

Madhav Sonkusare

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About

Mechanical engineer working on liquid rocket propulsion. Junior Engineer in the Technology Team at Thrustworks Dynetics, building in-house tools for thrust-chamber design, engine thermal analysis and nozzle geometry. At MIT Manipal I led the mechanical and propulsion work on a sounding rocket that placed 4th in category at IREC 2025, developed and static-fired solid rocket motors, and published two journal papers on natural fibre composites.

Education

Manipal Institute of Technology

2022 to Aug 2026

B.Tech. (Honours), Mechanical Engineering · Minor in Materials · CGPA 9.1 / 10

Experience

Thrustworks Dynetics, Pune

Jan 2026 to Present

Junior Engineer · Technology Team

- Develop in-house solvers and engineering tools for thrust-chamber design, engine thermal analysis and nozzle geometry, using Python, MATLAB, NASA CEA and ANSYS Mechanical.
- Work with other teams to take designs through numerical simulation, CAD, manufacturing, quality assessment and testing.
- Joined as a Technology Development Intern in January 2026; Junior Engineer since September 2026.

Team thrustMIT, MIT Manipal

Sept 2023 to Aug 2025

Deputy Project Manager · Mechanical & Propulsion Lead

- Coordinated a 30-member student rocketry team as Deputy Project Manager; owned the airframe, motor mount and thrust plate, avionics bay and mounts, and integration and launch operations.
- VAYUVEGA flew to 29,432 ft on an AeroTech O5500X and was recovered cleanly: 4th of 21 in the 30K COTS category at IREC 2025, top Indian team overall, and 2nd prize worldwide in the SDL Payload Design Challenge.
- Propulsion lead on AGNI, an in-house KNSB M-class motor: after the first motor failed at 1.63 s, the rebuilt motor completed its burn at 9,202 N·s total impulse and 2,163 N average thrust.
- Designed a reusable threaded-closure research motor (sized to ASME BPVC VIII-1, proof-tested at $1.5 \times$ MEOP) to static-fire nitrate propellants calculated at 40% to 75% higher Isp than KNSB.
- Mentored the junior propulsion team on Kali, the N-class motor that flew thrustMIT's Varuna at IREC 2026.

CSIR-National Aerospace Laboratories, Bangalore

May to Jun 2024

Research Intern · Advanced Composites Division

- Studied composite materials with negative-thermal-expansion fillers for cryogenic hydrogen fuel tanks.

Projects

Hybrid reaction-jet and aerodynamic control of an air-breathing hypersonic vehicle · final-year research. Simulated control of an air-breathing hypersonic vehicle shared between reaction jets and aerodynamic surfaces in MATLAB and Python; blending reduced peak surface demand where aerodynamic authority was limited.

Natural fibre composites · flax vs hemp epoxy. Fabricated vacuum-infused flax and hemp laminates, ran the mechanical, thermal, fire and acoustic tests, analysed the data and wrote the papers: two in Sci (MDPI).

Solar sail boom deployer · 3rd place, CAST design challenge 2025. Concept deployer for four CFRP tape-spring booms driven from one spur gear, with spring-loaded tensioners on each coil.

Wear of rPET and graphene-filled rPET · materials minor. 18 pin-on-disc tests to ASTM G99 at three loads and three speeds, with optical microscopy of the worn surfaces.

Publications

- Thermal and Acoustic Properties of Flax and Hemp Epoxy Bio-Composites Fabricated Using Vacuum-Assisted Resin Infusion Moulding. *Sci (MDPI)* · 17 Sep 2026 · first author
- Comparative Mechanical Performance of Alkali-Treated Unidirectional Flax/Epoxy and Hemp/Epoxy Composite Manufactured via VARIM. *Sci (MDPI)* · 9 Jun 2026 · second author

Skills and other

Software & tools: Fusion 360, SolidWorks, CATIA / 3DEXPERIENCE, ANSYS Mechanical, ANSYS Fluent, NASA CEA, ProPEP, OpenRocket, RASAero II, OpenMotor

Engineering: Liquid and solid rocket propulsion, Thermal modelling, FEA, Pressure vessel sizing (ASME BPVC), DFMA, GD&T, Propellant casting and static-fire testing, Composite layup and vacuum infusion, FDM / SLA 3D printing, Materials testing (UTM, hardness, wear)

Programming: Python, MATLAB, C | **Courses:** 4 NPTEL courses in materials engineering | **Languages:** English, Hindi, Marathi

Extracurricular: Core Committee Member, TechTatva 2024. Organised ESCAPE VELOCITY, a rocket design workshop and bottle rocketry competition at MIT's annual tech fest.