IIT ISM

INDIAN INSTITUTE OF TECHNOLOGY
INDIAN SCHOOL OF MINES
DHANBAD

Department of Mining Engineering

THE MINING EDGE

MONTHLY NEWSLETTER

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Content

Editorial Board

भारतीय प्रौद्योगिकी संस्थान
भारतीय खनि विद्यापीठ
धनबाद
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MINING ENGINEERING

From HoD's Desk

Dear Readers,

It gives me immense pleasure to present the July 2025 edition of The Mining Edge, capturing a month of vibrant academic engagements, international collaborations, and well-deserved recognitions for both faculty and students.

This month, our department marked a milestone in global academic synergy through the Indo-Russian Summer School on "Digital Mining" at St. Petersburg Mining University, where our scholars are gaining unparalleled exposure to advanced mining technologies under UNESCO's support.

Our campus also proudly hosted a delegation from CODELCO, Chile, and Hindustan Copper Limited, showcasing our cutting-edge laboratories and simulation-based training infrastructure. These visits are a testament to our growing relevance in the critical minerals landscape and our alignment with India's National Critical Mineral Mission.

Another significant initiative was the successful conduct of a six-day Executive Development Programme on "Safety and Health Management System Audit" in partnership with Mahanadi Coalfields Limited. The program not only emphasized regulatory compliance but also pushed for a transformative approach to mine safety, guided by system-wide integration.

We also take pride in the accolades received by our faculty and students. Dr. Santosh Kumar Behera was honored with the prestigious MEAI – Abheraj Baldota Memorial Gold Medal Award for Young Mining Engineer, while Ms. Jyoti Jagajjita Raj brought laurels by receiving the Emerging Talent Award in Tunneling.

Additionally, we celebrate the scholarly accomplishments of four research scholars who were awarded their Ph.D. degrees for pioneering work in coal combustion, slope stability, crown pillar optimization, and sustainable mine planning.

Looking ahead, we eagerly anticipate hosting the national conference CRISP–2025 and the international conference DIGMIN–2025. These events will bring together global thought leaders to deliberate on innovations in digital mining, sustainability, and critical metal processing—strengthening our position as a national hub for future-ready mining education and research.

As always, I extend my heartfelt gratitude to our students, faculty, staff, and collaborators for their relentless efforts in making our department a beacon of excellence.

Warm regards,
Prof. B.S. Chaudhary

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Spotlight

The Department of Mining Engineering is pleased to welcome Prof. Maitreya Mohan Sahoo, who has recently joined us as Assistant Professor.

Prof. Sahoo graduated with honors from the Department of Mining Engineering, National Institute of Technology Rourkela in 2016 and received his Ph.D. in Geoinformatics and Natural Resources Engineering from the Centre of Studies in Resources Engineering, Indian Institute of Technology Bombay in 2024 through the Prime Minister's Research Fellowship Program (PMRF). During his Ph.D., he also has an experience as a Visiting Research Fellow through the PhD Sandwich Scholarship in one of the state-of-the-art remote sensing laboratories at The Hebrew University of Jerusalem, Israel.

His areas of specialization include Remote sensing, Geographical Information System, Digital Image Processing with research interests of endmember identification, characterization and quantification in mining and mineral domain, application of remotely sensed datasets for ore estimation, modelling hyperspectral mixing and unmixing of geological mixtures, spatial-spectral super-resolution, earth, rock and soil spectroscopy and modelling digital twins for smart mining implementing artificial intelligence/machine learning. He has served in the mining industry, working in Coal India Limited as Assistant Manager (Mining) from 2016 to 2018 and as a Pikovsky – Valazzi-funded Postdoctoral Researcher in The Hebrew University of Jerusalem from October 2023 till July 2025.

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Spotlight

The Department of Mining Engineering also welcomes Prof. Santosh Kumar Behera, who has recently joined us as Assistant Professor.

Prof. Santosh holds a Ph.D. from IIT (ISM) Dhanbad. Prior to this, he was a Senior Scientist at CSIR-CIMFR, Dhanbad. He specializes in Mine paste backfilling, Underground metal mining, Underground metal mine backfilling, Underground coal mine stowing and associated mining method, Fly ash filling in opencast mines, Slope stability. He has authored 29 research articles in peer-reviewed journals and conferences, along with two book chapters. Over a span of nine years, he has successfully completed 70 industry-sponsored projects, serving as Principal Investigator for 27 of them.

