



10th Asian Mining
CONGRESS & EXHIBITION
November 06-09, 2023 • Kolkata, India
TAJ TAAL KUTIR CONVENTION CENTRE
Eco Park, Newtown, Kolkata



| HIGHLIGHTS & RECOMMENDATIONS |

**“ Roadmap for Best Mining Practices
Vis-à-vis Global Transformation ”**



Supported by



Ministry of Coal
Govt. of India



Ministry of Steel
Govt. of India



Coal India Limited
A Maharatna Company

Organised by:



THE MINING, GEOLOGICAL & METALLURGICAL INSTITUTE OF INDIA (MGMI)
Established 1906

GN-38/4, Sector- V, Salt Lake, Kolkata 700 091

T +91 33 4000 5168, +91 33 2357 3482

E office@mgmiindia.in / secretary@mgmiindia.in / mgmisecondary@gmail.com

W www.mgmiindia.in

MGMI PROMOTES THE CAUSE OF MINERAL INDUSTRY SINCE 1906



Principal Coordinators

President, MGMI

Dr B Veera Reddy, Director (Technical), Coal India Limited (CIL) & CMD, CCL

Honorary Secretary, MGMI

Shri Ranajit Talapatra, GM, Coal India Limited (CIL)

ORGANISERS

Conference (10th AMC)

Chairman, Conference

Shri Manoj Kumar, CMD, Central Mine Planning and Design Institute

Co-Chairman, Conference

Shri D B Sundara Ramam, VP, Tata Steel

Chairman, Technical Committee

Dr Amalendu Sinha, Former Director, CSIR-CIMFR

Convener Conference

Shri Prasanta Roy, HoD (Geology), CIL

Chairman, Cultural Committee

Shri Samiran Dutta, CMD, Bharat Coking Coal Limited

Convener, Cultural Committee

Shri Awadh Kishore Pandey, GM, MCL and **Dr Peeyush Kumar**, GM, CIL

TECHNICAL COMMITTEE

Advisors

Prof S P Banerjee, Past President, MGMI, Former Director, ISM, Dhanbad

Shri N C Jha, Past President, MGMI, Former Chairman, CIL

Chairman

Dr Amalendu Sinha, Former Director, CSIR-CIMFR

Technical Committee Members

Sri T K Nag, Former CMD, NCL • **Prof Bhabesh Chandra Sarkar**, Professor, IIT (ISM)

Dr Anupendu Gupta, Former DDG, GSI

Shri Ranjit Datta, Former Director, GSI • **Prof Sumantra Bhattacharya**, Professor, IIT (ISM)

Dr Prabhat Kumar Mandal, Chief Scientist, CSIR-CIMFR • **Dr M P Roy**, Chief Scientist, CSIR-CIMFR

Prof Biswajit Samanta, Professor, IIT-KGP • **Prof Ajay Mandal**, Professor, IIT (ISM)

Dr Rajesh Mukherjee, Chief Geologist, Tata Steel Limited • **Sri Chiranjib Patra**, GM (CED), CMPDI

Exhibition (10th IME)

Chairman, Exhibition

Shri Bhola Singh, CMD, NCL

Co Chairman Exhibition

Shri J P Goenka, MD, NMC

Convener Exhibition

Dr C S Singh, GM, CIL

Chairman, Buyer Seller Meet

Shri V K Arora, Chief Mentor, KCT Bros. Ltd



Snapshots of 10th AMC & IME 2023





Snapshots of 10th AMC & IME 2023





Organiser MGMI

The Mining Geological and Metallurgical Institute of India (MGMI), an internationally acclaimed professional body and one of the oldest institutions of its kind in the world, marked a century of its existence in 2006. Since its inception, it has been working to **promote and advance the mining and mineral industries**. Its flagship events, Asian Mining Congress (AMC) and International Mining Exhibition (IME), held concurrently, constitute globally reputed international meet organized biennially. These events provide plenty of opportunities to all stakeholders, namely, practising engineers, scientists, academicians, manufacturers of machinery, planners, regulators, and policy makers to share their knowledge, experience and expertise,



and exhibit their products that can benefit the mining and mineral industries not only in Asia but also globally. The first AMC and IME, concurrently held in January 2006, commemorated the centenary year of MGMI. Subsequent AMCs were held in 2008, 2010, 2012, 2014, 2016, 2017, 2019 and 2022 respectively. The 10th Asian Mining Congress and International Mining Exhibition were held concurrently during 6th to 9th November 2023.

Background

Asia happens to be a significant producer of ores, minerals and metals; the production of some major metal commodities accounts for more than half of the world's total. The region is also marked as a main producer and consumer of coal. However, the mining sector in particular and the mineral sector at large are at the crossroads of a global transformation for their long-term sustainability. While increasing depth and complexities of mineral deposits, efficient processing and utilisation of coal, minerals and metals and value addition are major technical challenges, combating the menace of climate change, implementing energy transition and living up to strong societal expectations are of serious concerns. At this juncture, it is very pertinent to brainstorm on the best mining practices, taking stock of recent developments, availability of state-of-the-art technologies and equipment, and relevant cutting-edge innovations including digital transformations in the sector.

Theme

'Ensuring sustainable and equitable use of resources without degrading the environment' is the demand of the day. It was especially appropriate and timely to organize the 10th Asian Mining Congress on a topical subject with its theme:

'Roadmap for Best Mining Practices vis-à-vis Global Transformation'

Highlights

The **10th AMC** was held at **Taj Taal Kutir, New Town Kolkata, India**, from **6th to 8th November, 2023**. Concurrently with the Congress, the **10th IME 2023** was also organized in collaboration with **M/s Tafcon Projects India Private Ltd** adjacently at **Eco Park, Rajarhat, Kolkata** from **6th to 9th November, 2023**. This Congress has scripted history by witnessing a huge participation of close to 550 registered delegates, which included executives, practicing engineers, planners, policy makers, equipment manufacturers, regulators, scientists, researchers and other professionals from various organizations from India as well as abroad (Australia, Germany, USA, Indonesia, Sri Lanka etc.), who shared their expertise and broad experiences. A total of **58 technical papers** on wide-ranging topics covering exploration, critical minerals, mine planning and production, policies, safety and surveillance, processing of minerals, sustainable green mining, explosive and blasting, mine ventilation and fire, coal gasification and CBM were presented and discussed in one Plenary session, two CEO's sessions and ten Technical sessions. For the first time in the history of MGMI the internationally reputed publishing house "Springer" published the Congress Proceedings Volume. A Supplementary Volume with Souvenir was also published and these were provided to the delegates. The CEO's sessions were addressed by the CEOs from SECL, MOIL, MECL, BEML, ESSEL Mining, TATA Steel, and GMMCO.



Inaugural Session



The Chief Guest of the inaugural session, **Shri Pralhad Joshi**, Hon'ble Minister of Coal, Mines & Parliamentary Affairs, Government of India, could not be physically present to inaugurate the Congress due to other pressing engagements. However his message was read by the compere and she invited the Guests of Honour and other dignitaries on to the dais. The dignitaries on the dais included:

- **Shri Amrit Lal Meena**, IAS, Secretary to the Government of India, Ministry of Coal as Guest of Honour
- **Dr Janardan Prasad**, Director General, Geological Survey of India as Guest of Honour
- **Shri P M Prasad**, Chairman, Coal India Limited as Guest of Honour
- **Ms Rowan Ainsworth**, Consul General, Australian Consulate, Kolkata as Guest of Honour
- **Shri Manoj Kumar**, CMD, CMPDI, Chairman, Organizing Committee
- **Shri Bhola Singh**, CMD, NCL, Chairman, Exhibition Committee
- **Dr B Veera Reddy**, Director (Technical), CMD, CCL, President, MGMI
- **Shri Ranajit Talapatra**, Honorary Secretary, MGMI

The dignitaries were welcomed with flower bouquets. The Congress was inaugurated by the dignitaries by ceremonial lighting of lamps.



Dr B Veera Reddy, President, MGMI welcomed the foreign and Indian guests, delegates and participants on behalf of MGMI to the City of Joy. He highlighted that India has achieved the highest ever coal production under the guidance of the present Secretary, MoC, Shri Amrit Lal Meena and it is to be increased further. A number of green initiatives for sustainable mining are also being promoted. Under the leadership of Shri Prasad, Chairman, CIL, the Coal India team has been motivated to achieve 12% growth. Dr Reddy presented a brief history of MGMI and its activities including its flagship programmes Asian Mining Congress and International Mining Exhibition. He complemented and congratulated each and every member who contributed to the organization of the 10th AMC.



Shri Manoj Kumar, Chairman, Organizing Committee briefed the august gathering about the 10th AMC and discussed about the theme of the Congress pointing out that Asia, the largest continent, shares the largest mineral resources in the world, much of which is still untapped. The mineral industry has to gear up and accelerate the pace of sustainable development of mineral resources to meet the increased demand of raw materials for key industries. He informed that 56 papers would be presented in 10 technical sessions on various lead topics, in addition to the Plenary session and CEO's session. Wishing the Congress a great success, Shri Kumar voiced that the delegates and participants would be benefited through interactions with the knowledgeable speakers.



Shri Bhola Singh, Chairman, Exhibition Committee briefed about the IME which is one of the largest gathering of mining equipment manufacturers and persons engaged in mining business in southeast Asia. He added that more than 400 companies, including exhibitors from 20 foreign countries, would be participating in the IME 2023. He expressed gratitude to the Ministries of Coal, Mines and Steel, Government of India; Chairman, Coal India Limited; and President, MGMI for providing excellent support for the event. The exhibition has become the most prestigious platform for display of mining equipment, latest technologies and publicity of innovative developments in mining and allied industries. He thanked Tafcon, the associate in the exhibition. Shri Singh concluded by inviting all to visit the exhibition.



