# PABLO ENRIQUE

MATERIALS AND MANUFACTURING SPECIALIST

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## SUMMARY

I have experience as a technical / project lead on advanced manufacturing R&D projects and production programs for aerospace, automotive, power generation, medical, and industrial robotics industries. 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 and characterization, and design of components for various manufacturing processes. My work has been published in peer-reviewed journals, has led to valuable IP generation (five patent applications), and has enabled high-performance commercial products. I am always eager to apply my expertise, learn new skills, and explore materials- and manufacturing-related challenges.

## SOFTWARE EXPERIENCE

Netfabb, Fusion 360, SolidWorks, Solid Edge, MATLAB, Octave, AutoCAD, LibreCAD, COMSOL, Develve, Jamovi, Arduino IDE, ImageJ, Veusz, Javascript, C++

## PROCESS EXPERIENCE

Laser and electron powder-bed fusion, metal and plastic FFF (FDM), binder jetting, heat treatment, projection and resistance spot welding, electrospark deposition, laser cladding, UV laser micromachining, hot pressing, spin coating, soldering

## EDUCATION

**University of Waterloo** — **PhD - Mechanical and Mechatronics Engineering**
Sept 2017 to Apr 2021 — Focus: Physical & mechanical metallurgy, Ni-superalloys, additive manufacturing

**University of Waterloo** — **BASc - Nanotechnology Engineering**
Sept 2012 to Apr 2017 — Focus: Nano-structured materials processing and properties

## EXPERIENCE

**Research Associate** — Waterloo, ON
*Multi-Scale Additive Manufacturing Lab (full time, contract)* — July 2023 to Present

- Developed a process for additive manufacturing (3D printing) and heat treatment of crack-susceptible materials.
- Transitioned processes from lab-scale to production-scale, including cost reductions and statistical quality control.
- Successfully produced and delivered aerospace and power generation components to external customers, while communicating directly with the customers and managing customer requests.
- Responsible for part design using DfAM principles and topology optimization, build file preparation, operation of a laser powder bed fusion printer, manufacturing quality assurance, and heat treatment.

**Advanced Process R&D Specialist** — Waterloo, ON
*Forcen (part time)* — July 2020 to Present

- Currently lead an industry-academic research collaboration to develop flexible thin-film force/torque sensors.
- Manage a team and provide technical guidance on process development (hot pressing, UV laser micromachining), prototype testing (fatigue, environmental), and delivery of assembled development sensors (TRL 7).
- Wrote and awarded $800k in grants and received adjunct appointment from the University of Waterloo.

**Senior Additive Manufacturing Specialist** — Waterloo, ON
*Beehive Industries (full time)* — June 2021 to July 2023

- Successfully led a research program to additive manufacture high γ’ Ni-superalloys for power/aero turbines.
- Responsible for process parameter development, heat treatment development, material characterization, property evaluation (tensile, fatigue, creep), and delivery of development parts (TRL 7).
- Led an R&D to production transfer program and supported production troubleshooting using NDT methods.
- Performed material selection on Al, Ti, Nb, and Ni-superalloys to prioritize R&D programs and assisted in material selection for use in attritable propulsion systems.

**Graduate Research Assistant** Waterloo, ON
*Centre for Advanced Materials Joining (full time)* May 2017 to Apr 2021
*Industry research in collaboration with Huys Industries*

- Optimized a micro-arc welding process for repair of damaged nickel superalloy components, and as a coating process to reduce surface roughness (82%) and increase fatigue life (> 10 times) of additive manufactured parts.
- Developed a projection welding strategy for joining additive manufactured parts to larger assemblies.
- Invented a binder jetting approach for wear-resistant metal matrix composites with ceramic reinforcing phases.
- Developed an interlayer technique to increase the strength (84%) of resistance spot welded aluminum to steel.

**Research Assistant** Kingston, ON
*Kingston Process Metallurgy (Co-op)* Jan 2016 to Aug 2016

- Performed lab-scale process R&D for graphite purification, zinc extraction from zinc silicate ore, and salt solution ammoniation for chemical and metallurgical industries.

**R&D Engineering** Ottawa, ON
*Lumentum (Co-op)* Aug 2014 to May 2015

- Developed and optimized a hermetic sealing process for optoelectronic devices using ultrasonic welding of aluminum to nickel-cobalt alloys as part of a successful cost savings program.
- Developed chemisorption models for the selection of effective moisture getters, and gas diffusion models for evaluation of hermetic sealing techniques.
- Studied the effect of heat induced stress on epoxied joints for long-term reliability.

**Process Control Engineering** Sarnia, ON
*INEOS Styrolution (Co-op)* Jan 2014 to Apr 2014

- Responsible for the development of a human-machine interface for facility-wide process control as part of an operating efficiency improvement strategy.
- Developed software for hazardous waste disposal tracking and a safety interlock cross-reference database for abnormal situation management.

**Research Assistant** Waterloo, ON
*Advanced Micro/Nano Devices Lab (Co-op)* Apr 2013 to Aug 2013

- Developed and performed experiments to programmatically acquire and display ultrasound data from 2D and 3D regions for capacitive micromachined ultrasonic transducer testing.