

Jack Nelson

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EDUCATION

University of California, Berkeley

May 2028

Mechanical Engineering

Relevant Coursework: Calculus I-III, Differential Equations, Linear Algebra, Physics I-II, Python/MATLAB, Computer Aided Design, Solid Mechanics, Manufacturing and Design Communication, Modeling, Simulation, and Digital-Twins of Drone Swarm Based Systems, Introduction to the Design of Radiation Detectors

WORK EXPERIENCE

Safran

Gainesville, TX

Tooling Design Engineering Intern

Summer 2025

- Designed and delivered 27+ complex production tools, including jigs, fixtures, and vacuum form tooling, using CATIA V5, with 93% of tooling designs passing first article inspection without modification
- Created technical drawings for CNC/manual machining; performed tolerance stackups and interference checks to ensure fit, repeatability, and manufacturability with tolerances as low as ± 0.001 "
- One project of note is the redesign of a multi-operation Schmidt Press process into a single-operation clamshell jig for a one-way clutch assembly, eliminating two tools and consolidating three steps into one
- Applied design-for-manufacturing principles across every design to reduce machining downtime
- Supported rapid prototyping and short-run production, responding to evolving production needs
- Co-led development of a UR20-based lights-out cobot tending system for a dual-gantry 5-axis DMS Glacier5 CNC mill using vision-based part detection, a 7th axis, and custom vacuum end-of-arm tooling
- Projected 6x throughput and 2-year ROI, presented system architecture to CEO and executive leadership biweekly

Total Concept Manufacturing

Fresno, CA

CNC Mill and CNC Lathe Operator

Summer 2023

- Operated and maintained CNC lathe and mill machines, producing over 500 precision parts daily
- Programmed and set up CNC machines for optimal performance, ensuring consistent accuracy/quality
- Applied precise machining techniques to achieve tight tolerances and conducted quality control checks to verify part conformity, meeting high-quality standards for fasteners, aerospace, and automotive components
- Reduced machine downtime by efficiently troubleshooting mechanical issues, performing preventative maintenance, and collaborating with the engineering team to improve machining processes and optimize production efficiency

LEADERSHIP & ENGINEERING INVOLVEMENT

Space Enterprise at Berkeley

Berkeley, CA

Student Propulsion Engineer

August 2024 – Current

- Engineered the quick-disconnect fill system, optimized bulkhead geometry, and simulated IPA injector flow CFD for Eureka 3, a liquid bipropellant rocket targeting the Kármán line. Collaborated with the simulations team to deliver validated propulsion subsystems. The regeneratively cooled Inconel-718 engine achieved a record 11 kN thrust.

PERSONAL PROJECTS

Regeneratively Cooled, IR-Suppressed, Additively Manufactured, Monolithic Micro Gas Turbine (Patent Pending)

- Designed, simulated, and manufactured a fully 3D-printed polymer micro gas turbine with regenerative fuel cooling, directional IR suppression, reduced part count through a monolithic structure, and a prototype cost under \$600
- Conducted materials analysis on thermoset resins and ceramic composites, iterating through multiple designs
- Engineered regenerative flow paths and combustor geometry for enhanced heat resistance and structural durability

Scram Jet Optimization Project (ScramOpt, Open-Source Tool)

- Developed an ML surrogate model using Bayesian Optimization, Gaussian Process Regression, and Latin Hypercube Sampling, designed to iterate upon and optimize JAXA's M12-02 hypersonic test bench
- Fully automated, headless optimization pipeline that parametrically generates scramjet geometries in FreeCAD, simulates them in SU2, and trains a surrogate model to predict flow outcomes; the model iteratively learns by comparing predictions to real CFD results, enabling rapid design space exploration by replacing costly simulations with learned approximations and evaluating only the top-performing designs per generation

SKILLS

CATIA, SolidWorks, Fusion 360, FreeCAD, ANSYS, SU2, MATLAB, Python, C++, Excel, Git, Docker; CFD, FEA, DFM, CNC Machining, Propulsion Systems, Additive Manufacturing, Industrial Automation, Materials Science, Rapid Prototyping, Microcontroller Systems, Bayesian Optimization, ML, RL, Headless Workflow Automation; Feedback-Driven Iteration