

# Mining Engineers' Journal



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Mining Engineers' Association of India

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No. 11

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June - 2025



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# Mining Engineers' Journal

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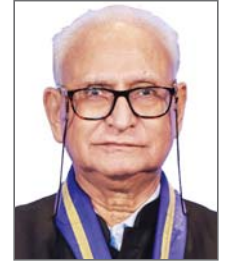
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## *President's Message.....*

**Dear members..**

We have returned about a fortnight back from Udaipur after attending the International Conference on “Centre of Excellence in Mining (Continuous Improvement and Asset Optimization), organized by Udaipur Chapter in association with Hindustan Zinc Ltd and the VII Council meeting there. It was a very well organized event at a beautiful location with nice hospitality and personalized care of all guests by the organizers. It was heartening to see that students and young professionals were also given equal opportunities to share the podium, providing them a nice platform to share their experience and enrich themselves.

During the Seventh Council Meeting I expressed having completed almost full term, barring a brief period of about a quarter with the final (8<sup>th</sup>) council meeting and the AGM left. I freely shared my experience as MEAI President, a mixture of some good experience with some bitter too, as caution for the future Presidents and the Councils. I hope the council must have taken my feelings sportingly. There have been certain issues which I feel should have been deliberated and resolved. Some of those issues I will like to take up again in the next (VIII) Council meeting.

With the loss of a jewel in the death of Shri Deepak Vidyarthi, we have lost a very active member who almost single handedly conducted programs like MTS, MPDP, MOST and the National Quiz. We have now to nominate or appoint a suitable substitute for him. During the VI Council Meeting at Belgaum we did nominate Dr. S K Vashisth, a Council Member to look after and organize these activities. I have full confidence in his competence and abilities but with so many programs we need to look into this again and consider a team instead of an individual. I therefore suggested that the Jaipur team of Shri Lalit Soni Chairman, Dr. Vivek Laul Secretary and Dr. Manoj, Treasurer, may be assigned these tasks under guidance of Dr. Vashisth. No deliberations could however be held. In the meantime, surprisingly the BH Chapter's Executive committee has taken a decision to authorize the Imm. Past President Shri K Madhusudhana to conduct the MTS Lectures. Though it was not in their scope, I still welcome it as Shri Madhusudhana is definitely a capable and competent person for the job. WE may now consider assigning the Jaipur team the remaining jobs of organizing MPDP, Most and national Quiz. A proposal to this effect will be placed in the next (VIII) Council meeting. That should provide an amicable solution for the issue.

With the best wishes,

**S.N. Mathur**  
President



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**Dr. P.V. Rao**  
Editor, MEJ

### *India and Australia: Contrasting Approaches to Mineral Exploration*

India and Australia, both endowed with vast mineral resources, have taken distinctly different paths in mineral exploration. Their approaches are shaped by geology, economic priorities, regulatory environments, and technological capabilities, resulting in notable contrasts in exploration depth, investment, technology adoption, and public-private collaboration.

Australia boasts comprehensive geological mapping, with over 90% of its potential area explored and about 95% coverage for deep-seated minerals within its Obvious Geological Potential (OGP) areas. Exploration routinely reaches depths of 300 meters or more. In contrast, India has mapped its OGP areas for surficial minerals but only 22% for deep-seated minerals, with exploration generally limited to shallow depths (50–100 meters). Overall, only about 10% of India's geological potential area has been explored.

Australia invests around US\$246 per square kilometer in mineral exploration, predominantly funded by the private sector. India, by comparison, spends just US\$17 per square kilometer, with most exploration funded by the government. Other mineral-rich nations like Canada and Chile also rely on private investment, recognizing the high-risk nature of exploration. India's dependence on public funds is seen as inefficient, given the low success rate of discoveries.

Australia's mining sector features a transparent, investor-friendly regulatory environment, with clear laws at both federal and state levels that encourage private and foreign investment. In contrast, India's sector is tightly controlled by government agencies, with complex licensing and regulatory processes that can deter private investment and slow development. The government's dominant role has often been criticized for inefficiency and limited innovation.

Australia leads in mining technology and services (METS), driving productivity and exporting these capabilities globally, including to India. India lags in adopting advanced exploration and mining technologies, though recent collaborations with Australia are helping to bridge this gap through training, technology transfer, and joint research.

Australia is a global leader in critical minerals such as lithium, cobalt, nickel, and rare earth elements, all essential for clean energy and advanced manufacturing. India, despite significant demand, is heavily import-dependent and has limited domestic reserves. Recognizing mutual interests, India and Australia have established formal partnerships, including a Joint Working Group on Critical Minerals and the India-Australia Critical Minerals Research Partnership (CMRP), to strengthen supply chains, co-invest in projects, and develop sustainable mining technologies. Both countries are also exploring new frontiers like seabed mining, leveraging Australia's scientific expertise and India's ambitions under its Deep Ocean Mission.

In Australia, the private sector drives exploration, with government agencies like Geoscience Australia providing data and regulatory oversight. In India, state-owned enterprises and government-funded agencies dominate, with private sector participation still limited despite recent policy reforms.

Australia places significant emphasis on ESG standards, mine rehabilitation, and community engagement, which are increasingly prerequisites for project approval and investment. India is working to improve mine safety and environmental standards, often drawing on Australian expertise through bilateral cooperation.

India can leverage Australian expertise, technology, and investment to accelerate exploration, especially for deep-seated and critical minerals. Joint ventures and research partnerships, such as the CMRP, can help both countries build resilient supply chains and advance sustainable mining practices. India must reform its regulatory and investment climate to attract more private and foreign capital, reduce bureaucratic hurdles, and encourage risk-taking in exploration. Both nations face technological and environmental challenges in emerging areas like seabed mining, requiring robust research and regulatory frameworks.

India's rapid economic growth and clean energy ambitions have led to surging demand for critical minerals. Mineral security now hinges on a dynamic partnership between government and private companies. The government must continue to provide strategic direction and regulatory support, while the private sector drives exploration and innovation. Only through such synergy can India reduce import dependence and achieve its clean energy and industrial goals.

In conclusion, Australia's mineral exploration strategy is marked by deep, technology-driven, and private sector-led initiatives, supported by a favourable regulatory environment and strong ESG standards. India, despite vast geological potential, remains constrained by shallow exploration, low investment, and government-dominated processes. However, growing collaboration with Australia—especially in critical minerals and technology—offers India a pathway to modernize its approach, enhance resource security, and play a larger role in global mineral supply chains.

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## NEWS FROM THE MINERAL WORLD

### ► **Scientists Just Discovered the Biggest Iron Ore Deposit Ever Worth \$5.7 Trillion — Here's What It Means for the Global Economy**

Scientists just discovered the world's largest iron ore deposit worth over \$5.7 trillion, promising to transform global mining and economies.



A groundbreaking discovery in Western Australia has revealed the largest iron ore deposit ever recorded, with an estimated 55 billion metric tons of iron ore valued at approximately \$5.7 trillion USD. Published recently in Proceedings of the National Academy of Sciences (PNAS), this find not only redefines the scale of Earth's mineral wealth but also challenges long-standing scientific views on how such deposits form. This vast resource, located in the Hamersley region, holds immense potential to reshape global mining, trade, and economic landscapes.

### **A New Perspective on Iron Ore Formation and Geological History**

The study reveals that the iron-rich formations in Hamersley are about 1.4 billion years old, much younger than the previously accepted age of 2.2 billion years. This revision is based on advanced uranium and lead isotope dating, providing fresh insights into the Earth's tectonic and mineralogical past. The iron deposit's formation appears intricately linked to the movements of ancient supercontinents, challenging prior theories centered on the Great Oxygenation Event alone. This timeline shift indicates that massive iron ore deposits can form over longer geological periods and under varying conditions, vastly expanding where future exploration might focus.

One of the study's co-authors stated, "The discovery of a link between these giant iron ore deposits and changes in supercontinent cycles improves our understanding of ancient geological processes." This insight is crucial for both geologists and mining industries as it suggests the formation of iron ore is tied to dynamic Earth processes rather than static ancient events, opening

new pathways for discovering untapped mineral reserves worldwide.

### **Implications for the Global Mining Industry and Supply Chains**

With an estimated value nearing \$5.775 trillion USD, the Hamersley deposit dwarfs all previously known iron ore reserves. It surpasses significant deposits such as the Kursk Magnetic Anomaly in Russia and consolidates Australia's role as the world's leading iron ore exporter. This discovery will have far-reaching effects on global steel production, supply chains, and international trade agreements, especially as demand surges in emerging economies like China and India.

The deposit's immense size and high iron content—ranging from 30% in its original state to over 60% today—make it an exceptionally lucrative resource. Mining companies are expected to pour significant investments into infrastructure, including new railways and ports, to efficiently transport this iron ore. However, the scale of extraction raises environmental concerns, with potential impacts on local ecosystems and water resources demanding sustainable approaches.

Associate Professor Martin Danisík explained, "The exact timeline of the change of these formations from 30% iron as they were originally, to more than 60% iron as they are today, was not clear." Understanding this transformation is vital for optimizing extraction methods and predicting where similarly high-grade deposits may be found.

### **How the Discovery Reshapes Future Exploration and Scientific Research**

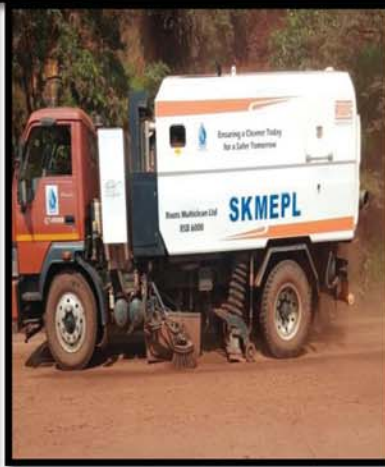
Beyond economics, this discovery is expected to influence geological research and exploration strategies globally. The link between supercontinent cycles and mineral deposits provides a framework for locating other large, previously overlooked ore bodies. Advanced isotope dating and chemical analysis techniques used in this study allow scientists to track mineral evolution over billions of years with unprecedented precision.

Mining companies and governments will likely revise their exploration targets, prioritizing regions with geological histories similar to Hamersley. This could lead to more efficient resource extraction, reducing waste and environmental impact. Furthermore, these findings contribute to a better understanding of Earth's tectonic history and mineral formation processes, which remain some of the most complex puzzles in geoscience.

*(Continued on Page 18)*



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# FUTURISTIC APPROACHES IN MINING: LEVERAGING AI AND AUTOMATION FOR SMARTER EXPLORATION AND OPERATIONS

Ms. Rojali Dey\* and Ms. Jalpa A. Patel\*\*

## Abstract

*The mining industry is undergoing a profound transformation, driven by advancements in artificial intelligence (AI), automation, and cutting-edge technologies, reshaping the landscape of mineral exploration and mining operations. In mineral exploration, breakthrough technologies like induced polarization (IP), airborne electromagnetics (EM), airborne gravity gradiometry (AGG), and deep learning-based automatic data processing are significantly enhancing exploration efficiency. These innovations improve economic viability by enabling labor-saving, automated operations, and increasing the accessing capability for deeper and more remote mineral deposits. In the realm of open-pit mining, automation technologies such as the development of unmanned transportation systems are enhancing operational efficiency. A key development in this area is the Fusion-Planner, a multi-task motion planning algorithm designed for autonomous mining trucks. This technology utilizes multi-sensor fusion to adapt to both lateral and longitudinal control tasks, enhancing the autonomy of transportation systems in open-pit mines. Furthermore, the introduction of the Parallel Mining Simulator (PMS) has provided a high-fidelity platform to evaluate the trustworthiness and robustness of these systems, significantly reducing operational disruptions like collisions and takeovers, and bringing mining trucks closer to continuous, round-the-clock operation. Additionally, robots are being deployed as mobile sensors in mining operations, particularly in hazardous underground environments. The “Robot-As-A-Sensor” (RAAS) concept allows robots to function as part of a wireless sensor network, improving the efficiency and reliability of tasks that require collaboration among multiple robots. This approach is particularly useful for monitoring and maintaining mining infrastructure in difficult-to-reach areas. Together, these advancements in AI, automation, and robotics are not only improving the precision and efficiency of mineral exploration and extraction but also making mining operations more sustainable, cost-effective, and safe. As the industry continues to embrace these technologies, it is poised to unlock new potential in mineral discovery, reduce environmental impacts, and pave the way for a more efficient future in mining.*

## 1. THE ROLE OF ARTIFICIAL INTELLIGENCE IN MINERAL DISCOVERY

Artificial Intelligence (AI) is transforming mineral exploration by enabling the rapid processing and analysis of large datasets. Geoscientists can now use AI to detect hidden mineral deposits with greater precision. Through machine learning algorithms, AI processes geological data that would have taken years for humans to analyze manually, such as seismic data, geochemical surveys, and drilling logs.

### 1.1 Case Study: Goldspot Discoveries

A prime example of AI's potential in mineral exploration is the work done by Goldspot Discoveries, a Canadian company that uses AI to identify new mineral deposits. Goldspot's AI system uses data from past drilling campaigns, geological surveys, and remote sensing to create predictive models for the location of valuable mineral deposits. By using AI to process thousands of data points, Goldspot has been able to reduce exploration costs by up to 40%. In regions such

as the Abitibi Greenstone Belt, which is rich in gold, their AI-driven predictions have led to the discovery of new gold deposits that were previously inaccessible.

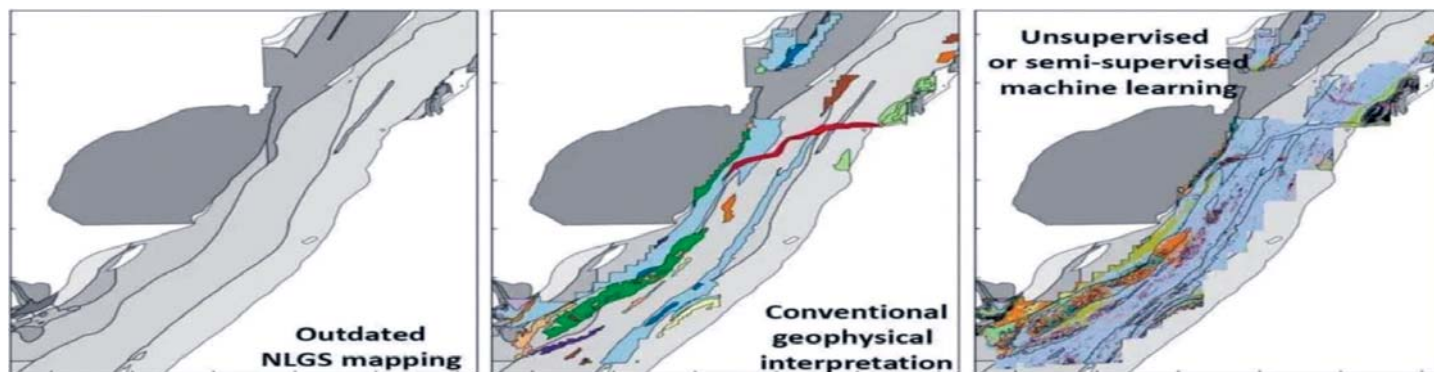
### 1.2 Automation of Geochemical Data Interpretation

AI is particularly effective in automating the analysis of geochemical data. In traditional mineral exploration, analyzing soil samples to detect metal concentrations is a time-consuming process prone to human error. AI systems can automate this process, quickly identifying geochemical anomalies that could indicate the presence of buried mineral deposits. For example, AI systems can detect trace amounts of gold, copper, or other metals that signal the proximity of larger deposits.