Ms Rowan Ainsworth, Guest of Honour, thanked the organizers, dignitaries and specially Shri Meena for the invitation in this important Congress. She spoke mainly on relationship of Australia and India, mentioning that the two countries have a strong bilateral relation. She referred to the comprehensive strategic partnership signed by the Prime Ministers of the two countries in 2020 pointing out that they met face to face three times this year. The free trade agreement has strengthened the relationship. She spoke of relationship in resources sector, particularly in areas of emission reduction, net zero goals, mining of critical minerals and green hydrogen. She informed that Australia was committed to be a world leader in exploration, extraction, production and processing of minerals and also in sustainable mining. She invited Indian entrepreneurs to visit Australia. In conclusion she made a brief mention on the women's role in the mining sector.



Shri P M Prasad, Guest of Honour, mentioned about expanding activities of MGMI, pointing out the large participation of leaders from mining industry in this Congress. He emphasized that this year the participation is almost double than that of the previous IME. In recent Indian Mobile Congress, CMPDI participated where application of 5G in mining practices was showcased. He felt that 5G and other related technologies would come in a big way in mineral industry. He also mentioned that the production from underground mining is to be enhanced considerably. On CO₂ emission, he informed that Coal India had controlled about 70 million tonnes of CO₂ emission by energy efficiency measures in the last three years. There was a strong focus on mine closure procedure in a scientific way keeping in mind proper use of the restored land with post-mining activities.



Dr Janardan Prasad, Guest of Honour, expressed his happiness to join the distinguished dignitaries, delegates and congratulated MGMI for the event. He presented a brief history of Geological Survey of India (GSI), a premier geoscience institute, mentioning its invaluable contribution to the national economy. Presently, GSI institutes thousands of projects each year across the country under different missions with major emphasis on mineral exploration, green energy and low carbon emission. The organisation is putting maximum priority on exploration of critical minerals. After enactment of MMDR Act of 2015, GSI has handed over 194 reports of G2 and G3 stage mineral exploration to State Governments for auctioning mineral blocks. For search of concealed and deep-seated mineral resources, GSI has undertaken programmes like project uncover, regional mineral targeting, national geophysical mapping, national aero-geophysical mapping. National geochemical mapping of whole of India has been completed which is helping in targeting areas for search of critical minerals. He wished the Congress a grand success.



Shri Amrit Lal Meena, IAS, Guest of Honour, complimented MGMI for organizing the AMC, a forum for interaction of industry and users, in regular intervals. He praised the theme of the Congress as very important and informative for the mining and energy sector. He conveyed that Shri Pralhad Joshi, Hon'ble Minister has sent his best wishes for the success of the Congress. Energy security is of paramount importance in our country. He voiced that our economy is growing, our power demand is growing fast and therefore, we have to depend on the primary source of energy, that is coal. Last year, 14% growth in production of coal had been achieved. He congratulated the coal industry players for their outstanding contribution to the energy sector for which shortage was not felt in spite of high demand of coal. He felt happy that now the country can produce extra coal if the need be. Since the country has huge reserve, the import need to be reduced to check the foreign exchange outflow. Of late, The percentage of imported coal versus total coal consumption on year-to-year basis shows a reducing trend. In pursuance of 'Make in India' many Heavy Earth-Moving Machines (HEMM) are being manufactured in India because of the support provided by the Coal India Limited.



Shri Meena requested the gathering for suggestions regarding improvements in manufacturing and application of HEMM as inputs to further policy framework. In the last three years, 91 coal blocks have been auctioned. By 2030, the production from captive and private mines is expected to be 500 million tonnes and with one billion tonne from Coal India, country's demand of 1.5 billion tonnes would be met. Government is promoting the policy of coal gasification in a big way so as to gasify 100 million tonnes of coal by 2030. CMPDI is planning a pilot plant for underground coal gasification. The underground coal mining needs to be promoted in a big way for which participation of private miners is being sought. Many blocks are on offer with lots of incentives.

Shri Meena touched upon the mine closure framework which has been prepared in consultation with experts. Surface areas of abandoned mines should be refurbished into environmentally sustainable uses. He suggested that there could be some pump storage projects for which Coal India is identifying potential areas where hydroelectric power plants can be set up. The Government had come out with a policy of long term lease of land of coal companies for setting up of energy related infrastructure projects. Under 'PM Gati Shakti' Plan for providing multimodal connectivity infrastructure to various economic zones, the requirement of rail infrastructure for evacuation of coal for the period 2047 has been planned. The project is continuing in three states, Jharkhand, Odisha and Chhattisgarh jointly by ministries of railways and coal. He apprised the participants with great pride that all the PSUs under Ministry of Coal had performed extremely well during the last one year. He requested the organizers to touch upon 5 points, viz. (i) Underground Mining, (ii) Coal Gasification (iii) Mine Closure (iv) Pump Storage in abandoned mines, and (v) Women in mining. He also emphasized on the need of state-of-the-art Research and Development and identification of best mining practices for India. He congratulated MGMI and wished the event a great success.



The inaugural session was concluded with Vote of Thanks by **Shri Ranajit Talapatra**, Honorary Secretary, MGMI who expressed gratitude to the dignitaries and thanked everyone, including the sponsors and others associated with this event.



The Proceedings, published by **Springer**, and the Supplementary-cum-Souvenir volume of the 10th Asian Mining Congress were released by the dignitaries on the dais. The guests of honour were felicitated with Congress mementos.



Plenary Session



Chairperson

Dr Janardan Prasad

Director General, Geological Survey of India



Coordinator

Shri Alok Lalit Kumar

Exec Director, CIL



Prof S P Banerjee, Past President, MGMI and former Director, ISM, spoke on **'The Impact of Recent Geopolitical Events on Supply of Critical Minerals for an Early GET'**. The Green Energy Transition (GET) is important for mankind. The fossil fuel energy needs to be replaced by green energy. For this some special variety of minerals are needed. Certain geopolitical events in recent times has helped the GET process and also caused impediments. Adverse impact was caused by Covid-19 and Russia – Ukraine war. Positives are policy changes, improvements in technology, accelerated induction of Electrical Vehicles (EV), batteries that need supply of critical minerals like lithium, cobalt, nickel etc. The R&D efforts for improving battery technology and search for alternative elements are going on in full swing. He deliberated the issue of availability of minerals for GET in the coming decades from the global as well as the Indian perspectives.



Shri N C Jha, Former CMD, CIL and Past President, MGMI talked on **'Impact of 2070 Net-Zero Pledge on the Future of Indian Coal Industry'**. He explained that Net Zero meant adding only that much of greenhouse gases in the atmosphere as much is extracted. In COP26, India made a pledge to achieve Net Zero situation by 2070. Globally, 90 countries have agreed to reduce carbon emission that accounts for 80% reduction. In India, coal accounts for more than 2/3rd of the CO₂ emitted to the atmosphere. Currently, India stands 3rd in carbon emission after China and USA. Also, India's carbon intensity in energy generation is the highest in the world, which is about 275g/kWh, due to inferior grade coal. While most of the major economies of the world are the major contributors of carbon in terms of per capita emission, India's per capita emission is nearly lowest. The pledge of reducing the carbon by 1BT by 2030 puts a huge restriction on usage of coal, as this is equivalent to nearly 600 MT of coal usage. India's energy mix is set to undergo transition from fossil fuel base to non-fossil fuel base, particularly renewable Energy (RE). However, RE requires huge investment in energy storage system (ESS). Though, futuristic increase in energy demand warrant huge investments in both sectors, i.e., fossil fuel and RE based energy, ultimate choice will hinge upon the most economic and dependable supply system. Just transition is another issue that requires to be addressed as in India, currently most of the economic activities are dependent on coal and other fossil fuels.



Dr Kalachand Sain, Director, Wadia Institute of Himalayan Geology presented **'AI-Based New Tool for Semi-Automatic Interpretation of Reflection Seismic Data'**. Seismic measurements on the Earth's surface are extensively used to delineate subsurface geologic features for the exploration of geo-resources and understanding geodynamics or seismic-tectonics. Over the decades, seismic attributes (properties or characteristics) extracted from 3D seismic volume have revolutionized interpretation of subsurface geologic environment. It is the high performance computing systems that have allowed processing of voluminous data within a reasonable time, but the interpretation by human analysts still remains tedious, particularly in a complex area. This has necessitated automatizing the process of interpretation. Several work flows have been designed for merging multiple attributes related to a subsurface structure into a single 'meta-attribute' that have allowed to delineate the 3D configuration of that feature from a large volume of data, even in a complicated region. This artificial neural based approach integrates the intelligence of human assisted machines over a small volume of data, followed by applying the trained system to entire volume for exploring the geologic feature quite accurately at a fast rate. Success stories from a variety of basins across the world including India were presented.



Shri Prasanna Kumar Motupalli, CMD, NLC India Limited, deliberated on **'The Pathways for Coal Transition and Net Zero Emission'**. India's per-capita electricity consumption was 1255 kWh during 2021-22, which is around one-third of the global average of per capita electricity consumption. Total energy is considered as indication of development of country and the same is very less in India compared to world average. There is an urgent need to improve the same for which coal / lignite sectors must grow by mitigating the impacts of climate change. India's roadmap for net-zero emission is emphasized through Panchamrit climate action by 5 goals to reach Net zero by 2070. Even after 2047, India will continue to need coal / lignite for energy generation. At the same time to ensure proper integration of Renewable energy, coal and lignite based thermal process generation continue to play a major role as per India's vision document 2047. A balance is to be maintained to ensure development and sustainability to go hand in hand. Unless a proven system is developed in a cost effective way, coal and lignite cannot be replaced. Shri Motupalli dealt with vulnerabilities caused due to Coal transition, Priorities of Just Transition and its related action areas to be implemented in achieving the Net-zero emission. NLCIL is increasing its capacity in renewable energy to 6071 MW by 2030 through various Solar, Wind power plants. NLCIL is planning to establish clean technologies like lignite to Methanol, use of electrical vehicles, battery storage systems, Lignite to Diesel, Lignite to Gasification and OB to M-sand.



