

YESHWANTH REDDY MEKALA

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TECHNICAL SKILLS

Foundry & Casting: Induction furnace operation, alloy steel melting & casting, mold preparation, foundry safety protocols

Heat Treatment: Quenching, tempering, hardness/toughness optimization of alloy steels

Mechanical Testing: Charpy V-notch (CVN) impact testing, tensile testing, Rockwell, Brinell, Vickers, and microhardness testing (ASTM standards)

Microscopy & Characterization: Metallographic specimen preparation, optical microscopy, SEM fracture analysis, ASPEX automated inclusion analysis, EBSD, EDS

Modeling & Simulation: MATLAB, COMSOL, ANSYS Fluent, STAR-CCM+, finite element analysis (FEA)

Sensing & Instrumentation: Distributed fiber optic temperature sensing, Brillouin optical fiber technology

Process & Data Analysis: cGMP process validation, risk assessment, root cause analysis, SAS, JMP

EDUCATION

Missouri University of Science and Technology, USA

Ph.D., Materials Science & Engineering | 2021–2026 | GPA: 3.8/4.0

Emphasis: Process Development, Electric Arc Furnace (EAF) & Data Analytics

M.S., Chemical Engineering | 2018–2020 | GPA: 3.3/4.0

Jawaharlal Nehru Technological University, India

B.Tech, Chemical Engineering | 2012–2016 | GPA: 3.8/4.0

RESEARCH EXPERIENCE

Graduate Research Assistant — EAF Thermal Monitoring & Fiber Optic Sensing — Missouri University of Science and Technology 2021–2026

- Instrumented a 150-ton DC electric arc furnace with Brillouin optical fiber sensors to enable distributed temperature sensing of the spray-cooled shell, improving real-time furnace monitoring.
- Developed a heat transfer model of a DC EAF bottom anode to analyze thermal dynamics and predict refractory wear, supporting furnace reliability and maintenance planning.
- Conducted heat treatment studies on high-carbon alloy steel to optimize impact toughness and hardness, correlating microstructure with mechanical performance.
- Authored 4 peer-reviewed journal/conference publications and presented findings at AIST conferences on EAF thermal monitoring and fiber optic sensing.
- Built and sustained industrial collaborations to support field-scale data collection and model validation.

Graduate Researcher — PSMRC (Peaslee Steel Manufacturing Research Center) 2021–2026

- Completed foundry safety training and operated induction furnaces to melt and cast ferrous and non-ferrous alloy steels.
- Executed full-cycle foundry operations — mold preparation, alloy melting, pouring, and casting — across a range of alloyed steels.
- Performed heat treatment processes (quenching and tempering) to optimize hardness and toughness of alloy steels.
- Conducted Charpy V-notch (CVN) impact testing and tensile testing in accordance with ASTM standards to characterize mechanical properties.
- Performed Rockwell, Brinell, Vickers, and microhardness testing to evaluate hardness across steel specimens.
- Prepared metallographic specimens and performed microstructural and fracture surface analysis using optical microscopy and SEM.
- Conducted inclusion characterization via ASPEX automated SEM and crystallographic/compositional analysis using EBSD and EDS.

Graduate Teaching Assistant — Metal Casting Lab — Missouri University of Science and Technology 2022, 2023

- Instructed undergraduate students in foundry operations, induction furnace operation, and metallurgical testing procedures.
- Supervised safe handling of molten alloys and equipment operation during laboratory sessions.
- Guided students through metallographic specimen preparation and microstructural analysis techniques.

Graduate Teaching Assistant — Design Theory I — Missouri University of Science and Technology 2020

- Facilitated economic analysis of chemical processes for undergraduate coursework.
- Created, ran, and troubleshoot Aspen Plus simulations using the RADFRAC distillation column model.

INDUSTRIAL EXPERIENCE

Process Engineer, Pilot Plant — *Cipla*

2016–2018

- Led a cross-functional team of 8 to execute process validations and trials within a cGMP-compliant quality system.
- Adjusted process parameters in real time to maintain product quality and process consistency.
- Performed risk assessments and reported findings to cross-functional departments, driving root cause analysis and continuous improvement.

Process Engineer Co-op — *MSN Laboratories*

2016

- Improved solvent recovery column purity from 87% to 94% through MATLAB-based process modeling and optimization.

Process Development Intern — *Aurobindo Pharma*

2015

- Contributed to a wastewater reduction and filtration improvement project.

SELECTED PUBLICATIONS

- Mekala, Y.R., et al. "Distributed Temperature Sensing in the Spray-Cooled Shell of a 150-Ton DC Electric Arc Furnace Using Brillouin Optical Fiber Technology." IEEE Transactions on Instrumentation and Measurement, vol. 75, 2026.
- Mekala, Y.R., et al. "Heat Transfer Modeling of the Metal-Mold Interface in Aluminum Casting Using Real-Time Temperature and Gap Measurements from Fiber Optic Sensors." MDPI, 2026.
- Mekala, Y.R., et al. "Advancing Temperature Monitoring of the Bottom Anode in a DC Electric Arc Furnace Operations with Distributed Optical Fiber Sensors." IEEE Transactions on Instrumentation and Measurement, vol. 74, pp. 1-12, 2025.
- Mekala, Y.R., et al. "Dynamic Heat Flow and Current Distribution Analysis in the Bottom Anode of an Electric Arc Furnace using Fiber Optic Sensors." AIST Conference, 2025.
- Athavale, V.A., Mekala, Y.R., et al. "Effect of Tempering Time and Temperature on Hardness and Impact Toughness of Ultra-High Strength Steel." International Ingot Casting Rolling Forging (ICRF) Conference, 2022.
- Athavale, V.A., Mekala, Y.R., et al. "Influence of Hot Rolling and Heat Treatment on the Mechanical Properties of a Low Alloy Ultra-High Strength Steel." AIST Conference, 2022.

Complete list of 9+ publications and presentations available on LinkedIn.

HONORS & ACTIVITIES

- Member, Association for Iron and Steel Technology (AIST) — 6 years
- Wire Arc Additive Manufacturing (WAAM) process training/project
- Missouri S&T Climbing Club
- University of Memphis Badminton Tournament, 2024