



IIM

Metallurgy
Materials Engineering

NEWSLETTER

THE INDIAN INSTITUTE OF METALS

(DELHI CHAPTER)

RAJ TIWARI

Chairman, Delhi Chapter

S. C. SURI

Chairman, Technical & Publication Committee

Issue No. 40/2010

Vol. XXXX "Monthly"

Date: 8.3.2011

Publication Committee

*S. C. Suri- Chairman
G. I. S. Chauhan
Dr. (Mrs.) Malti Goel
R. K. Vijayvargia
Dr. D. K. Likhi
Dr. A. K. Srivastava
Neeraj Gupta
Manoranjan Ram*

Executive Committee

Chairman

Raj Tiwari

Vice Chairmen

*S. C. Suri
K. L. Mehrotra*

Hon. Secretary

V. C. Singhal

Jt. Hon. Secretaries

*G. Mishra
V. N. Grover
P. Kanthasamy*

Hon. Treasurer

Manoranjan Ram

Jt. Hon. Treasurer

G I S Chauhan

Members

*P. K. Chatterjee
R. K. Gupta
B. R. Thukral
B. D. Jethra
Anil Gupta
Dr. G. N. Mohanty
P. R. Chandna
Sunil Garg
V. K. Tyagi
M. Saravanan*

INTRODUCTION

This News Letter is containing brief on eleventh Executive Committee Meeting for the year 2010-11 held on 5.3.2011.

The News Letter contains the following Write-ups:

1. Inaugural Speech of Shri P K Misra, Secretary (Steel) for the International Exhibition and Conference "MMMM 2011"
2. Summary of International Conference & Exhibition (MMMM 2011)
3. Global & Indian Steel Scenario-Current Status by Shri S C Suri, Vice Chairman, IIM DC & Chairman Technical Publication Committee
4. Scenario of Aluminium Industry & Human Resource need in India by Shri R N Parbat, Past President, IIM
5. Metal & Mineral Industry in India by Shri Anil Gupta, Member, Executive Committee, IIM-DC
6. How should Board of Directors handle Enterprise Risk Management (ERM)? By Shri P R Chandna, Executive Committee Member, IIM DC.
7. 4th Summit on Sustainable Mining to Green Steel Making
8. Some Statistics on Steel Production
9. IIM Delhi Chapter Website.

Published By

"The Indian Institute of Metals – Delhi Chapter"

Jawahar Dhatu Bhawan, 39 Tughlakabad Institutional Area, M B Road
Near Batra Hospital, New Delhi-110 062

Tel: 011-29956738, Telefax: 011-29955084; E-mail: iim.delhi@gmail.com

Website: www.iim-delhi.com

Chapter News

Executive Committee members paid tribute to the memory of Dr. P. Dayal the senior member of IIM Delhi Chapter.

Shri P K Chatterjee, Chairman of Building Committee briefed the EC members on the progress of lecture hall of IIM-DC. It was informed that the work shall be completed by 31st March 2011.

Shri S C Suri, Chairman of MMMM 2011 Technical Conference gave his observations and comments on MMMM 2011 Technical Conference.



Dr. P. Dayal– Gem of a man!

Dr.P.Dayal was perhaps the oldest living metallurgist in India till recently; he passed away on 2 February 2011 at a ripe age of 96 years. Last year at a function to pay tributes to Late Mr. R.P. Varshney at Safdarjung Club, he came alongwith his son Ramchander and said very innocently “Look! I am able to walk and climb up; only I have hearing problems”. He was keeping good health all through and would practically attend all the functions of IIM– technical talks, AGMs, social get togethers etc., I used to pick him up from his residence in Green Park for executive committee meetings, evening talks etc., at Chelmsford Club, Constitution Club etc., and would drop him back. In the mid seventies, a few of us from IIM Delhi Chapter went by road for a plant visit to Hindustan Copper Ltd; Dr. Dayal was driving his blue Fiat car DHC 193 and I was sitting by his side. We had very enjoyable and fruitful discussions on the way.

Dr. Dayal was no doubt an eminent metallurgist and he was in teaching, worked for Industry as well as Steel & Mines Ministries in post-independent India and lastly in consulting too. He rubbed shoulders with doyens of Indian metallurgy like Prof. N.P. Gandhi, Dr. Daya Swaroop, Dr. Daya P. Antia etc., IIM fondly recalls his multifarious contributions to the metallurgical profession. May his soul rest in eternal peace!

– L. Pugazhenthly, Past President IIM (2008– 09)

Inaugural Speech of Shri P K Misra, Secretary (Steel) for the International Exhibition and Conference “MMMM 2011” held on 11th February 2011 at Pragati Maidan, New Delhi

1. I am delighted to be present here at the Mineral, Metals, Metallurgy & Materials 2011 International Exhibition & Conference being organized by The Indian Institute of Metals, Delhi Chapter and International Trade and Exhibition Events Pvt. Ltd.
2. Metals are the driving force behind industrial growth. Through Metallurgical processes, metals are extracted from minerals and subsequent processes convert metals into useful shapes for various applications. Fortunately in India we have good amount of minerals in the form of iron ore, bauxite, manganese ore, chrome ores and other minerals that can be economically converted to metals.
3. Out of all the metals, the role of iron, aluminium, copper, nickel, magnesium, titanium, zinc, lead, tin and alloys of metals is important for economic growth. Aluminium production in India started around 1930s when in collaboration with firms from Switzerland and Canada, a few Indian entrepreneurs decided to set up aluminium rolling plants in West Bengal. Later on when the mineral bauxite was discovered aluminium smelting plants were set up by firms in the private sector as well as PSUs, looking into the huge potential of aluminium for cables, current conducting items and light structurals as well as utensils. There has been a fair amount of consolidation in the Indian aluminium industry at present. Major players are HINDALCO Industries, National Aluminium Co. and Sterlite Industries who are producing over 1.25 million tonnes of aluminium annually. As per available

projection, by the year 2020 the smelting capacity of aluminium in India will cross 3 million tonnes annually.

4. Due to its high electrical and thermal conductivity, copper is extensively used in power transmission industry as electric conductors, cables, bus bars, utensils etc. Due to its excellent resistance to corrosion, brass and bronze are a few alloys like copper that have wide applications in the process industry as well as in consumer durables. As per available statistics, the combined copper production capacity of the major players Hindustan Copper Ltd., Sterlite Copper and Birla Copper is around 1 million tonnes per annum. The refined copper production in the country during 2009-10 has been around 7 lakh tonnes. With thrust on higher electricity generation and better quality of power, the demand for copper in the electrical and related sectors is expected to register a substantial growth in addition to its demand in areas like air-conditioning and refrigeration; transport industry; consumer durable etc. India, at present is exporting refined copper also.

5. Stainless steel is an item very popular for utensils due to its anticorrosive nature. In consonance with the growth of stainless steel industry, the requirement of nickel and ferro-chrome is also growing. Though most of the nickel requirements are imported, we have registered significant production in ferro-chrome by way of processing the indigenous chrome ores of Orissa.

6. Whereas due to robust economic growth of India, steel demand is going up. The application of steel sheets particularly for the rural sector requires protection in the form of zinc coating. Therefore, growth of zinc industry will be synonymous with the growth of steel industry by virtue of the excellent corrosion resistance properties of galvanized steel sheets, an item the steel industry is manufacturing as well as exporting.

7. Iron and steel has for ages provided the key input for building the infrastructure and industrial base of nations. From a production of around one million tonnes of steel at the time of independence, India has grown to produce around 65 million tonnes currently, thus occupying the fifth position in the world. A steady growth during the last few years has made it possible for India to raise the per capita steel consumption to around 50 kg. Looking at the rapid economic growth, steel consumption is poised to grow significantly due to which steel capacity is likely to touch 124 million tonnes by the 2012. This is on the basis of capacity addition that is expected to come from Greenfield as well as brownfield expansion, and includes the projected expansion by nearly all of the steel plants of SAIL and RINL. Looking at the ambitious projects that are under commissioning very soon, India may in the near future occupy the second position in steel production just after China.

8. As we know, efficiency of metal production depends upon the content of metal in the mineral that serves as a raw material. Though, we have significant deposits of minerals including coking coal, there is need to raise the iron content of low grade ores and also to beneficiate coking coals to reduce ash content. The thrust now is to reduce energy consumption and environmental pollution in metal production apart from increase in productivity. Suitable R&D projects are therefore needed to provide solutions in respect.

9. Iron ore is a basic raw material for steel making. But at least 60% of fines are generated during iron ore production. Unless we make use of these fines, there are dangers of natural resource depletion and environmental hazards. Therefore beneficiation and agglomeration will help in improving productivity as well as sustainable development.