Prof Arvind Kumar Mishra, Director, CSIR-CIMFR, Dhanbad, presented a paper on **'Mass Production Technologies for Underground Coal Mining in India: Status, Challenges, and Prospects'**. The current trend in coal production in India shows that underground mining contributed less than 5% of the total coal produced. This trend is not sustainable in the Indian scenario due to environmental issues, coal quality problems, and socio-economic stresses due to opencast mining. CIL has also launched a mission to upscale the coal production from underground mines. While discussing the benefits of underground mining he suggested that the solution lies in the adoption of Mass Production Technology (MPT) in underground mining which can compete with opencast mining in terms of production rate. He presented the existing mining methods and potential MPTs for exploiting deep-seated coal deposits in India. The MPT for underground mining has been defined and the eligible technologies are presented. Finally, the prospects in R&D, testing, and policy making for smooth adoption in Indian coal mining have been deliberated.



Dr Rabi Bastia, CEO (E&P), Olimax Energy, spoke on **'Seismic Brings Paradigm Shift in Coal Seam Resolution: Enhancing Coal Mining Efficiency and Safety'**. This is a transformation technology that he presented with some global case histories. The significance of Seismic technology reverberates through the economic and safety dimensions of coal mines globally. Seismic data provides a continuous and detailed picture of the target coal seam. By employing seismic-derived depth surfaces and detecting faults and stratigraphic anomalies, technologists can strategically plan borehole drilling for fault assessment and grout pattern design. Recent advancements in 3D seismic interpretation and converted wave seismology have further expanded its capabilities. These developments focus on detecting subtle stratigraphic features, pinpointing gas locations, and mapping lithology, even in areas distant from borehole locations. Vertical and lateral resolution constraints inherent in seismic datasets place restrictions on the size of features that can be effectively imaged, underscoring the need for a nuanced approach to its application in coal mining ventures.



Shri Pinnaduwa H S W Kulatilake, Professor Emeritus, University of Arizona, talked on **'A Case Study on Stability and Rock Support Assessment for a Complex Underground Mine in USA'**. He presented a short description of the mine site and the tunnel system and went through the numerical simulation. He showed the tunnels cross sections and explained the supports installations and field instrumentations, part of which was covered by multiple point borehole extensometers. He also spoke about numerical procedures, estimation of rock mass properties, numerical model, rock supports, continuously yielding joint model for faults, sequential excavation, back filling and delayed supporting. He presented a summary of performed stress analysis of 37 cases and the conclusions.

The session concluded with **Shri Alok Lalit Kumar** summing up the proceedings and felicitating the speakers with mementoes.



CEO'S Session I



Chairperson
Shri Amrit Lal Meena
IAS, Secretary, MoC, GoI



Coordinator
Shri N C Jha
Past President, MGMI and Former Chairman, CIL



Dr P S Mishra, CMD, SECL in his delivery said that we are celebrating the 250th year of coal mining in India, that started in 1774. Shri Mishra asserted that best mining practices are policies, practices and procedures which are inclined, intended and implemented for obtaining optimal efficiency and best results in successful, stable and sustainable manner. SECL has endeavored to achieve this. Last year there was 17% growth in coal production and this year it is growing at the rate of 22%. SECL has produced 25% of CIL's production. To maintain this growth sustainable there are a few challenges. Every company owning number of mines has to abide by the principles of environment, society and governance. Informational Technology (IT) is being integrated with Operational Technology (OT) and some mines are running digitally. Shri Mishra pleaded industry – academia interface. SECL has taken steps to successful closure of mines like repurposing of mines, ecotourism, solar plant installation. He impressed upon the importance of Underground mining.



Shri Ajit Kumar Saxena, CMD, MOIL shared the importance of manganese ore, industries in the country and also the global scenario. Out of 1500 million tonnes of manganese ore available in the world, India is having 34 million tonnes. More than 95% of manganese ore goes in the production of steel. To achieve India's target of 300 million tonnes steel production by 2030, 11 million tonnes of manganese ore is required. Presently, 7 million tonnes are used in India of which 4.5-5 million tonnes are imported. Manganese is also being used for ferroalloys which are also exported. Shri Saxena presented the availability strategy and production target of manganese ores. MOIL has registered a growth of 35% over their best performance this year. He talked of the exploration programme by MOIL, mentioning some prospective areas have been identified in Gujarat. He shared some of the best practices implemented in manganese mining. In his concluding remarks, he invited everyone to visit the MOIL mines.



Shri I D Narayan, CMD, MECL spoke of global and Indian scenarios of critical minerals and MECL's role in mineral exploration. He said that these are called critical because of limited occurrence with 55% of reserves and 70% of production from 15 countries. That makes risk of availability and supply chain disruptions. China holds the supply chain of critical minerals with processing units being located there mainly. India is moving from petro to electro in energy sector for which critical minerals are needed. Government of India has identified 30 critical minerals, of which more than 30% is fully imported. There are very limited known reserves in India though we have large geological potential areas which remain still unexplored. There is a need for systematic exploration, sustainable mining and processing. For this, R & D and new type of equipments are necessary, which MECL is in the process of implementing. More than 50% of MECL exploration blocks are of critical minerals.



Shri Santanu Roy, CMD, BEML started with sectoral analysis and growth projection with respect to global market for coal and other minerals which showed a significant increase in recent years. He added that mining equipment is of key importance for excavation and extraction process. The significant factors for growth in India include the demand growth, tractive opportunities, Production Linked Incentive (PLI) schemes, policy support, competitive advantage, technology and smart mining. As far as equipment is concerned, best mining practices are best maintenance practices. He presented a short outline of BEML mentioning various areas of its activities, emphasising its association with Coal India, Neyveli Lignite and other mineral companies. He talked of future strategies including Artificial Intelligence (AI) and Environmental, Social, and Governance (ESG) initiatives.

A few queries from the audience were replied by the speakers. **Shri Meena** summed up after each talk with his valuable advice and **Shri N C Jha** made the closing remarks and concluded the session with thanks to the speakers and the Session Chairman. The speakers were felicitated with the Congress mementoes.

CEO'S Session II



Chairperson
Shri R P Ritolia
Former CMD, CCL



Chairperson
Shri Binoy Dayal
Former D(T), CIL



Coordinator
Dr Anupendu Gupta
Former Dy DG, GSI





Shri Thomas Cheriyan, MD, ESSEL mining initiated his talk by saying that whatever we need / use comes from two sources, one that are grown and the other from mining. That is why mining is important for human prosperity. He talked of the roadmap to Net Zero in mining. He focused on two points, technology and people. Today, mining has started looking at the best technology in the world. During the entire cycle of mineral search to extraction, the latest technologies like AI are being used. Global companies now carry out many of their potentially hazardous operations from a remote location without direct human involvement at the site. He felt that there was a need for attracting more people, including women, for mining to survive. Traditional practices need to be modernized. He presented a scenario of how future mining may be carried out.



Shri D B Sundara Ramam, Vice President, Tata Steel in his delivery said that community looks at the mining industry that spoils the environment, mostly because the required focus and importance were not being given to mine closure. Economy, environment and social are the three major baskets for the mining industry. He talked of challenges faced by the mining industry and also of the government in implementing proper procedures. Government of India has started star rating in 2016 and Sukinda mine of Tata Steel was the first mine to get five star rating in non-coal mining. Of the 135 mines that had applied for star rating, only 8 to 12% received five star rating. He further added that we should improve the mining processes, including mine closure to attain the benchmark. Digitalization is the keyword now and mining industry is not behind. He discussed automation in mining with eyes on safety and security, and innovations happening in mining. He shared some examples of sustainable mining carried out by Tata Steel as also global examples where AI/ML have been implemented and suggested the way forward for Indian mines.



Shri Anuj Keolia, COO, GMMCO in his talk stated that mining is a very big field and HEMM, i.e., the machine is the last portion where people give attention. The major thrust in any mining are the machineries without which mining cannot be carried out and how a machine is treated is very important. According to him, there is not much difference between the Indian and foreign mines. In fact, mining in India is more difficult due to attitude and social problems. In India, automation has started, and remote control truck dozer may be introduced next year. If we look at the machine journey, there is a complete evolution in India. Basically, the changes in mining are mine size, machinery, regulation and technology. He talked of improvements in machinery technology. In any machine, parameters need to be controlled properly.

Shri Ritolia gave his expert comments after each presentation. The proceedings of the session was summed up by **Shri Binay Dayal**. Queries from the audience were replied by the speakers. The session concluded with felicitating the chairpersons and speakers with Congress memento.

Technical Sessions

There were altogether 10 Technical Sessions in the Congress for presentations by authors on the 2nd and 3rd day of the Congress, besides the ones mentioned earlier, on various topics. In all 56 papers were selected for presentation in the technical sessions, of which 51 were presented by scientists, technologists, academicians, planners, regulators, and policy makers from India and abroad. The sessions with Lead Topics, Chairpersons, Coordinators and the Authors/Speakers of papers presented are listed below.

Technical Session I: Exploration, Estimation, Geostatistics and Hydrogeology



Chairperson
Shri I D Narayan
CMD, MECL



Chairperson
Shri S N Kapri
D(T), (OP), SECL



Papers presented:

- **Prof Bhabesh Ch Sarkar**, IIT (ISM) Dhanbad – **Geostatistics in Exploration and Mining**
- **Prof Mrinal Kanti Mukherjee**, IIT (ISM) Dhanbad – **Prediction of water inflow in a proposed underground Coal Mine of the Rajgamar Dipside (South of Phulakdih Nala) in Chattisgarh, India.**
- **Shri Anand S Sharma**, CSIR-CIMFR, Dhanbad – **Reserve Estimation through the Conventional Method and Computer-aided Software: A Comparative Study.**
- **Shri Sam Mitra**, Ex VP, Tata International Ltd, Ex Executive-in-Charge, Chrome and Titania Projects, Tata Steel Ltd – **Lithium: the Changing Landscape of Production and Economics.**
- **Shri Nihar Ranjan Sahu**, IIT Kharagpur – **Design of Operators' Cabin for Mineral Processing Plants using Specially Fabricated Acoustic Material with Simple Expansion Chamber Structure.**
- **Ms Krishna Dinda**, Dept of Mining Engg, IIT Kharagpur – **Non-Gaussian Copula Simulation: A New Approach to Recoverable Reserve Estimation in Indian Open-pit Copper Deposit.**

Shri Narayan gave his expert comments after each presentation. The proceedings of the Congress technical session were summed up by **Shri S N Kapri**. Queries were replied by the authors. The speakers were felicitated with Congress mementoes.

