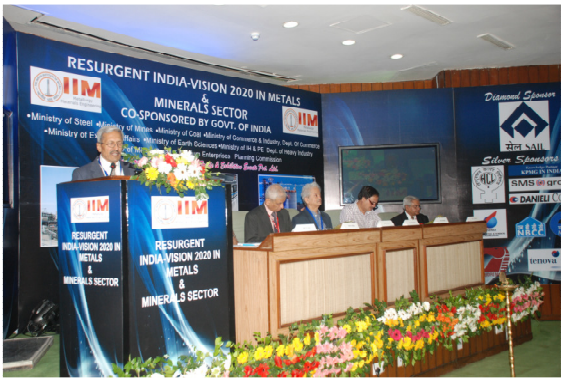
MMMM 2012 - A SUMMARY

The Conference "**Resurgent India-Vision 2020 in Metals and Minerals Sector**" was organized to deliberate on the present status and vision for 2020 in the Minerals & Metals Sector. The Conference consisted of 10 technical sessions.



Two plenary sessions were on the aluminum, uranium/thorium and raw materials for iron and steel industry and raw material beneficiation aspects. These two sessions covered raw material security aspects and technological strategies for steel sector and special steels for strategic applications.

Two sessions were devoted to mining and two sessions to business scenario for ferrous and non-ferrous metals industry. There were two sessions on current and futuristic metals and minerals technologies, one session on new material development and applications and one session on energy and environment.

51 papers of international standards, out of which 40 were from doyens of industry, were presented in the *International Conference*. Over 200 delegates from Indian and overseas companies participated in the Conference deliberations. Date-wise salient points of the *International Conference* are as under:

28th Sept 2012

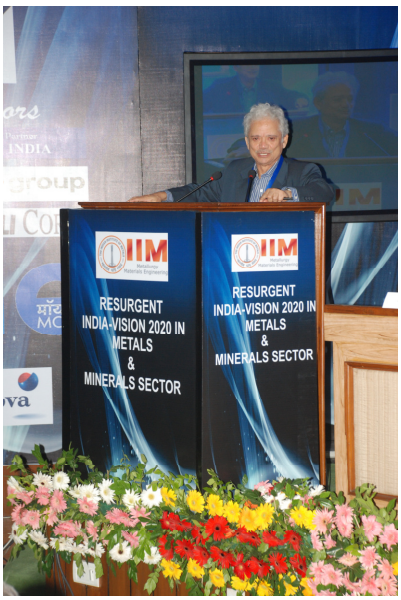
Inaugural Session

Shri Anil Gupta, Chairman, IIM DC welcomed the delegates participating in the Conference. He also briefed the delegates about the activities of the Chapter.

Shri S C Suri, Chairman, Technical Committee, IIM DC gave an overview of the Technical Conference.

Shri K V Rajan, Managing Director, ITEE spoke about the Exhibition details.

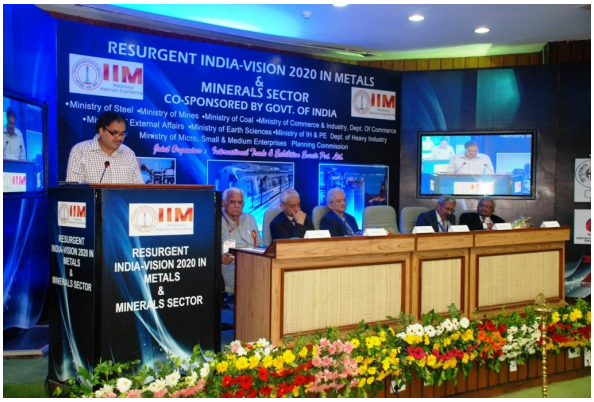
The keynote address was delivered by **Dr. S.K. Gupta (Former CMD, MECON and Director, JSW Steels)**. He discussed the current status of the iron and steel sector in India as compared to China and the effect of the present political scenario. He outlined two basic elements of growth of Iron & steel sector namely Raw Materials and Technology. He mentioned that presently, there is no definite methodology of selecting/adopting new technologies for iron and steel for making or high-risk investments that need to go to support new technologies. India requires concerted efforts for the large scale growth at a faster pace in the iron and steel sector. This is required to meet the growing requirements of the country and increase production capacity of 89 MTPA to ~200 MTPA by 2020. But lot more needs to be done to explore, develop and commit raw material resources for such projections of growth.



He also advocated serious view at national level on putting up large scale port based steel plants. He analyzed it as inevitable & sustainable in the long run as much of raw materials may have to be imported as well as to reduce disturbance to natural habitat including forests and water resources, as they require huge land and water for power plants and associated steel making.

The Inaugural Address has delivered by Dr. Dalip Singh, Jt. Secretary, Department of Steel. He dwelt upon the growth plans of India Steel Industry and also reviewed the details of the Process Routes for creation of enhanced steel capacity. He also informed that Department of Steel would welcome R&D proposals to cover the different facets of Iron and Steel production.