10. Raw Material Security – Manpower: An exhibition to display technologies for production of metals as well as shaping and processing of metals for various applications will provide an opportunity for the mineral and metal industries. The initiative by Indian Institute of Metals, Delhi Chapter and International Trade and Exhibition Events Pvt. Ltd. for organizing this exhibition is thus a timely event to guide the Indian minerals and metallurgy industry. I hope all of us will benefit immensely by participating in this useful venture.

I congratulate the organizers of the exhibition and the conference, and wish them all success.

International Conference on “Indian Metals Industry – Shaping the Next Decade” – A Brief Review

The Indian Institute of Metals – Delhi Chapter organizes a biennial event – Exhibition cum Conference (MMMM) since 1996. This year's conference theme was “Indian Metals Industry - Shaping the Next Decade”.

The 8th International Conference on Minerals, Metals, Metallurgy and Materials was held at Pragati Maidan, New Delhi during 12-14 February 2011. The conference provided a platform to stalwarts in the relevant technical fields, policy-makers in the Government of India, industry leaders, practicing metallurgists and mineralogists, various associations as well as engineering students.



The conference started with a Welcome Address by Shri Raj Tiwari, Chairman, IIM-DC. Shri S C Suri, Chairman, MMMM 2011 Technical Conference gave a brief introduction to the contents of the conference. Mr. K. V. Rajan, Chairman, ITEE, the organization responsible for arranging the MMMM 2011 Exhibition presented an overview of the Exhibition. Mr. M. Narayana Rao, Vice President, IIM delivered Presidential Address followed by a Special Address by Dr. Sanak Mishra, Past President IIM and CEO, Arcelor Mittal in India.

Mr. M. Narayana Rao deliberated on the consolidation and acquisition aspects in the ferrous and non-ferrous metallurgical sector. He was also appreciative of the fact that metal industry both in the ferrous and non-ferrous sector is growing at the rate of 8-10% per annum. The metal industry in India has ambitious growth and development plans.

Dr. Sanak Mishra, Past President IIM in his Special Address deliberated on the role of engineers and technologists in sustainable development in the industrial sector. He also deliberated on the role of engineers and technologists in environmental control in metallurgical industry.

The first technical session was in the format of a Panel Session with renowned personalities like Dr. S R Jain, Dr. Sanak Mishra, Mr. R N Parbat, Mr. Sushim Banerjee, Mr. Sunil Mahajan and Mr. Sunil Kakar. The panel members provided an overview of growth and development aspects in the ferrous, non-ferrous, construction and automobile segment. The presentation of these mentors leaders and stalwarts provided a very informative view on current issues as well as future trends related to different aspects of ferrous and non-ferrous industry.

Forty two technical presentations were made in the six technical sessions. Out of these technical presentations, eighteen presentations were made by international speakers.

In the session on “Raw material Security” different speakers gave their expert views in the area of coal, iron ore and other non-ferrous raw materials resources for metals like aluminium, copper, lead, zinc and nickel etc.



In the Technical Session on "Markets", authors made presentations on Steel in Construction industry, markets opportunities for copper in India, role of strategic alliance and acquisition and untapped potential of Titanium Metal. There was a session on "Current & Future Technologies". The papers deliberated on the alternative Iron Making Routes, Emerging Steel Making Technologies & Developments in the Hot Metal Pre-treatment.

There was a technical session on "Value Addition" in the metallurgical processing sector where the authors presented their views regarding the value addition aspects at the processing stage of different ferrous and non-ferrous metals.

There was a technical session on "Technology and Equipment". Different speakers deliberated on the advances that have taken place in the area of Nuclear Fuels, Thin Slab Casting, Compact Strip Processing and advances in new Iron Making processes including developments in the Blast Furnaces and galvanizing lines.

In the session on "Energy and Environment" different speakers deliberated on the subject of climate change, energy efficient technologies in reheating furnaces and rolling mills. Other areas like development of Tall Coke Oven Batteries with dry quenching and co-generation facilities were deliberated.

Valedictory Session

The valedictory session was chaired by Shri A C Wadhawan, former President of IIM. Shri Wadhawan highlighted the need to step-up R&D measures and identify appropriate technologies for exploiting our natural resources including the leaner ores, environment friendly technologies, recycling and sustainable developments in ferrous and non-ferrous sector to achieve global leadership in the metal arena. There was a need to restrict export of Iron Ore and acquisition of coking coal mines outside India.

In the valedictory session the conference and exhibition summary was presented. Awards were also presented to the exhibitors in the valedictory session.

The conference deliberations were interactive in nature and the technical contents of different presentations were of high order. Around 200 delegates participated in the International Conference.

The conference programme and details of technical sessions are given below:

International Conference on Indian Metals Industry – Shaping the Next Decade 12 – 14 February 2011, Hall # 3, Pragati Maidan, New Delhi

12 FEBRUARY 2011

10.00 Hrs – 11.30 Hrs	INAUGURAL SESSION
Welcome	Mr. Raj Tiwari, Chairman, IIM Delhi Chapter
Introduction to the Conference	Mr. S C Suri, Chairman, Technical Committee
Exhibition- An Overview	Mr. K.V. Rajan, Chairman – ITEE
IIM Presidential Remarks	Mr. M. Narayana Rao, Vice President ,IIM
Special Address	Dr. Sanak Mishra, Past President, IIM
Vote of Thanks	Mr. V C Singhal, Hon. Secretary, IIM Delhi Chapter
11.45 Hrs – 13.30 Hrs	PANEL SESSION
Introductory / Opening Remarks	Dr. Sanak Mishra, Past President, IIM
Panel Members	Dr. S R Jain, Past President, IIM
	Mr. R N Parbat, Past President, IIM
	Mr. Sushim Banerjee, Director General, Institute for Steel Development & Growth.

	Mr. Sunil Mahajan, Director, Construction Industry Development Council.
	Mr. Sunil Kakkar, General Manager, Maruti Udyog Ltd
Concluding Remarks	Dr. Sanak Mishra, Past President, IIM

14.30 Hrs – 16.15 Hrs	TECHNICAL SESSION – I	RAW MATERIALS SECURITY
-----------------------	------------------------------	-------------------------------

CHAIRMAN: Shri K L Mehrotra, Vice Chairman, IIM DC

Sl. No.	TITLE OF THE PAPER	Name of Speakers
1	Global Metallurgical Coal for Indian Steel Industry	Dr.H.S.Valia, President Coal Science Inc. (USA)
2	Raw Materials Security for Steel Industry	Mr. R K Vijayavergia, ED (Operation), Steel Authority of India Limited
3	Surge in Indian Steel Industry: Challenges of Input Security	Dr. Subir Bhattacharya, Sr. Manager and Mr. K K Mehrotra, Director, MECON Ltd.
4	Sintering and Palletisation of Indian Iron Ores	Dr. T M Srinivasan, M.D., Ferrogreen Consultancy
5	Developments in the Global Lead, Zinc, Copper and Nickel Industries	Mr. Paul White, International Lead, Zinc, Nickel & Copper Study Group
6	Non-Ferrous Metals Resources in India – Actions & Strategies	Mr. L. Pugazhenthay Executive Director, Indian Lead Zinc Development Association.

16.15 Hrs – 17.30 Hrs	TECHNICAL SESSION : II	MARKETS
-----------------------	-------------------------------	----------------

CHAIRMAN: Shri Raj Tiwari, Chairman, IIM DC

Sl. No.	TITLE OF THE PAPER	Name of Speakers
1	Steel Construction in India, its Potential and Cost Competitiveness	Dr. S R Mediratta, Director General Yamuna Group of Institutions, Yamuna Nagar
2	Demand, Availability & Market opportunities for Copper in India	Dr. D De Sarkar, CEO Indian Copper Development Centre
3	Motives and Challenges for Strategic Alliances and M & As in Indian Steel Industry	Mr. Rakesh Kulshreshtha Executive Director, Steel Authority of India Limited
4	'Why ERP is not Enough' The Quest for Business Excellence in Steel Industry	Mr. Avenish Prasad, Industry Director; Mill Products and Mining, SAP India.
5	Perspective of untapped potential of Titanium in India	Dr. Dinesh Likhi, Business Development Steel Authority of India Limited
6	Problems of Rail Movement and Wagon Availability	Mr. J C Naithani, Steel Authority of India, New Delhi

13 FEBRUARY 2011

10.00–11.30 Hrs	TECHNICAL SESSION: III	CURRENT & FUTURE TECHNOLOGIES
-----------------	-------------------------------	--