His contributions to the field have been recognized with several prestigious awards, including the Dr. K. N. Sinha Award (2020) from CSIR-CIMFR, the Inder Mohan Thapar Foundation (IMTF) Research Award (2021) from IIT (ISM) Dhanbad, the SERB International Research Experience (SIRE) Fellowship (2022–2023), KHANIK SANMAN 2024 from BCCL and Dainik Bhaskar, Dhanbad, the IEI Young Engineers Award (2024–25) in Mining Engineering by The Institution of Engineers (India), and MEAI - Abheraj Baldota Memorial Gold Medal Award (Young Mining Engineer)" for the year 2024-25. Notably, he is the sole representative from India on the international expert panel of MINEFILL.

Digital Mining Summer School - 2025
(A Joint Collaboration Programme between India & Russia)

As a part of the Indo-Russian academic collaboration, a cohort of 12 students including research scholars from the Indian Institute of Technology (Indian School of Mines), Dhanbad, commenced a specialized training programme on "Digital Mining" at St. Petersburg Mining University, Russia. This initiative, launched on June 30, 2025, marked the commencement of the third batch under the Indo-Russian Summer School Programme. The programme is supported by the International Centre for Competence in Mining Engineering Education with funding from UNESCO and IIT (ISM) Dhanbad.

This academic engagement aims to provide participants with advanced domain knowledge and international exposure through a curriculum comprising interactive lectures, hands-on training, master classes, industrial site visits, and cultural immersion. Highlighted by Prof. Datta Gupta (Associate Professor, Deptt. of Applied Geophysics), the programme is designed to integrate theoretical instruction with practical application, thereby enhancing the global competency of IIT (ISM) students and scholars in the energy and mineral sectors.

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Highlights from the Summer School – 2025

CODELCO VISIT

On July 9, 2025, IIT (ISM) Dhanbad hosted a high-level delegation from CODELCO – The National Copper Corporation of Chile, the world's leading copper producer and a prominent advocate of sustainable mining practices. Representatives from Hindustan Copper Ltd. (HCL), India's sole fully integrated copper producer and a major public sector enterprise also participated.

The delegation visited key research and training facilities, including the Mine Survey Laboratory, Ventilation Laboratory, Rock Mechanics and Excavation Labs, the Virtual Reality Mining Simulator (VRMS), and the Longwall Training Gallery, highlighting the institute's capabilities in advanced mining education, simulation-based training, and applied research.

The visit coincides with HCL's strategic objective to augment its production capacity from 3.47 to 12 million tonnes per annum by FY 2030–31, aligning with the goals of India's National Critical Mineral Mission. This engagement marks a significant step toward strengthening global partnerships in the field of critical mineral development.

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EDP on Safety and Health Management System Audit

The Department of Mining Engineering, IIT (ISM) Dhanbad, in collaboration with Mahanadi Coalfields Limited (MCL), successfully conducted a six-day Executive Development Programme (EDP) on "Safety and Health Management System Audit" for senior MCL executives. Held in two phases: 01 – 03 July, 2025 at IIT (ISM) Dhanbad and 07 – 09 July, 2025 at MCL's Lakhanpur Area—the programme focused on strengthening participants' competencies in safety audits and root cause analysis of mine-related incidents.

The programme featured expert lectures, case studies, and field visits, aligning with current regulatory frameworks and best practices. Coordinated by Prof. R.M. Bhattacharjee and co-coordinated by Prof. P.S. Paul, the inaugural session was graced by Prof. Dheeraj Kumar (Deputy Director) and Prof. S.R. Samadder (Associate Dean, R&D), alongside senior faculty members. The Department acknowledges the active participation of MCL executives and extends sincere thanks to all resource persons and stakeholders for their valuable contributions.

Field & Laboratory Visit in SSHM Audit

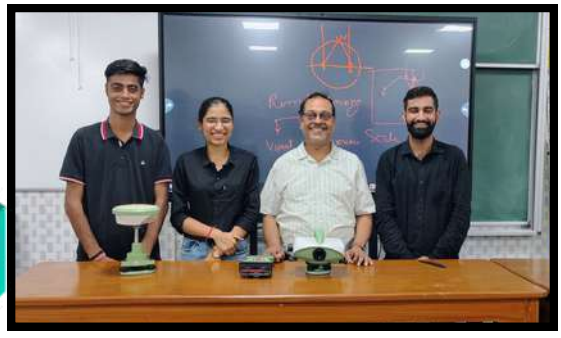
The concluding session was marked by a reflective and thought-provoking address delivered by Prof. R.M. Bhattacharjee, who emphasized a paradigm shift in the approach towards mine safety. He underscored the importance of developing and implementing a comprehensive mine safety system rather than relying solely on conventional, standalone mine safety plans. This distinction, he pointed out, lies in the systemic integration of safety practices into everyday operations and culture, as opposed to limiting safety initiatives to prescriptive plans that often lack adaptability and long-term vision.