Plenary Sessions



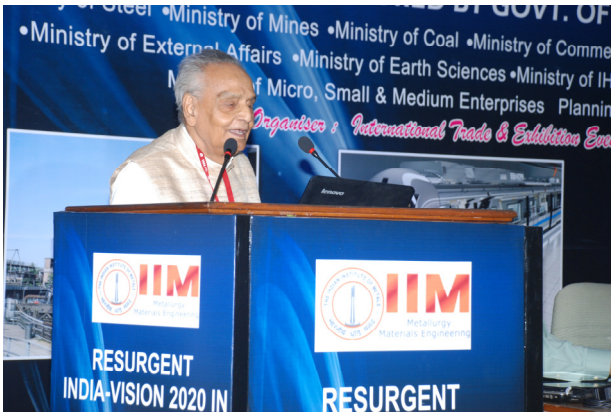
In the first plenary session, **Mr. R.N. Parbat (Past president-IIM)** delivered a talk on "*India's position in international aluminum arena*". He projected that by 2020, Indian aluminum output is likely to reach 5 MT compared to the present level of 2 MT. He made some very specific suggestions w.r.t. raw materials for aluminium industry. Indian east-coast bauxite should be converted to low cost alumina and aluminum. This should be done close to the mining sites. Facilities should be set up near the ports to facilitate cost effective export to the world market. He emphasized that high quality bauxite from Chattisgarh, Odisha & around be made available to Aluminum producer while that from Gujarat should be used only for refractories. He mentioned several applications of aluminum in automobiles and general engineering purposes.

Mr. P.C. Gupta (Ex CMD NMDC) talked on "*Raw material security aspects for Indian iron and steel industry*". He addressed the security of raw materials as an important aspect for the growth of iron and steel industry in India. He stressed that the government should frame policies, such as formulation of a Steel Mission be set-up for faster decisions. He also suggested setting up ultra-mega steel plants on the lines of Ultra High Power Plant to give benefits of economies of scale and forming an Iron and Steel Utilization Policy. He also informed about the quality issues of raw material and need for R&D initiatives required.

Mr. G.P. Kundargi, Director (Planning & Production) MOIL delivered presentation on "*Raw materials - manganese ore for Ferro Manganese and other Ferro Alloys for steel production*". He stressed that domestic Mn-ore production should be increased to fully meet the present demand. Focused attention is needed to ensure higher recovery of Mn and improved quality of ores by engaging beneficiation and sintering processes.

Mr. Indu Bhushan Jha (Tenova-Bateman India) made his presentation on "*Beneficiating low grade iron ore in India*". He reviewed the requirement and possible options available for beneficiation of low grade iron ores in India (in view of the present GOI norms of strict use of >45% Fe ore reserves compared to the earlier norms of using >55% Fe ores). He discussed about the various techniques for beneficiation of low grade iron ores by technologies such as, gravity separation, magnetic separation and flotation, which have become techno-economically attractive even in India.

Mr. P.S. Parihar (Deptt. of Atomic energy) delivered talk on "*Uranium and Thorium exploration in India*". He discussed the strategy of exploration of uranium and thorium in India. He discussed about pressurized heavy water reactor (PHWR) technique for uranium exploration in major uranium provinces in India. He reviewed the future exploration strategy for deep seated high grade deposits. He also discussed a three stage program for the exploration of thorium in India.



The second Plenary Session was focused on the present status of Indian steel industry and its growth potential. **Dr. G. Mukherjee (Ex-Vice Chairman SAIL)** shared his experiences in the Indian steel industry. Dr. Mukherjee stressed the need for enhancing the equipment manufacturing facilities for steel plant equipment and role of this capability in meeting the growth plans from present 75MTPA to 200 MTPA.

Mr. M. Narayana Rao (CMD MIDHANI & Past President IIM) talked on "*Technology Strategy for Growth of Special Steels & Alloys Sector in India*". He shared his experiences about the current status of production of Special Steels & Alloys in the country. He reviewed the importance of cladded steels, duplex steels and other special grade steels for various strategic applications. He mentioned that India is an innovating country and it has large growth potential in the special steel sector for various strategic applications.

Mr. Y.S. Kapadia (Ex-MD Lurgi India and Ex-GM Tata Steel) delivered presentation on "*New technologies in process development and their relevance to Indian steel industry*". He discussed the problems of poor quality of raw materials in the Indian steel sector. He mentioned about the new technologies and futuristic processes of secondary steel metallurgy for the steel production, such as Energiron process, Corex/Finmet, futuristic concepts of electric arc furnace (EAF), CAS/OB process, etc. These processes can have sustainable development and expansion by the year 2020. He explained about the automation in the above processes, such as online monitoring and control of melting and stirring processes, optimization of process parameters, etc. The aim of these processes and improvements is to develop lighter and stronger steels targeting 35% weight reduction and the emission reduction by the development of 20 new grades of steel by 2020.

Mr. N.C. Mathur (Jindal Stainless Steel, New Delhi) presented his talk on "*Growth potential for Stainless Steel Industry in India*". He stated that India is a high growth economy with increasing stainless steel consumption. He talked about the various growth areas, like architecture, building & construction, automobiles and railways, etc. However, the challenges ahead are the inadequate Indian infrastructures. With all these challenges, the Stainless Steel production is expected to grow up to 3.5 MTPA by 2015.

Technical Sessions on Mining Sector

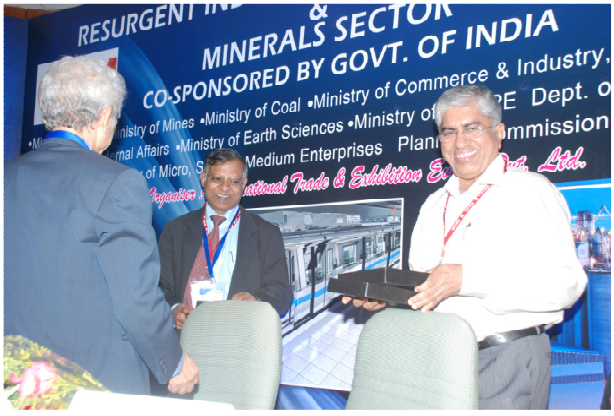
There were two sessions in the Mining sector. In the first mining session, invited experts from KPMG, SAIL and ESSAR discussed about the present scenario in this sector and the growing potential that exist in this key sector.