CHAIRMAN: Shri G.I.S.Chauhan, Ex E.D.I/c RDCIS, SAIL

Time	TITLE OF THE PAPER	Name of Speakers
1	Alternative Iron-making Processes – Relevance to India	Mr.B B Agrawal, DGM & TA to ED Incharge, RDCIS, , Steel Authority of India Limited.
2	Analysis of Emerging Iron-Making Processes in Indian Context	Paper from Tata Steel
3	The Reformerless Energiron ZR Process - Flexible Opportunities for the Indian Direct Reduction Industry	Mr.Thomas Scarnati and Mr.Pablo Duarte HYL Thermoprocess, Tenova

4	Alternative Iron & Steel Making Technologies – Likely Trends & Sustainability Aspects	Paper from M N Dastur & Co.
5	Manganese Ore Sinters – Misconcepts & Facts	Mr.Rajendra Sane, COO, Ghalsasi Engg. Systems (P) Ltd.
6	Developments in Hot Metal Pre-treatment	Dr. Robert Robey, SMS Mevac UK Ltd.
7	Doping and Growth of Carbon Nano -structures	Mr.Malay Jana Research Scholar, IIT, Rookee

13 FEBRUARY 2011

11.45 – 13.15 Hrs	TECHNICAL SESSION : IV	VALUE ADDITION
-------------------	-------------------------------	-----------------------

CHAIRMAN: Shri R. N. Parbat, Former President, IIM

Time	TITLE OF THE PAPER	Name of Speakers
1	Assessment of Cleanliness in Interstitial free steels	Paper from Tata Steel
2	Advances in Special Steel Products including Stainless Steels	Dr. L K Singhal, Director Jindal Stainless Ltd.
3	Challenges in Structural Materials for Thermal Reactors	Dr. B. K. Shah, Scientist, & Head, QAD, Bhabha Atomic Research Centre.
4	Heavy plate and pipe grades – Continuous casting solutions	Mr.Ramesh Ayya, SMS, Siemag AG,SMS India (P) Ltd.
5	Improvements in Deoxidation practice with introduction of High Dimensional Aluminium cored wire	Mr. S. Ghosh, RDCIS, Steel Authority of India Ltd..
6	Hot Rolled Formable Grades from SAIL: Present status and Future Trends	Mr.S Mukhopadhyay, Steel Authority of India Ltd.,
7	Value Added Product for Strategic Applications	Mr.Deepak Vaidya, Cluster Head -D&P Outokumpu India Private Ltd.
8	Development and application of Electric mould non-sinusoidal oscillation system	Mr. Zhiheng Tian RAMON Science & Technology Co. Ltd.,

14.30 – 18.00 Hrs	TECHNICAL SESSION : V	TECHNOLOGY & EQUIPMENT
-------------------	------------------------------	-----------------------------------

CHAIRMAN: Shri B.D. Jethra, Ex Advisor, Planning Commission, Govt. of India

Sl. No.	TITLE OF THE PAPER	Name of Speakers
1	Advances in Nuclear Fuel Fabrication - An Indian Perspective	Mr. R.N Jayaraj, CEO, Nuclear Fuel Complex, Hyderabad.
2	Tools for the reduction of life-cycle costs and maintenance expenditure in metallurgical plants and rolling mill technology	Mr.Viola Franyo, SMS Siemag AG, Germany
3	High-speed SBQ casting of blooms up to 500 mm dia at Nucor Memphis, USA	Mr. Govind Belgal, VP Danieli India Ltd
4	The new Micromill at CMC Steel Arizona an innovative process for the most competitive production of rebar products.	Mr. Sathya Bodha Asst. V P, Danieli India Ltd
5	The evolution of the thin slab caster concept: latest TSC technology to produce over 330 t/h per strand	Mr. S.K.Bhaumik, Vice President, Danieli India Limited
6	250t/hr : The most productive DRI single module in operation at ESI	Mr. Iouri Martynov, Sr. Sales Manager, Danieli Centro Metallics, Italy
7	20 years of CSP – The success story of an outstanding technology	Mr. Stephan Kramer, SMS Siemag AG, Germany.
8	I-STEEL: Tenova Innovative Technologies to reduce transformer costs and environmental impact.	Mr.Davide Masoero, iSteel Business Development, Tenova S.p.A, Italy

9	Electrical and Automation systems from SMS Siemag based on latest references for hot and cold rolling mills	Mr. Atanu Dey, Mr. Detlef Ehert SMS Siemag AG, Germany
10	High-class Continuous Annealing and Hot-dip Galvanizing Lines for a growing market	Mr. Markus Janecke, SMS Siemag AG, Germany

14 FEBRUARY, 2011

10.00 – 11.45 Hrs	TECHNICAL SESSION VI	ENERGY AND ENVIRONMENT
-------------------	-----------------------------	-------------------------------

CHAIRMAN: Shri B. R. Thukral, Ex Hindustan Zinc Ltd.

	TITLE OF THE PAPER	Name of Speakers
1	Sustainable Energy & Growth of Indian Metal Industry	Dr. (Mrs.) Malti Goel CSIR Emeritus Scientist JNU
2	Intervention of Energy Efficient Technologies in Steel Re-rolling Mills sector in India	Mr. G. Mishra, U.N.D.P. India
3	High temperature Air Combustion Technology for Energy Efficiency Improvement in Steel Re-rolling Sector	Prof. Xia Dehong, University of Science & Technology, China
4	New Design of 7M tall coke oven battery along with Dry Quenching & Cogeneration facilities	Mr. Ajoy Kumar & Mr. S K Sinha, MECON Ltd.
5	Quantifying heat Loss in a Steel Ladle Cycle	Mr. Aaron Jeske, Mr. Joseph Oresti & Mr. Sunil, HATCH Ltd
6	Environmental technology upgrades : How to make plants of today comply with the requirements of tomorrow	Dr. Christian Froehling, SMS Siemag AG, Germany

12.00 Hrs	Valedictory Session	CHAIRMAN Mr. A. C. Wadhawan
	Welcome by	Mr. K. L. Mehrotra, Vice Chairman, IIM - DC
	Conference Summary	Mr. Anil Gupta, IIM -DC
	Exhibition Summary	Mr. K. V. Rajan, Chairman, ITEE
	Award Presentation for Exhibitors	Mr. K V Rajan, Chairman, ITEE
	Concluding remarks	Mr. A. C. Wadhawan
	Vote of Thanks	Mr. R. K. Gupta, Past Chairman, IIM – DC

NB: If you want more details of various technical presentations, please visit our website: www.iim-delhi.com

MMMM 2011 – Exhibition – A Brief Review

This event was sponsored by The Indian Institute of Metals – Delhi Chapter and jointly organized by IIM Delhi Chapter & ITEE.

This is the 8th edition of Institutionalised Global Event and has become one of the most prestigious forum for National and International participants. The sector is extremely important for India's economy. Since it touches all aspects including self reliance, export, manufacturing, new technology challenges, energy consumption and the environment.

The Exhibition was co-sponsored by various Ministries, Industry Associations, Trade media etc.

The Exhibition was inaugurated by Shri P K Misra, Secretary Steel whose inaugural address has been reproduced in the news letter.

The exhibition covered an area of 4200 Sq. mtrs. More than 163 leading exhibitors from different countries, viz China, European Union, Italy, Luxemburg, Russia, Spain, Netherlands, UK & USA participated in the exhibition. Around 600 visitors visited the four day exhibition and highly rated the exhibition.

MMMM 2011 exhibition was acclaimed by the exhibitors as the best commodity show held in this part of the world covering Minerals, Metals & Allied Industries.

Global Steel Scenario

Sharp Recovery in Crude Steel Production in 2010

With drawing of 2011, it would be appropriate to christen 2010 as “A year of succulent revival” and 2011 as “Year of consolidation” for global steel industry.

World crude steel production in 2010 for the 66 countries reporting to the world-steel is estimated to be 1.395 billion tonnes up by 14.2%; YoY as compared to 1.219 billion tonnes in 2009. The global crude steel production in 2010 would be the highest ever in the history, thus eclipsing pre-crisis high in 2007. However, this increase is mainly due to the sharp increase in steel production in China and moderate growth in other developing countries. The production in UK is still at very low level and production in many European countries and in USA are much lower compared to 2007 and 2008 levels.

Export of Steel

A major portion of steel produced is traded internationally. China was the largest exporter but its share dropped drastically in 2009. In 2010, China's exports has gone up to 42.6 Mt – an increase of 73% on YoY. Japan is continuing to export at high level and export volume tend to be much steadier overtime. India's exports were 4.44 Mt and 3.24 Mt in 2008-09 and 2009-10 respectively.