Technical Session II – AI / ML Applications and Smart Mining



Chairperson
Dr P S Mishra
CMD, SECL



Coordinator
Shri A K Singh
D(T) P&P, WCL



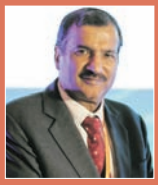
Papers presented:

- **Dr Siddhartha Agarwal**, IIT(ISM), Dhanbad - **Machine Learning based Predictions of Spontaneous Combustions Susceptibility of Coal using Intrinsic Properties: A safe Smart and Sustainable Mining of Coal Approach.**
- **Dr Surendra Kukam Dogra**, NIT, Rourkela - **Machine Learning Applications: Coal Mine Fire Prediction Using Graham's Ratio.**
- **Dr Shankhajit Mitra**, CSIR-CIMFR, Dhanbad - **An Approach for Implementation of IoT Enabled Smart Environmental Monitoring and Strata Monitoring System for Underground Coal.**
- **Dr Swades Kumar Chaulya**, CSIR-CIMFR, Dhanbad - **Virtual Fencing System for Periphery Surveillance.**
- **Mr Michalis Katapotis**, Senior Digital Mine Expert, Am TÜV 1, 45307 Essen, Germany: **A Framework for Digital Transformation in the Mining and Metals Industry.**

Dr P S Mishra commented on the necessity of the application of AI/ML and appreciated each presentation. Queries from the audience were replied by the authors. The proceedings were summed up by **Shri A K Singh**. The speakers were felicitated with Congress memento.



Technical Session III – Mine Planning and Production



Chairperson
Shri Manoj Kumar
CMD, WCL



Coordinator
Shri A K Roy
GM, (PMD), CIL



Papers presented:

- **Dr Ashok Kumar**, Sanjay Gorain, Sahendra Ram, Dheeraj Kumar, Dept of Mining Engg, IIT (ISM), Dhanbad, **Estimation of Side Spalling in Bord and Pillar Mining Method based on Field and Simulation Studies.**
- **Shri Anup Tiwari**, Bibhuti Bhusan Mandal, Dr Khanindra Pathak, Dept of Mining Engg, IIT Kharagpur, **Understanding Run-out Behaviour of Overburden Dump: Insights for Buffer Zone Design in Openpit Coal Mine.**
- **Dr Prabhat Kumar Mandal**, CSIR-CIMFR, Dhanbad – **Bridging Efficiency and Safety: A Case Study of Extraction of Thick Coal Seam having Low Incubation Period using Continuous Miner.**
- **Shri Mithilesh Kumar Mishra**, ICFAI University, Ranchi – **Performance of Mechanised Depillaring Operations with SDL and Continuous Miner Technology: A Comparative Study.**

Shri Manoj Kumar commented appreciating each presentation. Queries from the audience were replied by the authors. The proceedings were summed up by **Shri A K Roy**. The speakers were felicitated with Congress memento.

Technical Session IV – AI ML Applications, Digital and Smart Mining



Chairperson
Shri Achyut Ghatak
DT (RD & T), CMPDI





Papers presented:

- **Mr Toby J Cressman**, Lead Product Manager, R&P Automation and Data Solutions, Joy Global Underground Mining LLC – **Using Data Analytics to Measure Success.**
- **Shri Badal Manna**, GM (Mining) & I D Narayan Regional Director, CMPDI, Bilaspur – **Application of Artificial Intelligence to Create Virtual Copy of Physical Mine to Enhance Productivity, Safety and Profitability.**
- **Shri Sujit Kumar**, Senior Manager, West Bokaro Div, Tata Steel – **Improving Productivity and Utilisation of HEMM in Opencast mines via Digital Analysis.**
- **Shri Rajneesh Kumar** and **Shri Ajay Kumar Singh**, CMPDI, CMSMS (Coal Mine Surveillance and Management System) - **An Initiative of Ministry of Coal (MoC) for Prevention of Illegal Coal Mining.**
- **Dr R N Patra**, Chief Manager, CIL – **Risk to Resilience in Cyber Security on the way of Digital Transformation in Mining Industry.**
- **Shri Amit Sharma**, Dept of Mining Engg, IIT Kharagpur– **Machine learning Techniques for Predicting Health Risk of Mining Vehicle Operators subjected to Whole Body Vibration.**

Shri Achyut Ghatak presented the essence of each paper. Queries from audience were replied by the authors. The speakers were felicitated with Congress memento.

Technical Session V – Explosive and Blasting



Chairperson
Shri Jitendra Malik
DT (PP), NCL



Papers presented:

- **Dr Pijush Pal Roy**, Gammon Engineers & Contractors Pvt Ltd – **Strategic Planning and Guidelines to Control Dust and Post-detonation Fumes arising due to Blasting in Opencast Coal Mines.**
- **Dr Narayan K Bhagat**, R K Singh, P Hembram, Dr C Swamlina, Prof A K Mishra, CSIR-CIMFR, Dhanbad – **The Influential Role of Confinement, Charge Factor and Segmentation of Explosive Charge in a Blasting Round: a Perspective for the Blasting-Induced Ground Vibration Compliance.**
- **Shri Vivek Kumar Himanshu**, Ashish K. Vishwakarma, C. Sawmlina, R. S. Yadav, M. P. Roy and A. K. Mishra, CSIR-CIMFR – **Innovative Blast Design for Reduction of Boulder Generation in Opencast Excavations.**
- **Shri Ranjit K Paswan**, CSIR-CIMFR – **Evaluation and Quantification of Textural Properties of a Rock and its Impact on Blast Induced Ground Vibrations.**
- **Aditya Rana**, Saikat Banerjee, Arvind Kumar, Atul Singh, and Chhangte Sawmlina, CSIR-CIMFR – **Controlled Blasting within Danger Zone of 500 M from Dwelling Vis-À-Vis Production Enhancement-Problem and Challenges.**
- **Ms Monika Tewari**, Bibhuti Bhusan Mandal, and Amit Sharma, Department of Mining Engineering, IIT, Kharagpur– **A Comprehensive Analysis of the In-Plane and Out-of-Plane Response of a Masonry Wall Under Blast Loading Conditions. in the Vicinity of Coal Mines.**

Shri Jitendra Malik presented the essence of each paper. Queries from audience were replied by the authors. The speakers were felicitated with Congress memento.



Technical Session VI – Mine Health and Safety



Chairperson
Shri Prasanna Kumar Mottupalli
CMD, NCL



Chairperson
Shri R B Prasad
Director (T), CCL



Papers presented:

- **Shri Amit Kumar**, CSIR-CIMFR, Dhanbad – **Reliable Intrinsically Safe Circuit Design Specifications for Oil field and Coal mines.**
- **Dr Peeyush Kumar**, General Manager (Mining) & OSD, CCT, MoC – **Socio-Psychological Approach for Sustainability in Coal Sector in India.**
- **Prof Indrajit Roy**, Adjunct Professor, Birsa Institute of Technology, Sindri, Ranchi – **Optimum Combination of Safe and Economical Internal Dump Profile of Dragline Mines.**
- **Shri Ankit Chatterjee**, presented paper of Shri Biswajit Dutta, Eastman Crusher Co Pvt Ltd, Kolkata – **A Path to HEMM Protection from Reparable Crystalline Silica.**
- **Shri Biswajit Modak**, Technical Officer, CSIR-CIMFR, Dhanbad – **Safety in Underground Mines using Flameproof Light Fitting.**
- **Shri Ayush**, read the paper of Dr Sayan Ghose, Manager (Geophysics), CMPDI – **Near Surface Geophysical Investigations for mapping the Subsurface Features responsible for the Cracks developed in the View Point Patch, Dipka OC Mine, SECL.**

Shri Prasanna Kumar Mottupalli summarized the papers presented in the session. Queries from audience were replied by the authors. The speakers were felicitated with Congress memento.

Technical Session VII – Sustainable Mining and Mine Environment



Chairperson
Shri Samiran Dutta
CMD, BCCL



Coordinator
Shri C M Jaydev
GM (Environment), CIL





Papers presented:

- **Shri Binay Dayal**, Adjunct Prof Mining Engg, IIT (ISM) and Former Director (T), CIL – **Key Thrust Areas for Sustainable Coal Mining.**
- **Ms Daria Goncharova**, Global Sustainability Lead, Germany, Essen, AM TUV – **Principles of Sustainable Development of Mining.**
- **Shri Mihir Choudhury**, Former Director, DGMS, Dhanbad – **Sustainability of Underground Coal Mining in India vis-à-vis Coal Mines Regulations 2017.**
- **Shri Piyush Srivastava**, Chief, Natural Resource Division, Tata Steel – **Using Digital Means for Mine Monitoring, Improving Productivity and Sustainability.**
- **Preeti Kumari**, Vivek K Himanshu, Maneesh Vishvakarma, Shri Saket Kumar, CSIR-CIMFR, Dhanbad – **Roadmap for Best Mining Practices vis-à-vis Global Transformation.**

Shri Samiran Dutta recapped and summarized the papers presented in the session. Queries from the audience were replied by the authors. The speakers were felicitated with Congress memento.

Technical Session VIII – Back Filling & Waste Management



Chairperson
Shri G V Reddy
Director, SCCL



Co-ordinator
Dr Prabhat K Mandal
Chief Scientist, CSIR-CIMFR, Dhanbad



Papers presented:

- **Shri Santosh Kumar Behra**, CSIR-CIMFR – **Underground Mine Backfilling Transition in Sukinda, Odisha: Present and Future.**
- **Shri Pavan Kumar Gupta**, CSIR-CIMFR – **Syngas Cleaning Technologies in Gasification Process for Downstream Applications.**
- **Shri Anshuman Agarwal**, Minimac Systems Pvt Ltd, Pune – **Enabling Net Zero Industrial Targets through Decarbonising Lubricant Life-cycle.**

Shri Reddy presented the essence after every talk. Queries from participants were replied by the authors. **Dr Mandal** summed up the proceedings. The speakers were felicitated with Congress memento.