Mr. Harmeet Katari (Associate Director-KPMG) delivered presentation on "*Improving mining efficiency through mechanization, automation and continuous improvement*". He presented brief introduction about KPMG, the opportunities in operation excellence in Mining through continuous improvement, modernization and automation. He mentioned that the Indian mining industry needs to start its journey towards mechanization and automation as the other countries are progressing very fast.

Mr. Sanjay Garg (Partner, Governance risk and compliance services, KPMG) delivered presentation on "*Managing project risks in metals and mining sector in India*". He discussed that successful implementation of Metals and Mining projects requires addressing challenges through (i) robust project management processes implemented by a competent team, (ii) project-oriented financial and operating controls and, (iii) a reporting framework that guides timely and accurate decision making.

Mr. Santosh Jayaram (Technical Director, KPMG) delivered a presentation on "*Sustainability practices in mining –globally and in India*". In this presentation, he discussed about the sustainability aspects of mining globally (e.g., adopted by Rio Tinto) and in India.

Mr. A.K. Pandey (Director-RM & logistics) SAIL talked on "*Current challenges in raw material scenario for Indian steel industry*" He discussed the current challenges in raw materials scene for the Indian steel industry. He mentioned about the challenges faced by the industry during the last decade, like obsolescence of technology, high capital costs, high cost of basic inputs, environmental issues and competition in global markets. The Government of India has taken initiatives addressing various issues being faced by industry and has intervened to support the industry to meet the growing demand of steel in the country.

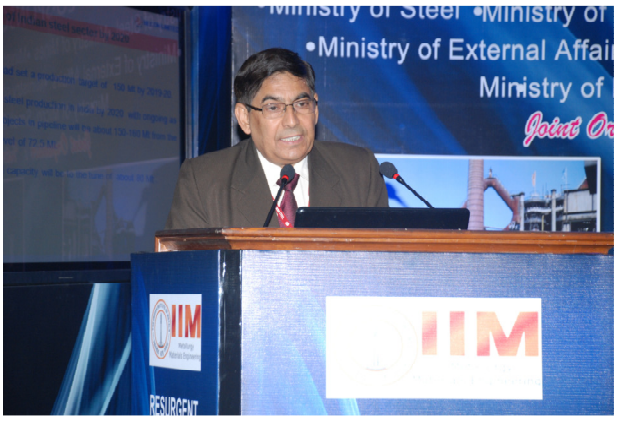


Mr. Ramesh Babu (VP, Essar Engg. Services) delivered a presentation on "*Utilization of iron ore fines/pellets in iron making*". He highlighted various steps and processes involved in low grade iron ore fines beneficiation process. He strongly advocated for the transportation of iron ore as slurry through pipelines to port based pellet plant for the production of different grades of pellets for economical iron making through Blast Furnace or Direct Reduction routes. He also discussed various concerns to be addressed by the concerned associations/government, to encourage usage of low grade iron ore fines for the iron making.

29th Sept 2012

Mining Session – II

The second session on mining was focused on challenges in the Indian scenario on mining & utilization of lower grade iron ore and coals, Government Policies and the importance of sustainable mining in the country. **Mr. K.K. Mehrotra (CMD, MECON)** delivered talk on "*Challenges for India-resources and technology*". He enumerated the challenges ahead in India for the mining resources and the available technologies to meet these challenges. He reiterated the India's vision of achieving the steel production capacity of 150-200 MTPA by 2020. To achieve this target, public and private sectors have decided to expand the existing capacities or setting-up new steel plants at green field locations. He discussed about the several greenfield steel plants being set-up by the steel giants, like, SAIL, NMDC, POSCO, Arcellor Mittal, TATA, Jindal group and Bhushan group in different states of the country. It was highlighted that the companies in the private sector, such as, TATA, Jindal, and Bhushan have planned to set-up new technologies for the steel production that will help India to take-up the challenges of scarcity of land, water, raw materials and to bring down the energy consumption.

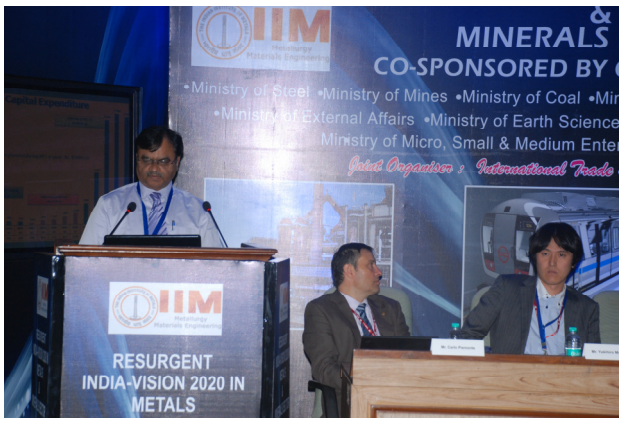


Mr. H. J. Hussain (Rio Tinto) talked on "*Importance of sustainable mining*". He discussed about the sustainable mining in the Indian scenario. He mentioned about the challenges being faced by the big miners, since lot of people get displaced due to the land acquisition. The use of different forest and agricultural lands that causes erosions, sediment in a channel, deforestation, desertification, flattening of mountains, etc are the other challenges ahead for the sustainable mining. The other important aspects to be considered for the sustainable mining are the concerns towards the increased environmental pollution of air, water and lands that will affect the local community and the globe as well, threaten the livelihood of the local residents due to their displacements, etc.