AI can also process data from geophysical surveys, combining information from multiple sources such as airborne electromagnetic (EM) surveys and gravity surveys to predict mineral locations with high accuracy.

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**Figure 1:** Goldspot Discoveries AI- Targeted; Machine learning geological map using unsupervised approach

## 2. GEOPHYSICAL ADVANCEMENTS-BREAKTHROUGHS IN MINERAL EXPLORATION

Geophysical techniques play a critical role in mineral exploration, especially when traditional methods fail to reveal underground mineralization. The use of airborne geophysical surveys, ground-based surveys, and advanced data analysis techniques has dramatically improved the efficiency of mineral discovery.

### 2.1 Induced Polarization (IP) Surveys

IP surveys measure the electrical chargeability of rocks and are particularly effective in identifying metallic mineralization, especially in sulfide-rich deposits like gold and copper. The IP method is an extension to a resistivity method that measures potential differences associated with artificially generated direct-currents passing through the ground. IP is valuable in areas where minerals are deeply buried or where traditional methods fail to penetrate the surface effectively. The integration of AI with IP surveys allows for quicker and more accurate analysis of the collected data, helping geoscientists pinpoint mineralized zones with greater precision.

The principle of induced polarization (IP) phenomena associated with metal sulfide was observed by Schlumberger (1920) in the 1910s.

The first breakthrough of IP survey is considered to be during the 1950s when it was developed for exploration purposes after being used for successfully developing a detector for mines-underwater explosive devices during World War-II. By 1950, Newmont established its IP procedures and equipment as a fully operational technology for mineral exploration (Wait 1959).

The second breakthrough since the practical application of the IP method was the development of the spectral IP (SIP) method in the late 1970s (e.g. Zonge and Wynn 1975; Pelton et al. 1978). Although IP is effective in the discrimination of metallic sulfides, IP also reacts strongly to

polarizable substances such as graphite, so it often misleads exploration. SIP provided a possibility that meaningful IP anomalies for mineral exploration can be separated and extracted even in areas where other polarizable substances are present. The development of IP equipment designed for SIP measurement also resulted in improved accuracy in normal IP measurement and expanded the field of IP application to exploration targeted at a variety of deposits other than porphyry copper.

The next breakthrough for IP will be airborne IP. Almost all the conventional ground IP methods are galvanic methods, in which current electrodes and potential electrodes are inserted in the ground for the measurement of IP phenomena.

### 2.2 Airborne Electromagnetic (EM)

Airborne Electromagnetic (AEM) surveys are a geophysical method used to map subsurface conductivity. These surveys involve the use of aircraft-mounted equipment to transmit electromagnetic waves into the ground and measure the response. The technique is primarily used in mineral exploration, groundwater studies, and environmental assessments. EM surveys measure the conductivity of rocks, identifying conductive minerals such as copper and iron. The combination of these techniques, with the addition of AI and automation enhances AEM survey by automated data acquisition and flight planning with real-time monitoring, real-time processing (detection, noise reduction, pattern recognition) as well as developing advanced inversion models, risk assessments and integration with other geospatial data.

The first breakthrough for the AEM method is considered to be during the late 1940s to early 1950s due to the need to develop a more direct exploration method targeting mineral deposits. Magnetic exploration was not a direct exploration of mineral deposits but rather an indirect exploration aimed at investigating geological structures surrounding mineral deposits; and in exploration targeting areas where a large



amount of magnetic minerals are distributed and undergo significant metamorphism and hence the first breakthrough.

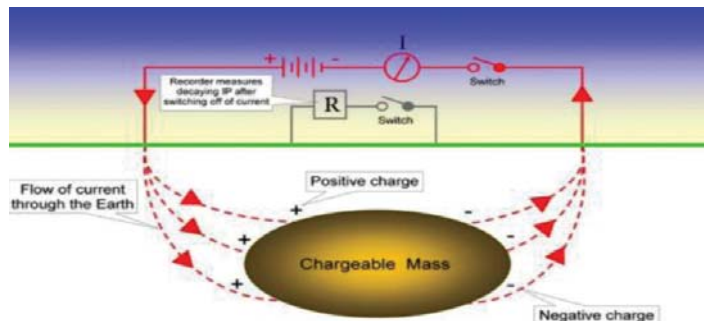


Figure 2: Induced Polarization

Until the mid-1970s, the airborne EM method was mainly used for the exploration of base metal resources such as copper, lead, and zinc, and was particularly effective for the exploration of massive sulfide deposits. Airborne EM systems are classified roughly into two types: frequency-domain electromagnetic (FDEM) and time-domain electromagnetic (TDEM) systems. Typical FDEM systems are commonly used for accurate mapping of shallower targets. On the other hand, TDEM systems are mainly used for exploration aiming at highly conductive or deeply buried mineral targets. The second breakthrough since the practical application of the airborne EM method was the advent of helicopter TDEM systems. In the 1990s or earlier, the platforms for TDEM systems were mainly fixed-wing aircrafts, while those for FDEM systems were mainly helicopters. The fixed-wing systems were deployed to benefit from their larger footprint and greater penetration depth while the heliborne systems were deployed to benefit from their higher resolution and better maneuverability.

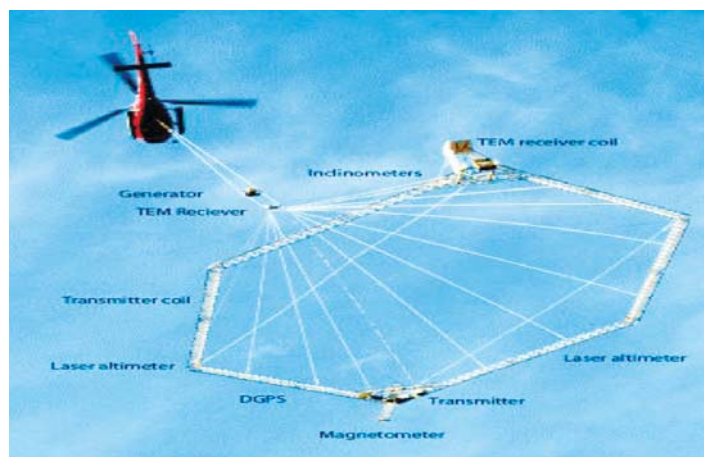


Figure 3: SkyTEM system in flight, showing the instrument configuration.

Besides the realization of the airborne IP method by applying the airborne EM method, as mentioned earlier, the next breakthrough will be the development of less expensive means for the airborne EM method.

### 2.3 Airborne Gravity Gradiometry (AGG)

Airborne Gravity Gradiometry (AGG) is an advanced geophysical technique used to measure the gravitational gradient of the Earth's subsurface. Unlike traditional airborne gravity surveys that measure gravitational acceleration directly, AGG measures the rate of change (gradient) of the gravitational field. This allows for a much higher level of detail and resolution in mapping subsurface structures, particularly at greater depths.

The incorporation of AI into AGG is a game-changer compared to traditional methods, enhancing real-time monitoring, automated flight planning, real-time signal processing, automated feature recognition, predictive modeling, and overall accuracy.

The first major breakthrough in AGG technology was the development of FALCON in the Late 1990s. The FALCON system utilized a single gravity gradient instrument (GGI) designed for mineral exploration, which significantly improved the ability to detect density anomalies caused by mineral deposits from the air. This development made AGG a viable tool for resource exploration, particularly for detecting iron oxide copper-gold (IOCG) mineralization, where gravity and magnetic signatures vary widely. The combination of AGG with airborne magnetics became an effective tactic for exploring IOCG deposits, with successful validation in known deposits like the Candelaria copper belt in Chile.

The second breakthrough was downsizing and helicopter deployment of FALCON in 2005. It provided several advantages over fixed-wing aircraft, including improved data resolution, smaller terrain clearance, and better accessibility to rugged, mountainous terrain. HeliFALCON enabled more efficient surveys in challenging environments and contributed to regional geothermal exploration, where AGG data, combined with other geophysical techniques, was used for three-dimensional inversion to interpret deep subsurface structures related to geothermal resources.

The next development for AGG is the combination of airborne gravity systems with gravity gradiometry for simultaneous operation. This combination, known as Full-spectrum FALCON, addresses AGG's limitations in detecting long-period gravitational field changes by enhancing the detection of smaller-scale gravity anomalies caused by mineral deposits.

### 2.4 Magnetotelluric (MT) Surveys

Magnetotelluric surveys measure the Earth's natural electromagnetic fields to determine the electrical resistivity of subsurface materials. These surveys are particularly valuable for detecting mineralization at greater depths, especially in

regions where traditional seismic methods are less effective. In Canada, MT surveys have been successfully used to identify deep-seated gold and copper deposits, providing valuable targets for drilling campaigns. MT surveys can also be combined with other techniques like seismic reflection to create a more comprehensive view of the subsurface. With advances in MT technology, there has been an expansion in the use of MT surveys for deep geothermal and hydrothermal exploration. The high-resolution data collected from modern systems can identify deeper geothermal reservoirs and even hydrothermal alteration zones in complex terrains, hot rocks typically have lower electrical resistivity, making MT a useful method for locating geothermal resources.

### 3. THE ROLE OF AUTOMATION IN MINERAL DISCOVERY

Automation is pivotal in the mining industry, enhancing productivity, safety, and addressing challenges such as rising costs and increasing demand. It also contributes significantly to sustainable mining practices (Jang & Topal, 2020). While automation has long been used in various sectors, its role in mining has grown, particularly in reducing workers' exposure to dangerous environments, improving safety (Kramer et al., 2019; Chirgwin, 2021). However, the adoption of new technologies brings about challenges, particularly in managing the development and integration of digital solutions (Atkins & Ritchie, 2019).

The mining industry has embraced advanced ICTs since the early 2000s to enhance productivity and safety (Jang & Topal, 2020). Notably, Autonomous Haulage Systems (AHSs), pioneered by companies like Caterpillar and Komatsu, have revolutionized open-pit mining. The Gaby mine in Chile became one of the first to deploy autonomous trucks in 2008, followed by Rio Tinto's West Angelas mine in Australia (Marshall et al., 2016). Such systems have become a cornerstone of mine automation, despite the initial high costs. The 'Mine of the Future' initiative by Rio Tinto, launched in 2008, underscored the company's commitment to integrating robotics for safety, resource exploration, and environmental impact reduction (Lopes et al., 2018).

By the 2010s, automation had extended into areas like longwall mining, with advances in anti-collision sensors, proximity detection, and intelligent water spray systems (Fisher & Schnittger, 2012). Companies like Rio Tinto and BHP further advanced their automation efforts by establishing operational centers in Perth and Pune to remotely manage and optimize mining operations (Jang & Topal, 2020). Today, mining companies are working toward "smart" mines that leverage digital technologies across exploration, planning, safety, and decision-making, all integral to the transition to Mining 4.0 by 2030 (Shrivastava & Pradhan, 2022; Kazanin et al., 2021).

### 4. AUTOMATION IN OPEN-PIT MINING: ADVANCEMENTS IN SENSING, MODELING, TRACKING, AND PLANNING

Open-pit mining is experiencing a technological revolution. Automation research is focused on integrating sensing, modeling, tracking (via digital twins), and planning, dispatching, and equipment operation, improving overall efficiency.

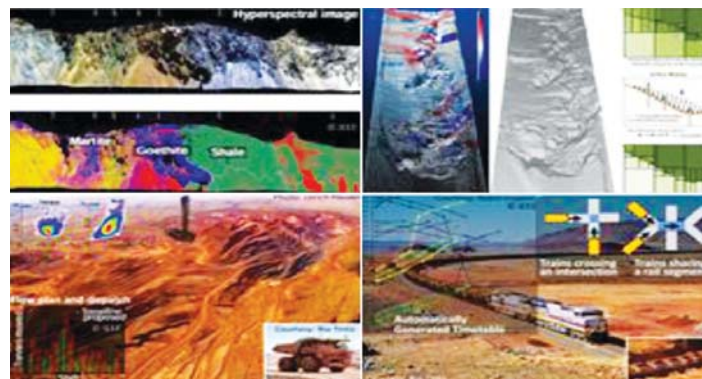


Figure 4: Automation in various opencast mining sectors

#### 4.1 Novel Sensing Technologies

Advanced sensing technologies are essential for creating real-time data that guide autonomous systems. Robotic equipment relies on accurate data to function effectively, and mining operations need continual updates on the pit status. Hyperspectral imaging, for example, is used to analyze mineralogy from exposed mine faces, allowing for improved decision-making regarding resource extraction (Karam et al., 2021). Early warning systems, utilizing sensor networks like strain gauges, have also been developed to detect potential mine structural instabilities (Karam et al., 2021). These systems are powered by AI algorithms that process and analyze data to predict failure, preventing accidents before they occur.

#### 4.2 Dynamic Systems and Material Tracking

The use of dynamic road networks and material tracking technologies in open-pit mining has led to significant advancements in operational efficiency. Vehicle movements are tracked using GPS data, aiding in real-time navigation and optimizing fleet operations. Additionally, probabilistic graphical models help estimate the state of the mine, adjusting for uncertainties in material composition, thus improving planning accuracy for material extraction and transport.

#### 4.3 Robotics in Mining

Robots play a crucial role in improving safety and efficiency by performing tasks in hazardous conditions. These tasks include detection, inspection, and containment, reducing risks such as crush injuries, landslides, and exposure to dangerous materials like asbestos. Robotics has also been integrated into well-defined mining operations, such as



drillhole inspections and conveyor belt monitoring, improving operational safety by automating routine tasks.

Robotic systems are equipped with advanced sensors such as LiDAR, radar, and cameras, allowing them to perform complex tasks autonomously. For instance, the Down-Hole Inspection Robot (DHIR) is designed to improve the accuracy of blasthole measurements, reducing manual handling and increasing the reliability of drilling processes (Markham et al., 2021).

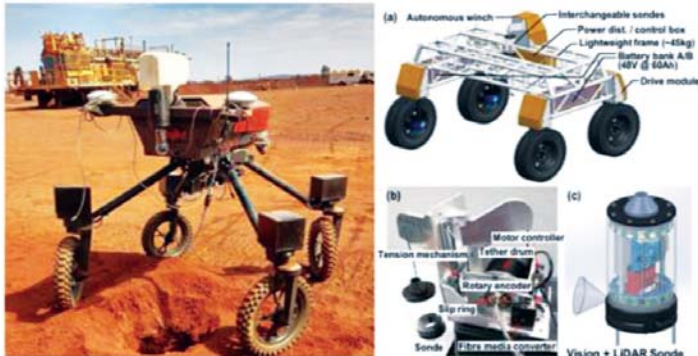


Figure 5: A mining-oriented blast-hole inspection robot. (a) System assembly, (b) LiDAR, (c) radar hardware.

#### 4.4 Advancements in IoT and Cybersecurity in Mining

The Internet of Things (IoT) plays an increasingly pivotal role in the mining industry, connecting machines, sensors, and people to create more integrated and efficient operations. IoT technologies facilitate the monitoring of personnel, equipment, and environmental conditions, allowing for safer and more efficient mining operations (Singh et al., 2018). However, the adoption of IoT in mining raises concerns related to cybersecurity. The increasing interconnectivity of mining operations creates vulnerabilities that could expose critical data or disrupt autonomous systems (Knights & Yeates, 2020). Addressing these risks through robust cybersecurity frameworks is crucial to ensuring the safety and operational continuity of automated mining operations.

#### 4.5 Autonomy and AI Applications in Mining

While AI and autonomous systems have significant potential to enhance efficiency and safety in mining, their implementation comes with challenges. AI systems, often considered “black boxes,” may lack transparency, which makes it difficult to understand their behavior under various operational conditions. Furthermore, the success of these systems relies on the quality and diversity of training data, meaning that poorly trained systems may struggle to adapt to unforeseen situations (Gamer et al., 2020).

