Lakshya Tiwari

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Professional Summary

Mechanical Engineer with research experience in advanced materials, thermoelectric, and jet flow acoustics, with peer-reviewed publications. Proficient in CAD (Creo, SolidWorks), simulation tools (COMSOL, FEA), and programming (Python, MATLAB). Skilled in experimental design, material analysis (SEM, EDS, TGA), and cross-functional collaboration to deliver high-performance, compliant engineering solutions.

Experience

BCVS Group Inc. (Contract)   **Austin, TX**
Mechanical Engineer   **September 2023-Present**
Smith & Nephew

- Leveraged SolidWorks 2023 to develop and refine innovative mechanical designs, optimizing functionality, performance, and manufacturability while ensuring strict adherence to industry regulations and standards.
- Designed and optimized plastic molded components with a strong focus on structural integrity, manufacturability, and cost-effectiveness, utilizing Design for Manufacturing (DFM) and Design for Assembly (DFA) principles in collaboration with cross-functional teams and suppliers.
- Applied GD&T principles to ensure precise tolerances, manufacturability, and assembly integrity, enhancing product accuracy, reliability, and consistency throughout design and production processes.
- Developed mechanical design concepts and 3D CAD models using SolidWorks, ensuring FDA, ISO 13485, and GMP compliance to improve product quality, safety, and manufacturability.

Baxter

- Utilized Creo to design and manage complex CAD assemblies, supporting engineering changes, BOM updates, and design modifications within PLM systems to ensure regulatory compliance and documentation integrity.
- Authored and executed test protocols, validations, and Gauge R&R studies, contributing to robust product verification and quality assurance processes.
- Collaborated with cross-functional teams to implement Design for Manufacturing (DFM) and Design for Assembly (DFA) principles, resulting in reduced production costs and cycle times without compromising product quality.
- Applied Six Sigma and Lean manufacturing principles to optimize mechanical design and production workflows, enhancing efficiency, durability, and cost-effectiveness.
- Conducted quality system initiatives, including FEA, simulation modeling, and life cycle testing, to validate mechanical performance and ensure adherence to industry standards.

Solinst Canada Ltd.   **Tempe, AZ**
Mechanical Engineer   **June 2023-August 2023**

- Engineered mechanical packer components in SolidWorks, ensuring functionality and form through iterative modeling, prototyping, and testing to meet project specifications.
- Produced 3D models and prototypes in SolidWorks, ensuring manufacturability and adherence to project specifications while maintaining product quality standards.
- Conducted CFD simulations in ANSYS to optimize performance, structural integrity, and product reliability, improving efficiency and functionality to meet project requirements.

Air India Limited   **Mumbai, India**
Research Assistant   **October 2021-May 2023**

- Collaborated with Aircraft Maintenance Engineers to perform comprehensive overhauls and assembly of PW4056 and GE-90 engines, ensuring safety and regulatory compliance.
- Utilized Nondestructive Testing (NDT) techniques to inspect engine components, identifying hidden defects and enhancing airworthiness of critical systems.
- Achieved a 10% improvement in engine performance through meticulous overhaul and reassembly of compressor modules, demonstrating precision and technical expertise.
- Maintained detailed records of maintenance activities and participated in continuous training to stay aligned with industry standards and best practices.

Projects

Manufacturing Innovation Lab   **Tempe, AZ**
Research Assistant   **October 2023-May 2023**

Thermoelectric Material Fabrication using Stereolithography Integrated with Hot Pressing.

- Co-authored a peer-reviewed paper on thermoelectric material fabrication using Mask Image Projection-based Stereolithography (MIP-SL) integrated with hot pressing.
- Collaboratively designed and 3D-printed a custom mold using Aqua Gray 4K resin and a Sonic Mini 4K printer; processed Sb_2Te_3 thermoelectric material through fine mesh filtration (100μm & 200μm).
- Enhanced sample density by heat-pressing at controlled temperatures (100°C & 200°C) under varying loads (500N & 1000N), followed by sintering at 400°C.
- Performed Thermogravimetric Analysis (TGA) on sintered specimens to evaluate thermal stability and purity, contributing to the optimization of fabrication parameters for improved electrical conductivity.