Stainless Steel

Stainless steel accounts for 2% of total steel production and Duplex 1% of total stainless market. Compared to the crude steel production of 1227 Mt in 2009, the stainless steel production was only 25 Mt. Like the crude steel production in ordinary grade, the stainless steel production dipped very low in last quarter of 2008 and Q1 of 2009 after which it has taken positive turn. Process industry, Building and Construction and White goods accounts for 83% of stainless usage worldwide.

Asia consumed alone 15.9 Mt out of which the percentage share of S 200, S 300 and S 400 grades were 17, 53 and 30 respectively. The use of S 200 grade is higher in Asia compared to the developed countries where it is only 1-5%. In India, the share of S 200 series was 76.2% in 2008-09. India's stainless steel utensils and kitchen appliances' export is likely to go up by around 25% in the current fiscal to Rs. 1,500 crore on increased demand from overseas. 90% of the material belongs to chrome-manganese low nickel stainless steel. Indian products receive good response in Middle East, South East Asia, Africa and the US.

Chinese stainless steel consumption per capita already is comparable to Western Countries. It is at 6.1 Kg compared to Europe's 6.8 Kg and USA's 5.1 Kg. The world average is 3.5 Kg. In India, the per capita consumption is well below at 1.7 Kg. After the installation of Jindal's plant at Jajpur, the capacity will go up by 0.8 Mt from 2011-12.

The total production in the first two quarters of 2010 has gone up by 44% after the sharp fall in 2009 and in 2010, there will be a record production exceeding 30 Mt.

Indian Steel Scenario

Alloy steel production by major producers during April to November 2010 has surged significantly in this year. The export of alloy steel too has gone up by 141.4%. The real consumption of total steel in all categories has gone up in this year by 6.8% compared to the same period of last year.

Prices

Steel prices are moving upwards due to the steep increase in prices of raw materials for steelmaking.

Coking coal price has gone up to US\$ 220 to 230 per tonne from US\$ 130 to 150 per tonne and iron ore is selling at about US\$ 176 per tonne. Industry players expect these raw materials' prices to rise further in the near future, especially in view of the recent disruption in transportation from Australia due to flood and, thereby, foresee a likely increase in steel prices from January, 2011 onwards.

The international quarterly price settlements for January to March 2010 period are reported to be up by about 8% for iron ore and 10% for coking Coal.

Thus all the steel makers have cited higher prices of input materials as the reason behind the price hike. But the major factors in hiking price are the surge in market prices.

Flat products prices in Indian market, to a great extent, move in tandem with global levels, which have surged by almost US\$ 50 per tonne in December 2009. On the other hand, long products prices in the Indian market have surged by almost 10% in December 2009. It is interesting to note that price increase in case of non-ferrous metals have been far more severe since January 2009. Some of the steel majors in India have already announced further hike in domestic prices applicable for sales in January 2011 with immediate effect.

SAIL has hiked prices across product categories by 3% or about Rs. 1,000 per tonne. JSW Steel Ltd has raised flat product prices by Rs. 1,400 to 1,700 rupees a tonne or about 4% to 5% across various grades. They will raise prices of long products too. Essar Steel has increased the prices by about 5% across product categories. Tata Steel has hiked rebar prices by Rs. 2,500 per tonne for retail sales whereas RINL has increased prices of long products by Rs. 3,000 per tonne.

SCENARIO OF ALUMINIUM INDUSTRY & HUMAN RESOURCE NEED IN INDIA

R N Parbat
Past President, IIM

Introduction

The outlook of Metal industry in India is very bright. The growth potential of some of the major metals in India in the international perspective and prospect of Aluminum Industry are depicted in Table 1 & Table 2.

Table – 1: Growth Potential of Major metals in India

	2007- Output (Million Tonnes – (mT)		Indian Outlook by 2020 (mT)
	World	India	
Iron & Steel	1250	50	220
Aluminium	30	1	3
Copper	18	0.75	2.5
Zinc	11	0.25	1.0
Lead	7	0.035	0.1

Table – 2: Current and projected capacities for Aluminium Industry

	Current Capacity (mT)	Projected Capacity by 2020 (mT)
Bauxite Mining	7.000	18.000
Alumina Refinery	3.000	7.500+
Aluminium Smelting	1.000	3.000+
Aluminium Sheet Rolling	0.360	0.500+
Aluminium Foil Rolling	0.036	0.045
Aluminium Extrusion	0.200	0.400
Aluminium Wire Rod	0.300	0.400
Aluminium Casting	0.250	0.500

High quality gibbsitic Bauxite deposit in India is currently estimated at 3000 million tonnes of which nearly 50% reserve is in the eastern coast of Orissa, 25 % in Andhra and the balance 25 % is in Madhya Pradesh, Gujarat, Jharkhand, Maharastra, Karnataka and Goa. India is the 5th largest country in Bauxite reserve.

Aluminium consumption (by %) in various sectors in India and in the world is given in Table-3.

Table –3: Aluminium consumption in various sectors for world and India

Sector	World	India
Transport	35%	23%
Packaging	25%	12%
Construction	17%	11%
Consumer Durable	13%	9%
Electrical	7%	38%
Others	3%	7%

While the average per capita consumption of Aluminium in the developed countries is over 12 kg., and 6 kg in the developing countries, it is only 1 kg in India. That indicates a tremendous opportunity for growth of aluminium usage in India.

Aluminium is the youngest metal of the last century. It now holds a tremendous potential for extensive commercial applications in the current century. Aluminium through proper alloying with a combination of mechanical and thermal treatment, found it's place in Aircraft, Aerospace, Defence, Building & Architecture, Transport, Packaging & Canning, Heat transfer and Power industries. Good mechanical properties coupled with high formability, weldability, precipitation hardenability, good thermal and electrical conductivity, excellent sub-zero properties and 100% recycleability and yet highly resistant to corrosive industrial and marine environment make aluminium a preferred metal / material for the designers and the manufacturers.

Let us look at some of the major challenges for the growth of aluminium industry in India. The world status will be drawn in automatically.

Is Aluminium Relevant In India?

Aluminium consumption at 0.8 kg. per capita in India is one of the lowest in the developing countries, although India is the 5th. Bauxite-rich-country in the world. In China, per capita consumption is more than 3 kg., despite relatively low volume and inferior quality of bauxite reserve there.

India is a mineral-rich country. At the current rate of mineral exploration, the developed countries will be left with very little reserve by the end of this current century. India will then hold the key to some of the specific mineral reserves, particularly bauxite. That is why the world leaders like ALCAN, ALCOA, BHP BILLITON are eyeing India for future opportunity in Aluminium. Over 1000 million population with nearly 300 million consumer class offers a great market opportunity. Indian economy is also heated up since the process of economic liberalisation, initiated by the GOI in 1991. Current GDP growth at 9 % per annum is only next to China and the economists all over the world expect India to surpass China's growth rate in the near future.

Indian companies like Hindalco, Nalco, Sterlite / Balco / Malco / Vedanta are growing in India at supersonic speed, pushing the smelting capacity from 0.6 million tonnes to 1 million and now moving towards 2 million and very soon to 3 million tonnes per annum. India has not yet experienced market growth in Beverage Can and Auto-Body. Indian industries have already established India as a least cost Alumina producer in the World and one of the low cost producer of Aluminium. Therefore, Aluminium is relevant for India.

Where Is The Hold, Then?

The primary Aluminium production in the world has almost reached 30 million tonnes annually.

Recycled Aluminium is over 8 million tonnes. Aluminium smelting is highly energy intensive. Depending on the level of technology employed by a smelter, the energy consumption for production of 1 tonne of aluminium varies from 16000 kWh to 13000 kWh. World over aluminium is smelted using Hydro electric or waste gas power. France is the only country where Nuclear power (highly subsidised by the Government) is used for aluminium smelting. India, having limited oil and gas reserves with poor potential for hydroelectric power is greatly dependent on poor quality Coal (35 % Ash) based power. Such power is not only costly, but also environmentally hazardous. Clean-Economic power is the DEMAND of the day. Can Scientists and Technologists innovate a more energy efficient reduction process than Hall-Heroult electrolysis process ? Should we also not explore the possibility of aluminium smelting in a neighbouring oil & gas rich countries ?

What Are The Research & Technological Challenges?

The most important challenge is to find an alternate low power intensive smelting technology. The target should be to reduce power consumption from 13000 kWh / t to say, 8000 kWh / t.

Liquor productivity should be increased further to reduce bauxite consumption in Alumina Refinery.

Production of 1 tonne of Alumina generates 2 tonnes of Red mud. Large scale industrial application of Red mud must be found.

Similarly, Coal based Power plants in India creates nearly 10 tonnes of Fly ash for production of 1 tonne Aluminium. We have not yet found commercial use of Fly ash beyond 30 % of generation. An answer for 100 % use of Fly ash is the need of the hour, primarily to save our environment.

