

# Abhinav Bukkapatnam | Mechanical Design Engineer

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## SUMMARY

Mechanical Design Engineer with over **3 years of experience** in HVAC, chassis, and suspension systems for cleanroom and automotive applications. Proficient in SolidWorks, AutoCAD, CATIA, GD&T, DFMEA, and MATLAB. Delivered measurable improvements in thermal efficiency, vibration performance, and manufacturability. Hands-on with ERP/PLM systems for BOM control and engineering change management. Known for identifying high-risk design failures early, reducing rework, and accelerating prototype cycles across cross-functional teams in fast-paced, deadline-driven environments.

## TECHNICAL SKILLS

**Design & CAD Software:** SolidWorks, AutoCAD, Fusion 360, CATIA V5 R21, MATLAB

**Mechanical Design & Manufacturing:** 3D Modelling, GD&T, Tolerance Analysis, DFM/DFA, BOM Creation, Mechanical Sub-Assemblies, Sheet Metal Design, 3D Printing, Casting, Forging

**Analysis & Optimization:** Structural Analysis, Motion Analysis, Performance Testing, Design Validation, DFMEA, DMAIC, Root Cause Analysis (RCA), FMEA, System Optimization

**Manufacturing Standards & Practices:** 5S Methodology, Good Manufacturing Practices (GMP), Compliance Adherence, Quality Control, Quality Assurance, Safety Management

**Project & Process Management:** Planning & Scheduling, Resource Allocation, Risk Management, Team Supervision, Documentation & Reporting, Change Management, Budgeting & Cost Control, Critical Path Analysis, Cost-Benefit Analysis, Process Improvement, Cost Reduction Strategies

**Cross-Functional Skills:** Customer Service Handling, Cross-Functional Collaboration, Training & Supervision, Communication,

**Product Lifecycle Management:** ERP/PLM Systems, Technical Documentation, Prototyping & Testing, Product Development

**Product Testing & Validation:** Component Testing, Thermal Management, Functional Testing of Mechanical Systems

**Productivity Tools:** Microsoft Excel, PowerPoint, Word, OneNote

## PROFESSIONAL EXPERIENCE

**DuPont de Nemours, Inc., USA**

Feb 2025 – Current

**Mechanical Design Engineer**

**Project: Tyvek® Cleanroom HVAC Heat Exchanger Redesign**

- Designed 3D heat exchanger assemblies using SolidWorks and AutoCAD, reducing thermal inefficiencies by 12% and shortening manufacturing cycle time by 17% through accurate GD&T and tolerance stack-up.
- Conducted MATLAB simulations to validate vibration and pressure response of polymer housing, preventing part failure under 1.5x expected operating loads during cleanroom system validation.
- Implemented DFMEA across critical components, identifying 5 high-risk failure points and mitigating issues through design change before physical testing, preventing project delays.
- Used DuPont's ERP/PLM system to manage BOM revisions and technical documentation, cutting supplier revision errors by 40% over two consecutive product development cycles.
- Led RCA on recurring leak failures in thermal modules, identifying O-ring misalignment as root cause and redesigning interface, reducing field complaints by 31% within six months.

**Mahindra & Mahindra, India**

Aug 2021 – Apr 2023

**Mechanical Design Engineer**

**Project: Scorpio-N Chassis and Suspension System**

- Designed suspension arms and brackets in CATIA V5 with GD&T and tolerance stack-up analysis, reducing welding rework and assembly issues by 22% during pre-production.
- Conducted MATLAB-based simulations for spring dynamics under off-road conditions, validating behavior under 1.2g lateral forces and ensuring structural stability across rugged terrains.
- Applied DFM and 5S practices to sheet metal parts, decreasing tool changeover by 14% and saving approximately ₹2.3 Lakhs annually through improved manufacturability.
- Led DFMEA sessions that uncovered three potential weld fatigue zones, reinforcing gusset areas and increasing test life span by 28% during full-vehicle fatigue trials.
- Managed BOM and engineering change documentation in ERP, achieving 99% part traceability and meeting 100% deadline compliance for Scorpio-N pilot builds.

**Mahindra & Mahindra, India**

Feb 2021 – Jul 2021

**Design Engineer Internship**

**Project: HVAC Duct System Optimization – Bolero Neo**

- Modelled HVAC duct layouts in CATIA V5, improving airflow efficiency by 18% and reducing cabin cooling time by 23 seconds during thermal validation testing in climate-controlled chambers.
- Used Fusion 360 and in-house 3D printing to prototype airflow channels, reducing design iteration time from seven days to 48 hours while maintaining geometric accuracy.

- Drafted initial DFMEA for HVAC components, identifying risks due to material expansion and suggesting geometric fixes to maintain consistent performance across idle and operational cycles.
- Supported airflow testing using pressure sensors and thermal probes, validating computational simulations and enabling final design sign-off for pilot vehicle production.
- Maintained BOMs and engineering drawings in ERP, achieving 100% supplier alignment across three manufacturing vendors during prototype production and pre-launch validation phases.

## EDUCATION

### Master of Science in Mechanical Engineering

Texas A&M University, Kingsville, USA

Dec 2024

### Bachelor of Science in Mechanical Engineering,

Sphoorthy Engineering College, JNTU Hyderabad, India

Aug 2022

## PROJECTS

### Design, Assembly, and Simulation of a Four-Wheel Drive Obstacle Avoidance Mobile Robot

- Designed and fabricated a custom aluminium chassis using SolidWorks and 3D printing; reduced frame weight by 20%, improving manoeuvrability and load efficiency in real-time mobile testing.
- Programmed Arduino for 0.2-second obstacle detection; integrated sensors, control logic, and simulation using MATLAB, achieving 95% accuracy in dynamic obstacle navigation during trial runs.

### Design & Modelling of Mechanical Raking Beach Cleaner

- Designed beach cleaner using chain sprocket mechanism and DC motor, collecting 85% of surface waste per sweep; focused on sustainable garbage removal in shoreline environments.
- Modelled full assembly in SolidWorks using ASTM A106 Grade B material, presented technical justification and stress data in a structured team presentation to peers and faculty.

### Design & Modelling of Four-Stroke IC Engine

- Designed a 4-stroke internal combustion engine in CATIA V5 R21; calculated precise dimensions for piston, crankshaft, and cylinder using analytical methods and real-world engine benchmarks.
- Validated design under full-load stress conditions using theoretical and simulation analysis; achieved safety margin of 1.3x over maximum torque, ensuring structural reliability of all key components.