

I am currently a technical lead for a team of researchers and production personnel at an additive manufacturing facility. My team has successfully manufactured small batches of aerospace and power generation components using high-temperature (high  $\gamma'$ ) nickel superalloys, and have delivered these components to external customers.

Responsible for: • R&D programs • manufacturing (build file preparation and operation of L-PBF printer, statistical process control, standard operating procedures, employee training) • customer communication (providing guidance on: "design for manufacturing" principles, mechanical property testing, and heat treatments).

### Advanced Process R&D Specialist, Forcen (*part time*)

July 2020 to Present

I currently lead a research team in the development of flexible thin-film force/torque sensors for a tier 1 manufacturer of robotic sensing systems. My team has successfully manufactured and delivered functioning development sensors (TRL 7), and I am currently overseeing the integration of these sensors into their product line.

Responsible for: • process development programs (hot pressing, UV laser micro-machining) • prototype development and testing (fatigue, temperature, humidity) • transfer to production • grant writing (successfully raised 500k).

### Senior Additive Manufacturing Specialist, Beehive Industries (*full time*)

June 2021 to July 2023

I successfully led several development programs for a contract additive manufacturer, enabling the production of aluminum satellite components and high  $\gamma'$  nickel superalloy turbine engine components. I supported the transition of these programs to production and resolved production quality control issues via non-destructive testing and metallurgical analysis. I also performed material selection studies on Al, Ti, Nb, and Ni-superalloys to prioritize R&D programs and to select materials for use in attritable propulsion systems (jet engines) according to customer specs.

Responsible for: • process development programs (EB-PBF, L-PBF, HIP, heat treatment) • material characterization and testing (tensile, fatigue, stress rupture) • production transfer (statistical analysis, documentation, qualification) • company-wide metallurgical engineering support.

**Research Assistant**, CAMJ, Huys Industries (*full time*)

May 2017 to April 2021

I pioneered several new processes for a supplier of resistance welding and metal/ceramic coating solutions to the automotive and aerospace industries. This includes techniques for the repair and coating of heat-sensitive components, surface treatments for fatigue life improvement, additive manufacturing techniques to create new metal matrix composites, welding techniques to join metal additive manufactured parts, and interlayer approaches to improve the strength of dissimilar material welds. Several projects were commercially successful, with sales to OEMs and tier 1 suppliers.

**Research Assistant**, Kingston Process Metallurgy (*internship*)

Jan 2016 to Aug 2016

I performed lab-scale R&D for graphite purification, zinc extraction from zinc silicate ore, and salt solution ammoniation processes to be used in chemical and metallurgical industries.

**R&D Engineering**, JDSU/Lumentum (*internship*)

Aug 2014 to May 2015

I led several cost reduction projects to create novel hermetic sealing processes. These include ultrasonic welding to create metal/metal joints for optoelectronic device packaging, as well as low permeability epoxies to seal electrical feedthroughs. I also developed chemisorption models to assist in the selection of effective moisture getters and gas diffusion models for evaluation of hermetic sealing techniques.

**Process Control Engineering**, INEOS Styrolution (*internship*)

Jan 2014 to April 2014

I led three projects to improve facility operating efficiency and improve safety procedures. I was responsible for the development of a human-machine interface for facility-wide process control, as well as software for hazardous waste disposal tracking and a safety interlock cross-reference database for abnormal situation management.

**Research Assistant**, Advanced Micro/Nano Devices Lab (*internship*)

April 2013 to Aug 2013

I developed a method to programmatically acquire and display ultrasound data from 2D and 3D regions for capacitive micromachined ultrasonic transducer testing.

## Education

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**PhD, Mechanical and Mechatronics Engineering** – University of Waterloo

Sept 2017 to April 2021

Focus: physical & mechanical metallurgy, Ni-superalloys, welding, and additive manufacturing

**BASc, Nanotechnology Engineering** – University of Waterloo

Sept 2012 to April 2017

Focus: processing and properties of nano-structured materials

## Professional writing experience

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**Metal Additive Manufacturing for Aerospace Components 2024** ([source](#))

In my role as a subject matter expert for Counterpoint Market Intelligence, I have written a 125 page report with technical summaries of additive manufacturing processes and their applications in the aerospace industry. It includes a market analysis of additive manufacturing equipment makers and end users of additive manufactured components in commercial aviation, defence, space launch systems, and satellites.

**29 published peer reviewed papers in scientific journals** ([source](#)) **and 1 technical magazine article**

Throughout my doctorate and afterwards as an adjunct assistant professor, I have written 29 peer reviewed articles as a lead author, in collaboration with colleagues, or with the students I have supervised and mentored.

**7 successful grant applications**

Throughout my doctorate and as part of my work in industry afterwards, I have successfully written 7 grant applications totalling over \$800k in funding.