

UDAY KUMAR

Mechanical Design Engineer — R&D Engineer — CAD/CAE/FEA — Product Development

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Professional Summary

Results-driven **R&D Mechanical Engineer** with expertise in the **automotive and industrial automation sectors**, specializing in **mechanical product design, powertrain systems, and engineering development**. Proven ability to translate **complex engineering concepts and research insights** into reliable, manufacturable, and cost-effective solutions aligned with **global industry standards**.

Experienced in managing the complete **product development lifecycle**, from **concept generation and design validation** to **prototype development and production readiness**. Skilled in delivering **lightweight, optimized, and high-performance components** that satisfy stringent requirements for durability, efficiency, quality, and manufacturability.

Strong background in **research-driven engineering and design optimization**, leveraging advanced simulation and modeling techniques to improve product performance, reliability, and process efficiency. Expertise in **3D CAD modeling, FEA, design validation, and system integration** for automotive, industrial, and automation applications.

Proficient in **Autodesk Inventor, HyperMesh, ANSA, and MATLAB**, with working knowledge of **Siemens NX, CATIA, PTC Creo, and ANSYS**. Experienced in developing complex assemblies, performing engineering analyses, and collaborating with cross-functional teams to deliver innovative, **future-ready engineering solutions**.

Core Competencies & Technical Skills

- **Mechanical Design & Product Development:** Powertrain Design, Heavy Machinery & Automation Systems, Precision Engineering, 3D CAD Modeling, Concept Development, Prototype Validation, Research-Driven Engineering, and End-to-End Product Development.
- **CAD Design & Engineering Tools:** Autodesk Inventor (Primary), Siemens NX, CATIA V5, PTC Creo, SolidWorks, AutoCAD; expertise in **parametric modeling, complex assemblies, drafting, and design optimization**.
- **Simulation & CAE Analysis:** ANSYS Mechanical, HyperMesh, ANSA, MATLAB; FEA, preprocessing, meshing, structural analysis, design validation, CAD/FEA workflow automation, DFMEA, PFMEA, Root Cause Analysis, and Design Review.
- **Manufacturing & Design Optimization:** Design for Manufacturability (DFM), Design for Assembly (DFA), Geometric Dimensioning & Tolerancing (GD&T), Tolerance Stack-up Analysis, Process Optimization, Engineering Documentation, 2D Engineering Drawings, Manufacturing Drawings, Detail Drawings.
- **Engineering Change & Release Management:** Engineering Change Management (ECN/ECR), Change Control, Design Release Documentation, Configuration Management, BOM Updates, Revision Control.
- **Engineering Management & Digital Workflows:** BOM Management, PLM/PDM Workflows, configuration management, CAD data management, cross-functional collaboration, and continuous improvement methodologies.

Professional Experience

Chropynska India Private Limited

R&D engineer - Trainee in Powertrain Design

Oct 2025 – Present

- Advanced engineering and R&D company focused on automotive and automation systems, specializing in **Powertrain & BIW components**, product concept development, detailed design, and validation.
- Spearheaded the design and development of **Powertrain components**, significantly enhancing struc-

tural integrity, performance, and manufacturability.

- Developed **100+ production-ready 3D CAD models and large-scale robotic deburring station assemblies (400–500 components)** using Autodesk Inventor, integrating mechanical subsystems and optimizing designs for manufacturing and assembly.
- Optimized mechanical assembly design using **DFM/DFA principles**, reducing assembly time by **15%** and improving manufacturing efficiency.
- Implemented lightweight design strategies through **CAD optimization and structural analysis**, achieving **10% reduction in component weight** while maintaining performance requirements.
- Improved engineering workflow efficiency by optimizing **CAD modeling, design validation, and documentation processes**, reducing overall design cycle time by **20%**.
- Conducted **FEA simulations** using ANSYS, Autodesk Nastran, NX Nastran, and HyperMesh for structural validation, stress analysis, failure identification, and component performance optimization.
- Applied **DFM/DFA principles** to reduce weight, minimize cost, and enhance manufacturability.
- Collaborated with manufacturing, quality, procurement, and engineering teams to deliver **first-pass approved designs** aligned with manufacturability, quality standards, and production requirements.
- Ensured compliance with **global automotive standards** and embraced Industry 4.0 practices to optimize manufacturing processes.

