

# Manoj Mugale

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## PROFILE SUMMARY:

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- Ph.D.: Mechanical Engineering | Material Science | Mechanical - Production Engineer.
- Research-3 yrs+ experience | Manufacturing | Materials Science | Lean Six-Sigma | Academics | 3D Printing.

## EDUCATION:

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- **Ph.D. Candidate, Mechanical Engineering**, Cleveland State University, Ohio, USA Dec 2024 (GPA: 4.0)
- **M.S. Manufacturing Technology**, National Institute of Technology, Trichy, India Aug 2012 (GPA: 3.7)
- **B.S. Mechanical Engineering**, Dr. BAMU University, Aurangabad, India Aug 2009 (GPA: 3.8)

## RESEARCH EXPERIENCE:

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**Graduate Research Assistant | Cleveland State University (CSU), Cleveland, Ohio** Aug 2021 - Present

**Project 1:** *Design and Development of Low-Density High Entropy Alloys (LDHEAs) for Aerospace and Structural Applications.*

- Designed LDHEAs based on phase formation principles using thermodynamic and topological parameters.
- Investigated the effect of heat treatment on phase formation (BCC/FCC), microstructure evolution, mechanical properties, thermal stability, and tribological performance.

**Project 2:** *Study of Oxidation and Protection Mechanism by Protective Coatings for Low Alloy Steel.*

- Evaluated various coatings for their oxidation and decarburization behavior on stainless steel (4340) alloy to reduce metal loss due to oxidation and enhance steel quality.
- Conducted testing on industrial specimens and prepared technical reports for companies including Canton Drop Forge, Clifford-Jacobs Forging, and PC Forge.

### Characterization/Analysis Techniques:

- **Materials testing:** Microhardness, Tribology test, Compression/Tensile Test, Mini-Tensile Test.
- **Materials Characterization:** Optical Microscopy, Scanning Electron Microscopy (SEM), X-ray Diffraction (XRD), Electron backscatter diffraction (EBSD), Differential Scanning Calorimetry (DSC), Thermogravimetric analysis (TGA), Design of Experiments (DOE), Statistical analysis.
- **Material Processing:** Mechanical Alloying, Powder Metallurgy, Spark Plasma Sintering, Heat treatments.

### Academic Projects/ Seminars (B.S./M. S):

- Finite element analysis of friction stir welding process of pure titanium using Ansys Explicit dynamics.
- Butt fusion welding of High-Density Polyethylene (HDPE) pipes.

### USRA Proposal and Projects:

- Received a grant for a proposal titled "Design and Development of Non-Equiatomic AlCuFeNiTi Low-Density High-Entropy Alloy for Energy-Saving Applications using Phase Formation Rules"
- Mentored undergraduate students for USRA projects, resulting in poster presentations.

## PROFESSIONAL EXPERIENCE:

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**Graduate Teaching Assistant | Cleveland State University (CSU), Cleveland, Ohio** Aug 2021-Present

### MCE-286 materials and manufacturing process lab

- Instructed students on safely using lathe and milling machines, demonstrated diverse machining techniques, addressed operational queries, prepared the lab by ensuring the availability of materials and equipment, conducted pre-lab checks on machine functionality, and troubleshoot technical issues.

**Assistant Professor Mechanical Engineering, University of Pune, India** July 2012 - July 2021

### Courses Taught:

- Manufacturing Processes I and II, Material Science, Engineering Metallurgy, Metrology and Quality Control
- Advanced Manufacturing Processes (Including FDM, Binder Jet and SLM), CAD/CAM, Strength of Materials

**Lab /Practical Session:** Workshop Practices I/II, Engineering Metallurgy, CAD/CAM / Auto-CAD, and Seminars

### Services:

- Delivered guest sessions for competitive exams (e.g. Graduate Aptitude Test in Engineering (GATE) Exam).
- Guided many undergraduate students with final-year project work.