Mr. N. N. Bhattacharjee (Director, KPMG) delivered presentation on "*Utilization of lower grade iron ore and coals*". He addressed the unprecedented external challenges the mining companies have been facing presently. These are deterioration of the reserve quality over the years, difficulties in the land acquisition for mining, enhancing energy cost every year, etc. For the sustainable mining performance, three aspects of efficiency improvement have emerged over the last few years that are: (i) increased mechanization, innovative equipment design, continuous operation instead of the batch operation, etc (ii) improved information and communication technology, e.g., remote operations, autonomous mining and non-invasive mineralogy, (iii) continuous improvement in the operations by the involvement of large and uniquely skilled workforce and creating a generation of multifaceted leaders. These aspects need to be considered for the sustainable mining in the country.

Mr. Nabin Ballodia (Partner, Tax & regulatory services KPMG) talked on "*Need for Fiscal and legislative support to provide growth impetus to the mineral value chain in India*". He discussed that a favorable tax and regulatory environment is key to the growth of any sector, e.g., the iron and steel sector. Although several steps have been taken in this direction by the Indian Government by liberalizing the foreign investment in mining sector, some fiscal incentives such as, liberalization of fiscal regime, higher depreciation for heavy mining equipment, etc are necessary for the sustainable growth of the industry.

Sessions on Business Scenario – Ferrous and Non Ferrous Metal Industry



The first session on **Business Scenario-Ferrous & non Ferrous Metal Industry** included six presentations. **Mr. S. S. Mohanty (Director-Tech. SAIL)** talked on "*Development and production strategies of SAIL steel plant in the 12th Plan period*". He discussed the global steel outlook and Indian perspectives in this area with emphasis on the SAIL's strategies. With the present growth rate of 9.7% per annum the steel production capacity of the country will be 130 MT by 2016-17. To achieve

this target, the steel plants are being modernized and mechanized. SAIL with the annual turnover of Rs. 50000 crores has major production from the integrated steel plants. SAIL has been increasing its finished steel products capacity and decreasing semi-finished products. SAIL is not only expanding by modernization in automation for competitiveness and sustainable development but also in energy efficient technologies. This includes increasing the LD steelmaking capacity and emphasizing on the continuous casting of steel. He also mentioned that the R&D plans of SAIL are being given extensive attention to meet the future challenges of quality requirements of the final steel products.

R. Y. Matsuoka (Nippon Steel Engg. Co. Ltd.) talked on "*High Grade Bloom Continuous Casting Technology by Nippon steel engineering*". He highlighted NS-ENG as one of the major supplier of bloom continuous casters for the special steels. The company has ambitious plans on the production of high quality blooms/slabs through product development based on the customer's need, provision of reliable products and continuous after care during the operation of relevant equipment.

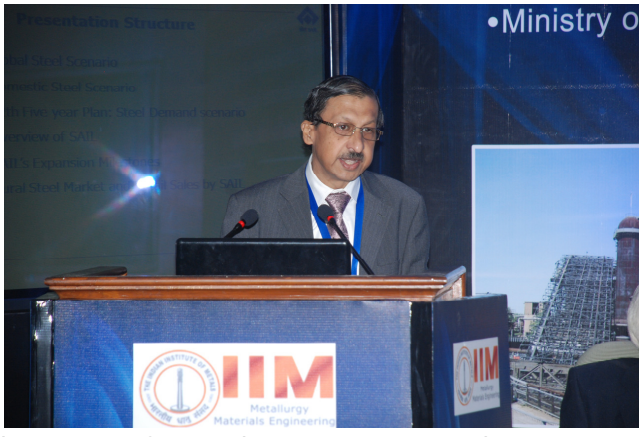
Mr. Sushim Banerjee (Director General, Institute of Steel Development and Growth) made a presentation on "*Growth and Development Scenario for the Indian steel industry*". He reiterated that India being the 4th largest producer of crude steel in the world and has ambitious growth plans for the steel production till 2020. He compared the Indian growth rate of steel with China and other countries in the world and highlighted the factors hindering the growth plans of India in this sector. He also talked about the present management policies and future strategies of SAIL on the raw materials, process technology, infrastructure, energy requirements, etc to find out solutions for the existing challenges ahead and to meet the targeted plans till 2020.

Mr. Zhiheng Tian (Ramon Science & Technology Co. China) talked on "*Development and application of mould non-sinusoidal oscillation system*". The non-sinusoidal oscillation mould system, independently developed by Ramon Cooperation is an innovative product that uses advanced and mature computer technology and high-power digital servo actuator. The speaker discussed the features of the system, principle and characteristics of the above product.

Mr. Michele Turchetto (Denieli Wean United) made a presentation on "*Denieli cold mill complex turboflo-pickling coupled to a 6 high tendom mill for automotive applications*". The above technology includes a patented technology for the hot rolling process (supplied by the Arvedi group in Europe) that produces thin and ultra-thin gauge sheet. Danieli, developed an innovative facility capable of handling hot rolled material from 0.6 to 3 mm to be reduced by and up to 70% in thickness. The author made a presentation on the technological aspects of the above product.