Recycling of discarded Pot lining is another issue at every Aluminium smelter.

Although environment friendly Scrap recycling is well established all over the developed countries, it is still in it's primitive stage in India. Recycling technology needs upgradation for conserving bauxite and minimising high cost mining, refining and smelting operations..

Extensive research is also needed to develop

- Super plastic alloys for ease of forming complicated shapes
- Intelligent materials for application in defence and human bodies
- Al-Li and similar light weight but strong alloys for aerospace industry
- Al metal matrix composites for light weight commercial applications
- Micro-alloyed products for higher strength and improved formability
- Aluminium Foam and Honeycomb structure for structural applications

Extensive research is also needed for improving product design with an eye to recycling.

What Are The New Products On The Horizon?

Beverage cans are waiting to be introduced in Indian market (acquisition of Novelis by Aditya Birla Group makes it easier to introduce international quality can stock in India)

Auto engine block, heat radiators and wheels are already in use. It needs wider coverage.

Auto body with extruded structure and sheet cladding will be the next major application of Aluminium. A car has the potential to use nearly 800 kg of aluminium in the form of sheet, extrusions and castings, reducing it's current weight by nearly 0.5 tonne, effecting substantial fuel saving. It is claimed by the Aluminium industries that every tonne of aluminium, produced for automobile industry, reduces Green House Gas Emission by 20 tonnes.

Extensive techno-commercial marketing is necessary to introduce Al alloy sheets in Rail Coaches, Marine containers, Gas cylinders, etc.

Extruded Doors, Windows, Partitions, Curtain walling and Structural glazing have already become a part of modern buildings. Marketing efforts with improved designs are to be intensified. Structural glazing has become essential for efficient thermal-management of big high-rise buildings.

What Are The New Opportunities?

India becomes least cost Alumina producer in the world by exploring highly gibbsitic east cost bauxite.

Instead of depending on 100 % smelting in India using high cost coal based thermal power, acquire or build smelters in the neighbouring oil and gas rich countries.

Follow the example of Aditya Birla Group and become global player in size, technology and market spread through acquisition, merger and/or strategic partnership.

Focus attention on large scale Scrap Recycling to minimise investment, reduce energy consumption and improve Environment conditions. This will also reduce the Cost of metal production substantially.

Keeping above in view

It is now clear that Indian Metal Industry is poised for a quantum jump in capacity-increase, primarily due to accelerated GDP growth in the country as well as the international marketing opportunity for "India made" commodities, goods and services. Aluminium industry, in particular, plans to grow seamlessly in an integrated manner both inside and outside India. Indian Aluminium industry could not take the advantage of the emerging markets in Beverage Cans and Auto Body for lack of investment in High Capacity tandem 4 High Hot Rolling Line and High Power 4 High & 6 High Cold Rolling Lines. Acquisition of high capacity international quality large Rolling lines of Novelis in US, Canada and Europe has now provided the option and the opportunity for Hindalco Industries to create this market also in India.

India is already the least cost Alumina producer in the World and Hindalco Industries has established herself as the least cost producer of Aluminium at the level of 0.350 million tonnes. They have achieved this through a series of technological upgradation, brown field expansion and continuous cost reduction. I have no doubt that Sterlite Industry will not lag behind. NALCO under government control has ambitious plan to grow within and outside India.

Indian industries are pursuing seamless growth in the "Value Chain". With the current challenging entrepreneurs and highly skilled & motivated manpower both at worker and management levels, there is no limit to growth.

Who can man this engine of growth in India?

It is the Metallurgists, the Geologists, the Mining Engineers, the Mechanical Engineers, the Electrical & Electronic Engineers, the Production Engineers, the Automation & Communication Engineers, the Civil, Architectural & Structural Engineers, the Chemical Engineers, the Environment Engineers and the Computer & IT Engineers who will build and run these emerging Manufacturing Industries.

As regards the Metallurgical Engineers, a recent study, conducted by The Indian Institute of Metals reveals:

- (i) IIM membership examination conducted since 1962 produced around 4000 Metallurgists who are successfully employed in the Public & Private Sector industries. This number is growing at the rate of 60 per year.
- (ii) Generation of Metallurgists from the academic institutions has stagnated and there is no sign of revival as yet.
- (iii) The first Metallurgy Department was established at BHU in 1923. Till 1983, there was meteoric growth of Metallurgy Departments to 22. There after, the growth has slowed down and the current number of Metallurgy Department in the country is around 30. While the number of Metallurgists & Material Engineers has been stagnating at around 600 per annum, the total number of Engineers produced in the country has sharply increased from 50,000 to 4.50,000 over the last 20 years.

Then what went wrong with the Metal & Manufacturing Industry?

Our Mining & Metallurgical Industry went into hibernation under Fiscal Control Regime. Economic liberalization pursued by the Govt. of India since 1991 saw a 10 year period of industrial restructuring for improving competitive position prior to embarking on a national and international growth plan.

Meanwhile, the lack of interest in pure Metallurgy brought metal physicists, chemical metallurgists, ceramics and polymer scientists together to create an integrated science of diverse materials. This has given birth to Material Science at the Northwestern University, Illinois, USA in 1959. It did not take long for this new concept to be accepted by the whole world.

Around the same time a handful of Neo-Entrepreneurs saw an international opportunity in Information Technology, both hardware and software. They were the first ones to take the full advantage of economic liberalisation in India. The existing Engineering Colleges started Computer Engineering & IT Departments. The Joint Entrance Examination System created an opportunity for the TOP SLOT of successful candidates a sure position in Computer related Engineering. Successful students were immediately identified by this new Service Industry and offered handsome remuneration. This had lead to mushrooming of a large number of Engineering Colleges offering Computer and IT related courses. Within a few years, it was established that IT education was not a MUST for IT industry. Any engineer can with a little training embrace IT career with big pay packet. It was then DESTINATION IT for nearly 80 % of the professional engineers. IT industries also very aggressively went for campus interview and selected students in their 2nd. or 3rd. year and offered jobs and financial supports. Some companies even offered international exposure during vacations.

Suggested Remedies For Manufacturing Industry, Education & Research?

" today, it is a war for talent. People don't come into the company and stay for reasons other than compensation Compensation part becomes the great leveller"

- Indra Nooyi, Chairman, Pepsico worldwide.

Therefore, Metallurgical Industry, Academic Institutions and Research Organisations should learn from IT and Service industries the aggressive posture needed to capture right talents early in the day and nurture them to growth. Compensation package is very important to-day and it must be recognised. There will be difference but it should be reasonable.

Manufacturing industries should visit the Engineering colleges in time and impress upon the students and the teachers with their growth plan and career opportunities. Should that happen, there will, perhaps, be a reversal in the flow of student from Service Industry to Metal & Manufacturing industry.

The kind of expansion plans, the Metal Industry, the Automotive industry, the Defence industry, the Aircraft & Aerospace industry, the Nuclear & Thermal Power industry, Petrochemical & Pharmaceutical industry and Mining industry are about to embark upon, will create employment opportunity for nearly 2,00,000 engineers in the classical disciplines over the next 10 / 20 years. Opportunities are many and the SKY IS THE LIMIT .

Conclusions

- Metal industry, downstream manufacturing industries & infrastructural industry are planning major expansions
- Large number of metallurgists and supporting engineers Are needed to man those projects
- Engineering colleges are to double their supply of engineers.

Evening classes may be an immediate solution. Industries should Also embark on extensive training programme to meet their immediate human needs. Polytechnic & iti products should be More extensively used by the industries to-day Universities, engineering colleges & research organizations.

Should change their recruitment policy for research scientists And teaching staff with commensurate salary for high-talents.

- Out of 4,50,000 engineers produced annually in india, over 3,50,000 Engineers are suited for it related industries only as they are not taught anything else. From the balance 1,00,000 engineers, nearly 50, 000 go for me, phd, mba, it and other service sectors in india & abroad leaving just 50,000 engineers for all other industries (minig, Metal, downstream manufacturing & infrastructure industries, etc.)and this is not adequate
- Industries, academic institutions and research organizations Need to be more aggressive in their hr-policy & initiatives
- Compensation package needs substantial improvement *There is no conflict between manufacturing & service industries. they are, in fact, complementary to each other

METAL AND MINERAL INDUSTRY IN INDIA

*Courtesy Shri Anil Gupta
Executive Committee Member, IIM-DC*

The metallurgical and mineral industries provide the basic raw material for industrial development. India is a country with vast geographical diversities that provide a variety of mineral and metal resources. India has known deposits of over 2000 minerals, and currently produces about 90 minerals including metallic, non-metallic and fuel, and also some 20 minor minerals. The country's mineral sector at present operating over 3300 active mines producing coal, iron ore, limestone, lignite, bauxite, copper, lead, zinc, etc.