JK Fenner India Ltd

Quality & Product Design Engineer

2021 – 2022

- Played a pivotal role in supporting product design through advanced **3D modeling and simulation**, ensuring functional and manufacturable designs.
- Assisted in quality validation processes, which resulted in **reduced rework and improved product reliability**.
- Focused on **enhancing manufacturability** while adhering to industry compliance standards to ensure cost-effectiveness and performance.

Key R&D Projects

Robotic Deburring Station – Cylinder Block Machining Automation

Customer: Cummins India Ltd. — Chropynska India Private Limited

- Designed and developed a **robotic deburring automation system** for heavy-duty engine cylinder blocks (KV/QSK60 variants), integrating robotic machining, material handling, and automated manufacturing solutions.
- Developed **3D CAD assemblies, machine layouts, and mechanical concepts** for major subsystems including loading/unloading shuttle, conveyor mechanism, turntable with lifter, robot cell structure, tooling fixtures, and safety enclosure.
- Performed **FEA-based structural analysis and design validation** using CAE tools to evaluate component strength, identify critical stress regions, validate mechanical designs, and optimize structural performance.
- Conducted **design analysis activities** including CAD interference checks, assembly feasibility analysis, tolerance verification, and engineering validation to ensure reliable system integration.
- Supported integration of **KUKA & Fanuc robotic systems, dry deburring tools, brush holder mechanisms, and brush wear detection fixtures** for automated surface finishing operations.
- Designed mechanical solutions considering **component handling, orientation, fixture design, accessibility, manufacturability, and production workflow requirements**.
- Worked on industrial safety integration including **machine fencing, light curtains, area scanners, sliding doors, and safety locking systems**.
- Prepared **assembly models, engineering drawings, technical documentation, and design review inputs** for customer and cross-functional engineering discussions.

- Applied **DFM/DFA, GD&T, tolerance analysis, and design optimization principles** to improve system reliability, operator safety, and manufacturing readiness.

Internships & Industrial Training

Mechatronics & Automation Training

Bajaj Engineering & Skills Training (BEST), PES University Feb 2025 – Jul 2025

- Gained hands-on experience in **industrial automation, robotics, PLC programming, sensor integration, and Industry 4.0 technologies** through practical training projects.

Conceptia Konnect / Prime Tooling — CAD/FEA Trainee Intern Feb 2025 – May 2025

- Developed **3D CAD models and performed FEA simulations** using SolidWorks to support mechanical design optimization and structural validation.

Bharat Fritz Werner Ltd — Industrial Trainee Oct 2023 – Nov 2023

- Acquired practical knowledge of **CNC machining, manufacturing processes, machine tools, and shop-floor production workflows**.

Belathur Industries — Mechanical Intern May 2023 – Jun 2023

- Designed **mechanical components and engineering drawings** using CATIA V5 while supporting machining and manufacturing activities.

Bosch Diesel Services — CFD Intern Feb 2023 – Mar 2023

- Performed **CFD simulations using ANSYS Fluent** to analyze fluid flow and thermal behavior.

Projects

Free Convection in a Trapezoidal Cavity with Porous Media

- Used FEM-based simulations to study **natural convection and heat transfer**.
- Analyzed **Rayleigh number, porosity, and boundary conditions** using MATLAB.
- Generated valuable insights for **thermal management** in industrial energy systems.

Modeling & Analysis of Vertical Axis Wind Turbine (VAWT)

- Designed and analyzed **Savonius and Darrieus-type VAWT blades**.
- Performed **FEA and aerodynamic analysis** using ANSYS, QBlade, CATIA, and SolidWorks.
- Proposed design modifications to improve **efficiency and structural safety**.

Education

B.E. in Mechanical Engineering 2022 – 2025

Bangalore Institute of Technology, Bengaluru — CGPA: 8.5

Diploma in Mechanical Engineering 2018 – 2021

Jawaharlal Nehru Polytechnic, Bidar — Percentage: 72%

Certifications

- **CAD & Design Certifications:** Autodesk Inventor Professional, Siemens NX Basics, CATIA V5.
- **CAE & Simulation Certifications:** ANSYS Mechanical, HyperMesh, Ansa, Matlab.

Professional Interests

Areas of Interest: automotive & automation Design and development, Research and Development, Powertrain Systems Engineering, Heavy Machinery Design, Industrial Automation, CAD/CAE-based Product Development.

Languages: English, Kannada, Hindi, Marathi