Mr. Carlo Piemonte (Denieli Wean United) made a presentation on "*Denieli contributions to the development of thin slabs casting and rolling process-from "first generation"* plants to the recent "world record breaking" applications. He highlighted that since its first pioneering applications on the rolling and slab castings, Danieli developed its own original design and technology strongly diversified from other available solutions on the market that allowed Danieli plants to largely overcome the original "first generation plants" limitations. The speaker discussed this progressive evolution through the outstanding results reached by Danieli reference plants, the different available solutions that can be adopted according to specific market needs as well as an outlook to future expansion already conceivable.

The second session on **Business Scenario-Ferrous & Non Ferrous Metal Industry** included five presentations. **Mr. Shuman Mukherjee (Director Commercial-SAIL)** talked on "*Development and growth scenario for the steel industry in India*". He discussed the global and domestic steel scenario and gave an overview of SAIL's present capabilities and future plans. He mentioned that in spite of the global slowdown, SAIL has registered a growth rate of 6.6% during the last financial year, which is promising and has good future prospects.



Mr. J.C. Marwah (Secretary General-The Indian Institute of Metals) presented his talk on "*100 years of metallurgy*". The presentation gave a bird's eye view of the discoveries and the developments that have taken place over a period of 100 years. The speaker discussed about the discovery of Periodic Systems, Developments in

technology and processes, Environmental concerns and the future prospects of the Metals and the Materials.

Mr. Mukesh Kumar (MECON) made a presentation on "*Emerging challenges for rapid expansion of the Indian steel industry*". This presentation was an investigation conducted to identify and assess the extent of challenges with regard to the steel industry's internal and external infrastructure and what needs be done to meet the challenges. The study indicated that there is likely to be scarcity with respect to the entire internal and external infrastructure required for steel making. This is going to seriously create constraints in the process of the desired rapid expansion of Indian steel industry. However, this problem can be mitigated through well designed strategic planning combining the diverse objectives of several government ministries, agencies etc.

Ms. Sushmita Dasgupta (Joint Plant Committee) delivered a talk on "*Growth plans of Indian steel industry and the challenges*". The presentation was focused on the investment opportunities in the Indian steel industry by the year 2020. She discussed the challenges ahead of the steel industry. Among them the real challenge will lie in the environment and community issue that will decide the organization of steel producing facilities. Other issues would be the choice of technology, the pattern of technology import, etc. The speaker suggested that the appearance of the steel industry in 2020 is likely to undergo several changes in a bid to address issues of environment and natural resources.

Mr. Davide Masoero (Tenova) talked on "*Steel Technologies: Tenova innovative approach for energy saving and environmental friendship in the melt shop*". This presentation focused on highlighting the Tenova's basket of technologies aimed at taking a holistic approach for dynamic process control and optimization for steelmaking operation along with process developments aimed at meeting the challenges faced by today's steelmaker. These challenges are the reduced conversion costs and reduced environmental impact.

Sessions on Current and Futuristic Metals and Materials Technologies

The first session on **"Current and Futuristic Metals and Materials technologies"** comprised of five presentations. **Mr. Jyunpei Kikuta (Nippon Steel Engg. Co.)** made a presentation on "*Rotary hearth furnace process for steel dust recycling and iron making*". The speaker mentioned Nippon Steel Corporation and Nippon Steel Engineering Corporation have developed and commercialized rotary hearth furnace (RHF) as effective treatment equipment for making dust and sludge discharged from the steel mills recyclable. The RHF is equipment that reduces steel making duct and sludge containing impurities, such as, Zn, Pb, K, Na, etc at high temperatures to produce recyclable DRI and zinc. The presentation was focused on the characteristics of the RHF process and the possibility of using the RHF as an Iron making process.

Mr. Wang Li (Sinosteel Equipment & Engineering Co. Ltd.) delivered a presentation on "*Development of ore dressing technology for low grade complex and refractory iron ores in China*". He addressed that steel industry plays a vital role in the national economy and the high efficiency utilization of iron ore resources is an arduous task. The domestic institutions universities as well as the mining enterprises in China have made great efforts over the recent period and there are many achievements in the ore-dressing technology for iron ores.

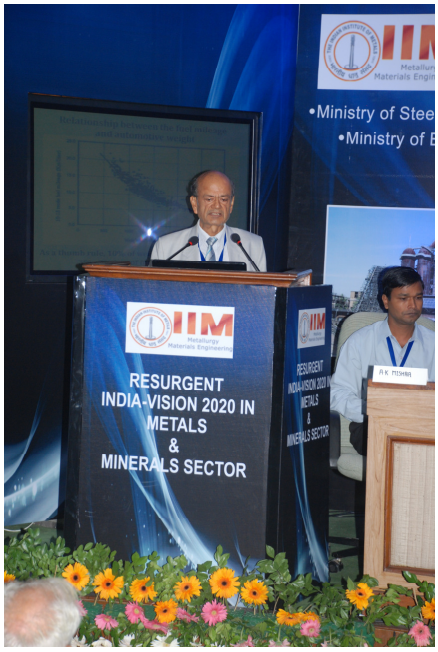
Mr. Ryo Yamamoto (Nippon Steel Engg. Co.) talked on "*Electrolytic tinning line revamping of conversion to advanced insoluble anode system*". The speaker addresses that PT Latinusa is the only tinplate producer in Indonesia. It conducted a major revamping project in 2011 that is expected to increase the Latinusa's capacity of production from 130,000 tons to 160,000 tonnes per annum. This project will enable the convergence of the electrolyte tinning system from a soluble to insoluble anode system and the addition of the induction heating reflow system. This Latinusa's electrolytic thinning line revamping project proves the insoluble anode system as an essential and vital for revamping projects.