Despite these risks, AI applications offer opportunities for improving mining operations, including better resource estimation, equipment management, and predictive maintenance. The continued development of AI and

autonomous systems will be key to the evolution of the mining sector.

#### 4.6 Blasting and UAV Technology in Mining

Blasting remains a fundamental part of the mining process. Recent innovations, particularly the integration of unmanned aerial vehicles (UAVs), have enhanced the safety and efficiency of blasting operations. UAVs equipped with remote sensing technologies like LiDAR and photogrammetry enable real-time monitoring of blast outcomes and the assessment of pit wall stability, improving both safety and operational efficiency.

#### 4.7 Technological Infrastructure in Automated Mining

Automated mining operations depend on an array of sensors and technologies to improve operational efficiency, enhance safety, and ensure continuous optimization. Laser-Induced Breakdown Spectroscopy (LIBS) is employed to analyze extracted core samples in real-time, providing valuable data for decision-making. Similarly, LiDAR technology, combined with Simultaneous Localization and Mapping (SLAM) algorithms, plays a crucial role in mapping and navigating mining environments, enabling autonomous vehicles to operate safely and efficiently. Time-of-Flight Cameras (TFC) further enhance mapping capabilities by capturing precise environmental data with a single light pulse, making them faster and more efficient in challenging mining environments.

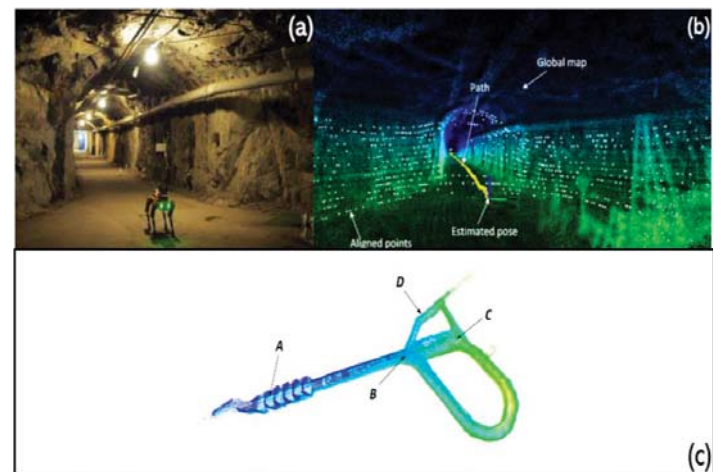


Figure 6: Obtaining a point cloud map using a LIDAR sensor using a quadruped robot.

#### 4.8 Collaborative Robotics in Mining

The integration of collaborative robotics allows different robotic systems to work together seamlessly, improving mining efficiency. Systems like autonomous haulage trucks, drilling robots, and charging robots are increasingly being coordinated within networks, enhancing the productivity and safety of mining operations. Collaborative robots reduce human exposure to hazardous conditions, such as

toxic gases or unstable mine structures, and contribute to more effective and timely rescue operations in emergency situations.

#### 4.9 Neural Networks for Augmented Personnel Safety

AI-powered neural networks are increasingly utilized to enhance safety by monitoring personnel activity in real-time. For example, the YOLOv8 model is used for detecting hazardous zones and the location of workers within the mine, helping prevent accidents by providing early warnings and ensuring safer working conditions (Markham et al., 2021).

#### 4.10 Open-Pit Mining and Unmanned Transportation

Open-pit mining is a highly efficient method for extracting minerals from near-surface deposits, employing specialized machinery like mining trucks, shovels, and bulldozers. This method offers significant cost advantages over underground mining, contributing to its widespread use. The large-scale nature of open-pit mining, combined with specialized equipment, creates the ideal setting for the deployment of unmanned systems, especially autonomous mining trucks.

### 5. KEY TECHNOLOGICAL CONTRIBUTION

**5.1 FusionPlanner:** A multi-task motion planning algorithm that incorporates multi-task learning and a hybrid evidential fusion model to improve the robustness and trustworthiness of control commands in autonomous mining trucks.

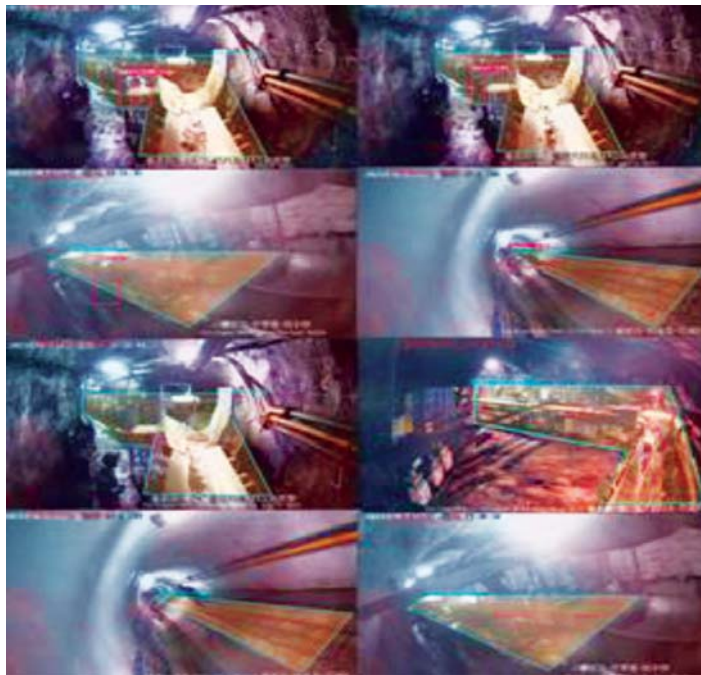


Figure-7: A YOLOv8 model detects personnel and hazardous areas

**5.2 MiningNav:** A benchmark specifically designed for unmanned transportation in open-pit mines, which tests the robustness and reliability of algorithms across various mining environments.

**5.3 Parallel Mining Simulator (PMS):** A simulation platform tailored for open-pit mining, enabling testing and development of autonomous mining systems in realistic, scalable environments.

#### 5.4 Benchmarks and Testing for Autonomous Mining Trucks

##### 5.4.1 Fusion Planner: Enhancing Autonomous Mining Truck Navigation

The Fusion Planner improves the navigation of autonomous mining trucks by: 1) Predicting multiple future control commands to ensure smooth and continuous operation. 2) Overcoming sensor limitations, especially in low-light conditions, by using predictive models that compensate for low-frequency sensor data. 3) Adapting to out-of-distribution (OOD) events, such as unexpected terrain changes or obstacles. One of the biggest challenges is the navigational complexity. Open-pit mines are vast and have uneven surfaces, lacking identifiable landmarks, making it challenging for autonomous vehicles to navigate without sophisticated algorithms and sensors.

##### 5.4.2 MiningNav benchmark

The MiningNav benchmark stands out as a unique validation tool for testing autonomous trucks in the challenging environment of open-pit mines. It provides a realistic testing environment using the PMS simulator and includes three verification experiments to assess system performance in dynamic mining conditions. MiningNav Benchmark: Testing Autonomous Mining Trucks

The MiningNav benchmark validates the performance of autonomous mining trucks by focusing on: 1) Trustworthiness: Ensuring algorithms perform reliably across various mining scenarios. 2) Realistic Testing: Using the PMS simulator to create accurate and dynamic testing environments. 3) Verification Experiments: Evaluating trucks under different conditions to ensure robustness in real-world mining operations.

Driving Simulators: Simulators like CARLA and GTA V are designed for urban environments, but open-pit mines present unique challenges, such as rough terrain and unpredictable conditions. PMS addresses these challenges by providing a comprehensive simulation platform specifically for open-pit mining operations, supporting up to 300 trucks simultaneously.

##### 5.4.3 Parallel Mine Simulator (PMS)

PMS offers a realistic, high-fidelity simulation of open-pit mining environments, including complex terrain and environmental factors. It allows researchers to collect detailed sensor data and performance metrics, simulate large-scale operations with up to 300 trucks, testing multi-agent coordination and safety & provide a scalable platform



for testing autonomous systems without the risks and costs of real-world trials.

PMS simulates the entire transportation process in open-pit mines, allowing autonomous mining vehicles (trucks, bulldozers, excavators) to be tested under realistic conditions. It's built on a one-server, multi-client framework, the server renders the environment, and clients represent autonomous agents. Users can adjust server parameters, reset simulations, and modify environmental conditions such as weather and road conditions to test the vehicles under different scenarios. The simulator includes meteorological conditions, luminosity, precipitation, and dust levels to enhance realism and provide a complete testing environment. Features include high-fidelity 3D models of mining machinery, vehicles, infrastructure, and the mining terrain as well as PMS can simulate large-scale mining operations with up to 200 mining trucks simultaneously, ensuring that performance is tested under various load conditions.

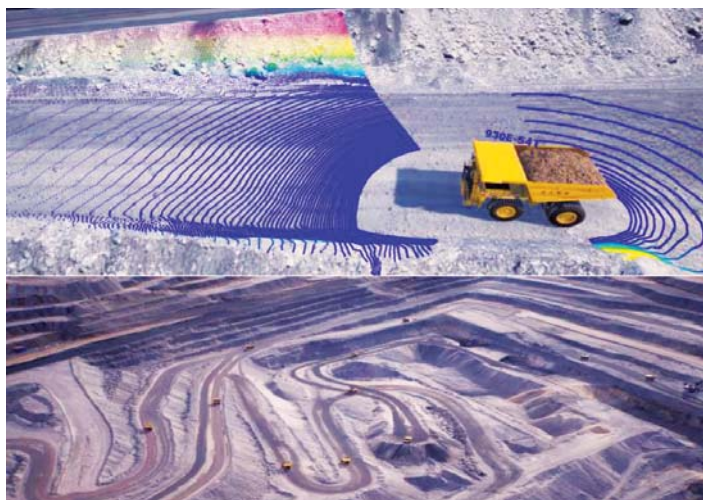


Figure-8: Part of scenarios of the open-pit mine in PMS

PMS can build an open-pit mine environment using systematic approaches such as: 1) Importing production zones: These include key areas such as loading sites, transportation roads, and dumping sites, which are crucial for the mining operation. 2) Adding boundaries and textures: The simulator incorporates relevant boundaries (such as fencing or borders) and applies realistic textures to the environment. 3) Manually placing infrastructure: Important structures like buildings, terrains, and traffic infrastructure (e.g., road signs, barriers) are placed within the mine to simulate a real-world mining environment. 4) Defining traffic participant zones: Specific areas where mining vehicles are allowed to operate are defined to ensure controlled traffic flow and prevent collisions.

- **Key Sensors in PMS:** 1) LiDAR: Critical for 3D mapping of the terrain and obstacle detection in low visibility conditions. 2) MMV Radar: Useful for detecting

obstacles in poor visibility and ensuring safe navigation. 3) Onboard Cameras: Multiple types of cameras (RGB, depth, grayscale, semantic, fisheye) provide a broad spectrum of visual information for decision-making.

- **Transportation Participants in PMS:** Includes mining trucks, bulldozers, excavators, and auxiliary vehicles (e.g., water sprinklers) as well as High-Fidelity Models of mining trucks such as Komatsu 730E and Caterpillar 797F are used to ensure realistic dynamics and kinematics.

## 6. ROBOTS FOR UNDERGROUND MINING MISSIONS

In underground mining, Robot-as-a-Sensor (RAAS) networks play a crucial role in enhancing safety and operational efficiency. In these networks, robots serve as mobile sensor units that continuously collect and share real-time data, such as environmental conditions, equipment status, and potential hazards. By collaborating and exchanging information, robots can adjust their behavior, such as changing their paths or responding to unsafe conditions, based on the data shared within the network. This allows for improved situational awareness, faster decision-making, and more efficient mining operations. RAAS networks are particularly valuable in the challenging and hazardous underground environment, where real-time data is critical for minimizing risks to personnel and optimizing the extraction process.

### 6.1 Key Aspects of Robotic Sensing in Mining 5.0

- 1) Vision-Based Sensors: Cameras and LiDAR help with tasks like inspection, mapping, and environmental monitoring, providing critical data for autonomous systems.
- 2) Non-Vision-Based Sensors: Infrared, ultrasonic, and IMUs help detect hazardous gases, monitor environmental factors, and enhance autonomous navigation.
- 3) Wireless Sensor Networks (WSNs): WSNs enable robots to share sensory data and communicate with each other, facilitating real-time decision-making.
- 4) Robot-As-A-Sensor (RAAS): Robots act as sensor units within a collaborative network, sharing data, modifying paths based on sensor information, and improving situational awareness.

### 6.2 Challenges in Realizing RAAS Networks

- 1) Scalability: RAAS networks must handle a growing number of robots, requiring dynamic power management and adaptive data rates.
- 2) Mobility: The mobile nature of robots and their communication needs make data routing and localization difficult.
- 3) Communication Coverage and Latency: Strategies like mesh networks and low-bandwidth technologies (LoRa, Bluetooth) are essential for reliable communication in mines.

### 6.3 Future Directions

Integrated Sensing and Communication (ISAC): This

combines sensing and communication to enhance efficiency. Edge Computing: Processing data locally to reduce network congestion and improve efficiency. Semantic Communications: Only meaningful data is transmitted, reducing network strain and ensuring real-time decision-making.

## 7. CONCLUSION

In conclusion, the integration of Artificial Intelligence, robotics, and advanced geophysical techniques is transforming the mining industry by improving the efficiency, accuracy, and safety of mineral exploration and extraction. AI systems, such as those used by Goldspot Discoveries, are revolutionizing the analysis of geological data, reducing exploration costs, and uncovering previously hidden resources. Advances in geophysical methods like IP, AEM surveys, and Gravity Gradiometry have expanded exploration capabilities to more challenging environments. Automation and robotics, including autonomous haulage systems and real-time monitoring, are enhancing operational efficiency while minimizing human exposure to hazardous conditions.

The integration of advanced sensors and communication technologies like RAAS, WSNs, and edge computing holds great promise for transforming mining operations into more autonomous, efficient, and safe systems. By addressing key challenges in communication, scalability, and mobility, autonomous mining operations are expected to play a significant role in achieving the goals of Mining 5.0. The future of mining is set to be shaped by these technologies, fostering smarter, safer, and more sustainable practices across the industry.

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(Continued from Page 9)

The new data also challenge old assumptions about the timing and mechanisms of mineral deposit formation, suggesting that the Earth's geology is more dynamic and nuanced than previously thought. As technologies improve and new discoveries emerge, this could mark the beginning of a new era in mineral exploration.

IDR, News | May 17, 2025

### ➤ Rare earth deposit believed to be the third largest in the world has been discovered



Kazakhstan's recent announcement about a colossal deposit of rare earth metals has triggered excitement across energy and tech sectors. Officials claim it could rank among the world's top three in total reserves.

"Four prospective areas have been identified within the site, with total estimated rare earth reserves reaching 935,400 tons," said the spokesperson for Kazakhstan's Ministry of Industry and Construction. This discovery, located in the heart of the Karagandy region, is being called "New Kazakhstan," and it might reshape critical mineral supply chains for years to come.

### Understanding rare earth metals

Rare earth metal elements like cerium, lanthanum, neodymium, and yttrium serve as key ingredients in many modern devices, including smartphones and digital cameras. These metals also power some green technologies, particularly electric cars and wind turbines, making them vital for global manufacturing.

"In order to call it a deposit, you first need to fully study all the elements in the area with mineralization," said Georgiy Freiman, the executive committee chair of the Professional Association of Independent Mining Experts. The new find in Kazakhstan appears promising, but caution is essential.

