VAMSI SAI MOLLETI

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ACADEMIC PROFILE

Aerospace Structures Engineer with over three years of experience assessing the structural integrity, fatigue life, and manufacturing and service-related defects of critical aero-engine components for Pratt & Whitney programmes. Experienced in applying advanced finite element methods to non-conformance assessment, remaining-life evaluation, and engineering substantiation. Developed an internally approved industrial invention integrating digital twins, AI-based defect detection, structural risk assessment, and adaptive material re-deposition; the invention is currently under legal review for intellectual property protection.

RESEARCH INTERESTS

Metal Additive Manufacturing | Aerospace Structural Integrity | Additive Repair Technologies | Defect Characterisation | Fatigue and Fracture Assessment | Digital Twin-Driven Manufacturing | AI-Based Defect Detection | Sustainable Remanufacturing

EDUCATION

Master of Technology in Digital Manufacturing, BITS Pilani WILP, Hyderabad, India **2023–2025**

CGPA: 7.28/10 | Dissertation grade: Excellent

- Dissertation: Metal Additive Manufacturing as a Strategic Solution for Reducing Manufacturing Deviations in Aero-Engine Hot Sections.
- Relevant coursework: Additive Manufacturing, Digital Manufacturing, and Advanced Manufacturing Systems.

Bachelor of Technology in Mechanical Engineering, BVCITS, Batlapalem, India **2020–2023**

CGPA: 7.9/10

- Project: Design and Fabrication of a Semi-Artificial Intelligence-Based Electric Vehicle.

Diploma in Mechanical Engineering, BVCITS, Batlapalem, India **2017–2020**

Percentage: 80.83%

PROFESSIONAL EXPERIENCE

Cyient Ltd., Hyderabad, India **April 2023–Present**

Structures Engineer / CAE Engineer | Client: Pratt & Whitney | MTF Programme

- Perform structural integrity, fatigue-life, and defect assessments for critical aero-engine casing and hot-section components, including HPT cases, outer and inner cases, heat shields, and vane structures.
- Conduct static and thermal finite element analyses in ANSYS Workbench and Mechanical APDL to evaluate components and assemblies under operational loads.
- Develop nominal and defect sub-models from global-model results, covering model setup, contact definition, meshing, boundary conditions, loading, post-processing, crack-initiation life, and crack-propagation life using Pratt & Whitney-provided tools.
- Assess quality non-conformances from root-cause understanding through component lifing and prepare detailed technical substantiation for client approval.
- Support time-critical Eagle Net Cases involving inspected service-part defects by calculating remaining life and providing structural assessment results.
- Evaluate the influence of thickness and defect deviations on aero-engine components to establish a conservative framework for verifying and approving manufacturing non-conformances.
- Collaborate with design and manufacturing teams to clarify processes, strengthen assessments, and communicate technical feedback.

PATENT AND INNOVATION ACTIVITY

System and Method for Closed-Loop Stress-Informed Digital-Twin-Driven Directed Energy Deposition

with AI-Based Defect Detection, Structural Risk Assessment, and Adaptive Material Re-Deposition

Status: Internal technical approval completed; under legal review for intellectual property protection.

- Developed an industrial invention integrating additive manufacturing, digital twins, AI-based defect detection, structural risk assessment, and adaptive material re-deposition for the repair of critical metallic components.
- Completed internal technical approval at Cyient Ltd.; currently undergoing legal review for intellectual property protection.

RESEARCH MANUSCRIPTS

Metal Additive Manufacturing as a Strategic Solution for Reducing Manufacturing Deviations | In preparation

in Aero-Engine Hot Sections

- Completed research on the use of metal additive manufacturing to reduce manufacturing deviations in aero-engine components; manuscript is being prepared for submission to a peer-reviewed journal.

Generative Design and Single-Bead Parametric Optimisation of a Mechanical Component | Ongoing

with Assumed and Thermal Strain Analysis: A Study of 273 Iterations

SELECTED RESEARCH AND ENGINEERING PROJECTS

Metal Additive Manufacturing for Aero-Engine Hot Sections | M.Tech Dissertation

- Investigated a strategic transition of aero-engine turbine vane packs from conventional investment casting to Laser Powder Bed Fusion and Directed Energy Deposition to address recurring manufacturing non-conformances.
- Performed thermo-structural FEA and additive manufacturing simulations in ANSYS and optimised laser printing parameters to achieve a reported solid-density ratio of 1.0 with internal porosity below 0.1.

Semi-Artificial Intelligence-Based Electric Vehicle | B.Tech Project

- Designed and fabricated an electric vehicle using a 60 V, 80 Ah lead-acid battery and a 60 V BLDC motor with differential.
- Implemented semi-autonomous functions including self-driving, obstacle detection, constant acceleration, safety navigation, and automatic forward and reverse acceleration using Raspberry Pi, Arduino, and advanced Arduino coding.

Additional Engineering Projects

- Unlocking Precision: Role of AI and Robotics in Precision Engineering.
- Revolutionising Organisation: The Future of Cable Management Through Additive Manufacturing.

TECHNICAL SKILLS

Research domains: Metal additive manufacturing, aerospace structural analysis, fatigue and fracture assessment, defect characterisation, additive repair technologies, digital twin-driven manufacturing, structural risk assessment, and smart manufacturing systems.

Analysis and simulation: ANSYS APDL/Classic, ANSYS Workbench, ANSYS Additive, finite element analysis, static and thermal analysis, nominal and defect sub-modelling, crack-initiation and crack-propagation assessment, and remaining-life evaluation.

Engineering and programming tools: Python, NX, CATIA, SolidWorks, AutoCAD, Solid Edge, Cura, MATLAB/Simulink, Proteus, Raspberry Pi, and Arduino.

Languages: Telugu, English, Hindi, and basic German.

AWARDS AND LEADERSHIP

- Most Valuable Performer of the Team, Cyient Ltd., awarded in three consecutive years: 2024, 2025, and 2026.
- Student Section Chairperson and Member, American Society of Mechanical Engineers, BVCITS Chapter.
- District-level Chess Championship participant.