Mr. Hiroaki Takesue (Nippon Steel Engg.Co.) presented his work on "*Desulfurisation process for coke oven gas*". The presentation was focused on the latest process (NNF) of desulfurization for coke oven gas. The speaker suggested that the NNF process is able to produce the concentrated sulfuric acid from contaminated waste water including elemental sulfur and ammonium salt. Moreover, the NNF process shows advantages both in efficiency and operating costs compared to the other wet oxidation processes or absorption/stripping processes. The speaker mentioned that in the view of initial investment and operating costs for COG (coke oven gas) desulfurization unit including the sulphuric acid production unit, the NNF process is an ideal choice for COG desulfurization field.

On behalf of **Mr. Pablo Duarte (Tenova), Mr. Davide Masoero** delivered a presentation on "*JSPL DR projects: a practical example of the flexibility of Energion DR technology for using any energy source with the same ZR scheme*". Based on the Energion ZR technology, Tenova and Denieli have taken up a project for Jindal Steel & Power Ltd. In India for a DRP of 2.5 MTPA capacity of hot and cold DRI production. The speaker focused on the features of the above process that will be implemented for the JSPL project and that makes the Energiron ZR technology the most flexible, efficient and environmental friendly.

The second session on **"Current and Futuristic Metals and Materials technologies"** comprised seven presentations. **Mr. R. Kulshreshtha (ED I/C-Corporate Planning-SAIL)** delivered presentation on "*SAIL Strategy 2020*". He presented current plans of SAIL to meet the growing requirements of steel in the country with the aim of achieving planned targets by 2020 and also to stay ahead in the steel business in terms of product quality, production capacity and cost aspects. The proportion of the value added product has to go up from 39% to 55% of the saleable steel post completion of the ongoing modernization plans of SAIL. Imported coking coal is a major component of SAIL's production cost and it has been evaluating emerging alternative iron making technologies which can utilize non-coking coal. SAIL has formed strategic alliances within India and abroad with international majors for the production of technologically advanced products. Joint ventures for power are also set-up by SAIL for achieving self-reliance in the availability of power for its own plants.

Dr. L.K. Singhal (Ex. CMD, MECON & Jindal Stainless Steel) delivered presentation on "*Trends in special steel and stainless steel applications in automotive and transport sector*". He highlighted the requirements for high strength steel (HSS) and advanced high strength steel (AHSS) for weight reduction in automotive sector. Mounting energy crisis, stringent emission law and strict safety rules have guided car manufacturers to improve strength/weight ratio of the vehicle, thereby promoting application of special steel in the car bodies. He mentioned that automotive and transport sector are making increasing use of stainless steel for weight reduction, improved aesthetics, enhanced safety, etc. The speaker discussed future trends in the transport and automobile sector with a vision for 2020 for the use of high strength special steel and stainless steel.



Mr. A.K. Mishra (MECON) delivered presentation on "*Iron ore resource base, a critical review for sustainable supply under changed scenario*". He addressed that to keep pace with the raw material (iron ore, etc) requirements for the fast growing steel industry in the country, there is urgent need to broaden the reserve base of the ores. Besides, it is important to use the low grade minerals, rejects and wastes effectively using the modern beneficiation technologies. At the same time, it is also required to conserve the large resources under low grade and sub grade ores for their future use instead of dumping them as waste. The broader aspects of possible steps to be taken to meet the above objectives were discussed in the presentation.

Ms. Liu Jia (Sinosteel Equipment and Engineering Co. Ltd.) talked on "*Hematite pallet technology research and application-chain grate-rotary kiln process*". The speaker highlighted that Sinosteel Equipment & Engineering Co., Ltd. (Sinosteel MECC) has been actively engaged in hematite pellet technology study. Several studies have been conducted on hematite in Brazil, India and China. It was addressed that with the improvement of production process and adjustment and optimization of system thermal regime, one complete set of technology and equipment using hematite as the only raw material has been formed at Sinosteel and successfully applied in industrial production.

Mr. Carsten Born (Tenova) talked on "*Heat recovery for EAFs, SAFs and walking beam furnaces-a comparison of technology and chances*". The speaker gave an overview of the parallels and differences in heat recovery technology, spotlights steam usage aspects and discussed the various approaches of waste heat power generation. The speaker observed that in several cases, a careful planning can get a project on the track to the steam turbine, still in other cases the problems remain significant, especially in small projects. For these projects, a discussion of alternative ways of power generation has shown that using the ORC turbine technology is a way that combines acceptable electrical efficiency with very easy operation.

Mr. Davide Masoero of Tenova delivered presentation on "*The value of using BOF endpoint control as an effective tool while operating with higher phosphorous hot metal*". He discussed the factors affecting phosphorous removal and reversion including the importance of understanding and controlling the slag chemistry. He also discussed the increasing need for effective carbon and temperature endpoint prediction. A carbon, temperature, phosphorous endpoint control model was developed that was verified against in-blow and turndown chemistries and used to confirm the key factors needed to control turndown phosphorous level.

Mr. Suguru Sedoyama (Nippon Steel Engg. Co.) delivered presentation on "*Modern blast furnace equipment of Nippon Steel Engineering*". He discussed some equipment recently developed by Nippon Steel Engg., such as, multi-vessel electrostatic precipitator, metallic burner type top combustion stove, chute type top charging equipment, etc. These newly developed equipments whose functions have been drastically enhanced on the basis of existing technologies with abundant actual performance have a high reliability in excellent maintainability and operational stability.