(Continued on Page 31)



## MEAI NEWS

### 7<sup>th</sup> NATIONAL COUNCIL MEETING

#### Held on 26-4-2025 at Ramee Royal Resort, Udaipur

Council Members attended the meeting – Shri. A.K. Kothari, Dr. S.S. Rathore, Dr. T. N. Venugopal, Prof. Sushil Bhandari, Shri. B. Surender Mohan, Shri. Anil Mathur, Shri. K. Venkataramana, Shri. A K Garg, Shri. Rachappa M Saradagi, Shri. K. Prabhakar Reddy, Shri. S K Vashisth, Shri. B L Kotriwala, Shri. Prem Raj Dave, Shri. Ravi Chandran Raj, Dr. Pukhraj Nenival, Shri. Praveen Kumar, Shri. Asif Ansari, Shri. A. K. Jaiswal, Shri. Ramesh Singh, Shri. Vijay Singh A R, Shri. Lalit Mohan Soni, Dr. Vivek Laul, Shri. Sitaram Kemmannu, Shri. P V Rao, Ms. Gunjan Pande, Dr. C H. Rao & Shri. L. Krishna.



L to R: Shri. M. Narsaiah, SG, Shri. S.N. Mathur, President, Shri. D.B. Sundara Ramam, Vice President – I & Shri. Dhananjaya G Reddy, Vice President – II on the dais



Paying Homage to those members who passed away since the previous Council meeting



View of members present at the Council Meeting

#### MEAI - Life Memberships Approved in the 7<sup>th</sup> Council Meeting

| SI No | LM No. | Name                    | Chapter   |
|-------|--------|-------------------------|-----------|
| 1     | 6473   | Silambarasan N          | Tamilnadu |
| 2     | 6474   | Rajasekaran R           | Tamilnadu |
| 3     | 6475   | Pushpendra Kumar Mishra | Jabalpur  |
| 4     | 6476   | Ms. Jyoti Patel         | Udaipur   |
| 5     | 6477   | Shashank Sinha          | Jaipur    |

|    |      |                       |                |
|----|------|-----------------------|----------------|
| 6  | 6478 | Navneet Surana        | Jaipur         |
| 7  | 6479 | Rajeev Choudhary      | Jodhpur        |
| 8  | 6480 | Ramarao Tota          | Hyderabad      |
| 9  | 6481 | Ramakrishna Chintala  | Hyderabad      |
| 10 | 6482 | Rohant Gulab Shahare  | Hyderabad      |
| 11 | 6483 | Srikanth Jutru        | Hyderabad      |
| 12 | 6484 | Prasad Vallepu        | Hyderabad      |
| 13 | 6485 | V. Vinod Kumar        | Hyderabad      |
| 14 | 6486 | Pudari Harish         | Hyderabad      |
| 15 | 6487 | Gurram Dileep         | Hyderabad      |
| 16 | 6488 | Rammohan Perumalla    | Hyderabad      |
| 17 | 6489 | Aruna Kumar Bisoyee   | Bhubaneswar    |
| 18 | 6490 | Lokesh K Krishnappa   | Hyderabad      |
| 19 | 6491 | Parijat Nandi         | Kolkata        |
| 20 | 6492 | Raja Kishor Sahoo     | Hyderabad      |
| 21 | 6493 | Prasad Saraswat       | Hyderabad      |
| 22 | 6494 | Manan Kamble          | Hyderabad      |
| 23 | 6495 | K S Ravikiran         | Hyderabad      |
| 24 | 6496 | Ms. Akshatha N M      | Hyderabad      |
| 25 | 6497 | Ms. Stella Mary       | Hyderabad      |
| 26 | 6498 | Ms. Kavya K           | Hyderabad      |
| 27 | 6499 | Girish Kumar Pandey   | Ahmedabad      |
| 28 | 6500 | Amit Raj              | Ahmedabad      |
| 29 | 6501 | Ujjwal Mishra         | Ahmedabad      |
| 30 | 6502 | Santosh Ghadi         | Goa            |
| 31 | 6503 | Rahul Kishore         | Barajamda      |
| 32 | 6504 | Sanjay Singh          | Jodhpur        |
| 33 | 6505 | Dinesh S              | Hyderabad      |
| 34 | 6506 | Pranav Dave           | Hyderabad      |
| 35 | 6507 | Mahesh Garg           | Jaipur         |
| 36 | 6508 | Dasari Appaji         | Hyderabad      |
| 37 | 6509 | Pankaj Kulshrestha    | Udaipur        |
| 38 | 6510 | Shubham Mishra        | Bangalore      |
| 39 | 6511 | Navneet Sharma        | Ahmedabad      |
| 40 | 6512 | Dibakar Parida        | Bellary-Hospet |
| 41 | 6513 | Gali Venugopal        | Bellary-Hospet |
| 42 | 6514 | S V Praveen Kumar     | Bellary-Hospet |
| 43 | 6515 | Raghavendra B         | Bellary-Hospet |
| 44 | 6516 | Abhay Shanker Dashora | Udaipur        |
| 45 | 6517 | Jayant Sharma         | Udaipur        |
| 46 | 6518 | Ravi Kant Sharma      | Udaipur        |
| 47 | 6519 | Ashok Paliwal         | Udaipur        |
| 48 | 6520 | Manider Singh Sandhu  | Udaipur        |
| 49 | 6521 | Ritesh Purohit        | Udaipur        |

|    |      |                              |                |
|----|------|------------------------------|----------------|
| 50 | 6522 | Ashok Kumar Vaish            | Udaipur        |
| 51 | 6523 | Ms. Dipika Gupta             | Udaipur        |
| 52 | 6524 | Manoj Salvi                  | Udaipur        |
| 53 | 6525 | Manoj Bhatnagar              | Udaipur        |
| 54 | 6526 | RK Khiyani                   | Udaipur        |
| 55 | 6527 | Krishna Bhupathi Raja Buruga | Bellary-Hospet |
| 56 | 6528 | Samula Shiva Krishna Reddy   | Bellary-Hospet |
| 57 | 6529 | Subhransu Bhusan Das         | Bhubaneswar    |
| 58 | 6530 | Vinjamuri Saineesh           | Hyderabad      |
| 59 | 6531 | Nanjundappa M                | Bangalore      |
| 60 | 6532 | Ms. Dwitheeya E C            | Bellary-Hospet |
| 61 | 6533 | R M Yadav                    | Udaipur        |

### BELLARY HOSPET CHAPTER

### EXECUTIVE & DEVELOPMENT COMMITTEE MEETING

**Date:** 29<sup>th</sup> April 2025,

**Venue:** Royal Orchid Central Kireeti, Hosapete

**Meeting commenced:** 04.00 PM.

Following members attended the meeting:

Office Bearers: Sri S H M Mallikarjuna (Chairman), Sri P Venkateswara Rao (Secretary)

Ex-officio and Council Members: Sri K Madhusudhana (Past President), Sri K Prabhakar Reddy, Sri. G Laxminarayana

Executive Committee Members: Sri T Jitender Reddy, Sri Vinay Kumar

Development Committee Members: Sri. YVR Krishna Reddy, Sri. Paleti Srinivas Rao, Sri. Gopal Joshi

First-Aid Committee Members: Sri MM Rakesh, Sri S Ravindra



Sri P. Venkateswara Rao, Secretary of the BH Chapter delivered the welcome address. In his speech, he extended

a warm welcome to all the distinguished members, office bearers, and invitees. He expressed his gratitude for their presence and commitment to the objectives of the Association.

A one-minute silence was solemnly observed in memory of the recently departed members of the mining fraternity - Shri G.V.V. Krishna Rao, Shri P. Sitaramaiah and Shri Deepak Vidyarthi. The gathering paid heartfelt condolences to these esteemed professionals, acknowledging their invaluable contributions to the mining industry. Their dedication, leadership, and commitment to the field were remembered with deep appreciation.

Sri P Venkateswara Rao, Secretary, started discussing the points of the agenda circulated, and discussed previous meeting minutes and the minutes of meeting were approved unanimously.

### FOLLOWING POINTS DISCUSSED DURING THE MEETING

#### 1. Upcoming national seminar proposed in the month of october-2025

Committee has discussed the arrangements for the National Seminar proposed to be held on the 10-11 October 2025. The discussion was led by Sri K. Madhusudhana, who gave key directions regarding the seminar planning and execution. Sri K. Madhusudhana directed the Secretary to oversee all preparatory activities, particularly focusing on the arrangements for the function hall and food provisions for the seminar attendees. He emphasized the need for timely and high-quality arrangements to ensure the seminar runs smoothly.

In addition, he advised that a suitable theme for the seminar be selected, specifically suggesting topics in the fields of Artificial Intelligence (AI), Robotics or Machine Learning (ML) to align with the current technological advancements and industry relevance.

Furthermore, Sri K. Madhusudhana stated that all Unit Heads should be designated as organizing committee leaders, highlighting the importance of leadership and accountability in organizing the event. He also encouraged the active participation of young professionals from various companies, promoting inclusivity and innovation.

#### 2. Finalization of various committees for national seminar

As part of the preparations for the upcoming National seminar, the executive committee finalized the formation of various subcommittees to ensure efficient planning and execution of the event. Each subcommittee will handle specific responsibilities, with designated team leads and members.



### 3. Construction of new building for MEAI BH chapter

Construction of a new building for the MEAI BH Chapter during the session. Sri K. Prabhakara Reddy presented and discussed the blueprint of the proposed new office building. The blueprint included detailed plans i.e. the layout, design, and structural aspects of the construction. The discussion was constructive and generated productive output among the attendees, who appreciated the clarity and scope of the proposed design. Further steps toward the commencement of construction were also deliberated.

### 4. Discussion on improvement of first aid training seeking members and expansion of first aid training facilities to students, other institutions

Sri Ravindra appraised the status of application regarding the “Recognition of Mining Engineers’ Association of India (Bellary - Hospet Chapter) as “First Aid Training Institute” in the state of Karnataka for the purpose of “First aid Training & Certification” as per the Section 45(3) of the Factories Act, 1948”. He said we have paid a fee of Rs. 10,000/- and submitted a duly filled application to The Director of Factories, Boilers, Industrial Safety & Health, Bangalore. He expressed the need to follow up the application further at Bangalore. Sri K Madhusudhana took the lead and asked Sri Ravindra to send all the details so that he will follow up at the Bangalore office to get the job done.

Committee also discussed arranging online training classes for upcoming DGMS Examinations. Sri Ravindra expressed that there is a shortage of Computers for giving demos to the candidates who are going to attend training classes and requested all the members to donate the computers. If it is not possible to donate the new ones, he requested to donate used computers at least. Sri. K. Madhusudhana emphasized the significance of these classes in equipping candidates with the necessary knowledge and skills required to succeed in the mining industry, particularly for competitive examinations such as the First and Second Class Mine Manager’s Exam. He further invited Sri Rakesh MM to consider and reflect on this idea, indicating that further action or planning could be developed based on Sri Rakesh’s feedback and decision.

### 5. Membership Improvement

It was decided to increase the membership of the chapter by conducting special drives. Committee requested all the members to take the lead in increasing the membership. It was also decided to increase the student Chapter membership from Nandihalli PG College and TMAES Polytechnic.

### 6. Other Matters with the permission of Chair

Sri T Jitender Reddy informed all the members that VSKU Chancellor was requested to give permission to

use the conference hall of Nandihalli PG college for BH Chapter workshops, seminars, meetings etc., which are planned to be conducted in Sandur area. The Vice Chancellor promptly responded and gave his approval to use the same and advised the Chapter to give a letter to the director of Nandihalli PG College whenever the conference hall is needed.

### 7. Financial position as on date

During the executive committee meeting, an update on the financial status of the Chapter was presented. A detailed report was presented outlining the total income generated from membership fees, sponsorships, and other sources etc.

The next meeting of the Executive committee is tentatively planned for July, 2025.

Dr. K. Prabhakara Reddy addressed the gathering during the meeting and offered valuable guidance to the newly elected Executive Committee for the year 2025–27. He emphasized the importance of setting new targets and goals to drive the chapter’s progress in the coming term. Additionally, he proposed the preparation of a comprehensive book compiling recent circulars and updates issued by the Department of Mines & Geology, DGMS, IBM, and other relevant bodies in the mining sector. His suggestions were well-received and noted for further action.

Furthermore, he proposed that the traditional printed souvenir for the upcoming National seminar be replaced with a digital version accessible through a QR code. This, he explained, would not only make information more accessible and user-friendly but also promote sustainability by reducing printing. He specifically discussed the initiation and support for coaching classes targeted at candidates preparing for the First and Second Class Mine Manager’s Examination.

Sri M M Rakesh thanked all the Members present in the Meeting and also thanked the staff of Hotel Royal orchid, for their work.

### TECHNICAL WORKSHOP BY ROSSI GEARMOTORS (INDIA) PVT. LTD

**Date:** 29<sup>th</sup> April 2025

**Venue:** Hotel Royal Orchid Kireeti, Hosapete

**Meeting Commenced At:** 06.00 Pm

**Percipients:** 120 Members

Sri Rakesh MM, Manager KSMCL Workshop commenced with a warm and respectful welcome extended to the dignitaries on the dais. As they took their seats on the dais, each guest was greeted with a traditional welcome – a bouquet of flowers and a token of appreciation presented by the organizing committee members. The

audience acknowledged their presence with a round of applause, reflecting the respect and enthusiasm shared by all in attendance.



In his address, Sri. Mallikarjuna warmly welcomed the delegates and appreciated Rossi Gearmotors for hosting the event aimed at enhancing technical awareness and industrial collaboration. He emphasized the critical role of reliable power transmission systems—such as gearmotors, gearboxes, and related automation technologies—in ensuring efficiency, safety, and sustainability in mining and heavy industries.

The technical workshop hosted by Rossi Gearmotors (India) Pvt. Ltd. witnessed a compelling address by Sri. Pavan Dave, Senior Manager at Rossi. His address set the tone for the technical sessions that followed and reflected Rossi's commitment to driving innovation and operational efficiency in the power transmission industry. He emphasized the importance of technological upgrades in industrial processes, particularly in sectors where machinery operates under extreme conditions. He shared insights into Rossi's latest range of high-efficiency gear units, planetary gear systems, and smart monitoring solutions, which are designed to enhance reliability, reduce downtime, and support sustainability goals.

Sri. Hemant Mohindra, Managing Director of Rossi Gearmotors (India) Pvt. Ltd., delivered an insightful and engaging presentation on the recent advancements in gearboxes and their evolving role in the mining industry. His address focused on the technological innovations that Rossi Gearmotors has introduced to meet the increasing demands of performance, efficiency, and durability in mining applications.

- **Innovative Gearbox Design:** Shri. Mohindra showcased the latest design upgrades in Rossi gearboxes, which incorporate enhanced thermal capacity, compact construction, and superior torque handling to suit rugged mining environments.
- **Digital Integration:** He elaborated on how Rossi is integrating smart technologies into their gear systems, including condition monitoring sensors and IoT-enabled diagnostics, to support predictive maintenance and reduce downtime in mining operations.

- **Customization for Mining Equipment:** Emphasis was placed on the company's ability to tailor gearboxes for specific mining applications such as stackers, reclaimers, crushers, and conveyors, ensuring optimal alignment with customer requirements.



As part of the concluding session of the workshop, a formal felicitation was extended to Rossi Gearmotors (India) Pvt. Ltd. in recognition of their valuable presentation and excellent arrangements for the technical event. The felicitation acknowledged the leadership of Sri. Hemant Mohindra, Managing Director, and his dedicated team for their efforts in sharing in-depth knowledge on advanced gearbox technologies and their critical applications in the mining industry.



