



From HoD's Desk

Dr. Shravan Kumar
Associate Professor & HOD
Department of Fuel Minerals & Metallurgical Engineering
Indian Institute of Technology (ISM) Dhanbad
Mob: +91-9771421510, LL: +91-326-223-5948
Email: fmme@iitism.ac.in



Dear Readers,

It is with great pride and delight that I present to you the fourth edition of our department's monthly newsletter. This marks a significant milestone as we continue to thrive in our three core verticals: Fuel, Minerals, and Metallurgical Engineering. Our department's research endeavors are intricately aligned with the nation's aspirations, focusing on the processing of critical minerals, pioneering technologies for harnessing alternative energy resources, advanced methodologies in iron and steel processing, the exploration of non-ferrous metals, the integration of AI and ML into our practices, and innovative equipment design.

The past month has been particularly eventful and rewarding for the department. We successfully hosted an engaging invited talk on sustainable recovery of critical metals delivered by Dr. Dhruva Kumar Singh, Head, Hydrometallurgy & Rare Earths Development Section, BARC, Mumbai. The faculties of the department have also earned recognition for outstanding contributions to peer review and editorial work in prestigious journals. Additionally, the department celebrated multiple publications in reputed international journals, showcasing the exceptional research output of our faculty and students.

Your feedback and suggestions serve as a guiding light for us to grow further and refine our impact in academia, industry, and research. Together, let us forge a path toward innovation and excellence.

RESEARCH ACHIEVEMENTS

Terex: Strengthening Foothold Across India

It gives me immense pride and joy to know one of our distinguished alumni from the batch of 1999, Shri Jaideep Shekhar, Vice President and Managing Director, Terex, India.

It's a remarkable achievement as he has been honored with the prestigious 'Equipment India Person of the Year 2024' award. This award is a recognition of his visionary contributions to the field and an inspiration to our students and alumni alike.

The FMME Department wishes him great success in the journey ahead and look forward to witness many more such outstanding contributions to the industry and beyond

Our hybrid technology and telematics give cost-effective, eco-friendly solutions with crucial information and predictive maintenance.

Jaideep Shekhar
VP, Managing Director, Asia,
Australia, and EMEAR,
Terex India Pvt. Ltd.



WORKSHOP

WORKSHOP COORDINATORS



Dr. Antarip Poddar
Assistant Professor,
Department of Mechanical Engineering,
Indian Institute of Technology (ISM) Dhanbad,
Jharkhand, India. Mobile: (+91)8902683894
E-Mail: antarip@iitism.ac.in



Dr. Vishnu Teja Mantripragada
Assistant Professor,
Department of Fuel Minerals & Metallurgical Engineering,
Indian Institute of Technology (ISM) Dhanbad
Jharkhand, India.
Mobile: (+91)8754510216
E-Mail: vishnu.teja@iitism.ac.in



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A one-week workshop titled "CFD in Practice: Fundamental Research to Recent Industrial Applications" was successfully conducted from December 16–20, 2024, at IIT (ISM) Dhanbad. Jointly organized by the Department of Fuel, Minerals and Metallurgical Engineering and the Department of Mechanical Engineering, the event welcomed over 110 participants from academic institutions and industries across India. The workshop included insightful expert lectures covering diverse topics such as coal combustion modelling, granular flows, fluidized bed reduction of iron ore fines, microfluidics, biomedical flows, GPU-accelerated simulations, and hydrogen combustion, providing attendees with an in-depth understanding of cutting-edge advancements in Computational Fluid Dynamics (CFD). A specialized hands-on session on Ansys Fluent further enriched the experience by equipping participants with practical skills in modern CFD methodologies. The workshop concluded with great enthusiasm, motivating participants to apply innovative approaches and drive advancements in CFD across various domains.

INVITED TALKS & CONSULTANCIES

**Transformational Technologies in material and
manufacturing**

**1) Dr. M R Rahul presented
an Invited Talk in: "ICME
and Microstructure
Informatics framework for
the alloy design" at
International Conference on
Materials for Energy,
Environment, and
Healthcare, December 20th
and 21st, 2024, at the
Department of Materials
Science and Engineering,
National Institute of
Technology Calicut.**



**2) Dr. M R Rahul also
carried out and completed
the Consultancy project
(project number CONS 7386
C):**

**3) Given three days of talk
and training from (17th to
19th December 2024) for
VSSC, ISRO scientists for the
consultancy project
"TRAINING AND
UNDERSTANDING
MICROSTRUCTURE
SIMULATION TOOL (FOR
ISRO, TRIVANDRUM)"**

PUBLICATIONS

1. S Sarita, M Agilan, M R Rahul, G Phanikumar, "Integrated macro-micro scale and physical simulation framework for optimising electron beam welds of Ni-based superalloy" Materials Characterization, 114699, 2024
2. Sudharm Rathore, Avanish Kumar, Anurag Kumar, Kushal Mishra, Aparna Singh: Prediction of sub-critical fatigue crack growth rate in a high-carbon tempered martensitic steel at varying R ratio: experimental investigation and machine learning based modelling. International Journal of Fatigue (Accepted 31 December 2024). Q1, IF – 5.7

Conference Proceedings

Conference paper as a part of collaboration with Tata Research Development and Design Centre (TCS) Pune

- 1) G Jain, A Sardeshmukh, G Tennyson, S Koneru, MR Rahul, "Microstructure modeling of deformed alloys using contrastive conditional generative adversarial networks" AI for Accelerated Materials Design-NeurIPS 2024, Vienna

EDITORIAL BODY

Editor-in-Chief

Prof. Shravan Kumar
Head of the Department

Editors

Dr. Kasturi Sala
Assistant Professor

Dr. Subhendu Mishra
Assistant Professor (Visiting)

Contact Us:



fmme@iitism.ac.in



+91-326-223-5948



fmme.iitism.ac.in/

Stay tuned for more exciting updates in our next edition...