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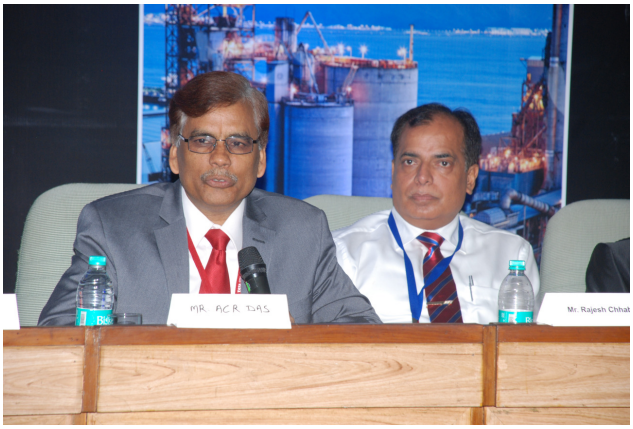


The first session on the third day was on **"New Material Development and Applications"**. There were six speakers in this session. **Dr. R.K. Iyengar (President, Technovations International Inc.)** delivered presentation on "*Knowledge Management based innovations system*". He provided a road map for innovations in the metals and minerals companies, which he suggests should be foundation for the "Resurgent India". He persuaded that under the present market situations of global competition and the extent and pace of structural changes, metals and minerals companies have to depend on their ability to innovate. With the explosion of knowledge and information, the dependence on in-house effort for innovation is no longer adequate. Collaborations amongst several knowledge workers and experts are necessary.

Dr. B.B. Agarwal (DGM I/C-TM, IPR, TDC & TPQ), SAIL RDCIS, Ranchi presented his views on "*R&D plans of SAIL in the next five years*". He said that the Indian steel industry has potential to go for a quantum jump for its production capacity from current level of around 70 MT to more than 200 MT by 2020. He discussed about R&D plans of SAIL to meet the quality requirements of its products to meet the growth demand competitively. He mentioned that RDCIS Ranchi has been undertaking projects in SAIL plants in the area of iron ore/slime beneficiation, cost reduction, quality improvement, energy saving etc. and is open to taking up projects on behalf of other private sector steel plants also.

Mr. A.S. Saini (Head-product application group, Tata Steel) delivered presentation on "*Development efforts for special steels production at Tata Steel*". He discussed that safety, increased fuel consumption and vehicular emissions are present concerns in the automobile industry and there is requirement of weight reduction by the usage of stronger and formable material for advanced vehicle applications. He talked about the plans of TATA Steel towards development of special steels to meet the above demand. He explained that TATA steel has developed special steels, such as, rephosphorised Al-killed high strength steels, bake hardening grades, etc. quite satisfactorily. He mentioned about the customer's requirement and efforts at TATA Steel to meet those requirements.

Mr. Rajesh Chhabra (SMS Meer) made presentation on "*Acting economically-growing sustainability, the ecoplants solutions from SMS Meer*". The speaker highlighted that Ecoplants is a new SMS mark for sustainable solutions, in recognition of the fact that sustainability has become a key growth factor for the growth of business due to the economic and ecological reasons. He discussed about the dedicated efforts of engineers at his company in redesigning processes to boost energy efficiency or reduce emissions. Ecoplants provides these efforts with a framework under a set of rules and makes them the highest priority for the future development of innovations.

Mr. Atul V. (SMS Siemag) delivered presentation on "*The new continuous electric arc furnace access steady EAF (S/EAF)*". He discussed about the development of electric arc furnace using a novel combination using tried-and tested components from submerged-arc-furnace (SAF) saved energy and production costs and improved productivity by upto 30%. The ARCCESS® steady EAF (S/EAF®) is a

stationary electric arc furnace that is designed for the use of DRI, HBI, hot metal and steel scrap. The novel design allows the S/EAF to operate continuously, with energy consumption reduced to the lowest level.

Dr. Rainer Tarmann (Senior Vice President, Inteco GmbH Austria) talked on "*Latest developments in Electro Slag Remelting technology*". He presented INTECO special steel melting technologies that have been developed with the design and delivery of various small and large sized ESR furnaces. He highlighted the new developments in the ESR ingot that posed challenge far ahead of the design of such large ESR plants. He presented theoretical verifications of results regarding the electrical, mechanical as well as operational parameters due to practical relevant data. He emphasised that the main melt station and its high current line of INTECO´s large ESR furnaces is designed to enable the application of the CCM® – Technology (current conductive mold) which was discussed in the presentation.

Session on Energy and Environment

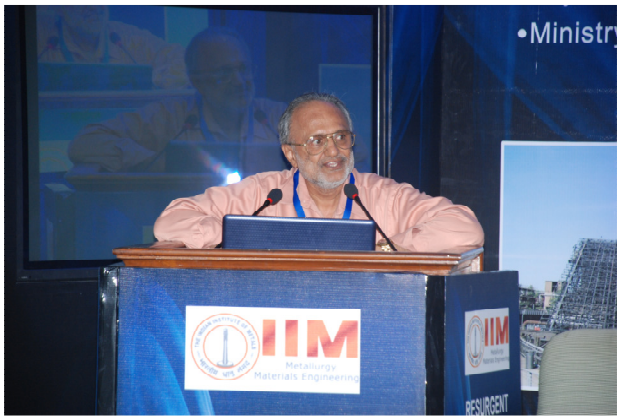
The final technical session at the conference was on **"Energy & Environment"**. There were three speakers in this session. **Mr. Palash Banerjee (MECON)** delivered presentation on "*Strategies for advanced environmental management in iron ore mining industry in India*". He discussed about the gradually increasing industrial growth rate demand quantum increase of raw materials, such as, iron ore production. However, the inhibiting factors for such growth include strict environmental regulations, social pressures imposed by the local residents due to the environmental concerns and fear of their displacement. The speaker discussed about the advanced system approaches as the key solutions for the above problems.