Cultural Programme

A cultural programme was organized in the evening of 7th November 2023. A dance troupe SAPHIRE DANCE TROUPE entertained the guests, delegates and participants of the 10th AMC with their performance at the same venue.





Technical Session IX – Coal Gasification, CBM, Mine Fire & Ventilation



Chairperson
Shri Debashish Nanda
Director, BD, CIL



Chairperson
Shri Niladri Roy
D(T), ECL



Coordinator
Shri D Mohanty



Papers presented:

- **Shri Rupesh Kumar Singh**, Nilesh D. Dhaigude, Arti Sahu, Vishal Chauhan, Gajanan Sahu, Pavan Kumar Gupta, Sujan Saha, and Prakash D. Chavan, CSIR-CIMFR, Dhanbad – **Gasification of High-Ash Indian Coal and Agro-Industry Biomass Waste in Oxy-Blown Bubbling Pressurized Fluidized Bed Gasifier.**
- **Shri Anjani Kumar**, Essar Oil and Gas Exploration and Production Ltd, and G. P. Karmakar – **Refracturing in CBM Wells: A Case Study.**
- **Shri Debashish Mishra**, N. K. Mohalik, D. P. Mishra, S. K. Ray, Asfar M. Khan, and J. K. Pandey, CSIR-CIMFR & IIT(ISM), Dhanbad – **Design of an Effective Ventilation System for Deep Underground Coal Mines Affected by Spontaneous Heating and Fire Using Double Booster Fans – A Practical Approach.**
- **Dr Jitendra Pandey**, A. Khalkho, S. K. Ray, Aditya Kumar, and J. K. Pandey, CSIR-CIMFR – **Assessment and Control of Concealed Fire in Underground Coal Mine: A Case Study.**
- **Shri Praveen Kumar Rai**, DGM (Mining), SAIL – **Exploration and Ore Reserve Prospects of Opencast Mines in Forest Zone: a Case Study.**

Shri Debashish Nanda and **Shri Niladri Roy** appreciated the speakers mentioning the salient points after each talk. **Shri D Mohanty** summarized the proceedings. Queries from the audience were replied by the speakers. The speakers were felicitated with Congress memento.



Technical Session X – Rock Mechanics and Ground Control



Chairperson
Dr B Veera Reddy
D(T), CIL & CMD, CCL



Chairperson
Shri D K Mohanty
Director (Production), NMDC



Papers presented:

- **Sai Rohith Samala**, John Loui Porathur, Ayan Giri, and Vinod Kumar Jagapthal, CSIR-CIMFR, Nagpur – **Numerical Modelling of Split-set Friction Bolt.**
- **Dr Siddhartha Roy** & Dr Hemant Agarwal, CMPDI, Ranchi – **An Investigation on Optimal and Safe Design of Highwall Mining Panel beneath Jointed Overburden Strata using Discrete Element Modeling.**
- **Dr Arkajyoti Das**, Prabhat Kumar Mandal, Nilabjendu Ghosh, Subhashish Tewari, Rana Bhattacharjee, CSIR-CIMFR, Dhanbad – **Design of Extraction Methodology for Highwall Mining under Multi-Seam Conditions - A Case Study.**
- **Shri Subodh Kumbhakar**, Arka Jyoti Das, K. Nageswara Rao, C. P. Verma. P. K. Mandal, CSIR-CIMFR, Dhanbad – **Stability Assessment of Overburden Dump on Black Cotton Soil Bench: A Numerical Modelling Approach.**
- **Shri Nilabjendu Ghosh**, Subhashish Tewari, Rana Bhattacharjee, Arka Jyoti Das, Pankaj Kumar Mishra and Prabhat Kumar Mandal, CSIR-CIMFR, Dhanbad – **A Study on the Effects of Horizontal Stress Anisotropy on Stability of Galleries in Deep Underground Coal Mines.**

The chairpersons appreciated the speakers mentioning the salient points after each talk. Queries from the audience were replied by the speakers. The speakers were felicitated with Congress memento.



Panel Discussions



The following Panelists were invited on the dais by Dr Amalendu Sinha, Chairman, Technical Committee:

- **Prof S P Banerjee**, Past President, MGMI & Former Director, ISM - Chairman
- **Shri N C Jha**, Past President, MGMI & Former Chairman, CIL
- **Shri N N Gautam**, Former Advisor, MoC, GoI
- **Shri D Mohanty**, Director (Production), NMDC
- **Shri T K Nag**, Former CMD, NCL
- **Shri N V K Srinivas**, Director (Op), SCCL

Coordinator : **Dr Amalendu Sinha**, Former Director, CSIR-CIMFR and Chairman, Technical Committee, 10th AMC.

There were two special talks:



Shri N V K Srinivas spoke on the **Challenges faced in Longwall Mining in SCCL**. One of the major challenges was the huge quantity of impure slushy water coming out of the mine face at 600m depth after being pumped out that filled the sumps with slush. They had to deploy three stage pumps from underground to the surface at 250m head difference such that outlet of one pump from lower level was the inlet for the other. Another issue was controlling the temperature of the air at mine face. Shri Srinivas explained the process by which it was controlled. Other problems discussed were the roof support, conveyor belt system etc.



Shri D V Pichamuthu talked on **Amendments of Mining Legislations and their Impact on Mining Industry**. He traced the history of mining laws, National Mineral Policies (NMP) and MMDR acts, starting from 1939 when certain key minerals were controlled. He discussed the amendments of 1994 and 1999 that loosened the government control and the major amendments of 2015 that, according to him, is not proper and require modifications. He presented the effects of the acts and suggested some recommendations touching critical minerals, taxation, and the auction process.



Shri N C Jha pointed out the basic idea of the theme of this Congress was the best global mining practices and how to adopt it in Indian mining. Many presentations have been made here including a number of case studies. He added that mining in India should focus particularly with respect to optimization of productivity with due regard to safety, with least carbon emission technologies. We should inculcate the habit of safety. He stressed on efficient burning of coal. He advocated for attracting more people in the mining profession.



Shri N N Gautam said the most important subject was how to reach Net Zero emission. Initially, it was thought coal would be phased out. But the situation is more coal would be required to meet rising demand. The only way is to use coal in a cleaner manner. Coal gasification is a better process. The latest talk in the energy scenario is the hydrogen economy. Hydrogen is not an energy source, it is an energy carrier. Research to make it cheaper should continue.



Shri D Mohanty – NMDC, the number one mining company, secures the raw material security for the country. He presented the activities of NMDC, including the opening of a gold mine in Australia. He discussed safety, environment, social responsibility in mine activities. According to him, new technologies have to come in the mining and energy sector.



Shri T K Nag shared his thoughts about safety in mining operations. In India after any accident the conventional enquiry is done and someone is penalized, as there is no system of root cause analysis. On the basis of a report of a committee (of which Shri Nag was a member) Government has now asked all companies to go for risk-based analysis in case of an accident. He advocated for a risk analysis-based safety management plan and its audit.

Prof Banerjee mentioned the salient points adding his thoughts on the subject after each talk. Dr Amalendu Sinha invited comments from the audience.



Dr G K Pradhan talked on the height of benches in opencast mining. He praised NMDC mines.



Shri G V Reddy, Director (PP), SCCL said the future of SCCL is at stake due to the MMDR Act 2015. The search for coal is now through the auction route. He pleaded to MGMI to place the point to the Government.



Dr Kalyan Sen told coal preparation in India gets no importance. Gasification or generation of hydrogen with high ash coal will not be easy. For that coal preparation will be needed. He opined that Net Zero cannot be achieved without coal preparation.

Valedictory Session





The concluding session of the 10th AMC commenced with the following guests and office-bearers on the dais.

- **Shri V L Kantha Rao**, IAS, Secretary, Ministry of Mines, GoI, Chief Guest
- **Shri P M Prasad**, Chairman, Coal India Limited, Guest of Honour
- **Shri A Rajkamal**, IAS, Director, Mines and Geology, Jharkhand, Guest of Honour
- **Dr B Veera Reddy**, Director (Technical), CMD, CCL, President, MGMI
- **Shri Manoj Kumar**, CMD, CMPDI, Chairman, Organizing Committee
- **Dr Amalendu Sinha**, Chairman, Technical Committee
- **Shri Ranajit Talapatra**, Honorary Secretary, MGMI
- **Shri Prasanta Roy**, Convenor, 10th Asian Mining Congress

The dignitaries on dais were welcomed with flower bouquets.



Dr B Veera Reddy welcomed the dignitaries and guests in the session. He especially thanked Shri Kantha Rao, the key man known for key reforms in the mineral sectors, for honouring the session as chief guest. He thanked Shri Prasad for his help in organizing this Congress and Shri Rajkamal for his cooperation and support in CCL activities. He also thanked Dr Sinha for the good work in publication of the proceedings volume by Springer, and Shri Kumar for leading the Congress to a great success. Finally, he appreciated the contributions of S/Shri Prasanta Roy and Ranajit Talapatra.



Shri Manoj Kumar told that over the past three days, the power of collaboration, exchange of knowledge and the spirit of innovation were witnessed. He presented a brief outcome of the 10th AMC mentioning the keynote papers in the plenary session, CEO's perspective and insights, and technical presentations from various distinguished speakers from industry, academia and research scholars in ten sessions. This congress was a hub of learning and a source of inspiration.



Dr Amalendu Sinha expressed satisfaction that this time the Scopus-indexed Proceedings volume could be published by Springer, an international publisher. He thanked the President, Secretary, MGMI, Convener, 10th AMC, editors, reviewers and authors for this unique achievement. He told that recommendations from this congress will be prepared by a committee, considering the points suggested by Shri A L Meena, Secretary, MoC, and forwarded to the Government. He hoped the recommendations would be fruitful to our country in particular and the global community as a whole.