Longwall Training Gallery Visit

A distinguished delegate visit was held at the Longwall Training Gallery, IIT(ISM) Dhanbad, under the Department of Mining Engineering. The visit highlighted the department's commitment to practical learning and cutting-edge research in underground mining. The delegates appreciated the state-of-the-art facilities and the interactive demonstration of longwall mining techniques.

MBM University Student Visit

The Department of Mining Engineering, IIT (ISM) Dhanbad, was pleased to host a group of enthusiastic students from MBM University, Jodhpur on 15th July 2025. During their visit, the students explored various state-of-the-art laboratories within the department, gaining insights into cutting-edge research and practical applications in the field of mining engineering. They also toured the Longwall and Bord & Pillar Training Gallery, where they observed simulated underground mining techniques and safety practices.



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digmin 2025

INTERNATIONAL CONFERENCE

"Digital Intelligence for Green Mining and Industrial Networks"

(DIGMIN-2025)

The Department of Mining Engineering, Indian Institute of Technology (Indian School of Mines), Dhanbad is proud to host the prestigious International Conference on Digital Intelligence for Green Mining and Industrial Networks (DIGMIN-2025) during 12-13 September 2025, organized as part of the centenary celebrations of IIT (ISM) Dhanbad. This two-day event will serve as a flagship forum for deliberations and collaboration in sustainable and intelligent mining technologies.

DIGMIN-2025 will bring together the distinguished academicians, researchers, industry professionals, policymakers, and sustainability leaders to explore the convergence of digitalization, automation, artificial intelligence, and green mining practices. The conference will showcase the cutting-edge developments in AI/ML for risk prediction, IoT-enabled mine automation, autonomous systems, and cyber-physical solutions for resource efficiency and environmental stewardship.

Key themes of the Conference include:

- **Smart Mining Infrastructure and Digital Foundations**
- **Robotics & Automation in Harsh Mining Environments**
- **Real-time Analytics and Edge AI for Mining Operations**
- **AI-Driven Intelligence for Critical Mineral Estimation**
- **Energy Optimization and Resilient Mining Systems**

DIGMIN-2025 promises an enriching experience with high-impact keynote addresses, technical paper sessions, industry exhibits, and policy roundtables, aiming to create actionable roadmaps for a digitally empowered and environmentally responsible mining future.

INTERNATIONAL CONFERENCE ON
"Digital Intelligence for Green Mining and Industrial Networks (DIGMIN-2025)"
September 12–13, 2025
GJLT Auditorium, IIT (ISM) Dhanbad

Faculty Achievement

Prof. Santosh Kumar Behera, Assistant Professor in the Department of Mining Engineering at IIT (ISM) Dhanbad, has been honored with the prestigious MEAI – Abheraj Baldota Memorial Gold Medal Award (Young Mining Engineer of the Year) for 2024–25. The award was presented during the 52nd Annual General Meeting of the Mining Engineers' Association of India (MEAI), recognizing Prof. Santosh's outstanding contributions to the field of mining engineering and his dedication to advancing research and innovation in the discipline. He delivered his presentation on the topic "Underground mining transition in Sukinda, Odisha: Present and future" in the Technical conference on "Contribution of Miningand Allied Industry for Viksit Odisha 2036"

Student Achievement

Ms. Jyoti Jagajjita Raj, a first-year M.Tech student in Tunneling & Underground Space Technology (TUST), has been conferred with the prestigious Student Excellence Award for Women in Tunnelling (Emerging Talent Award – Master's Student) in recognition of her exceptional potential and early contributions to the field of tunneling and underground construction. The award ceremony, held on June 23, 2025, at Hotel Taj City Centre, Gurugram, celebrated her achievement under the guidence of Dr. Swapnil Mishra, Assistant Professor, Department of Mining Engineering.