Mr. Deepak Vaidya (Business Head-N&E-Outokumpo India Pvt. Ltd.) delivered presentation on "*Sustainable development in food & drink processing industry*" relating to increased used of stainless steel. He discussed about the success stories of Outokumpo consultancy projects that were based on the development of stainless or special steels for their customers in India and solved the industrial problems of corrosion. Some of the case studies Outokumpo took up for its customers included: development of duplex/stainless steel for evaporation tubes for sugar processing, storage tank application of duplex steel, wine storage tank of duplex stainless steel, process tank (for mustard) using a suitable special steel, etc.

Dr. S.C. Jain (MECON) talked on "*Environmental challenges & mitigation strategies in primary iron making units of integrated steel plants in India*". The speaker discussed about the sources of air emission (including particulate matters, SOx ,NOx, CO_2) and fugitive emissions in the iron making process and methods to control it. He also described the available methods of air pollution control on the transmission path from process to stack vis-à-vis modern technology available to eliminate emissions at source itself. He illustrated the examples of upcoming steel plants adopting clean technologies and control measures for the emissions during iron making processes.

Valedictory Session

During the Valedictory session at the end of Conference, **Mr. G I S Chauhan, Hony. Jt. Secretary-IIM Delhi Chapter** presented a brief Summary of Conference proceeding. **Mr. B D Jethra, Past President-IIM Delhi Chapter** made overall remarks about MMMM2012 event (Exhibition & Conference). Awards were given to the Exhibitors in various categories. The Conference ended with vote of thanks by **Mr. Vipin Singhal, Hony. Secretary-IIM Delhi Chapter**



MMMM 2012 RECOMMENDATIONS

The International Conference was attended by luminaries and stalwarts in the area of Mining, Metals, Metallurgy and Materials and allied sectors. The issues discussed were current and relevant. The following issues have come into sharp focus:

1 Minerals constitute the most valuable natural resource and form the basic raw material for development of infrastructure, capital goods and basic industries and their exploitation has to be guided by long-term national goals and perspective

2 Increased emphasis is required on exploration activity for coal and Iron Ore reserves. Geological Survey of India has to play a more emphatic role in survey and increased exploration of minerals

3 So far the exploration of Iron Ore resource in India is being done only to a depth of 60-70 meters against 100 meters the world over. In order to improve the resource base the exploration activities need to be permitted to the public and private sector by the government

4 There is a need for preparation of a data-base of minerals resources as a resource inventory. The information available is scanty and obsolete

5 Mining Sector should be treated as an industry and there exists a need for establishment of appropriate linkages for the concerned consuming industrial units

6 There is a need and requirement of exclusive allocation of Iron Ore and Coal Mines to steel plants

7 There is a need for adoption of scientific method of mining. This will include mechanization and automation of Iron and Coal Mines and other minerals. This will improve output, increase efficiency and production

8 Utilization of leaner grade of Iron ore has to be undertaken after beneficiation. Some R&D work may be required in this context. With the revision of the threshold of the iron content in iron ore by IBM at 45%, there should be a thrust on R&D efforts for use of iron ores of different regions in India

9 There is an urgent need for acquisition of Coal Mines in overseas countries to ensure Coal Security for Iron and Steel Production

10 There is a need for utilization of Iron Ore fines at iron Ore Mines by creating large scale pellet facilities. This activity can be undertaken even on a centralized basis. This would mean creation of large scale pellet making facilities

11 There is a need to seriously consider large port based steel plants which could meet future needs, flexible enough to use local/imported materials and satisfy land/environmental conditions

12 There exists a need for enhancing indigenous equipment manufacturing facilities for steel plant equipment. There has to be a greater thrust on development of design and engineering in organizations in addition to R&D efforts

13 Extensive R&D work needs to be undertaken for utilization of red-mud generated at aluminium refining facilities

14 An allocation of Rs. 500 crores has been made for R&D activities in Iron and Steel during the 12^{th} Plan period. R&D proposals are invited against these allotted funds

15 More intensive efforts in R&D area for Iron Ore beneficiation and Coal beneficiation are the need of the day

16 Installation of dry coke quenching facilities for energy saving in all the coke producing units

17 Adoption of emerging technologies by usage of non-coking coals to tackle shortage of coking coal in the country

18 Enhanced production of special steels for critical applications by creation of secondary refining and usage of other new technologies like ESR etc

19 CO_2 generation in steel making in India is a major problem. There are technologies available for recovery of CO_2 generated during steel making and use it effectively for energy saving

20 Government should create top organizations to train the operatives and lay stress on technology transfer as different from the earlier tonnage concept which laid thrust on production / operations

21 Government of India may consider the following options:

- ✓ Allocation of Ore Mines for Steel Industry for captive use
- ✓ Sort out the issues related to water, land and power shortages. The setting up of ultra-mega steel plants may be considered so that clearances are easy. Ultra-mega steel plants require comparatively less space for creating a tonne of steel capacity vis-à-vis requirements of space by smaller tonnage plants

22 Shore-based steel plants to be established to give impetus to steel exports

23 Thrust for 100% utilization of blast furnace and steel making slags for effective waste utilization.