## **PUBLICATIONS:**

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- **Mugale, M.** et al., “High Strength-Ductility Combination in Low-Density Dual Phase High Entropy Alloy.” *Journal of Alloys and Compounds* (2024): *under review*.
- **Mugale, M.** et al., “Tweaking AlNi Atomic Fraction to Enhance the Mechanical Properties of Low-Density Non Equiatomic AlCuFeNiTi- based High Entropy Alloy.” *Materials Science and Engineering: A* (2024): *under review*.
- **Mugale, M.** et al., “Investigation of Protective Coatings for Reducing High-Temperature Oxidation of Steels.” *JOM* 2024, *under review*.
- Digole, S.; Karki, S.; **Mugale, M.**; et.al., “Influence of Spark Plasma Sintering Temperature on Microstructure and Characteristics of Pure Titanium.” *Materials* 2024, *17*, 3469.
- Choudhari, A.; Elder, J.; **Mugale, M.**; et.al. “Enhancing Quality Control: Image-Based Quantification of Carbides and Defect Remediation in Binder Jetting Additive Manufacturing.” *Materials* 2024, *17*, 2174.
- Walunj, G., **Mugale, M.**, et al., “Spark Plasma Sintering of Mechanically Alloyed High Entropy Nitrides to Investigate the Mechanical, Tribological, and Oxidation Properties,” *JOM* 2023, 1-15.
- Wankhede S, Pesode P, Jadhav D, Mane Y, **Mugale M.**, “Experimental Performance and Comparison of Sustainable Cooling Techniques for Solar (Photovoltaic) Panel,” *NanoWorld-2023, J 9(S4): S105-S112*.

## **BOOKS/BOOK CHAPTERS:**

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- **M.V. Mugale**, Dr. M. B., “Manufacturing Process – I,” Nirali Prakashan, *ISBN-13-978-9386084095*, 2016
- Dr. A.K. Bewoor, **M.V. Mugale**, Pralhad Pesode, “Manufacturing Process – II,” Nirali Prakashan, *ISBN-13 - 978-9387397354*, 2017.
- Wankhede, Sagar V., Ahmad, A., Pesode, P., & **Mugale, M.**, "Reuse, Remanufacturing, and Recycling of Mg Alloys." *Magnesium Alloys for Biomedical Applications*. CRC Press 189-206.

## **TECHNICAL SKILLS:**

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**Design tools and software:** AutoCAD, SolidWorks, ANSYS Workbench, MATLAB, Origin Pro, ImageJ, High Score Plus, Minitab.

### **Certification:**

- Lean Six Sigma-Green Belt and White Belt: GD&T Metrology (Drawing Interpretation).
- CNC Machining Training Program, ACE America’s cutting-edge online program.
- CSWA-Additive Manufacturing (AM) certificate
- Exploratory Data Analysis (JMP), Design of Experiments (DOE), Statistical Thinking, and Problem Solving by SAS/(JMP) programming.

## **LEADERSHIP AND VOLUNTEER:**

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- Worked as National Service Scheme (NSS) Program Officer and guided a team of 100 students in various social activities for three consecutive years in India.
- Faculty Advisor for **BAJA-SAE** at the National Level competition.
- President of the American Society of Engineers of Indian Origin (ASEI), CSU, Ohio
- Vice President of Material Advantage Society Chapter at CSU, Ohio.
- Participated in work on ‘Tape Scape: International Tape Station’ at Great Lakes Science Center, Ohio.
- Worked as a Volunteer at the BEST Medicine Engineering Fair, CSU, Ohio.
- Assisted as a Workforce Development Volunteer at The City Mission, Cleveland.

## **PROFESSIONAL MEMBERSHIPS:**

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- Member of the Material Advantage Society Oct 2021- Present
- Member of the Minerals, Metals & Materials Society (TMS) Oct 2021- Present

## **AWARDS:**

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- Appreciated by the Ministry of Water Supply and Sanitation for working as Coordinator for National Service Scheme-Govt. of Maharashtra, India.
- Dean’s Travel Grant for TMS and MS&T conferences.