Sri Madhusudhana also shared his valuable perspectives on the future of mechanical power transmission in India, underlining the critical role of collaboration between equipment manufacturers and end-users in achieving long-term reliability and performance. He encouraged participants to embrace modern technologies, invest in skilled manpower, and focus on sustainability.



Sri. K Prabhakara Reddy spoke on the importance of adopting modern gear technologies to improve productivity, reduce downtime, and ensure sustainability in manufacturing and infrastructure sectors. He also highlighted the role of such workshops in bridging the gap between



industry practices and evolving technology, encouraging professionals to engage in continuous learning and technical collaboration.



Sri. T. Jitendra Reddy, Executive Member of the Chapter delivered a formal Vote of Thanks during the closing segment of the technical workshop. He expressed gratitude to all individuals and organizations who contributed to the successful execution of the event. Rossi Gearmotors (India) Pvt. Ltd. and Sri. Hemant Mohindra, Managing Director, distinguished dignitaries, speakers, and technical experts, and The audience, The organizing committee members of the Chapter.



## GOA CHAPTER

### Annual General Meeting

The Annual General Meeting of Goa Chapter was organized on Tuesday 23/02/25 at GGVTC, Curti, Ponda followed by an Extraordinary General body meeting on 10/05/25 at Hotel Menino Executive, Ponda, Goa. The members have unanimously elected the following members to the New Executive Committee for the term 2025-27.

1. Shri. E Hymakar Reddy - Chairman
2. Shri. Raju T Salgaonkar - Vice Chairman
3. Shri. Santosh Kotapkar - Secretary
4. Shri Rakesh B Singh – Jt Secretary/ Treasurer
5. Shri. Joseph Coelho - Member
6. Shri. Ramesh K Singh - Member
7. Shri. Cletus D'Souza - Member
8. Shri. Hemant Karmali - Member

9. Shri. Clarence D'Souza - Member

10. Shri. Rupesh Pangam - Member

11. Shri. C S Dhavaji (Permanent Invitee)

12. Shri. T Victor (Past President)

13. Shri. A Avudaiyappan (National Council member)



New Executive Committee



Chairman (2023-25) Shri. Joseph Coelho (Left) & New Chairman (2025-27) Shri. E Hymakar Reddy (Right) of Goa Chapter



(L to R), Shri. Ramesh K Singh (Secretary, 2023-25), Shri. Joseph Coelho (Chairman, 2023-25), Shri. Raju T Salgaonkar (Vice Chairman, 2025-27), Shri. E H Reddy (Chairman, 2025-27), Shri. Clarence D'Souza and Shri. T Victor (Former President, MEAI)

## JABALPUR CHAPTER

### One-Day Workshop on National Critical Mineral Mission on 24-04-2025

On 24-04-25, the Jabalpur chapter organized a one-day workshop on the National Critical Mineral Mission at Satya Ashoka in Jabalpur. Mr. Pratyendra Upadhyay, Secretary



gave the welcome speech. In his speech, he emphasized the importance of the National Critical Mineral Mission, why the government formed the committee, and also mentioned the MEAI Jabalpur's objective for conducting the workshop to enhance the knowledge about the subject among all members. Mr. Sabre, SMG, IBM Jabalpur, gave an excellent presentation on the National Critical Mineral Mission, covering detailed topics related to the mission, such as objectives, exploration planning, key international

initiatives, components of the National Critical Mineral Mission, and successfully conducting a session on Q&A. Mr. Pukhraj Neniwal, Chairman of the Jabalpur chapter, addressed the gathering and appreciated the members for their wholehearted participation in the workshop. He also emphasized the need to increase the membership of the Jabalpur Chapter and the way forward. Mr. Gaurav Tipathi proposed a vote of thanks on behalf of the Jabalpur Chapter for the participation and excellent presentation.



## RAJASTHAN CHAPTER - UDAIPUR

### International Conference at a Glance

Two-day International Conference on “Centre of Excellence in Mining (Continuous Improvement and Asset Optimisation)” was organized by the Rajasthan Chapter-Udaipur & Hindustan Zinc Ltd., Udaipur on 26-27 April, 2025 at Ramee Royal Resort, Udaipur.

*India has become the 5<sup>th</sup> largest economy in the world and likely to become the 3<sup>rd</sup> economy by 2027. Presently India's GDP growth rate is varying between 6-7 %. Mining is one of the major industries in India which currently contributes around 2% to the country's GDP. Over a past few years it is facing serious challenges such as decreasing ore grades, over exploitation of shallow deposits, delays in newer discoveries, mining of deeper deposit, management of multiple issues from mine to mill or port, ensuring minor metal and by-product recoveries, value addition and utilization of waste, environmental issues and alike. These challenges have created a turning point and to establish a centre of excellence which will have continuous improvement in the system and also asset optimization in the mining sector. Several digital innovations such as the internet of things (IoT), automated drones and 3D printing are being implemented in many mining operations across the globe. Not only these provide solutions to the existing problems but also help in radical transformation of mining processes for increasing efficiency, profitability and the ability to comply with the stricter regulations.*

In order to cater to the above need, the Rajasthan Chapter-Udaipur during a brainstorming session in its Executive meeting, it was decided to organise an International Conference on “Centre of Excellence in Mining (Continuous Improvement and Asset Optimisation)” jointly with Hindustan Zinc Ltd, Udaipur on 26-27 April, 2025.



Sh SN Mathur, National President MEAI presided over the function where Sh Peeyush Narayan Sharma, Controller General (I/C) IBM was the Chief Guest and Sh Bhagwati Prasad Kalal, IAS, MD-RSMML, Sh Namit Mehta, IAS, District Collector, Udaipur, Sh Deepak Tanwar, Director, Director Mines and Geology, Govt. of Rajasthan & Sh Arun Misra, CEO &WTD-HZL & ED-Vedanta were the Guests of Honour. Keynote Speaker was Sh Ravi Sharma, COO-IRH, Chairman BMRC. Sh Praveen Sharma, COE-HZL & Chairman of Udaipur Chapter and Dr. SK Vashisth, Organising Secretary of the Conference were on the dais. After the floral welcome of the guests, lighting of the lamp was held in front of Lord Ganesha by the dignitaries.





Sh Praveen Sharma, Chairman of Rajasthan Chapter-Udaipur expressed his warm welcome and gratitude to all the dignitaries on the dais and off the dais, speakers from India and overseas who generously shared their expertise with us. This International Conference aims to trigger open deliberations on benefits of establishing the centre of excellence to solve complex problems of the mining industry and increasing its efficiency, profitability & safety through continuous improvement and asset optimisation. Conference provides a forum for exchange of ideas and discussions among vital stakeholders i.e. policy makers, managers, engineers, entrepreneurs' regulatory bodies, geo-scientists and academicians from India and Globe. He appreciated the hard work and dedication of the organizing team, who have made this event possible.



Dr. S.K. Vashisth, organizing secretary of the conference, informed various activities to be held in the conference and said that this conference will focus on the specific technology of deep-seated metallic mineral deposit Exploration & Mining, Latest innovations in mineral exploration, innovations in discovery and reporting of mineral reserves and resources. Papers will be read by subject matter experts on new age minerals and their strategic importance, establishment of Centre of Excellence in Safety and Environment, Strategic Mine Design and "Value Optimization" Excellence in Mining including Drill and Blast, Mine Development and Stopping, Automation in Mining operations, Use of Artificial Intelligence (AI) and Robotics, TMM in Mining and Benchmark Practices, Use of State-of-the-art Technology for "Waste to Wealth", Paste filling technology and moving towards "dry disposal".



(L to R): Dr SK Vashisth, Sh AK Kothari, Sh Deepak Tanwar, Sh Ravi Sharma, Sh Bhagwati Prasad Kalal, Sh Namit Mehta, Sh SN Mathur, Sh Arun Misra, and Sh Praveen Sharma



Shri Arun Kumar Kothari, Former National President and Chief Coordinator of the Conference informed that Mining Engineers Association of India is a national organization having more than 6000 members in the country and abroad and 27 Chapters in India out of which 3 Chapters are in Rajasthan at Jaipur, Jodhpur and Udaipur. Apart from this, 83 mining related government undertakings of Government of India and state governments and big mining industries are life institutional members of this organization. The Mining Engineers Association from time to time organizes seminars on topics like asset optimization, modern technology, innovation, continuous improvement etc. in mines and suggestions are being sent to mining policy makers. He welcomed and thanked all the guests for attending the conference.

Sh Arun Misra, CEO, Hindustan Zinc Ltd, Guest of Honour emphasized on turning waste to wealth by verifying critical minerals, low grade ores and minerals. Emphasis was laid on adopting radar technology, robotic dealing, and artificial intelligence in mines.

Sh Deepak Tanwar, Director, Mines and Geology, Guest of Honour said that environmental protection should be done to protect natural resources, continuous improvement in mining process, reducing waste, use of modern equipment and smart mining practices.

Sh Namit Mehta, IAS, District Collector, Udaipur, Guest of Honour, in his address said that environmental protection in Bajri / simple mining and advanced mining on the ground should be the thought of this conference. Community participation in mining is also necessary. Illegal mining is also a challenge. Well Organization of 80 percent of the unorganized sector should be the achievement of this workshop.

Sh Bhagwati Prasad Kalal, IAS, MD, RSMML, Guest of Honour, said that India is going to become the third economy of the world in which the mining industry has an important contribution. Mining Excellence Center in mines must work for humanity by using modern equipment from waste to

wealth, training for employees in mines, occupational health and zero losses in mining.

Sh PN Sharma, Controller General Indian Bureau of Mines, Nagpur Chief Guest emphasis was laid on asset optimization, savings, skill level, data analysis. Work will have to be done mainly for resource identification and the private sector will have to be connected with it. Mining industry is proving to be the first pillar for developed India. Work will have to be done on critical and strategic resource identification, working lease, waste dump, process plant-telling etc. and Indian Bureau of Mines will always be ready for data sharing

related to it. Mining Engineers Association of India, Udaipur was congratulated for this wonderful event.

Sh Ravi Sharma, COO-IRH, Chairman BMRC, Keynote Speaker said that the mining industry stands at pivotal juncture-balancing innovations, sustainability and growth. The center of excellence in mining embodies the vision, serving as a hub where cutting edge technology, responsible practices and leadership coverage. Our journey is driven by a commitment to advance mining technology, fostering sustainable practices and nurturing the next generation of industry leaders.



Address by the Guests of Honour



The program's chairman Sh S N Mathur reiterated the importance of sustainable mining practices and development of critical and strategic mineral resources. He said that the conference on the center of excellence in mining has gained a great importance particularly when the Government of Rajasthan recently announced the new mineral policy 2024 followed by its inclusion in state budget provision for the year 2025. His emphasis on mineral exploration and mining operations, green energy has translated into and increased demand for strategic and critical minerals. IT is of utmost importance to develop new technology by establishing a center of excellence in mining. He congratulated the Udaipur Chapter for organizing a successful and impactful international event.





On this occasion, a technical souvenir, covering the technological innovations, digitization, automation and next generation

technology establishing a center of excellence in mining was released by all the dignitaries. Efforts made by Sh NK Kavdia & Dr SC Jain were recognized.



On this occasion, eminent personalities from the mining industry and event sponsors were ceremoniously honored for their valuable contributions.

The program was anchored by Sh Alok Pagaria and vote of thanks was proposed by Sh Asif M Ansari, Secretary of the Chapter.

### Technical Session - I: Key Presentations

- Sh A. Hall, CEO of AMC Consultant Pvt. Ltd., Melbourne, Australia, online presented a paper on Environmental, Social, and Governance (ESG), highlighting global best practices and the growing importance of ESG in mining operations.
- Sh Pablo Venegas, General Manager – Operations, delivered an insightful presentation on the successful mining journey in Zambia, outlining operational strategies and development milestones.
- Sh Shashank Sharma, CEO of Bedrock Global Technology, spoke on digitization, automation, and next-generation technology. He emphasized how advanced technologies are transforming mining into a safer, more efficient, and profitable industry.
- Sh Amit Bhandari and team presented a paper focusing on a digital platform for quality improvement and control in key mining processes such as drilling, blasting, and stopping.
- Sh Ravi Babel, Sh Ankit Bhandari, and Sh Sufal Mehrotra shared innovative applications of automation,

artificial intelligence, and robotics implemented at Hindustan Zinc. Their work demonstrated significant improvements in operational efficiency.

- Ms. Rojali Dey, Geologist, CB Project, GMDC, delivered a paper on “AI and Automation in Action: Advancements in India’s Exploration and Mining Sector.” The presentation highlighted how cutting-edge technologies such as artificial intelligence, machine learning, and automation are transforming mineral exploration and mining operations across the country. Ms. Dey emphasized the integration of AI-driven analytics in geological modeling, predictive maintenance, and remote operations.
- Dr. CH Rao, Chairman, Visakhapatnam Chapter & Secretary General, FEMMI presented a thought-provoking paper titled “Auctioning the Unquantifiable: A Policy Mismatch – The Exploration-Auction Disconnect for Minor Minerals.” He critically analyzed the challenges associated with auctioning minor mineral blocks without adequate exploration, arguing for a more coherent policy framework that aligns exploration outcomes with the auction process to ensure resource sustainability and investor confidence.



Sh AR Vijay Sing, Chartered Accountant, Bangalore & Council Member, MEAI, discussed the implications of a landmark judicial ruling in his paper on “Impact of the 9-Judge Bench Judgment of the Hon’ble Supreme Court in *MADA & Anr vs. SAIL & Anr*, dated 25.07.2024.”

On this occasion, distinguished mining professionals from across the industry were honored for their contributions.



*A View of Audience & Glimpse of International Conference*





Glimpse of International Conference

On this occasion a Cultural program based on Rajasthani culture i.e. folk song and dances beside patriotic song was solemnized which was appreciated by all ladies and gents.



### Day 2 – Technical Sessions Overview (27.04.2025)

There were two technical Sessions on 2<sup>nd</sup> day of the Conference. Six technical papers were presented. HE Sh Javier Manuel Paulinich Velarde, Honorable Ambassador of Peru to India, Dr Pukh Raj Neniwal & Sh Ravi Sharma were chairpersons.

- Sh Luigi Domenico Sassarini Vergara presented a paper titled “*Beyond the Ore: Strategic Mine Design to Build Legacy in Mining*”.
- Prof. Singam Jayanthu delivered an online presentation on his paper, “*Urgent Need for Trans-disciplinary Translational Industry-Oriented Research and Academics for Excellence in Mining for Improved Safety and Sustainability*.”
- Dr. PK Rajmeny & Subrato Dutta, Principal Geo-tech Consultant & Principal Mine Design Consultant Ex-COM, IBM, presented a paper titled “*Some Control Measures to Optimally Extract Deep-Seated Deposits: An Overview*.”
- Sh Dushyant Tailor and Sh Zeeshan Jamal presented a paper titled “*Enhancing Value thro Ore Dilution Control at Hindustan Zinc Limited*.”



- Sh Lalit Mohan Soni, Principal Consultant & Lead (Mining) at Infosys Limited and Chairman – MEAI Rajasthan Jaipur Chapter, presented a paper titled “Harnessing Advanced Technologies for Sustainable and Efficient Mining: A Path to Green Extraction.”
- Sh Ramesh K. Singh, MIE (Mining), FCC (M), presented a paper titled “Use of State-of-the-Art Technology for Waste to Wealth: Paste Filling Technology & Moving Towards Dry Disposal.”