Shri A Rajkamal thanked MGMI and CCL to provide Jharkhand state an opportunity to be a partner in this event. Jharkhand being a state with the highest mineral resources in the country, has the responsibility to promote mining activity and also ensure a sustainable transition to fulfil net zero commitments. Policy and technical activities are taking lead in Jharkhand, technology being used in monitoring purposes in mining activities, and exploration. He felt the knowledge from the 10th AMC would be of good help to Jharkhand in the mineral exploration and mining domain. Jharkhand government has formed a PSU, called JEMCL, with huge capital infusion. Industries department of Jharkhand has come up with an electric vehicle policy. It is also a pioneer state that came up with a policy of sustainable energy task force that would create a road map for moving to net zero. The hydrogen economy is also an area for focus by Jharkhand.



Shri P M Prasad thanked Shri Kantha Rao on behalf of MGMI for coming to the occasion. As suggested by Shri Kantha Rao, he requested MGMI authorities to plan the next AMC at New Delhi. He talked of the success of 10th AMC with 56 papers presented, and IME with 400 stalls. He suggested that MGMI should arrange a seminar on critical minerals. He thanked all for the all-round success.



Shri V L Kantha Rao congratulated MGMI for an excellent event related to mining conducted during the 3 days. He praised the theme and very relevant lead topics on which the deliberations were presented and hoped that the outcome would benefit all stakeholders related to the mining industry. After joining the Ministry of Mines, he was looking for a flagship event on the mining industry and when he heard of the AMC at Kolkata, he decided to attend it. He suggested there is a need to organize an event covering all the minerals sector where stakeholders from the entire mining sector may assemble, preferably in Delhi. He feels ease of doing business following ESG standard is the need of the hour. MoM is trying to simplify the procedures in the mining business, with a soft touch policy for the smaller mines. For mine approval, there is a mining tenement system in IBM, which is being digitized and simplified. He requested all stakeholders to come up with suggestions to simplify the leasing process. It has been decided that now the auction of blocks of 24 critical minerals would be done by the Government of India, not by the states as is the policy for other non-coal minerals. Shri Kantha Rao spoke of offshore economic mineral zones where exploitation could be carried out. A lot of offshore surveys have been done by GSI and 32 blocks are ready for auction. Within 4 months these blocks would be auctioned where private entrepreneurs may participate. The government would spend a lot of money through the National Mineral Exploration Trust (NMET) to encourage exploration, especially for critical minerals. The government would also fund R&D programmes by start-ups in the mining sector. He requested all to help in making India self-sufficient in the mining sector.



The 10th Asian Mining Congress was concluded with a Vote of Thanks by the Convener **Shri Prasanta Roy**. He expressed gratitude to Shri V L Kantha Rao, Shri A Rajkamal, Shri P M Prasad, Dr B Veera Reddy. He thanked profusely to Shri Manoj Kumar, and Shri Bhola Singh under whose guidance the AMC and IME have become a grand success. He thanked Springer for publishing the proceedings, the technical committee, the editors, and the reviewers, under the chairmanship of Dr Amalendu Sinha. He thanked all the sponsors, naming them individually, to Tafcon for organizing the exhibition, the event management team, and Taj Taal Kutir. The most important parts of the conference are the authors, delegates and participants, to whom Shri Roy expressed gratefulness. He thanked Shri Ranajit Talapatra, Secretary, Dr C S Singh, Jt Secretary, MGMI, the comperes, and all the staff members of MGMI.

Recommendations

Based on the technical papers, presentations, comments, discussion and deliberations during different sessions of the 10th AMC (November 6-8, 2023). the Technical Committee constituted for this Congress framed the following recommendations:

Government's call on: (i) Underground Mining, (ii) Coal Gasification (iii) Mine Closure (iv) Pump Storage in abandoned mines; and (v) Women in mining, need to be suitably addressed. Added with these, state-of-the-art Research and Development, suitable policies and identification of best mining practices for India also need due attention.

Lead topic-wise recommendations of the congress are:

(a) Mineral Exploration, Critical Minerals, Speciality Materials and Hydrogeology

- (i) Deposit geology suitably integrated with appropriate geostatistical procedure should provide improved understanding of the mineralization types and specifics for assessment of a meaningful mineral inventory and grade-tonnage relations;
- (ii) With possible inrush of groundwater at places that could occur through underground solution channels and local fractures within shallow depths in coal mines, there is a need for a thorough hydrogeological evaluation keeping in mind a steady inflow distributed over a corresponding progressive depth;
- (iii) V-transformed copula-based simulation method may be considered to enhance the accuracy of reserve estimation that captures a diverse set of asymmetric and nonlinear spatial correlation configurations through parameter adjustments;
- (iv) Lithium, by virtue of its presently irreplaceable position in the rechargeable energy storage systems, may continue to play a pivotal role in global energy transition. The process of supply chain optimization, with due governmental policy support, may establish lithium-backed green energy system as a viable and the most-preferred option in the long run.



Application of AI/ML and Smart Mining

- (i) AI-based tools should be used for semi-automatic interpretation of reflection seismic data to delineate subsurface geologic features for exploration of geo-resources and understanding of geodynamics;
- (ii) Application of smart mining and autonomous technologies using IoT, AI, ML, digital twins, virtual reality, 3D visualization, image processing, and wireless communication will improve safety and productivity in mines;
- (iii) Intelligent digital mine systems should be implemented by integrating IoT-enabled sensors, wireless network, and artificial intelligence for real-time monitoring, prediction, and controlling of underground mine hazards to enable safe and efficient mining;
- (iv) Private 5G networks, vehicle-to-everything (V2X) communication, autonomous technologies, augmented reality, and AI-based analytics should be used in opencast mines for monitoring and optimizing the HEMM performance and improving safety;
- (v) Deployment of radar-based virtual fencing systems for mine periphery surveillance should be made to detect intrusion in real-time, and stop intrusion and mineral theft through unauthorized routes;
- (vi) Machine learning-based prediction of mine fire prediction and spontaneous combustion susceptibility of coal for fast and cost-effective analysis and accurate decision-making may be adopted;
- (vii) Data analytics provide a key to managing successful mine and training operators on best operating practices for improvement in overall mine productivity. Data analytics may also be used to support change management process and continuous improvement;
- (viii) Cybersecurity of Industrial Internet of Things (IIoT) with key approaches toward formation of security capsules for creation of secured environment for optimum profitability and sustainability of mining sector may be introduced with cyber-resilient framework for pit to port operation.

Mine Planning and Production

- (i) Success of highwall mining depends on optimum size of web pillars whose stability should be ensured during and after the mining operation. The design of web pillars should consider the effect of slenderness (w/h ratio) as well as aspect ratio/rectangularity (L/w) of web pillars on their strengths. The existing method to calculate the effective width of web pillars overestimates their strength which may lead to unsafe working.
- (ii) It is necessary to establish a buffer zone surrounding the periphery of in-pit dumps for restricting worker and machinery movement and to mitigate the risk of unwarranted failures and to enhance safety measures. A comprehensive post-failure runout study is required to control waste dump failure accidents;
- (iii) Requirements of safe and fast extraction, effective management of mining-induced stresses, selection of an appropriate support system for high roof and early detection of spontaneous heating and fire incidents are crucial during the liquidation of thick seams with a low incubation period including minimizing coal loss in the goaf. By adopting a fast-paced extraction methodology using a Continuous Miner with increased cutting height from 4.6 m to suggested 5.4 m, it becomes possible to extract full seam thickness and to increase number of pillars per panel, even in low incubation coal seams.

Explosive and Blasting

- (i) Optimized blast design parameters, charging patterns and explosive confinement should be kept in mind while minimizing blast induced ground vibrations. However, it should be practiced to split the total charge of blasts into a number of small segments to ensure the complete safety of the structures;
- (ii) Pocket charging and satellite hole drilling and charging should be devised in order to reduce the generation of boulders from cap hard rock;
- (iii) Rockmass subjected to dynamic stress conditions developing fractures due to different textural parameters may be inferred that the uniaxial compressive strength of rock can increase with the increase in total charge;
- (iv) Selection of high precision digitally programmable electronic detonators can reduce the chances of generation of flyrock and blast induced ground vibration;
- (v) Houses/structures in mining areas experiencing varying degrees of in-plane and out-of-plane loading make it essential to consider both loading conditions in their design and assessment for durability and safety caused due to blast induced ground vibration.
- (vi) Using time-limited water spraying before and after blasting, particularly in blasting zones and adjacent haulage roads, is advisable for effective dust control;



Mine Health and Safety

- (i) Circuitry designs of electrical equipment installed in coal mines or oilfields should meet the performance and design requirements as per the standard IS/IEC 60079-11. Reliability in safety plays a vital role in attainment of the safe and continuous desired performance of any electrical equipment.
- (ii) Addressing the challenge of dragline and shovel-dumper dump stability requires a focused approach targeting the most influential factors: angle of internal friction (Φ_2) and cohesion (C_2) of the (dump & interface material), mine floor inclination (I), height of the water table within the internal dump, and ground accelerations generated within the dump mass due to blast vibrations.
- (iii) Adoption of ISO 23875 with Amendment 1 addresses overexposure in environmentally controlled operator enclosures. This is a comprehensive solution which addresses the manufacture, retrofit, validation testing, ongoing performance, maintenance, and recertification process. The standard aligns with industry best practice and creates regulatory enforcement of an industry developed consensus standard.
- (iv) High resolution electromagnetic scanning may be accomplished using Ground Penetrating Radar (GPR) and Electric Resistivity Imaging (ERI) for near surface geophysical data acquisition.
- (v) Acoustic properties of periodic structures based on inline cavity structure principle using impedance tube that can reduce the risk of noise-induced hearing loss among workers in the mining industry could improve their health and safety in the workplace;

