



RAJ RUPESH MAHADIK

Metallurgical Engineer

CONTACT

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SKILLS

Hydrogen-Based Direct Reduction (DRI)

Mechanical Properties Evaluation:
Porosity Measurement, Compression
Testing

Iron Ore Beneficiation & Pelletization

Thermodynamics & Kinetics of
Reduction

Thermogravimetric Analysis (TGA)

Pin Gauge Calibration

Metrology & QC

Slip Gauge Calibration

Origin

BOM Preparation

AutoCAD

MATLAB

ANSYS

MS Excel

MS Word

Mechanical Design

3D Printing

Markforged

Machine Shop Operations

ABOUT ME

Metallurgical Engineer pursuing M.Tech at IIT (ISM) Dhanbad, specializing in iron ore processing, pellet chemistry, and hydrogen-based direct reduction for green steel. Experienced in experimental R&D, including reduction kinetics using TGA, flux and basicity optimization, and microstructural characterization through XRD, SEM, and XRF techniques. With a strong Mechanical Engineering foundation, I possess expertise in mechanical design principles, process equipment understanding, CAD tools, and thermo-mechanical behavior of materials. Passionate about DRI decarbonization and sustainable steelmaking, I aim to integrate metallurgical science with mechanical systems to develop scalable, industry-oriented, low-carbon solutions for global steel industry transformation.

WORK EXPERIENCE

Feb 2024 - Jun 2024

Quality Control Intern

Accurate Metrology and Automation | Pune, Maharashtra

- Calibrated precision instruments including pin gauges, slip gauges, and cylindrical masters to ensure measurement accuracy.
- Worked with automation and Bill of Materials (BOM) systems to streamline quality control processes.
- Gained hands-on experience with machine shop operations and precision measurement techniques.

Mar 2021 - Apr 2021

Social Audit Resource Person

MS-SSAT, Government of Maharashtra | Ratnagiri, Maharashtra

- Conducted field audits and community meetings for MGNREGA social audits under the guidance of District Resource Persons.
- Performed data verification and reporting to ensure transparency and accountability in government schemes.

NOTABLE ACHIEVEMENTS

Designed and planned hydrogen-based reduction studies on fluxed hematite pellets to evaluate basicity influence and binder performance for green steel applications.

Developed an eddy-current-based automation system for component sorting at Schaeffler India Ltd.

Led 3D printing and Finite Element Analysis (FEA) on ASTM specimens to optimize design decisions using ANSYS and Markforged.

Served as a Social Audit Resource Person for MGNREGA, conducting field audits and data verification.

PROJECTS

Hydrogen-Based Iron Ore Reduction for Green Steel

Researcher

EDUCATION

M.Tech - Metallurgical Engineering

Indian Institute of Technology (ISM),
Dhanbad CGPA: 7.38 (3rd Sem)
July 2024 - Present

B.Tech - Mechanical Engineering

Dr. Babasaheb Ambedkar Technological
University, Lonere (DBATU) CGPA: 6.58
2021 - 2024

- Studied hydrogen-based reduction of fluxed hematite pellets through kinetic modeling, swelling analysis, and SEM/XRD characterization.
- Conducted TGA reduction trials using H₂ with varied binders (eggshell, bentonite, lime) to generate process insights.
- Provided scale-up guidance aligned with India's Green Steel Mission and future H-DRI technologies.

Eddy Current Crack Detection System

Developer

- Developed an eddy-current-based automation system for Schaeffler India Ltd.
- Implemented sorting mechanisms for ASEH and SLH components.

FEA of Nylon & Onyx ASTM Specimens

Lead Analyst

- Led 3D printing and Finite Element Analysis (FEA) on ASTM specimens using ANSYS.
- Explored infill and material effects to make data-driven, optimized design decisions.
- Operated the Markforged Mark 2 printer for prototype fabrication.

Screw Jack Design (160 kN)

Designer

- Designed a complete screw jack mechanism including material and thread profile selection.
- Developed and fabricated an automatic door closer mechanism.

ACCOMPLISHMENTS

Certifications

- **Summer Training Programme on Remote Sensing and GIS India Space Academy (ISA)** - India Space Academy (ISA) Under: Department of Space Education India Space Week (July–August 2025)
- **Tata Technologies Ready Engineer** - Tata Technologies

Awards

- **1st Prize - Geography Project** (2013-14)
- **C Grade - Government Drawing Exam** (2013-14)
- **First Class - Science Entertainment Competition** (2013-14)
- **Special Excellence - Mathematics Sambodh Examination** (2012-13)

Volunteer Work

Core Organizing Team Member at CRISP 2025

Volunteered for Critical Metals: Recycling, Innovation, Separation and Processing.

Core Committee Member at MESA (Mechanical Engineering Students Association)

CONFERENCES & EVENTS

- Attended National Conference on Green Steel Production (GSP 2024)
- Participated in 18-hour study event on Dr. B.R. Ambedkar Jayanti 2023