### Technical Session III

- Ms. Anu shree Shekhawat, B.E. II Year, Department of Mining Engineering, MBM University, presented a paper titled “Digitization and Environmental Stewardship in Blasting Operations.”
- Dr. Anupam Bhatnagar, Professor & Head, Department of Mining Engineering, CTAE, MPUAT, Udaipur & Dr. Hitanshu Kaushal, CEO & Principal Consultant, H K & Associates, Udaipur, jointly presented a paper on “AI-Integrated Drone Technology for Optimized Blast Design in Mining: A Patent-Based Framework for Pre-Real-Time, and Post-Blast Risk Mitigation.”
- Sh Krishna Kumar Vyas, Mine Ventilation Engineer, Mawarid Mining LLC, presented his paper titled “Optimizing Underground Thermal Conditions in Ghuzayn Underground Copper Mine – A Case Study.”
- Prof. D.P. Tripathy, Department of Mining Engineering, NIT Rourkela, delivered a paper on “Centers of Excellence in Mining Engineering in India and Abroad: A Comprehensive Overview.”
- Sh Shashank Gupta, Hindustan Zinc Ltd. (HZL), presented his paper titled “Advanced Techniques in Narrow Vein Mining: A Case Study of Zawar Mines.”

Department of Mines & Geology. Sh Dhananjay G. Reddy, Vice President, MEAI; Sh B. Dayasagar, Director, Mine Safety (Udaipur Region); and Sh Mahesh Mathur, Additional Director, Department of Mines and Geology were the guests of honor.



The dignitaries were welcomed by Sh Praveen Sharma, President, MEAI Rajasthan Chapter, Udaipur.

Dr SK Vashisth, Organizing Secretary, presented a comprehensive summary of the papers discussed during the three technical sessions and extended heartfelt thanks to all the participants and contributors.

Dr SS Rathore, Former Dean, CTAE and National Council Member reviewed the papers read in this seminar and their recommendations will be sent to the headquarters, government and policy makers.

While addressing Guest of Honour Sh Dhananjay G Reddy, Vice President, Mining Engineers Association of India, congratulated the organizers for this successful event and called for incorporating the suggestions received in exploration, legal advice and mining of minerals in the processes.

While addressing Guest of Honour Sh B Dayasagar, Director, Mine Safety Department, drew people's attention to increase India's growth by modernizing the mines for a developed India. Our aim should be to develop our country by taking everyone along. Sh Mahesh Mathur, Additional Director, Mines and Geology Department, said that drone survey has been included in the new mineral policy of Rajasthan, this will prove to be a milestone in implementing the new policy.

Chief Guest Sh Deepak Tanwar, Director, Department of Mines and Geology thanked the organizers for the successful event and said that till now only 5 percent minerals have been discovered in India which is much less than the international mineral discovery, hence NMET / RSMET have been formed at national and state level. This conference is the beginning of modernization through which technological improvement and asset optimization, cost of mining operations can be reduced. Correct use of data can stop illegal mining. It is necessary to make meaningful use of waste and barren

### Valedictory Function



(L to R): Sh Asif M Ansari, Sh AK Kothari, Sh SN Mathur, Sh Deepak Tanwar, Sh Dhananjay G Reddy, Sh Mahesh Mathur, Sh Praveen Sharma, and Sh B Dayasagar.

The valedictory function of the conference was presided over by Shri SN Mathur, National President, Mining Engineers' Association of India (MEAI). The **Chief Guest** for the ceremony was Shri Deepak Tanwar, Director,

land has to be used for agriculture. The technical mining and innovations in the conference will make mining ideal.

The chairman of the function, Sh SN Mathur, National President, Mining Engineers Association of India, said that all the papers read in this conference were good.

Special recognition was given to key contributors for their role in the successful organization of the conference. Honorees included Sh NK Kavadia, Sh AK Kothari, Dr. SS Rathore, Sh Praveen Sharma, Dr. SK Vashisth, Dr SC Jain, Sh MK Mehta, Sh SL Sukhwal, Sh Syed Maqbool Ahmed, Sh RP Mali, Dr. Hitanshu Kaushal, Sh RC Kumawat, Sh Gopal Dangi, Sh O.P. Agal and Satya Narayan Joshi.



The program was conducted by Dr SK Vashisth, Organizing Secretary and vote of thanks was given by Sh Asif M Ansari, Secretary, MEAI-Udaipur.

On this occasion a press conference was held on 24<sup>th</sup> April, 2025 at MEAI, Chap office, Udaipur.

In the conference, tributes were paid to the departed souls in the unfortunate terrorist attack that took place in Pahalgam.

### Recommendations of International Conference

1. Use of robotics and underwater imaging to explore and open vast mineral rich regions of the mineral floor.
2. Global mining industry is facing challenges as higher grade deposits are depleting faster than the new discoveries. Therefore, it is needed to explore new areas for mining to make balance between exploration and exploitation.
3. Advanced technology and deep drilling rigs need to be applied to explore deep seated mineral deposits.
4. Establishment of Centre of Excellence in Mining is needed and that will provide leadership, best practices, research support and skill training to the Mining Sector. It is the need of the hour and is to be followed for mineral resource optimization in mining sector.
5. The integration of artificial intelligence and automation technologies in the mining sector is the need of the hour and emphasizes advancements that contribute

to continuous improvement and asset optimization in mining operations.

6. Ore dilution control is a critical asset of efficient and profitable mining operations of zinc, lead and silver in India and known for its underground mining operations with complex ore body geometry due to inclusion of waste rock and low-grade material with the ore during mining can negatively impacts the mine's economy's by increasing processing costs and reducing the overall grade of the extracted material. Therefore, by using sophisticated software which creates 3D modeling and to overcome the problem of dilution.
7. Mine digitization and automation are crucial trends for staying competitive. The recent innovations enhance productivity, sustainability, efficiency and safety while reducing costs and environmental impacts. Digitization also helps in precise control and optimization of mining operations.
8. The use of drones is nowadays common in opencast mines. But its application in underground mines will be implemented in India as it is already in practice abroad.
9. The Govt. of India has brought several modifications in the MMDR Act and Mineral Concession Rules. But in the country things are not happening at the ground level. There is a need for coordination of various departments at the State level to reduce delay in clearance of mineral concessions.
10. Adoption of advanced AI based tools to reduce ore dilution and maximize ore recovery - link mine plan, survey and post blast analysis.

### VISAKHAPATNAM CHAPTER

#### Inauguration of Visakhapatnam GIET Student Chapter

Visakhapatnam Chapter inaugurated a new student chapter on April 4, 2025, at the Godavari Institute of Engineering and Technology (GIET), Rajahmundry. The establishment of this student chapter marks a significant step towards encouragement of academic collaboration and encouraging student engagement in the field of mining engineering disciplines.



L-R: Dr. T. Jayananda Kumar, Principal, GIET (A); Shri. B. Sahoo, Jt. Sec cum Treasurer, Dr. C. H. Rao, Chairman - Visakhapatnam Chapter, Dr. B. Prabhakara Rao, Dean, School of Engineering, GGU and Shri. L. Krishna, Secretary – Hyderabad Chapter



The inaugural function was graced by dignitaries from MEAI, faculty members, and student representatives. The event included keynote addresses, interactive sessions, and discussion on the importance of professional networking and innovation in mining engineering. This initiative aims to provide students with opportunities for professional growth, exposure to industry practices, and participation in MEAI activities at regional and national levels.



42 student membership certificates were issued upon formation



Dr. C H. Rao presenting a memento to Dr. U. Chandra Sekhar, Vice Chancellor, GGU



View of Students from Visakhapatnam, GIET Student Chapter

(Continued from Page 18)

#### Potential impact on trade

Industry insiders note that if verified, this cache of metals could place Kazakhstan just behind China and Brazil for total rare earth reserves. That status would boost the country's position as a strategic partner in critical rare earth mineral supply. European stakeholders are keen to strengthen ties. "The announcement was well timed because it increased the importance of Kazakhstan in the whole discussion about the critical raw materials," said the EU's ambassador to Kazakhstan, Aleška Simki.

#### Timely strategic move

Kazakhstan released the news just before a high-level summit involving the European Union and Central Asian states. Observers see this as a bid to attract foreign partners and investment in new mining projects. Developing a rare earth deposit is expensive and time-intensive. Private and government groups are assessing how best to proceed with exploration, extraction, and infrastructure.

#### Challenges in rare earth extraction

Kazakhstan's existing mining operations focus on other minerals, so new methods and technology might be needed to handle the unique processes of neodymium and lanthanum extraction. Experts say cooperation with countries that already refine these metals would accelerate growth in local industries. China leads in

rare earth refinement and manufacturing, making it a likely partner. Other global players, including the European Union, have also expressed interest in future collaborations.

#### Next steps for Kazakhstan

Kazakhstan's national mining company, Tau-Ken Samruk, may spearhead the next phase of study and development. That process involves advanced geological surveys, feasibility work, and commercial planning. Analysts project it could take several years to establish a stable extraction operation. High startup costs and the need for specialized equipment mean progress is not guaranteed.

#### Global significance of rare earth find

Rare earth elements influence energy transition and digital progress around the world. Countries depend on steady supplies of these metals for electronics, clean energy, and military technology. Kazakhstan could diversify supply chains and help nations reduce reliance on a single source. This prospect might reshape international cooperation and spur further investment in Central Asia.

#### Balancing optimism with caution

Experts do not want speculation to get ahead of real data, especially when actual extraction is years away.

(Continued on Page 41)



## NACRI/MEAI REINFORCE INDIAN MINERAL RESOURCE SECTOR WITH PROFESSIONAL SKILL DEVELOPMENT: INDUSTRY OVERWHELMINGLY BACKED THE 6<sup>th</sup> IN-PERSON TRAINING PROGRAM ON IMIC: 5-9 MAY 2025, HYDERABAD

The Mining Engineers' Association of India (MEAI), the trusted voice of the Indian mineral resources sector, is the only Professional Organisation (PO) recognised by CRIRSCO and NACRI in India. As part of its obligations as a PO, NACRI, in collaboration with MEAI, has been periodically steering professional development programs for mineral industry professionals, registering Competent Persons (CPs) under the CRIRSCO-approved Indian Mineral Industry Code for reporting Mineral Resources and Reserves in India (IMIC), and overseeing their code of conduct. Five such training programs on IMIC have been successfully conducted in January 2021, April 2021, April 2022, April 2023, and May 2024. The IMIC training program has received a splendid response from the Indian mineral resources sector, with an average participation of over 35 professionals in each program-the highest being 64 in the 5<sup>th</sup> program.

Participants have included representatives from several leading **Central and State Government-controlled mining companies** such as NMDC Limited, Coal India Limited, Hindustan Copper Limited (HCL), MOIL Limited, NLC India Limited, Mineral Exploration and Consultancy Limited

(MECL), Hutti Gold Mines Company Limited (HGML), Odisha Mining Corporation Limited (OMCL), Odisha Mineral Exploration Corporation Limited (OMECL), Singareni Collieries Company Limited (SCCL), Andhra Pradesh Mineral Development Corporation (APMDC), Karnataka State Minerals Corporation Limited (KSMCL), etc.; **private mining companies** such as Tata Steel Limited, Hindustan Zinc Limited (HZL), JSW Steel Limited, ArcelorMittal Nippon Steel India (AM/NS), Adani Enterprises Limited, MSPL Limited, ERM Group, Deccan Gold Mines Limited, BGR Mining & Infra Ltd, Lloyds Metals and Energy Ltd, Orient Cements, etc.; and **consulting organisations** such as DMT Consulting Private Limited, SRK Mining Services (India) Pvt Ltd, GMMCO Technology Services Ltd, Capstone Geo Consultants, World Consultancy Services Odisha, Geovale Services, BMRC, etc. The 6<sup>th</sup> (current) version of the IMIC training was attended by 55 delegates from 18 organisations

The list of delegates that attended all the six training programs on IMIC and subsequently registered/ renewed as CPs may be found on the MEAI website at [www.meai.org](http://www.meai.org).



### About the 6<sup>th</sup> Professional Development Program on IMIC

NACRI has formulated a 40-hour (5-day) in-person training

program on IMIC, held from 5–9 May 2025. This professional development program, conducted by domain experts from NACRI and the industry, as well as online overseas guest



faculty from CRIRSCO member countries, included sharing knowledge on all relevant aspects of IMIC and the Code of Ethics, mineral industry best practices in exploration, estimation, and reporting of mineral resources and reserves, and general guidance to prospective RCPs. The course has been formulated in line with the JORC Code training program conducted by The AusIMM and is delivered under major modules such as: Why the IMIC standard? – Context and Principles; Exploration Results and Exploration Targets Reporting; How to Properly Inform Investors (Technical Studies); Reporting of Mineral Resources; Reporting of Mineral Reserves; and The Role of the Regulatory Environment.

The objectives of the IMIC training program are to:

- Appraise the obligations and liabilities of the Competent Person under the IMIC.
- Understand the role played by the IMIC in the resources sector.
- Interpret the IMIC within the context of the participants' working environment.
- Recognize and counter common misconceptions about the IMIC.
- Identify good and poor technical reporting.
- Understand risk and uncertainty in mineral projects.
- Demonstrate the correct application of the IMIC.

These objectives are designed to ensure that participants gain a comprehensive understanding of both the technical and ethical responsibilities required for compliance with the IMIC, including the legal and professional liabilities associated with being a Competent Person.

A special feature of the 6<sup>th</sup> version of the IMIC training was the participation of seven overseas domain experts as guest faculty from JORC (Australasia), PERC (Europe and UK), CBRR (Brazil), SAMREC (South Africa), CIM (Canada), KCMI (Indonesia), and the USA, who spoke on best/good practices and presented practical examples on reporting of exploration results, mineral resources, and mineral reserves, wherever possible. The following esteemed overseas guest faculty made stimulating technical presentations on their respective topics:

A notable feature of the 6<sup>th</sup> version of the IMIC training was the participation of seven overseas domain experts as guest faculty, representing:

- JORC (Australasia)
- SAMREC (South Africa)
- CBRR (Brazil)
- SME (The USA)
- PERC (Europe and UK)

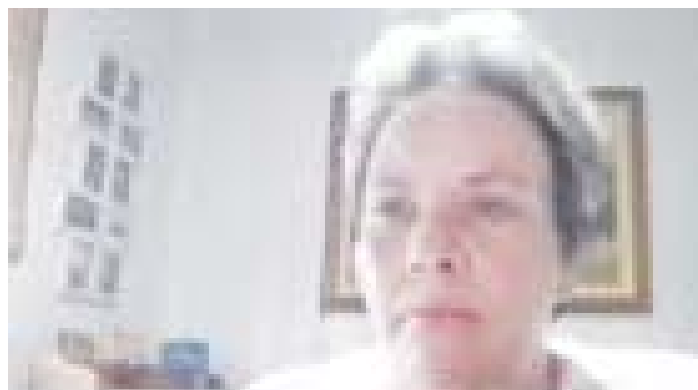
- CIM (Canada)
- KCMI (Indonesia)

These experts delivered stimulating technical presentations, sharing best practices and practical examples on the estimation and reporting of exploration results, mineral resources, and mineral reserves, wherever possible. Their contributions provided participants with a global perspective on the application of reporting codes and standards, further enhancing the program's relevance and depth.



**Mr Peter Stoker**, Deputy Chairman JORC, Representative of Australasia on CRIRSCO, CRIRSCO Executive as Treasurer, Principal Geologist AMC Consultants Australia. Recipient of the Medal of the Order of Australia for services to the mining industry in 2020. Contributor to Monograph 23 (Mineral Resources and Ore Reserves Estimation: The AusIMM Guide to Good Practice) & Monograph 30 published by AusIMM.