INDIAN MINERAL INDUSTRY

The mineral production per year is about 650 million tonnes contributing a whopping Rs.60,000 crores to the national economy. The sector employs 290 million workers in the organized and unorganized sectors together.

Apart from this figure, about 70 million workers are indirectly employed depending on mineral industry. The government had introduced various mineral and mining policy resolutions including the Minerals and Metals (Research and Development) Act to provide adequate guidelines for the sustainable development of Indian mining industry.

According to World Mining Data 2010, Asia was the leading minerals producer in the world with 7.35 billion (excluding diamonds and natural gas) metric tons in 2008, a 6.9% increase from 2007.

In the next 4 years, India's metals and minerals industry is expected to reach USD30 billion and to account for 2.5% of India's GDP. The key mining sectors like coal, metallic ores and mining equipment will need major investments for the coming 5 to 10 years in order to support India's high rate of economic growth.

The metallurgical and mineral industries in India form the fundamentals of its industrial growth and development. India has a vast resource base spread throughout the country, which provides the basic raw materials for most of the industries. India produces a total of 84 minerals comprising 4 fuel, 11 metallic, 49 non-metallic industrial and 20 minor minerals. India has an estimated 85 billion tonnes of mineral reserves remaining to be exploited.

For the past three decades, the Indian mining industry has been progressing at an annual rate of 4 percent to 5 percent. The Indian mining industry currently employs over 1.1 million people.

There are over 2,326 private and 292 public operating mines in India and the minerals and metals from these mines contribute about 16 percent in India's total exports. With the recent amendments and Provisions in MM(R&D) Act, October 1996, the minerals and mining sector, which was earlier reserved exclusively for the public sector, has now been opened up for the private sector and the investments in the industry are being encouraged. The Government of India is making efforts to boost up the activities like research and making the mining and mineral's industry more competitive.

India has around 20,000 known mineral deposits and the geological potential in this regard is very substantial. The mining sector in India has already reached a high level of development. The majority (about 80%) of the mines are concentrated in the seven states of Andhra Pradesh, Bihar, Orissa, Madhya Pradesh, Rajasthan, Gujarat and Karnataka. To the total mineral production, the public sector companies operating in the Indian mining industry contribute 100% of copper, diamond, lead, silver and zinc and lignite, 98% of coal, 60% of iron ore and 50% of manganese, bauxite, chromate and dolomite

Exports:

Minerals (both in raw and processed form) constitute a significant portion of India's exports trade. Diamond (mostly cut) continues to be the largest constituent with 81% share of the Indian mineral exports.

Imports:

Crude oil is the largest constituent of imports with 42% (approx) share followed by diamonds (uncut).

INDIA MINING INDUSTRY

India mining industry covers exploration of new minerals and mines, production of mineral resources from various mines in India, processing of the mineral ores like iron ore, bauxite ore, manganese ore etc. to obtain the more useful forms like iron, steel, Aluminium, manganese, etc., extraction of coal, gold, diamond etc. and economic matters of the India industry of mineral ore mining, the governmental mining policy, regulatory acts and laws, mining infrastructure of India, small-scale and mass mining projects, impact of mining jobs on the environment and other community issues.

Overview of Mining Industry in India:

The mining industry in India includes both metallurgical and mineral mining industries in India and together they form the backbone of the industrial development of India as they provide the basic raw materials like coal, petrol, mining minerals, steel, copper, Aluminium metals etc. to the India manufacturers.

Mining Products in India:

India mining products include a total of 84 minerals consisting of 4 fuels, 49 non-metallic industrial minerals, 11 metallic minerals, and 20 minor minerals. These mined products include: Aluminium, coal, cobalt, copper, chromium, diamond, gold, iron ore, lead, manganese, molybdenum, nickel, oil sands, palladium, platinum, silver, tantalum, tin, titanium, tungsten, uranium, vanadium, zinc, etc.

Location of Mining Sources or Mines in India

- o **Petroleum:** Bombay High Field, Gujarat and Assam
- o **Coal:** Tamil Nadu, Chhatisgarh, Maharashtra, Orissa, West Bengal and Andhra Pradesh
- o **Iron Ore:** Andhra Pradesh, Bihar, Goa, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Rajasthan etc.
- o **Diamonds:** Panna Mines in Madhya Pradesh, Andhra Pradesh and Orissa
- o **Gold & silver:** Kolar fields in Karnataka, Dona block in Andhra Pradesh, Bansawar district Rajasthan and Madhya Pradesh.
- o **Bauxite:** Orissa, Andhra Pradesh, Madhya Pradesh, Gujarat, Maharashtra, and Bihar
- o **Chromite:** Byrapur, Karnataka, Boulga, Kathpal, and Orissa
- o **Copper Ore:** Madhya Pradesh, Rajasthan, Bihar and Sikkim
- o **Granite:** Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Orissa, Rajasthan, Tamil Nadu, Uttar Pradesh etc.

- **Lead and Zinc Ore:** Rajasthan, Andhra Pradesh, Bihar, Gujarat, Maharashtra, Sikkim, Tamil Nadu, Uttar Pradesh
- **Manganese Ore:** Madhya Pradesh, Goa, Maharashtra, Andhra Pradesh, Bihar, Gujarat, West Bengal and Karnataka

Mining Companies in India:

- NCDC - National Coal Development Corporation of India
- NMDC - National Mineral Development Corporation of India
- BALCO - Bharat Aluminium Company
- PPCL - Pyrites, Phosphates and Chemicals Ltd.
- HZL - Hindustan Zinc Ltd.
- NLCL - Neyveli Lignite Corporation Limited
- HCL - Hindustan Copper Ltd.
- BGML - Bharat Gold Mines Ltd.
- SAIL - Steel Authority of India Limited (formerly it was Hindustan Steel Ltd.)

India's contribution in the mineral production in world:

- India is leading producer of mica blocks and mica splitting
- Third largest Chromite producer in the world
- Third in production of coal, lignite and barites
- Fourth largest iron ore producer
- Sixth largest bauxite and manganese ore producer
- Tenth position in Aluminium
- Eleventh position in crude steel production in the world

Analysis of Indian Mining Industry

Strengths:

- With the aim of encouraging investment in mining industry in India, the government offers a wide range of concessions to investors engaged in the mining activity.
- India is the world's largest producer of mica; third largest producer of coal and lignite; and also ranks among the top producers of iron ore, bauxite, manganese ore and aluminum.
- The availability of cheap labour for the industry offers a major attraction to the global players.
- India offers low labour and conversion costs.
- India still has a large quantity of untapped high quality reserves.
- India exports iron-ore to China and Japan on a large scale.
- **Strategic location:** India's Proximity to the developed European markets and fast-developing Asian markets for export of steel, aluminum also offers an added advantage.

Weaknesses:

- India still does not have properly developed infrastructure facilities in the sector.
- The mining technology is often outdated
- Low innovation capabilities
- Labor force is highly un-skilled and inexperienced.
- High rate of accidents gives rise to a number of health and safety issues.
- Lack of R&D efforts and training and development

Emerging Challenges in Mining Industry

Technological challenges -The technology being used in India is outdated and needs to be brought up to date. *Environmental issues*- The threats and effects on the environment due to the various functions of this industry constitute a growing concern. *Health and safety issues*- The increasing number of accidents in the industry has posed a lot of health and safety issues for the workers in the sector.

Scope of Mining Sector

The mining and minerals industry provides an important support to the economy and is of strategic importance to every country. The mining sector in India has reached a high level of development but it still has a lot of unrealized potential. Owing to the use of outdated technology, Indian companies are at times unable to explore and exploit many reserves. The current mining technology and practices being used allow mining only to the depth of 300 meters, which means that 25% of the reserves of India still remain unexploited. There are opportunities for discoveries of sub-surface deposits with the application of modern techniques and processes.

With a view to encourage initiative and make the mining and minerals industry more competitive, the Government of India has opened up the sector to private players and foreign investment. It is also making efforts to boost the 'Research and Development' in the sector because there is a lot of untapped potential in India. Focusing on technology for future, India's numerous technology research institutes are working on energy related R&D.

Minerals and mining sector contributes significantly to the economic growth and development of India in the form of exports, raw material to other industries in the country and finally vast employment opportunities and a high rate of wages. The Indian mining industry currently employs over 1.1 million people and offers a wide range of opportunities to mining engineers in the public as well as private sector. The government offers a wide range of concessions to investors engaged in the mining activity. India is the world's largest producer of mica; third-largest producer of coal and lignite; and also ranks among the top producers of iron ore, bauxite, manganese ore and aluminum. The availability of cheap labour for the industry is a major attraction to the global players. India has around 20,000 known mineral deposits and the geological potential in this regard is very substantial. There are over 2,326 private and 292 public operating mines in India, and the minerals and metals from these mines contribute about 16 percent to India's total exports.