Research Publications & Projects

Research Publications

- **Bisoyi, S. K., Khatti, J., Fissha, Y., Behera, B., Pal, B. K., & Sazid, M. (2025).** Optimizing blast-induced vibration predictions using hybrid ANN: A study in Dongri-Buzurg mine. Journal of Applied Geophysics, 241, 105867. https://doi.org/10.1016/j.jappgeo.2025.105867

- **Midda, S., Bhat, M. F., Roy, T. S., Bisoyi, S. K., & Koner, R. (2025).** RTMS: Real-Time Data Acquisition, Calibration, and Warning System for Open-Pit 1 Mine Slope Monitoring. http://dx.doi.org/10.2139/ssrn.5354323

- **Khatti, J. & Mishra, S. (2025).** Estimating Shield Tunnel Boring Machine Penetration Rate in Mixed Face Conditions: Feature Selection and Multicollinearity Effects on Machine and Deep Learning Models; Frontiers in Built Environment **(Accepted for Publication)**

Projects

- **Prof. B.S. Chaudhary** has been awarded consultancy project titled "Scientific study for designing deep hole drilling and blasting for controlling vibrations and Fly rock within Safe limits for Lasarda Pacheri Iron & Manganese Mine of M/s Thriveni Earthmovers Put. Ltd".

Ph.D. Awarded

- **Dr. Sanjay Kumar Singh**, a full-time Research Scholar of the Department of Mining Engineering, has been awarded the Doctor of Philosophy (Ph.D.) degree under the supervision of **Prof. Dheeraj Kumar** for his doctoral research titled **"Mine Planning and Sustainable Management of mass Exploitation of coal Deposit; A Strategic Framework Development in Indian Context"**.

- **Dr. Mukesh Vikram**, a part-time Research Scholar of the Department of Mining Engineering, has been awarded the Doctor of Philosophy (Ph.D.) degree under the supervision of **Prof. R. M. Bhattacharjee** for his doctoral research titled **"Development of Spontaneous Combustion Classification System of Indian Coal Using Heuristic Approach and Adiabatic Oxidation Method"**.

- **Dr. Abhishek Mehra**, a Full-time Research Scholar of the Department of Mining Engineering, has been awarded the Doctor of Philosophy (Ph.D.) degree under the supervision of **Prof. G. Budi** for his doctoral research titled **"Integrated Approach to optimize Crown and Rib Pillar Stability around Sublevel open Stope"**.

- **Dr. Peeyush Garg**, a part-time Research Scholar of the Department of Mining Engineering, has been awarded the Doctor of Philosophy (Ph.D.) degree under the supervision of **Prof. G. Budi** for his doctoral research titled **"Development of Two Dimensional Spatial Probabilistic Elastoplastic Finite Element Modal for a slope"**.

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DEPARTMENT OF MINING ENGINEERING

Faculty Profile of the Department

Prof. V M S R Murthy
Professor (HAG) On Deputation As Director IIEST Shibpur

Research Interest:
Rock Excavation Engineering

Prof. Arvind Kumar Mishra
Professor (HAG) On Deputation As Director CIMFR

Research Interest:
Explosive Engineering, Rock Blasting Technology, Rock Excavation Engineering, Opencast Mining

Prof. Dheeraj Kumar
Professor (HAG)

Research Interest:
Digital Mining Technologies, Mine Surveying & Geospatial Technologies

Prof. R M Bhattacharjee
Professor

Research Interest:
Underground Coal Mining Technology, Risk Assessment And Safety Management, Emergency Response & Disaster Management, Accident Investigation, Mine Fire And Explosion

Prof. Devi Prasad Mishra
Professor

Research Interest:
Mine Ventilation and Environmental Engineering, Mine Fire And Explosion, Application of CFD In Mine Ventilation and Environmental Engineering, Methane Drainage/CBM/UCG, Stowing/backfilling With Fly Ash/pond Ash, Characterization of Fly Ash/pond Ash

Prof. Bhanwar Singh Choudhary

Professor

Research Interest:
Drilling & Blasting Technology, Underground Metal Mines, Computer Aided Mine Planning, Tunnel Engineering

Prof. Partha Sarathi Paul
Professor

Research Interest:
Core Mining Discipline: Mine Safety Engineering; Occupational Health, Safety And Ergonomics; Applied Multivariate Modeling And ML Techniques; Rock Mechanics; Mine Ventilation. Interdisciplinary: Automation For Workplace Safety; Socio-economic Impact Of Mining

Prof. Anindya Sinha
Professor of Practice

Research Interest:
Mine Planning & Design, Mine Environment Planning & Management, Mine Mechanization & Digitization

Prof. Rabindra Kumar Sinha
Associate Professor

Research Interest:
Design of Structures in Rock, In situ Rock Mechanics Investigations, Numerical Modelling

