

Roopinder Singh

MECHANICAL ENGINEER - CAD Design, Simulation and Analysis, Process Optimization

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SKILLS

- **Advanced CAD Tools:** SolidWorks, AutoCAD, Autodesk Fusion 360, and GD&T, with expertise in creating 3D models, technical drawings, assembly designs, and tolerance for precision engineering applications.
- **Simulation and Analysis:** ANSYS WorkBench, Fluent, SIMULINK, and Finite Element Analysis, performing structural, thermal, and simulations to enhance design accuracy and optimize engineering solutions.
- **Programming Proficiency:** Python, MATLAB, ArduinoIDE, C++, and APDL for engineering automation, data analysis, scripting, control system development across engineering and industrial projects.
- **Product Management:** SolidWorks PDM, SAP S4 Hana, Advanced Excel, PowerBI for managing project life cycles, engineering documentation, data visualization, inventory control across manufacturing environments.

WORK EXPERIENCE

Research Engineer

January 2023 - October 2023

National Research Council of Canada, Remote, Ottawa

- Generated CAD models for bridge components, improving design accuracy by 30% and reducing manual redesign.
- Analyzed load-carrying capacities using simulations & calculations, streamlining processes across 10 projects.
- Boosted simulation efficiency by 20% through maximized boundary conditions and high-quality mesh generation.
- Authored technical reports incorporating material properties and compliance with all Eurocode standards.

Engineering Student (Co-op)

January 2022 – April 2022

National Research Council of Canada, Hybrid, Ottawa

- Redesigned tilt-table chains, reducing operator strain by 20% using advanced tools like ANSYS Workbench.
- Presented project updates to 12 stakeholders, securing alignment and ensuring timely milestone achievement.
- Automated dynamic and static load analysis with VBA, improving productivity by 30% and reducing error.
- Amplified load-bearing capacity of M59 Wall Furnace by 10% using advanced design and finite element analysis.

Junior Product Engineer (Co-op)

August 2021 – December 2021

PolyUnity Tech – CHEO Hospital, Remote, Ottawa

- Crafted 20+ 3D-printed components, reducing development time by 25% & increasing product reliability.
- Revamped production efficiency by 40% through process enhancements, effective collaboration, & agile workflows.
- Mitigated equipment downtime by 15% through troubleshooting and maintenance of 3D printing systems.
- Collaborated with 15 clients on custom product designs, achieving a 95% satisfaction rate & project expectations.

Assistant Manager

January 2020 - November 2020

Vedanta Aluminum Ltd, India

- Supervised manufacturing teams, achieving a 15% increase in throughput by streamlining operational processes.
- Reduced downtime by 20% for 50 machines through predictive maintenance & structured servicing schedules.
- Systematized safety audits, reducing workplace incidents by 25% through training and advanced compliance.
- Implemented raw material management improvements, reducing waste by 10% and improving material usage.

Engineering Intern

June 2018 - August 2018

Maruti Suzuki, India

- Upgraded assembly workflows, reducing rejection rates by 10% & enhancing consistency in production lines.
- Minimized defects by 15% through tool adjustment, ensuring CNC equipment operations, precision, & tolerances.
- Identified production bottlenecks, reducing delays by 20% with root cause analysis and process optimization.
- Innovated improvement plans for processes, achieving a 12% increase in throughput and smoother transitions.

Engineering Intern

May 2017 - June 2017

Indian Railways, India

- Reduced inspection times by 20% through refined track alignment methods, enhancing operational efficiency.
- Controlled material performance tests, increasing rail component durability by 15% through recommendations.
- Reduced equipment downtime by 10% by designing schedules and ensuring timely execution during downtime.
- Authored detailed technical reports for project milestones, aiding in future planning & reducing troubleshooting.

Engineering Intern

March 2017 - April 2017

Indira Gandhi International Airport, India

- Improved efficiency by 10% through optimizing power distribution systems & equipment maintenance schedules.
- Reduced equipment repair response times by 15%, enhancing reliability & ensuring servicing of airport operations.
- Supervised energy audits, identifying inefficiencies & achieving 8% operational savings by optimized power usage.
- Enhanced documentation, improving maintenance consistency by 12% through streamlined recording methods.

PROJECTS

DTU SuperMileage Vehicle – Urban and Prototype Concept

Steering and Brakes Department

- Established and revitalized steering and braking systems, achieving a mileage of 150 kilometers per kilowatt-hour.
- Designed Ackermann geometry, rack and pinion systems, and brake mounts, achieving precise control accuracy.
- Collaborated with 10 teammates across departments, reducing design errors and ensuring vehicle compliance.