A high demand for mining engineers is found in the gulf countries like Saudi Arabia, Kuwait, UAE / Dubai, and specially Qatar. Gulf countries, collectively functioning, as members of OPEC, are the hubs of crude oil, petroleum and related products in the world and are reporting a spurt in the requirement of mining engineers. Therefore, a career in gulf countries is also a lucrative option for the students interested in taking mining as their career.

Future of the Sector

Mining is an important part of every economy. In a world that is already facing shortages of some of the important minerals and metals like petroleum and coal, the demand for such products is only bound to increase with time. Meeting those demands will be a challenge for the mining and minerals industry worldwide. With the increasing efforts in R&D and technological innovations, the mining and minerals industry has developed huge Human resource requirements. There is already a shortage of skilled workforce throughout the world. Developments are taking place rapidly and many companies in this sector are expanding their operations and are working on new projects like the refinery being constructed by Reliance Industries Limited in Jamnagar. Also Bharat Petroleum is conducting R&D for value added products and alternate fuels. So to conclude, it can be said that mining and minerals sector has a bright future, be it in terms of employment or technology.

How should Board of Directors handle Enterprise Risk Management (ERM)?

P R Chandna
Executive Committee Member
IIM Delhi Chapter

The most extensive delineation of board responsibilities has been enumerated in the Canadian Corporate Governance Guidelines, which has identified beside other components the following two specific components:

1. Adoption of a strategy planning process.
2. Management of Risk.

The role of the board of directors (BOD) in **Enterprise Risk Management (ERM)** oversight includes:

1. Determining a risk-adjusted corporate strategy and adequate metrics to track executive performance in the pursuit of such a strategy,
2. Approving a risk inventory and fundamental ERM parameters (such as risk measurements, risk appetite and tolerance levels) as part of the annual business plan.
3. Being about the effectiveness of designed procedures.

In determining its risk oversight structure, the board should conduct a preliminary analysis of corporate governance practices. Specifically, it should consider the following issues:

1. The independence, professional expertise, and time availability of board members;
2. The assignment of board oversight functions to specialized board committees;
3. The quality of the information flow between board members and management.

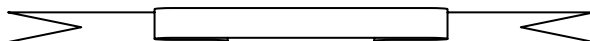
Delegating Responsibilities within the Organization: A growing number of companies have been assigning such leadership responsibilities to a dedicated chief risk officer (CRO). But companies should assess the time availability of existing executive positions, evaluate skills and expertise needed, determine the need to promote visibility and authority, and weigh a number of other issues before deciding whether such a position will prove a valuable contribution to the ERM efforts.

From the foregoing it is essential that, the board cannot and should not be involved in actual day-to-day risk management. Directors should instead, through their risk oversight role, satisfy themselves that the *risk management processes* designed and implemented by executives and risk managers are adapted to the board's corporate strategy and are functioning as directed, and that necessary steps are taken to foster a culture of risk-adjusted decision-making throughout the organization. Through its oversight role, the board can send a message to the company's management and employees that corporate risk management is not an impediment to the conduct of business nor a mere supplement to a firm's overall compliance program but is instead an integral component of the firm's corporate strategy, culture and value generation process.

Given the increased significance of the risk oversight role in the current risk environment, a company's risk management system should function to bring to the board's attention the company's most material risks and permit the board to understand and evaluate how these risks interrelate, how they affect the company, and how management addresses these risks. It is important for directors to have the experience, training and knowledge of the business necessary for making a meaningful assessment of the risks that the company faces, however complicated they may be.

The board should also consider the best organizational structure to give risk oversight sufficient attention at the board level. In some of the companies, this may include creating a separate risk management committee or subcommittee. In others, it may be sufficient to have the review of risk management as a dedicated, periodic agenda item for an existing committee such as the audit committee, in addition to periodic review at the full board level. While no "*one size fits all*" it is

important that risk management be a priority and that a system for risk oversight appropriate to the company be put in place.



Article was first published on the web on 18th June 2009.

4th Summit on Sustainable Mining to Green Steel Making

The above conference was held at Hotel Le Meridian, New Delhi on 21st February 2011. The following members from Executive Committee of IIM Delhi Chapter participated in the summit.

- Mr. Raj Tiwari
- Mr. S C Suri
- Mr. P K Chatterjee
- Mr. V K Tyagi
- Dr. (Mrs.) Malti Goel
- Mr. G I S Chauhan

The conference had the following sessions:

- Inaugural Session
- Plenary Session I - Sustainable Mining and its business challenges in India
- Plenary Session II - Green Steel focusing on environment sustainability in the Indian Steel Industry
- Plenary Session III - Transporting 600 MT steel and Raw Materials by 2020
- Valedictory Session

The conference was sponsored by Ministry of Steel & Ministry of Mines. The conference had participants from ICC, Ministry of Mines, Planning Commission, Ministry of Environment and Forest, Crisil, MSTC etc. Chief Executives of companies like SAIL, Tata Steel, ArcelorMittal, NMDC, INSDAG participated in the deliberations. The conference theme address was delivered by Shri S K Roongta former Chairman, SAIL. Shri Sri Prakash Jaiswal, Hon'ble Minister of Coal delivered the valedictory address in the Valedictory Session.

SOME STATISTICS ON STEEL PRODUCTION

World DRI production reached 64.4 Mt in 2009, which is remarkably healthy in light of economic conditions. India, once again, led all nations in DRI production with over 22 Mt, more than one third of the world total. Of this, 16.2 Mt were made in coal-based rotary kilns. There are approximately 350 of these furnaces operating within India.

Table 1: Global DRI production in 2009

Rank	Country	DRI Production, Mt.
1	India	22.0
2	Iran	8.2
3	Venezuela	5.1
4	Saudi Arabia	5.0
5	Russia	4.7
6	Mexico	4.2
7	Egypt	2.9
8	Malaysia	2.3
9	Qatar	2.1
10	Trinidad	2.0

Raw Materials for Steelmaking

Possession and control of steelmaking raw materials now determine the sustainability of a steel company. Europe is now facing the problem in view of the soaring prices of iron ore and coal over the last few years. In the Asian region, India has the highest level of self sufficiency followed by Posco

and Japan. China and Taiwan have very meager source of iron ore. The self sufficiency in raw materials amongst the few major steel plants in Asia are shown in Table 2.

Table 2: Self sufficiency in raw materials, %

	Iron Ore	Coking Coal
Steel Authority of India	103	0
Tata Steel (consolidated)	29	11
Posco	18	26
Nippon Steel	24	11
JFE Holdings	15	15
Blue Scope	18	-
JSW	201-	-
China Steel	1	1

GLOBAL STEEL SCENARIO

In 2009, the production of crude steel of five major steel producing countries were (Mt):

- China 567.8
- Japan 87.5
- India 62.8
- Russia 60.0
- United States 58.2

Table 3: Top ten global producers of crude steel

Company	2008 Rank	Production, Mt	2009 Rank	Production, Mt	Change, %
Arcelor Mital	1	103.3	1	73.2	-29.1
Hebei I&S	4	33.3	2	40.2	+20.7
Baosteel	3	35.4	3	38.9	+9.9
Posco	5	33.1	4	31.1	-6.0
Wuhan I&S	7	27.7	5	30.3	+9.4
Anshan-Benxi	9	23.4	6	29.3	+25.2
Jianfsu Shagag Group	10	23.3	7	26.4	+13.3
Nippon Steel	2	35.6	8	24.3	-31.7
JFE	6	33.0	9	23.5	-28.8
Tata Steel	8	24.4	10	21.9	-13.5

Source : China Iron and Steel Association

Steel Scenario In Asian Countries

Table 4: Crude steel production, since 2001 and projection upto 2012 in Million tonnes.

	2001	2202	2203	2004	2005	2006	2007	2008	2009	*2010	*2011	*2012
China	151.6	182.4	222.3	282.9	353.2	419.1	489.3	500.3	567.9	625.0	660.0	679.8
India	27.3	28.8	31.8	32.6	45.8	49.5	53.5	57.8	56.6	65.2	71.1	77.4
Japan	102.9	107.7	110.5	112.7	112.5	116.2	120.2	118.7	87.5	109.6	119.8	120.9
South Korea	43.9	45.4	46.3	47.5	47.8	48.5	51.5	53.6	48.8	59.5	64.8	64.8
Taiwan	17.3	18.2	18.8	19.6	18.9	20.0	20.9	19.9	15.7	21.6	22.9	25.5
Other Asia	11.6	12.5	12.5	17.1	17.3	19.0	21.5	20.7	15.7	18.0	18.9	19.8

Category-wise Production of Steel

The total crude steel production has increased by 11% in 2009-10 despite fall in production in many other countries. Tata Steel, JSW Steel and JSPL have achieved significant rise in production as shown in the following Table.