*Topic: "The role of the Competent Person under the CRIRSCO Template, look at the variation in requirements for Competent/Qualified Persons of CRIRSCO NROs, Codes of Ethics and enforcement and the importance of disciplinary processes to credibility of the CRIRSCO governance system" (May 5, 2025).*



**Dr Heather King**, South Africa, specialises in mineral resource modelling, geostatistical estimation in both 2D and 3D environments, auditing geological and mineral resource models, conducting due diligence assessments, and strategic project planning. Frequently acting as the

Competent Person or Qualified Person for reporting under the SAMREC (2016) and JORC (2012) Codes, as well as CIM reporting guidelines, Heather is recognized as a Professional Natural Scientist and CP by the SACNASP.

*Topic: "SAMREC Best practices in Mineral Exploration for CP" (May 6, 2025).*



**Mr Edson Ribeiro**, a founding member of the Brazilian Commission of Resources and Reserves (CBRR), a member of the Australian Institute of Geoscientists (AIG), a registered member of the Society for Mining, Metallurgy and Exploration (SME), and a fellow of the Australasian Institute of Mining and Metallurgy (AusIMM). Past Chairperson of CRIRSCO and a member of the Executive. Currently head of Exploration and Mineral Projects at Vale S.A.

*Topic: "CBRR Best practices in Mineral Resources estimation & reporting" (May 7, 2025).*



**Dr Abani Samal**, a fellow of SEG and a registered member (RM) and fellow of SME. Dr Samal is an active member of various other national and international professional organizations in the areas of geology and mining, such as CIM, SAIMM, PDAC, etc. He serves as Chief Editor (Geology and Exploration) of the Mining, Metallurgy & Exploration journal (MMEX) and serves as an editorial advisory board

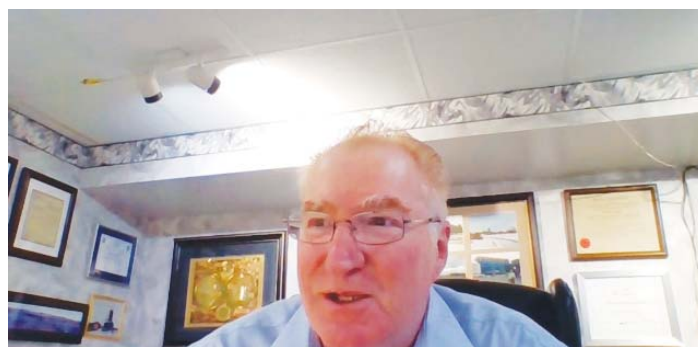
member of the Natural Resources Research Journal (NARR). He also serves as an editorial board member of the MEJ.

*Topic: "Mineral Resource Reporting, Practical Examples of Mineral Resources Reporting" (May 8, 2025).*



**Dr Edmund Sides** has been a member of the Pan-European Reserves and Resources Reporting Committee (PERC) since 2014 and is currently the Chairperson of PERC, as well as being one of PERC's two representatives on the Committee for Mineral Reserves International Reporting Standards (CRIRSCO). At the 2023 CRIRSCO AGM, he was appointed as Deputy Chair of CRIRSCO and took up this role at the start of 2024.

*Topic: "Consideration of risk and uncertainty aspects of mineral projects, The CRIRSCO-UNFC relationship and the updated CRIRSCO-UNFC Bridging Document, Effective use of the Table- 1 Checklist" (May 8, 2025).*



**Mr Reno Pressacco** (CIM, Canada) has recently participated in the crafting of the CIM Mineral Exploration Best Practices Guidelines (2018), the CIM Mineral Resource and Mineral Reserve Best Practices Guidelines (2019), and the CIM Industrial Minerals Leading Practices Guidelines (2023). He received the CIM Robert Elver award in 2020. He is a member of the CIM Mineral Resources and Mineral Reserves Committee and the United Nations Minerals Working Group. In 2023, Reno established the Pressacco scholarship, which will be administered by the CIM Foundation.



*Topic: "MRMR Estimation and Reporting in the Canadian System" (May 8, 2025).*



**Mr Lufi Rachmad** earned the KCMI Competent Person Indonesia, JORC Competent Person, and is a Fellow Member of AusIMM. He has been actively contributing to the PERHAPI organization and is currently the chairman of Kombers KCMI IAGI PERHAPI. He has been the Indonesian representative for CRIRSCO (Committee for Mineral Reserves International Reporting Standards) since 2017 and has been elected as the CRIRSCO Executive Secretary from 2023-25.

*Topic: "Reporting Mineral Reserves - A Team Approach" (May 9, 2025).*

In addition to the seven overseas guest faculty members, twelve in-house faculty members from NACRI, along with domain experts from the mineral industry, made valuable contributions to the IMIC training program. The faculty for the program is primarily drawn from NACRI, with domain experts invited on specialized topics as needed. An evaluation test was conducted at the end of each day's session to assess

the participants' learning and understanding of the material presented.

### Inaugural function held on 5<sup>th</sup> May 2025

Mr. T.R. Rajasekar, PDP Coordinator of the NACRI training program, welcomed the dignitaries and participants during the inauguration of the event. Dr. P.V. Rao, Co-Chair of NACRI, fondly recalled the invaluable mentoring and guidance received from the late Dr. Harry M. Parker, who served as Chairperson of CRIRSCO and Chairman of the SME Resources and Reserves Committee in the USA. Dr. Rao also acknowledged the support provided by Mr. Peter Stoker, Deputy Chair of JORC; Dr. Abani Samal (USA), former Co-Chair NACRI; Mr. A. Bagchi, Mr. T. Victor and all former Presidents of MEAI, each of whom played a significant role in the formation and nurturing of NACRI. Mr. Shameek Chattopadhyay, a founding member of NACRI and a domain expert in geology, also addressed the gathering.

Mr. Vinay Kumar, Director (Technical) at NMDC Limited, inaugurated the IMIC training program as the Chief Guest. In his address, he emphasised the urgent need for the mineral industry and the Indian government to adopt the IMIC framework and to train professionals for seamless implementation of the Code, ensuring transparent resource reporting that meets the expectations of potential investors. He also highlighted the importance of continuously developing professional skills to align with international standards and commended the exemplary service provided by MEAI in this regard.

Mr. M. Narsaiah, Secretary General of MEAI, proposed a vote of thanks to the Chief Guest and other dignitaries.



Chief Guest Mr Vinay Kumar addressing the delegates



Felicitation to Chief Guest



Mr TR Rajasekar welcome address



Dr PV Rao highlighting Importance of IMIC



Mr Shameek Chattopadhyay speaking on scope of IMIC



Mr M Narsaiah proposing vote of thanks

## 5-day IMIC Training Sessions

The faculty members commenced their presentations immediately after the inaugural function. Mr. T.R. Rajasekhar, NACRI PDP Coordinator, assumed overall responsibility for conducting the IMIC training program. Mr. M. Narsaiah and his MEAI team took full responsibility for coordinating

with various internal and external agencies in successfully organizing the program.

The day-wise training schedule and the faculty members' photographs for the 5-day IMIC training program are given below:

|              |        |                                                                                                                                                                                                                                                                                  |  |                                                        |
|--------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------|
|              |        | NACRI Professional Training Program - IMIC: 6.0 Schedule                                                                                                                                                                                                                         |  |                                                        |
|              |        | Date: 5th May 2025                                                                                                                                                                                                                                                               |  |                                                        |
| 9.30-10.30   | 60 min | Inaugural Function                                                                                                                                                                                                                                                               |  |                                                        |
|              |        | Module -1 Why the IMIC Standard? Context and Principles                                                                                                                                                                                                                          |  |                                                        |
| 10.30-11.15  | 45 min | Introduction to MEAI/ NACRI / IMIC / CRIRSCO                                                                                                                                                                                                                                     |  | Dr PV Rao<br>Co-Chair NACRI                            |
| 11.30-12.45  | 75 min | The role of the Competent Person under the CRIRSCO Template, look at the variation in requirements for Competent/Qualified Persons of CRIRSCO NROs, Codes of Ethics and enforcement and the importance of disciplinary processes to credibility of the CRIRSCO governance system |  | Mr Peter Stoker - JORC, Australasia<br>(Guest Faculty) |
| 13.00-14.00  | 60 min | Lunch Break                                                                                                                                                                                                                                                                      |  |                                                        |
| 14.00-14.45  | 45 min | 1.1 Scope of IMIC- Principles governing application of IMIC (clause-1), the importance of Public Reports (clause-2), Applicability (clause-3), General relationship between Exploration Results, Resources and Reserves (clause-5)                                               |  | Mr Shameek Chattopadhyay<br>MD, SRK-India              |
| 15.00-15.45  | 45 min | 1.2 Competence and Responsibility , Code of Ethics, Discussion on MEMC Rules , Bridging Document .                                                                                                                                                                               |  | Dr PV Rao<br>Co-Chair NACRI                            |
| 16.00-16.15  | 15 min | Tea Break                                                                                                                                                                                                                                                                        |  |                                                        |
| 16.15 -17.00 | 45 min | Role of Geophysical in Mineral Exploration                                                                                                                                                                                                                                       |  | Dr Suman Mandal<br>MD, Capstone Pvt Ltd                |
| 17.15-17.30  | 15 min | Evaluation test                                                                                                                                                                                                                                                                  |  |                                                        |



Dr PV Rao



Mr Shameek Chattopadhyay



Dr Suman Mandal

| Date: 6th May 2025              |        |                                                                                                                                                                                          |                                                       |
|---------------------------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| Module -2 Exploration Reporting |        |                                                                                                                                                                                          |                                                       |
| 09.30-10.15                     | 45 min | 2.1 Reporting Terminology (clauses-10,11, 12, 13, 14), Reporting of Exploration Targets (clause-15) & Reporting of Exploration Results (clauses-16, 17, 18): Concept of RPEE (clause-19) | Mr Shameek Chattopadhyay<br>MD, SRK-India             |
| 10.30-11.00                     | 30 min | Tea Break                                                                                                                                                                                |                                                       |
| 11.00-11.45                     | 45 min | 2.2 Criteria for Sampling Techniques and Data (Table-1, section-1)                                                                                                                       | Mr Parijat Nandi,<br>Sr.Consultant, DMT- India        |
| 12.00-12.45                     | 45 min | 2.3 Generic Terms and Equivalents (Appendix-1) . Criteria for Reporting of Exploration Results (Table-1, section-2)                                                                      | Mr Shameek Chattopadhyay<br>MD, SRK-India             |
| 13.00-14.00                     | 60 min | Lunch Break                                                                                                                                                                              |                                                       |
| 14.00-14.45                     | 45 min | QA/QC Best practices in Mineral Exploration                                                                                                                                              | Mr Shanto Mukherjee<br>Head-Tech. Services- Adani Ltd |
| 15.00-15.30                     | 30 min | Tea Break                                                                                                                                                                                |                                                       |
| 15.30-16.45                     | 75 min | SAMREC Best practices in Mineral Exploration for CP                                                                                                                                      | Dr Heather King South Africa<br>(Guest Faculty)       |
| 17.00-17.15                     | 15 min | Evaluation test                                                                                                                                                                          |                                                       |





Mr Parijat Nandi



Mr Shanto Mukherjee

| Date: 7th May 2025                               |        |                                                                                                                                                                         |                                                            |
|--------------------------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------|
| Module -3 Mineral Resources & Reserves Reporting |        |                                                                                                                                                                         |                                                            |
| 9.30-10.15                                       | 45 min | 3.1 What is a Mineral Resource (Clause-19), Mineral Resource Classes - Inferred, Indicated and Measured Mineral Resources (clauses- 20,21,22)                           | Dr Kavita Bhardwaj<br>Dy CEO Hindmetal Expl. Services, HZL |
| 10.30-11.00                                      | 30 min | Tea Break                                                                                                                                                               |                                                            |
| 11.00-11.45                                      | 45 min | 3.2 Selection of Mineral Resource class (clause- 23, 24, 25, 26, 27)                                                                                                    | Mr Shameek Chattopadhyay<br>MD, SRK-India                  |
| 12.00-12.45                                      | 45 min | 3.3 Criteria for estimation and reporting of Mineral Resources (Table-1, Section-3)                                                                                     | Dr Kavita Bhardwaj<br>Dy CEO Hindmetal Expl. Services, HZL |
| 13.00-14.00                                      | 60 min | Lunch Break                                                                                                                                                             |                                                            |
| 14.00-14.45                                      | 45 min | 3.4 What is a Mineral Reserve? (Clause- 28), Probable Reserve (clause- 29), Proved Reserve (clause- 30), Mineral Reserves classes and selection (clause- 31, 32, 33,34) | Mr Somnath Gain SRK -India                                 |
| 15.00-15.30                                      | 15 min | Tea Break                                                                                                                                                               |                                                            |
| 15.45 -17.00                                     | 75 min | CBRR Best practices in Mineral Resources estimation & reporting                                                                                                         | Mr Edson Ribeiro- CBRR, Brazil<br>(Guest Faculty)          |
| 17.15-17.30                                      | 15 min | Evaluation test                                                                                                                                                         |                                                            |



Dr Kavita Bhardwaj



Mr Somnath Gain

| Date: 8th May 2025                   |        |                                                                                                                                                                                                   |                                                   |
|--------------------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Module -4 Mineral Reserves Reporting |        |                                                                                                                                                                                                   |                                                   |
| 9.30-10.15                           | 45 min | Mineral Resource Reporting, Practical examples of Mineral Resource reporting                                                                                                                      | Dr Abani Samal- GeoGlobal, USA<br>(Guest Faculty) |
| 10.30-11.00                          | 30 min | Tea Break                                                                                                                                                                                         |                                                   |
| 11.00-11.45                          | 45 min | Advanced integration of Drones, LiDAR, Satellite data, AI/ML and IBM Guidelines for Mineral Mine Management                                                                                       | Mr Rahul Pinnamaneni<br>CEO, Polygon Geospatial   |
| 12.00-12.45                          | 45 min | 4.1 Technical Studies: Scoping study (clause-35), Pre-Feasibility study (clause-36), Feasibility study (clause-36), 4.3 Study accuracy ranges for Capital and Operating cost estimates (Table-2 ) | Mr R Karthikeyan<br>Director, DMT-India           |
| 13.00-14.00                          | 60 min | Lunch Break                                                                                                                                                                                       |                                                   |
| 14.00-15.15                          | 75 min | Consideration of risk and uncertainty aspects of mineral projects, The CRIRSCO-UNFC relationship and the updated CRIRSCO-UNFC Bridging Document, Effective use of the Table- 1 Checklist          | Dr Edmund Sides- PERC, UK & EU<br>(Guest Faculty) |
| 15.30-16.15                          | 45 min | 4.2 Capital and Operating costs estimation                                                                                                                                                        | Mr R Karthikeyan<br>Director, DMT-India           |
| 16.30-17.45                          | 75 min | MRMR Estimation and Reporting in the Canadian System                                                                                                                                              | Mr Reno Pessacco- CIM Canada<br>(Guest Faculty)   |
| 17.45-18.00                          | 15 min | Evaluation test                                                                                                                                                                                   |                                                   |



Mr Rahul Pinnamaneni



Mr R Kathikeyan

| Date: 9th May 2025                                             |        |                                                                                                                                                                                                         |                                                          |
|----------------------------------------------------------------|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Module -5 Technical Studies (How to Properly inform Investors) |        |                                                                                                                                                                                                         |                                                          |
| 9.30-10.30                                                     | 60 min | Reporting of Mineral Reserves- A team Approach                                                                                                                                                          | Mr Lufi Irwan Rachmad<br>KCMI, Indonesia (Guest Faculty) |
| 10.45-11.00                                                    | 15 min | Tea Break                                                                                                                                                                                               |                                                          |
| 11:00-11.45                                                    | 45 min | 5.1 Criteria for estimation and reporting of Mineral Reserves (Table-1, Section-4),<br>5.2 Reporting of Mineralised Fill, Pillars, low-grade mineralisation, Stockpiles, Dumps and Tailings (Clause-39) | Dr A Srikant<br>Consultant, Nagpur                       |
| 12.00-12.45                                                    | 45 min | 5.3 Reporting of Exploration Results, Resources and Reserves of Coal: (Clauses- 40, 41, 42), Diamond: (Clauses- 43, 44, 45, 46), Industrial minerals: (Clauses- 47, 48)                                 | Mr TR Rajasekar<br>Coordinator, IMIC PDP                 |
| 13.00-14.00                                                    | 60 min | Lunch break                                                                                                                                                                                             |                                                          |
| 14.00-14.45                                                    | 45 min | Best Practices in Technical Studies - Mine Design & Rock mechanics                                                                                                                                      | Dr A Srikant<br>Consultant, Nagpur                       |
| 15.00-15.45                                                    | 45 min | 5.4 Regulatory environment, Permitting and Legal issues in India (Table-1: Checklist of assessment and reporting criteria)                                                                              | Mr AR Vijay Singh<br>Independent Mining Consultant       |
| 16.00-16.15                                                    | 15 min | Evaluation test                                                                                                                                                                                         |                                                          |



Dr A Srikant



Mr TR Rajasekar



Mr AR Vijay Singh

### Valedictory function held on May 9, 2025

Mr. V.S. Rao, Former President of MEAI, served as the Chief Guest for the occasion. Also present on the dais were Mr. B. Sahoo, Dr. P.V. Rao, Dr. A. Srikant, Mr. T.R. Rajasekar, and Mr. M. Narsaiah.