Sustainable Mining and Mine Environment

- (i) The Net-Zero Pledge of India necessitates its energy mix to undergo a transition from fossil fuel sources to non-fossil fuel-based sources dominated by Renewable Energy (RE) in the future. Energy Storage Systems (ESS) can be used for storing energy available from RE sources to be used at other times of the day, for which massive investment is required. While in the near future terms the requirement of coal may increase by, say up to the year 2040, in the longer terms it all depends on the progress made in carbon capture, storage and its utilization with its cost competitiveness with renewable based energy generation and the extent of greening the country by massive plantation. Research and Development in these areas must be enhanced.
- (ii) Sustainable development of coal sector, which is need of the hour can be achieved by making suitable policies in terms of organisational behaviour so as to generate positive psychological climate.
- (iii) Ensuring the stability of the mining technical system throughout the period of operation is only possible by changing the requirements for the natural resources involved in operation in line with the dynamics of mining work development, with the corresponding changes in their design component and justification of the principles of creating information technologies for working with large amount of data in solving design, operation, conservation, and elimination tasks of mining technical systems.
- (iv) Prevailing practices in underground mines in India vis-a'-vis new conditions incorporated in Coal Mines Regulations, 2017 need reorganization/planning of large underground coal mines with an aim for large output from a single mine.
- (v) While companies are better at managing issues relating to the environment, health and safety, the social, economic and community issues still remain the biggest challenge.
- (vi) Method as proposed by R Folchi (Folchi method) to measure the mine's influence on various environmental parameters, such as air and water quality, soil health, and biodiversity, among other provides a complex overview of mining operations and their intricate environmental relationships. It emphasizes the necessity for an approach that recognizes the mining process's challenges and opportunities, focusing on responsible practices to align growth with sustainability goals. Special emphasis must be on regulating air pollution and unwavering adherence to environmental management plans for both environmental sustainability and human well-being.

Back Filling and Waste Management

- (i) Alternative backfill materials for mines planning to switch over from sand to bottom ash-based backfill can be mine overburden, slag and tailings. Considering the expansion of underground mining, the paste backfilling could be an option to be practiced in future.
- (ii) Lubricant reconditioning and reliability lead to lesser cost of oil replacement and new oil purchases. Circular economy can tackle global challenges through reclamation of lubricant for benefits of increased machine reliability, savings on cost and time on oil change-outs, decreased oil disposal costs and reduced environmental impact towards the Net Zero Targets through decarbonizing lubricant life-cycle;
- (iii) Syngas cleaning, conditioning, and conversion account for a significant portion (~30%) of capital expenses for a gasification technology to downstream process. Cooling the syngas stream and using a liquid scrubbing or absorption



device is most adaptable option. Chemical energy in the tars which is lost as a result of cooling of syngas leading to generation of a waste stream must be treated or disposed of. Ultraclean syngas, a process scheme with fewer separation steps developed employs unique sorbents capable of removing many contaminants in a single process.

Coal Gasification, CBM, Mine Fire and Ventilation

- (i) Owing to the limitations of handling low-ash coal (< 30 wt%) in all mature gasifiers worldwide, development of fluidized bed gasification technology is desirable for judicious utilization of high-ash Indian coal and agro-industry biomass waste and to strengthen Methanol and Hydrogen Economy and Net Zero Emission;
- (ii) Refracturing of CBM wells in a cost-effective manner with optimum job design help to create a wider fracture as a stimulation technique to increase the production from such wells;
- (iii) Installation of a double booster fan could be implemented in a way that ventilation of upper seam goaved-out areas and sealed-off fire areas remain unaffected. Application of double booster fans in deep underground coal mines could help practicing ventilation engineers;
- (iv) Risks to machinery, output, and personnel can all be mitigated with good mining environment analysis. Active fire has always been a problem for mining engineers. An accurate forecast system is desirable to reduce the danger of unexpected coal fires;
- (v) Data from various sensors for temperature and gas, when analyzed by AI/ML algorithms can serve as harbingers of spontaneous combustion of coal and thus increasing much-needed production of coal in a sustainable manner;
- (vi) Spontaneous combustion problem, particularly in underground coal mines, could create several mining complications on productivity and mine safety, which leads to a huge economic burden to the nation. To overcome this menace, early detection and dealing of spontaneous heating/fire is foremost important to manage spontaneous combustion in early stage.

Rock mechanics and ground control

- (i) Other than grouted type of rock bolts, such as resin or cement encapsulated bolts, friction type of bolts are also becoming popular in mining and other underground structures. A split-set friction bolt is one such rock reinforcement. A developed numerical modelling methodology has been used to find out the pull-out load for various lengths and diameter of the split-set. Results have shown that the pull-out load increases linearly with increase in length and curvilinearly with increase in diameter of the bolt. Hence, split-set bolt can be used for support of underground openings;
- (ii) In underground coal mines design of a larger and competent pillar does not alleviate the issue of spalling/slabbing as it is largely affected by the status of overlying strata in the goaf/void than its size. Numerical simulations and empirical studies indicate that during pillar extraction using Continuous Miner technology, strength of coal, nature of roof, depth of cover, poor caveability of strata and induced stress due to large overhang of strata in the goaf are the major factors affecting side spalling of pillar;
- (iii) Dimension stones have been exploited in almost all parts of the world for millennia. Presently, stricter legislation has sometimes limited opencast quarrying with the result that, under favourable geological conditions, underground mining is adopted. In India, a underground marble mine has been designed proposing chambers and pillars method based on rock mechanics studies and numerical modelling. Similar approach can be adopted for underground mining of dimension stones;
- (iv) In-situ horizontal stress orientation plays a significant role in the stability of roof of galleries including bords, trunk roadways and gate roadways in underground coal mines. Higher obliquity between the major horizontal stress direction and the gallery drivage direction may cause cutter roof failure. With increase in mining depths, detrimental effects of high horizontal stress and its orientation assumes greater significance. Orientation of galleries, especially that of trunk roadways, and their support system should ideally be designed by considering magnitude and direction of in-situ major horizontal stress;
- (v) 3D models using discrete element modelling method can be applied to investigate optimum but stable size of pillars in highwall mining panel below jointed overburden. This can help to determine optimum size of web pillar, barrier pillar and openings so that recovery of coal can be increased without sacrificing safety and stability of structure;
- (vi) Design and analysis of Over Burden (OB) dumps play a vital role in safety and productivity in opencast mines. An extensive numerical modelling study conducted to understand stability of single bench OB dumps and double bench OB dumps in presence of Black Cotton (BC) soil revealed that the BC soil has a significant effect on the stability of OB dumps. In overall, the Factor of Safety of the OB dumps decreases with increased BC soil thickness and it is proposed to design the OB dumps in a composed number of slope OB dumps rather than single bench OB dumps. With OB dump over BC soil, it is observed that the increased bench width of BC soil improves stability of dumps.



Previous Asian Mining Congresses (AMC) & International Mining Exhibitions (IME)

The **1st AMC** was organized in **2006** as the culminating function of year-long eventful centenary programmes. It was inaugurated on **16th January 2006**, the **101st foundation day of MGMI**. Concurrently, **IME 2006** was also arranged. Since then, the subsequent AMCs and IMEs are being held biennially. The salient features of the AMCs are listed below.

1st Asian Mining Congress & IME 2006

Theme : **Asian Mining – Towards a New Resurgence**
Dates : 16th - 18th January 2006
Venue of AMC : Hotel The Oberoi Grand, Kolkata
Venue of IME : Netaji Indoor Stadium, Kolkata

Inaugurated by

Dr. Desari Narayan Rao, Hon'ble Minister of Coal & Mines, Govt of India, Chief Guest

Papers presented – 84

Foreign Participation from – China, Iran, Mongolia, Nepal, Oman, Pakistan, Russia, Thailand, Turkey, Australia, Germany, South Africa, Sweden, UK, USA

2nd Asian Mining Congress & IME 2008

Theme : **Mineral Resources in Asian Countries: Innovative Solutions for Exploitation**
Dates : 16th - 19th January 2008
Venue of AMC : Hotel The Oberoi Grand, Kolkata
Venue of IME : Netaji Indoor Stadium, Kolkata

Inaugurated by

Shri H. C. Gupta, Secretary, Ministry of Coal, Govt of India, Chief Guest

Papers presented – 73

Foreign Participation from – China (partner country), USA (focus country), Australia, Belarus, Canada, Germany, Iran, Japan, Poland, Russia, Sweden, UK

3rd Asian Mining Congress & IME 2010

Theme : **Resurgence of Mining in Asia: Prospects & Challenges**
Dates : 22nd - 25th January 2010
Venue of AMC : Hotel Taj Bengal, Kolkata
Venue of IME : Netaji Indoor Stadium, Kolkata

Inaugurated by

Mr. Sriprakash Jaiswal, Hon'ble Minister of State for Coal and Statistics & Programme Implementation, Govt of India, Chief Guest

Papers presented – 73

Foreign Participation from – China, Iran, Pakistan, Russia, Australia, Germany, Netherlands, Poland, Switzerland, UK, USA

4th Asian Mining Congress & IME 2012

Theme : **Sustainable Mining in Asia - Challenges and Opportunities**
Dates : 29th – 31st January 2012
Venue of AMC : Hotel Hyatt Regency, Kolkata
Venue of IME : Salt Lake Stadium, Kolkata

Inaugurated by

Mr. NC Jha, Chairman, Coal India Ltd, Chief Guest

Papers presented – 50

Foreign Participation from – USA (partner country), Australia (focus country), Austria, Belarus, Belgium, Canada, China, Czech Republic, Denmark, France, Germany, Indonesia, Iran, Italy, Japan, Norway, Poland, Russia, South Africa, South Korea, Spain, Sweden, Switzerland, Turkey, Ukraine, UAE, UK

The 5th Asian Mining Congress & IME 2014

Theme : **Scenario of Mining in Asia and Investment Opportunities**
Dates : 13th – 16th February 2014
Venue of AMC : Hotel Hyatt Regency, Kolkata
Venue of IME : Salt Lake Stadium, Kolkata