Research on Robotic Mapping Techniques

Research and Developer

- Formulated a 2D mapping algorithm with 95% accuracy, integrating ultrasonic and IMU sensors for consistency.
- Reduced positional errors by 15% using probabilistic models, enhancing algorithm performance and accuracy.
- Conducted tests across three simulated environments, ensuring algorithm robustness and mapping reliability.

Conveyor System Redesign and Implementation

Design Engineer

- Redesigned conveyor sections using AISI 1018 steel, improving and increasing operational efficiency by 30%.
- Conducted finite element analysis using ANSYS software, validating mechanical behavior under load conditions.
- Optimized system layout, reducing material handling delays by 15% and enhancing conveyor integration.

Aftermarket Electronic Clutch System for Manual Vehicles

Design and Simulation Lead

- Modeled clutch components using SolidWorks and ANSYS tools, achieving a 15% improvement in performance.
- Integrated actuators, sensors, and control units into a prototype, ensuring clutch-less driving experience.
- Prepared a presentation for stakeholders, securing approval to further develop the prototype & improve readiness.

Computer Vision-Based Road Surface

Simulation Lead

- Developed a CNN detection system for road surfaces with TensorFlow, for 90% accuracy by backpropagation.
- Integrated Kalman filters with sensor techniques, reducing vehicle stopping distances by 15% by optimization.
- Validated performance on 50+ image samples, ensuring consistent system accuracy and demonstrating scalability.

Simulation of Rolling Resistance Impact on Vehicle Energy Consumption

Course Project

- Simulated tire pressure variations, optimizing energy consumption variability and improving consistency by 20%.
- Delivered a comprehensive velocity profile model for 24-hour usage, achieving predictive accuracy improvements.
- Recommended monitoring solutions, helping achieve a 12% reduction in rolling resistance effects using instrumentation.

Valve Seat Height Analysis Using the Moving Range Method

Summer Intern and Quality Analyst

- Analyzed valve seat height tolerances in Maruti Suzuki's DMS, improving precision & reducing defects by 15%.
- Improved machining efficiency by 10% through comparative analysis of cutting fluids, enhancing manufacturing.
- Implemented process changes for valve finishing, reducing inspection time by 25% while ensuring product quality.

Automated Net Static Load Analysis and Chain Selection Tool

Freelancer

- Created a Google AppSheet tool for load analysis and chain selection, improving workflow efficiency by 35%.
- Automated load calculations for tilt tables, reducing time consumption, & improving manual effort by 20%.
- Steered feedback sessions with two users, refining the tool interface and reducing input errors by 12% iteratively.

Cryptocurrency Data Analytics and Visualization

Data Analyst and Visualization Specialist

- Processed historical datasets of 23 cryptocurrencies, achieving 99.85% accuracy for Ethereum price predictions.
- Designed interactive Power BI dashboards with Python scripts, enhancing stakeholder decision-making processes.
- Evaluated correlations between 3 major cryptocurrencies, identifying predictive trends & providing insights.

ARTICLES

Development and Analysis of a Thermo-Electric Generator to Incorporate in a Roof-Top Water Tank.

International Conference for Advanced Production and Industrial Engineering

October 2017

- Proposed a thermo-electric unit integrated into a rooftop water tank, utilizing CSP systems to raise the tank's outer surface temperature to 423K, leveraging Seebeck effect principles, and producing a steady voltage of 12V.
- Orchestrated thermal analysis using ANSYS, validating thermo-electric coefficients from commercial units, optimizing heat flux distribution, leveraging finite element methods, & achieving an efficiency improvement.
- Demonstrated a green energy solution with noiseless operation, converting waste heat at temperatures below 500K to electrical energy using Seebeck effect principles, thermo-electric modules, and heat sink optimization.

EDUCATION

Master of Engineering – Mechanical Engineering

September 2020 – April 2023

University of Ottawa, Ottawa, Canada

Bachelor of Technology – Mechanical Engineering

August 2015 – June 2019

Delhi Technological University, Delhi, India

CERTIFICATIONS

- SOLIDWORKS: Design for Mechatronics, SOLIDWORKS: Sheet Metal Design Introduction to Geometric Dimensioning and Tolerancing, Introducing Robotic Process Automation, Learning MATLAB.