Prof. Vasanta Govind Kumar Villuri
Associate Professor

Research Interest:
Photogrammetry, Cartography, Remote Sensing, GIS And GPS

Prof. Radhakanta Koner
Associate Professor

Research Interest:
Mine Automation, Data Analytics, Georesources Utilization Using Remote Sensing Technology, Slope Stability Analysis, Landslide Analysis, Wireless Sensing Technology, Real-time Monitoring System In Mining

Prof. Patitapaban Sahu
Associate Professor

Research Interest:
Mine Ventilation,Sub-Surface Enviornmental Engineering,Mine Radiation,CBM and Data Analytics In Mining

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Faculty Profile of the Department

Prof. Gnananandh Budi

Assistant Professor
Research Interest:
Rock Mechanics And Ground Control

Prof. Kashinath Pal
Assistant Professor
Research Interest:
Rock Mechanics, Groundwater, Slope Stability

Prof. Mohammad Soyeb Alam

Assistant Professor
Research Interest:
Geospatial Technology In Mining, Underground Metal Mining, Mine Subsidence Studies, Mine Slope Stability Analysis, Mine Surveying

Prof. Siddhartha Agarwal

Assistant Professor
Research Interest:
Digitalization of Mining Operations, Industry 4.0 Applications In Mining, Machine Learning And Artificial Intelligence Applications In Energy Consumption In Mines, Earth Sciences: Geostatistics, Open Pit Mine Planning & Scheduling, Real Time Monitoring Of Air Pollution In Open Cast Mines, Geo-technical And Environmental Closure And Repurposing Planning

Prof. Swapnil Mishra
Assistant Professor
Research Interest:
Blast Resistant Design of Underground Structures, In- situ Stresses Surrounding Underground Structures, Impact Testing on Weak and Weathered Rock Conditions, Ground Subsidence, Rock Dynamics and Material Testing, Physical Modelling

Prof. Ashok Kumar
Assistant Professor
Research Interest:
Underground Mining Methods, Strata/Rock Mechanics, Numerical Modeling, Underground Instrumentation And Monitoring Of Strata, Support Design, Rockmass Characterisation, Excavation Methods For Tunnels & Caverns, Drilling & Blasting, Operations Research, Mine Environment, Surface Mining

Prof. Dondapati Gopi Krishna

Assistant Professor
Research Interest: Rock Mechanics, Numerical Modeling in Geotechnical Engineering, Coal Mining, Mine Instrumentation and Monitoring

Prof. Bhaskara Behera

Assistant Professor
Research Interest:
Rock Mechanics And Ground Control, Mining Methods, Numerical Methods In Geomechanics, Mine Planning
And Design

Prof. Ajeet Yadav
Assistant Professor

Research Interest:
Rock Mechanics and Ground Control, Mining Methods, Mine Ventilation, Numerical Modelling

Prof. Ankush Galav
Assistant Professor
Research Interest:
Rock Mechanics and Ground Control, Mining Methods, Rock Excavation Engineering, Numerical Modelling, Mine Planning and Design, Mine Instrumentation and Monitoring

Prof. Santosh Kumar Behera
Assistant Professor
Research Interest:
Paste backfilling, underground metal mining, underground metal mine backfilling, underground coal mine stowing and associated mining methods, fly ash filling in opencast mines, and slope stability.

Prof. Maitreya Mohan Sahoo
Assistant Professor
Research Interest:
Remote Sensing, Geographical Information System, Geoinformatics, Digital Image Processing, Geological Spectroscopy, Hyperspectral Mixing and Unmixing, Super-Resolution, Digital Twin Technology, Artificial Intelligence

2025 CALENDAR

JANUARY

M	T	W	T	F	S	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

FEBRUARY

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MARCH

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APRIL

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28	29	30				

MAY

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26	27	28	29	30	31	

JUNE

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JULY

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28	29	30	31			

AUGUST

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25	26	27	28	29	30	31

SEPTEMBER

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15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

OCTOBER

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20	21	22	23	24	25	26
27	28	29	30	31		

NOVEMBER

M	T	W	T	F	S	S
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17	18	19	20	21	22	23
24	25	26	27	28	29	30

DECEMBER

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22	23	24	25	26	27	28
29	30					

2025 Calendar of Important Mining Days

4th April : International Day for Mine Awareness and Assistance in Mine Action
22nd April : World Earth Day
1st May : International Labour Day
4th May : Coal Miners Day
23rd June : International Women in Engineering Day
12th - 13th September: DIGMIN - 2025
30th October : Mine Rescue Day
1st November : Coal India Foundation Day
1st November : Indian Mining Day
5th December : World Soil Day
11th December : International Mountain Day
14th December : National Energy Conservation Day