Inaugurated by

Mr. Shriprakash Jaiswal, Hon'ble Minister of Coal, Govt of India, Chief Guest

Guests of Honour

Ms. Katarzyna Kacperczyk, Hon'ble Dy. Min., Foreign Affairs, Republic of Poland

Dr. Jerzy Witold Pietrewicz, Hon'ble Dy. Min. of Economy, Republic of Poland

Prof Piotr Klodkowski, His Excellency Ambassador, Republic of Poland
Dr. A.K. Dubey, IAS, Addl. Secretary, Ministry of Coal, GOI
Mr. S. Narsing Rao, IAS, Chairman, Coal India Limited
Papers presented – 53

Foreign Participation from – Poland (partner country), Czech Republic (focus country), China, Germany, USA, Iran, Australia, Egypt, Ethiopia, Singapore, Ukraine

The 6th Asian Mining Congress & IME 2016

Theme : **Resurgence of Mineral Industry in Asia**
Dates : 23rd – 27th February 2016
Venue of AMC : Hotel Hyatt Regency, Kolkata
Venue of IME : Eco Park, Rajarhat, Kolkata

Inaugurated by

Mr. Anil Swarup, IAS, Secretary, Ministry of Coal, Govt of India, Chief Guest

Guests of Honour

Mr. Sutirtha Bhattacharya, Chairman, Coal India Limited

Mr. Radoslaw Domagalski Labedzki, Hon'ble Deputy Minister of Development, Republic of Poland

Mr. Tim Martin, Trade Commissioner, Australian High Commission

Papers presented – 66

Foreign Participation from – Australia, Belarus, Belgium, China, Czech Republic, Finland, Germany, Indonesia, Iran, Israel, Italy, Japan, Poland, Russia, South Africa, Spain, Sweden, Switzerland, USA, United Kingdom.

7th Asian Mining Congress & IME 2017

Theme : **International Cooperation in Innovative Technology for Growth of Mineral Industry**
Date : 8th to 10th November, 2017
Venue of AMC : The Hotel, Westin Kolkata Rajarhat
Venue of IME : Eco Park, Rajarhat, Kolkata

Inaugurated by

Mr. Susheel Kumar, IAS, Secretary, Ministry of Coal, Govt. of India, Chief Guest

Guests of Honour

HE Milan Hovorka, Ambassador, Embassy of Czech Republic

Mr Gopal Singh, Chairman, Coal India Ltd

Papers presented – 55

Foreign Participation from – Australia, China, Czech Republic, Germany, Iran, Japan, USA.

8th Asian Mining Congress & IME 2019

Theme : **Green Mining : The Way Forward**
Date : 6th to 9th November, 2019
Venue of AMC : The Hotel Westin, Rajarhat, Kolkata
Venue of IME : Eco Park, Rajarhat, Kolkata

Inaugurated by

Shri Pralhad Joshi, Hon'ble Minister of Coal, Mines & Parliamentary Affairs, Govt. of India, Chief Guest

Guests of Honour

Mr Andrew Ford, Australian Consul General

HE Mr Milan Hovorka, Ambassador, Embassy of Czech Republic

Papers presented - 53

Foreign participation from - Australia, China, Czech Republic, Poland, Russia, South Africa, UK, USA

9th Asian Mining Congress & IME 2019

Theme : **Ensuring sustainable and equitable use of resources without degrading the environment**
Date : 4th to 7th April, 2022
Venue of AMC : Biswa Bangla Convention Centre Eco Park Newtown, Kolkata (WB)
Venue of IME : Eco Park, Rajarhat, Kolkata

Inaugurated by

Dr Anil Kumar Jain, (IAS Secretary, Ministry of Coal, Govt. of India,)

Guests of Honour

Shri M. Nagaraju, IAS, Additional Secretary, Ministry of Coal, Government of India

Shri Pramod Agarwal, IAS and Chairman, Coal India Limited

Papers presented - 52

Foreign participation from – Norway, United States of America



International Mining Exhibition (IME 2023)

The 10th edition of “IME 2023 – the Premier International Exhibition for Mining, Equipment & Minerals” held during November 6-9, 2023 at Eco Park, Kolkata, was the largest ever and brought buyers, manufacturers and visitors from 20 Countries. The Event which was spread over 42, 000 square meters, had participation from 447 International and domestic Exhibitors and 25, 430 trade visitors.

IME is a prestigious institutionalised biennial International Exhibition held concurrent to the Asian Mining Congress (AMC), organised by TAFCON and MGMI respectively.

The Exhibition was inaugurated by Chief Guest Shri Amrit Lal Meena, Secretary, Ministry of Coal, and Government of India on November 6, 2023 in the presence of Guests of Honour Smt. (Mrs.) Rowan Ainsworth, Consul General, Australian Consulate Kolkata, Shri P.M. Prasad, CMD, Coal India Ltd... The other eminent dignitaries present on the occasion were Dr. B. Veera Reddy, President MGMI & Director (T), Coal India Ltd.; Shri Shantanu Roy, CMD, BEML; Shri M. Prasanna Kumar, CMD, NLC India Ltd., Shri Bhola Singh CMD, Northern Coalfields Ltd.; Shri Rajesh Nath, MD, VDMA.



IME 2023, had the most impressive outdoor machinery display, apart from multiple halls which showcased the latest new equipment's and innovative technologies, leading to four very busy and eventful days of high level networking and exploration of new opportunities by the participants – exhibitors and visitors alike.



High level Trade Delegations and Country Level Group Participation from Germany (Partner Country), Australia (Focus Country), Czech Republic, Poland and many other countries like Russia, Iran, Tehran, Turkey, UK, USA were a part of this important event, along with large participation from mineral rich states of India such as Gujarat (Partner State) & Jharkhand (Focus State) & West Bengal.

Some of the other highlights of IME 2023 –1) “Buyer Seller Meet” which has become a well awaited and looked forward to programme by the attendees. Presentations were given by Coal India Ltd. NLC India, SCCL, Tata Steel Ltd. 2) Introduction of “ISME - Steel and Metallurgy Exhibition” as a part of IME. 3) A one day high level conference (including CEO's session) on Steel with the theme “Minimising Carbon footprint in the Steel Industry” along with “Grant Thornton – Bharat” as the knowledge partner.

IME has a strong allegiance from the mining industry, naming some of the major sponsors / participants - JMS Mining, BKT Tires, Maha Hydraulics, SANY Heavy, MOIL Ltd., Northern Coalfields Ltd., Primus Sam, IOCL, Continental Conveyors alongwith some of key players participating namely; Andritz; Austrade; BEML; Beumer; Carboundum Universal; Caterpillar; Czech Extraction And Mining Technology / Ministry of Industry & Trade Czech Republic; Coal India; Directorate of Industries, Government of Jharkhand; GMDC; GSI; Joy Global; Jindal Steel & Power; Komatsu; L&T; Liebherr; Maco; Marine Electricals; Mecon; MOIL; Netzsch; NMDC; Orbinox; Premium Transmission; Ravasco; Revathi; Shanthi Gears; SRB Group; NLC India; NTPC; Tata Hitachi; Tata Steel; Thejo Engineering; Thermofisher; Thyssenkrupp; Trade And Investment Queensland; VDMA; Voltas; WBMDTCL, WBPDC, etc.

The exhibition had 447 exhibitors, 94 from 20 foreign countries and 353 from India. There were 25, 430 visitors during the four days. IME 2023, the 10th Edition was an unprecedented success as also by the remarks and comments given by VIPs, Delegates, Exhibitors and Visitors et all.





SPONSOR

PRINCIPAL



Coal India Limited
A Maharatna Company

PLATINUM



GOLD



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्यम)
Oil India Limited
(A Government of India Enterprise)

DELEGATE KIT



CCL

DINNER



MCL



LUNCH



SECL

South Eastern Coalfields Ltd.

ASSOCIATE

TATA STEEL
WeAlsoMakeTomorrow



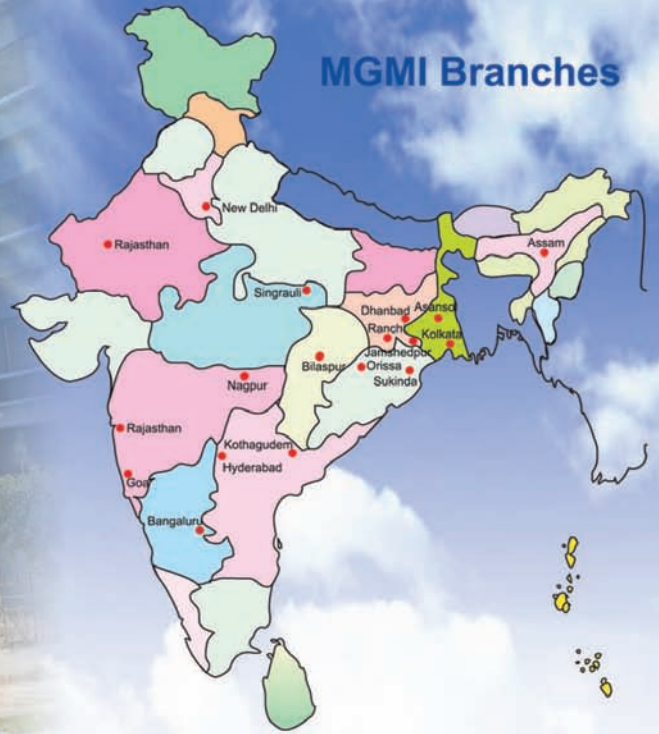
HI TEA



cmpdi
A Mini Ratna Company



EGL
Eastern Coalfields Limited



MGMI Members

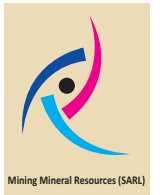
Corporate



Life Corporate



Patron



Donor

Address for Communication :



THE MINING, GEOLOGICAL & METALLURGICAL INSTITUTE OF INDIA (MGMI)

GN – 38/4, Salt Lake, Sector – V, Kolkata – 700 091, INDIA

T +91 33 2357 3482

W www.mgmiindia.in

E office@mgmiindia.in / secretary@mgmiindia.in / mgmisesecretary@gmail.com