Physical modeling and simulation of polymeric structures with metallic material for property enhancements
- Investigated resin compositions and optimized curing parameters through 10 iterative cycles; analyzed microstructural properties of samples with 0–3% PEDOT: PSS to evaluate conductivity and material performance.
- Conducted copper deposition experiments on conductive 3D-printed films under applied voltages ranging from 50–100V, exploring feasibility for flexible electronic applications.
- Simulated nine distinct designs using COMSOL Multiphysics to verify copper deposition behavior, mechanical strength via tensile testing, and overall conductivity.
- Fabricated 400 µm structured cubic samples, executed copper deposition, and performed Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray Spectroscopy (EDS) to evaluate top surface and its composition.
- Analyzed experimental results to validate the effectiveness of the resin formulation and copper deposition process, contributing to the development of next-gen conductive composite materials.

SRM Institute of Science & Technology   **Chennai, India**
Research Assistant   **January 2019-May 2020**
Analysis of acoustics of jet flow using a conditioning assembly for different Mach Numbers.
- Co-authored a research paper published in IOP Conference Series: Materials Science and Engineering, focusing on jet flow behaviour and acoustic analysis.
- Collaborated with a research team to design and fabricate converging-diverging nozzles (Mach 1–2.5) and a flow conditioning assembly to ensure laminar inlet conditions.
- Conducted experiments across Nozzle Pressure Ratios (NPR) from 1 to 3, analysing jet acoustics and establishing that Over All Sound Pressure Level (OASPL) increases proportionally with NPR.
- Diagnosed flow characteristics using acoustic data and visual analysis, identifying shock cell formations across nozzle configurations.
- Observed that the Mach 2.5 nozzle at NPR 3 exhibited over-expansion and a distinct screech, as indicated by sharp peaks in the acoustic spectrum.

Multi-Disciplinary Design-Aircraft design
- Spearheaded a multi-disciplinary design project focused on aircraft innovation, demonstrating a deep understanding of aerospace engineering principles and design considerations.
- Utilized advanced engineering software, such as Catia V5, to create a detailed and accurate 3D model of the aircraft, allowing for precise analysis and optimization of various parameters.
- Conducted in-depth simulations and analysis to evaluate the aircraft's performance, including speed, aerodynamics, and fuel efficiency, resulting in a remarkable maximum speed of M=1.8 while improving overall efficiency by 3-4%.

Technical Skills ──

- **Languages & Software**: MATLAB, Python, LabView, Minitab, Excel Macros, PLM software, LabVIEW
- **Design & Analysis Tools**: AutoCAD, SOLIDWORKS, CATIA V5, Fusion 360, PTC Creo, Siemens NX, ANSYS, COMSOL Multiphysics, Abaqus, GD&T
- **Certification**: Autodesk CAD/CAM/CAE for Mechanical Engineer, Six Sigma Green Belt, Digital Manufacturing & Design Technology, Autodesk Generative Design, CAD and Digital Manufacturing, Machine Learning

Education ──

Arizona State University, Tempe, AZ
Master of Science: Aerospace Engineering   **August 2021-May 2023**
Relevant Coursework- Linear Algebra in Engineering, Polymers & Composites, Design of Aerospace Structures, Modern Manufacturing Methods, Applied CFD, Design Optimization, Probability & Reliability, Thesis

SRM Institute of Science & Technology (KTR), Chennai, India
Bachelor of Science: Aerospace Engineering   **August 2016-May 2020**
Relevant Coursework- Aerospace Materials, Aircraft Structures, Applied Structural Mechanics, Vibrations & Elements of Aeroelasticity, Applied Solid Mechanics, Material Science, Major Project

Publications ──

1. Tiwari, L., Tang, T., Rong, J., Shan, W., Yang, Y., Li, X. (2022). "Thermoelectric material fabrication using mask image projection based Stereolithography integrated with hot pressing." Journal of Material Science and Technology Research, 9(1), 105-113.
2. Tang, T., Joralmon, D., Tiwari, L., Ravishekar, R., He, Q., Pham, L., Yang, Y., Li, X. (2024). "Additive manufacturing of polymer matrix composites via direct ink writing process." Additive Manufacturing of Polymer-Based Composite Materials.
3. Tiwari, L. (2023). "Physical Modeling and Simulation of Polymeric Structures with Metallic Material Printed by Electrically Assisted Vat Photopolymerization for Property Enhancements." Arizona State University.
4. Dubey, P., Pramod, M.Y., Tiwari, L., Kannan, B.T. (2020). "Preliminary aeroacoustics measurements of conditioned jet flow from a circular nozzle." IOP Conference Series: Materials Science and Engineering, 912(2), 022024.