Address by the Chief Guest Mr VS Rao



Felicitation to Chief Guest Mr VS Rao





Mr TR Rajasekar welcoming the guests



Mr B Sahoo addressing the delegates



Address by Dr A Srikant, Dr PV Rao and Vote of thanks proposed by Mr M Narsaiah

### Participants' Feedback session

During the feedback session, the following ten participants, representing different organisations, commended the content of the IMIC training program, appreciated the

presentations made by both overseas and in-house expert faculty members, and the arrangements made by MEAI. They also shared their honest observations and suggestions for further improvements.



Mr. Srinivasa Rao Kollikonda NLC Limited



Mr. Vemula Rajeshwar SCCL



Mr.K Ramkumar Lloyds Metals and Energy Ltd



Ms. Dweepannita Bose DMT Consulting Pvt Ltd



Ms. Aparna Agarwal BMRC Group



Mr. Soumen Bhadra SRK Mining Services (I) Pvt Ltd





Mr. Santosh Ghadi  
Vedanta Ltd, Sesa Goa



Mr. Kannuri Prudhvi  
Tata Steel



Mr. Vikash Kumar Singh  
Hindustan Copper Limited



Mr. Ignatius Minj  
NMDC Limited

While sharing their feedback, the participants commended the meticulous organization of the training sessions, the punctuality of both participants and faculty members throughout the program, the excellent arrangement of lunch and snacks, the timely circulation of training materials before the presentations, the engaging Q&A sessions, and the friendly ambience maintained between the faculty and participants. They also requested that the organisers hold the IMIC training program more than once a year.

The participants appreciated being exposed to best practices followed in major mineral-rich countries through

online presentations by domain experts on various frontier subjects. Additionally, they requested the organisation of a virtual conference for participants from all six IMIC training programs held thus far, to update them on the latest developments in the field of resource estimation and reporting.

The Chief Guest Mr VS Rao presented Merit Certificates to all the successful candidates. In all 55 participants received the Merit certificates and a few photographs are presented below:



Mr. S Shiva Krishna Reddy MSPL Limited



Ms. Puja Kumari Lloyds Metals and Energy Ltd



Mr. Navneet Sharma BMRC group



Mr. Sunish Raj Hindustan Copper Ltd



Ms. Sudeesha Banerjee SRK Mining Services (I) Pvt Ltd



Mr. Suyash Kumar Jha NMDC Limited

The 5-day IMIC training program concluded on May 9, 2025, at 6:00 pm (IST) with a vote of thanks proposed by Mr. M. Narsaiah, Secretary General of MEAI. In his address, he expressed gratitude to the Chief Guest for accepting the

invitation and gracing the occasion, acknowledged the participants for their cooperation, and thanked the overseas guest faculty from Australia, Brazil, Canada, Indonesia, the UK, South Africa, and the USA for generously sharing their



expertise. He also extended appreciation to the NACRI and Indian faculty for their continued support of the IMIC PDP,

as well as to the Association office staff for their dedicated service throughout the program.



Participants with the Chief Guest Mr VS Rao and the Organisers of the PDP (sitting in the middle row).

(Prepared and submitted by)  
**Dr PV Rao, FAusIMM**  
**Co-Chair NACRI**  
**May 15, 2025**

(Continued from Page 31)

Without a deeper study of deposits, potential reserves remain projections. Geologists are reminding investors that a deposit must meet strict economic and technical standards. Concerns about the environment and local communities also require careful attention before large-scale operations move forward.

### Regional cooperation

Leaders in Central Asia hope to establish shared transportation networks, and may develop projects including rail lines that link production hubs with overseas buyers. Streamlined routes support commercial growth and are often discussed at summits on economic development.

Governments view connectivity as a cornerstone for regional prosperity, and Kazakhstan's location makes it a key passage for East-West trade. Collaborative policies could lower transit times and significantly reduce costs.

### Environmental considerations

Extracting rare earth elements may intensely disturb local ecosystems. Regulators demand advanced studies to avoid seriously damaging fragile natural landscapes. Waste management is a priority wherever mining expands, as improper disposal of byproducts can severely harm wildlife and surrounding rural

communities. Local groups push for transparent environmental assessments, while frequent public input sessions help residents stay informed about significant possible industrial changes.

### Looking ahead

Mining experts predict shifts in labor demand if new projects start up rapidly. Training programs would be essential to align workers with modern requirements. In this regard, governments may collaborate with private firms to fund significant vocational classes.

Balanced policies could ensure benefits often reach broader communities but, in the meantime, donors will watch feasibility studies closely. New trade routes depend on stable mineral extraction and processing.

### Hope for rare earth development

Kazakhstan's bid to become a leading source of rare earth metals draws hope for economic growth and innovation. The next few years will reveal whether these deposits can be translated into lasting benefits for the country and communities. Many observers will be watching each new stage of exploration and anticipating the announcements that will follow once feasibility studies are complete.

*Earth.com staff writer / 05-16-2025*

## CONFERENCES, SEMINARS, WORKSHOPS ETC.

### ABROAD

**10-12 Jun 2025: Coaltrans China 2025.** Beijing, China. For more details Contact [conferences@fastmarkets.com](mailto:conferences@fastmarkets.com).

**11-12 Jun 2025: UK Mining Conference in Cornwall.** Organised at Princess Pavilion, 41 Melvill Road, Falmouth, Cornwall, TR11 4AR, United Kingdom. Contact: +44 7885 131097 or [info@ukminingconference.co.uk](mailto:info@ukminingconference.co.uk).

**21-22 Jun 2025: International Conference on Oil, Gas and Petroleum Geology ICOGPG 2025.** Vienna, Austria. Website URL: <https://waset.org/oil-gas-and-petroleum-geology-conference-in-june-2025-in-vienna>. Organised by World Academy of Science, Engineering and Technology.

**22-23 Jul 2025: International Conference on Mining and Economic Geology ICMEG.** Berlin, Germany. Website URL: <https://waset.org/mining-and-economic-geology-conference-in-july-2025-in-berlin>

**29 - 30 Jul 2025: Life of Mine | Mine Waste and Tailings Conference 2025 (#LOMMWT2025).** Brisbane Convention & Exhibition Centre. Contact by phone at T: 1800 657 985 or +61 3 9658 6100 (if overseas). Po Box 660 Carlton, VIC 3053, Ground Floor, 204 Lygon St, Carlton VIC 3053.

**7-9 Aug 2025: 2025 China International Coal & Mining Exhibition.** China International Exhibition Center (CIEC) No. 6 North Third Ring Road East, Chaoyang District, Beijing, 100028, China.

**10 - 13 Aug 2025: Application of Computers & Operations Research in the Mining Industry.** #APCOM2025. PCOM Conference 2025, Perth Convention and Exhibition Centre, Perth, Western Australia. AusIMM T: 1800 657 985 or +61 3 9658 6100 (if overseas). Po Box 660 Carlton, VIC 3053, Ground Floor, 204 Lygon St, Carlton VIC 3053.

**19-21 Aug 2025: International Conference on Mining, Material, and Metallurgical Engineering.** Paris, France. Website URL: <https://mmmeconference.com/>. Organised by International ASET Inc.

**2 - 4 Sep 2025: Critical Minerals Conference 2025 (#CMC2025).** Perth Convention & Exhibition Centre. Contact by phone at T: 1800

657 985 or +61 3 9658 6100 (if overseas). Po Box 660 Carlton, VIC 3053, Ground Floor, 204 Lygon St, Carlton VIC 3053.

**25-26 Oct 2025: International Conference on Hydrometallurgy and Mining ICHM.** Istanbul, Turkey. Website URL: <https://waset.org/hydrometallurgy-and-mining-conference-in-october-2025-in-istanbul>.

**28-31 Oct 2025: China Coal & Mining Expo 2025.** Organised by China International Exhibition Center (Shunyi Hall), 88 Yuxiang Road, Tianzhu Airport Industrial Zone, Shun Yi District, Beijing, China. Contact 852 28815889 or [katherinelee@together-expo.com](mailto:katherinelee@together-expo.com).

**11-13 Nov 2025: Environmental Integration on Sustainable Perspective and Beyond.** Manila, Philippines. Website URL: <https://www.ierek.com/events/environmental-integration-on-sustainable-perspective-and-beyond-eispb/introduction>.

**25-26 Jan 2026: International Conference on Geological and Earth Sciences ICGES (ICGES 2026).** Paris, France. Website URL: <https://waset.org/geological-and-earth-sciences-conference-in-january-2026-in-paris>. Organization: World Academy of Science, Engineering and Technology.

**25-26 Feb 2026: International Conference on Earth Science (ICES 2026).** Buenos Aires, Argentina. Website URL: <https://waset.org/earth-science-conference-in-february-2026-in-buenos-aires>.

**3-7 Mar 2026: CONEXPO-CON/AGG 2026.** Las Vegas Convention Center, 3150 Paradise Rd, Las Vegas, NV, 89109, United States. North America's largest construction trade show happens once every three years.

**25-26 Mar 2026: International Conference on Geosciences, Mineralogy and Petrology (ICGMP 2026).** Madrid, Spain. Website URL: <https://waset.org/geosciences-mineralogy-and-petrology-conference-in-march-2026-in-madrid>. Contact [international@conexpoconagg.com](mailto:international@conexpoconagg.com).

**24-25 May 2026: International Conference on Mining and Economic Geology (ICMEG 2026).** in London, United Kingdom. Website URL: <https://waset.org/mining-and-economic-geology-conference-in-may-2026-in-london>.

## REQUEST TO READERS/ MEMBERS OF MEAI

The Editorial Board of the Mining Engineers' Journal (MEJ) requests our esteemed Readers/ Members of MEAI to share their valuable Research work in geosciences/ mining or Best practices developed/ adopted while employed in the mineral industry, for publication in our Mining Engineers' Journal (MEJ), for the benefit of the mineral industry fraternity.

Interested professionals may please contact the Editor, MEJ for obtaining "Author(s) guidelines" for submitting technical papers at [editor.mej.meai@gmail.com](mailto:editor.mej.meai@gmail.com).

Editor, MEJ

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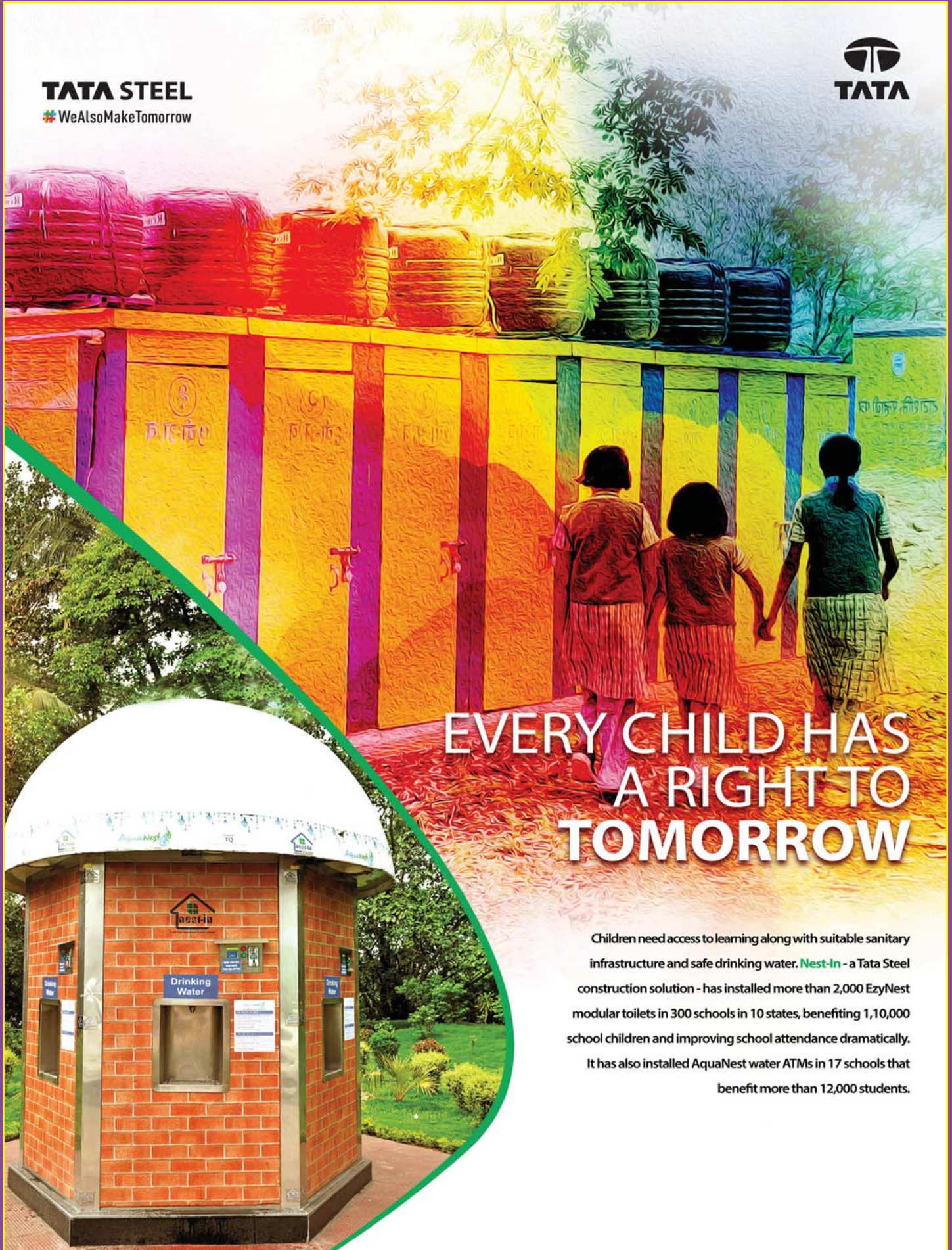
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