Table 5 : Plant-wise cumulative production of crude steel in Kilotonnes

	*April-March'10	April-March'09	Change YoY, %
1. Main Products			
(A) SAIL	13509	13409	0.7
i) BSP	5108	5183	-1.4
ii) DSP	1966	1886	4.2
iii) RSP	2128	2083	2.2
iv) BSL	3599	3577	0.6
v) ISP	400	417	-4.1
vi) ASP	205	168	22.0
vii) SSP	0	0	-
viii) VISL	103	95	8.4
(B) Tata Steel	6563	5646	16.2
(C) RINL (VSP)	3205	2963	8.2
Total-Main Produces	23277	22018	5.7
2. Other major Producers			
(A) JSW Steel	5257	3218	63.4
(B) Essar Steel	3474	3342	3.9
(C) Ispat Steel	2689	2201	22.2
(D) JSPL	1961	1457	34.6
Total-Major Producers	13381	10218	31.0
3. Other Producers			
Grand Total			

*Provisional figures

Courtesy: Steel Tech, July 2010

IIM Delhi Chapter Website

Chairman IIM Delhi Chapter, Mr. Raj Tiwari, formally inaugurated the dedicated Website of IIM Delhi Chapter on 29Jan.2011. The basic objectives for creation of this Website have been:

- ✓ Quick communications with the members of IIM Delhi Chapter
- ✓ Instantaneous availability of information related to different activities of Delhi Chapter
- ✓ Instantaneous availability of current and previous copies of Monthly News Letter
- ✓ Posting of useful technical information for members of Chapter
- ✓ Information about Members
- ✓ Photographs of different activities of the Chapter
- ✓ Reduction and gradual elimination of paper circulars

The website is fully functional (www.iim-delhi.com) and contains the following information:

- ✓ Home Page giving at a Glance Chairman's Message; a detailed Write-up about IIM Delhi Chapter, Current Activities and Current Publications
- ✓ Detailed information about Current Executive Committee members and mention about previous Executive Committees
- ✓ Detailed information about Current and forthcoming activities. Here a copy of presentations made at all such technical talks/conferences etc. are also being posted
- ✓ Soft copies of Publications released by IIM Chapter (including current as well as old Monthly News Letters) are also being posted
- ✓ Useful links to Professional Organisations, Related departments of Govt. of India, Mines & Metals Industries and Academic Institutes
- ✓ Detailed information about Members of IIM Delhi Chapter. Here members can update their own information after completing the registration formalities
- ✓ Photographs of Current & Past activities

This Website has a direct Link with the official website of IIM Headquarters at Kolkata.

All members of IIM Delhi Chapter and other interested personnel are urged to access the Website regularly for up-to-date information about various activities being organized.



R. Singh & Associates (P) Ltd
Consulting Engineers | Since 1968

ISO 9001-2000

Engineering Success for you



IRON MAKING

DRI Plants, Sinter Plants, Blast Furnaces

STEEL ROLLING

Flat Product/Long Product Hot Rolling Mills
Cold Rolling Mills & Processing Lines



STEEL MAKING

Electric Arc Furnaces, Basic Oxygen Furnaces
Induction Furnaces, Secondary Metallurgy through
Ladle Furnaces, Vacuum Degassing Units,
Converters, Continuous Casting Machines



MATERIAL HANDLING SYSTEMS

Raw Materials
In Process Material
Finished Products

www.singenes.com

Corporate Office: 37, Rajpur Road, Delhi - 110 054 Tel: +91 11 23910194, 23941600 Fax: +91 11 2394 1356 e-mail: info@singenes.com

Engineering Office: 3rd Floor, Virat Bhawan Commercial Complex, Dr. Mukherjee Nagar, Delhi - 110 009
Tel: +91 11 2765 0153, 2765 4006 Fax: +91 11 2765 4007

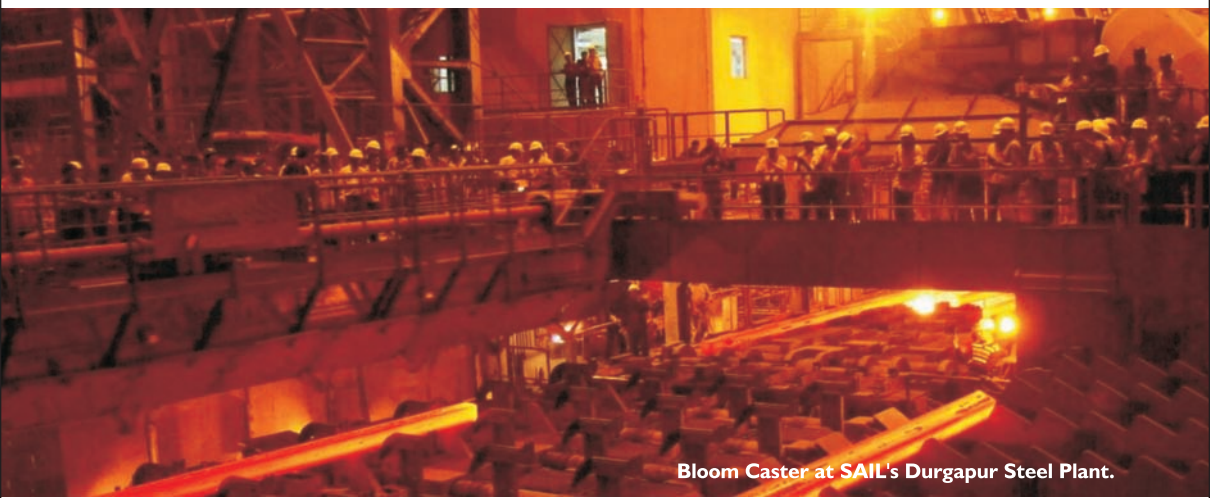
Branch Offices:

Kolkata: 5th Floor, Diamond Chambers, No. 4 Chowringhee Lane, Kolkata - 700 016 Tel: +91 33 4001 4859

Mumbai: A-4, Queen's Park Apartments Juhu Road, Mumbai - 400 049 Tel: +91 22 2660 4429 Fax: +91 22 2660 0359



SAIL - A Maharatna Company



Bloom Caster at SAIL's Durgapur Steel Plant.

Steel Authority of India Ltd. (SAIL), owns and operates five integrated steel plants at Bhilai, Durgapur, Bokaro, Rourkela and Burnpur and three special steel plants at Salem, Durgapur and Bhadravati. SAIL also produces iron-ore. It has its own captive mines that fulfil its iron ore requirements. A subsidiary at Chandrapur produces ferro alloys. SAIL has recently been awarded the prestigious status of a *Maharatna* by the Government of India.

- All its production units are ISO 9001:2000 certified.
- Current annual production of crude steel is around 14 Million Tonnes (MT). Produced over 350 million tonnes of crude steel since its inception.
- SAIL's product basket comprises Flat products, Long products and Pipes, including branded products such as SAIL TMT, SAIL JYOTIGP/GC Sheets.
- Supplier to strategic sectors like defense, atomic energy, power, infrastructure, heavy machinery, oil & gas, railways, etc.
- Supplier of rails to the Indian Railways.
- Major production units are ISO:14001 certified.

SAIL STEEL - Catering to Diverse Segments



Bandra-Worli Sea link



Windmills



Chandrayaan



Railways



Hydro Power



Construction



Petrochemicals



Naval Warship



Power



Infrastructure



स्टील अथॉरिटी ऑफ इण्डिया लिमिटेड

STEEL AUTHORITY OF INDIA LIMITED

www.sail.co.in

There's a little bit of SAIL in everybody's life



Steel Authority of India Limited (the "Company") is proposing, subject to market conditions and other considerations, to make a further public offering of its equity shares in the near future and is in the process of filing a red herring prospectus with the Securities and Exchange Board of India and the Registrar of Companies, National Capital Territory of Delhi and Haryana, India. This material is not an offer of securities for sale in the United States or elsewhere. This advertisement is not to be released in the United States, Australia, Canada or Japan. The shares of the Company are not being registered under the Securities Act of 1933, as amended (the "U.S. Securities Act") and may not be offered or sold in the United States unless registered under the U.S. Securities Act or pursuant to an exemption from such registration. There will be no public offering of the shares of the Company in the United States.