NEWSLETTER
THE INDIAN INSTITUTE OF METALS
(DELHI CHAPTER)

RAJ TIWARI
Chairman, Delhi Chapter

S. C. SURI
Chairman, Technical & Publication Committee

Issue No. 35/2010 **Vol. XXXV "Monthly"** **Date: 31.07.2010**

INTRODUCTION

This News Letter is containing briefs on second Executive Committee Meeting for the year 2010-11.

The News Letter contains the following Technical Write-ups:

1. " Hi-tech and Special Steels – A Profile" by Shri S C Suri, Life Fellow IIM and Chairman, Technical & Publication Committee
2. "Master Metal" by Shri P K Chatterjee, Chairman, Building Committee, IIM-DC.
3. "Indian Foundry Industry- Procurement Challenges" by Shri Neeraj Gupta, Member, Tech. & Publication Committee, IIM DC.
4. "A Brief on Corex & Finex Iron Making Process" by Shri G I S Chauhan, Member, Tech. & Publication Committee, IIM DC.
5. "Uranium Mining & The Superstitions" by Shri L. Pugazhenthy, Past President IIM & ED-ILZDA

The News Letter also contains news relating to SAIL a Maharatna PSU Company.

Published By
G D Renwal, Executive Officer
on behalf of
"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

Chapter News

Executive Committee Meeting

The second EC meeting was held on 26th June 2010. It was decided to have a micro-website of IIM-DC. The Chairman, Building Committee was requested to prepare a final recommendation to EC regarding renovation work of auditorium.

Technical Talk

A technical talk by Mr. Sachin Tyagi, a PhD Scholar of IIT Roorkee, on the topic **"Reaction Kinetics and Magnetic studies of RADAR Absorbing $SrFe_{11.2}Ni_{0.8}O_{19}$ Hexaferrite Nanoparticles"** was organized on 31st July 2010 at 13.00 hours in the Board Room of IIM Delhi Chapter. During the presentation, Mr. Tyagi elaborated the importance of nano-crystalline nickel substituted strontium hexaferrite, $SrFe_{11.2}$ Ni $_{0.8}O_{19}$ powders for various applications. He emphasized about fundamentals of this material in particular synthesis and characterization. The structural, microstructural and magnetic characterization was dealt in depth. The effect of systematic morphological transformation of nano-crystals on reflection loss properties were estimated by absorber testing device (ATD) in Ku band (12-18 GHz). Development of this nano-ferrite by chemical methods results in development of coatings for Radar Absorption Application. This talk was followed by lively technical discussions and question-answer session.

News About Members

Shri D K Likhi, Life Member of IIM and member of Tech. & Publication Committee of IIM-DC has completed his PhD in "Strategic Alliance" from IIT, Delhi. The degree shall be awarded on 8th August 2010. Shri Likhi holds M. Tech., degree along with MBA from Maastricht School of Management, Netherlands. He is presently employed as General Manager in Maharatna PSU – SAIL, New Delhi holding the responsibility of heading Business Development Projects and Strategic Management Processes.

Heartiest Congratulations to Mr. D K Likhi!

IIM CHAPTERS ANNUAL SESSION

The IIM Chapters Relationship Committee organized the above meeting at Tollygunge Club, Kolkata on Monday 26 July 2010. It is proposed to organize the Annual Session every year, a day before the IIM AGM at Kolkata, so that chapters could exchange notes on their activities, programmes etc., and also share each other's experiences. It is an ideal opportunity for relations development and networking among the chapter office bearers.

About twelve chapters attended the annual session. The deliberations began with a welcome and opening remarks by Mr L Pugazhenthy, Co-Chairman, IIM Chapter Relationship Committee. Mr Pugazhenthy paid rich tributes to the Former IIM President, Dr L R Vaidyanath who passed away that day at Kolkata and this was followed by tributes from Mr R N Parbat, Former IIM President and Mr S S Dasgupta, Former Hon. Secy IIM. Mr Ashok Kr Das, a former Jt. Director, EMD, SAIL addressed the gathering on "Environmental Issues & Concerns in the Indian Metals Industry". Subsequently two school students from Jamshedpur and one undergraduate student from BE College, Shibpur spoke on their "PERCEPTIONS ON METALS & CAREER IN METALLURGY", which was truly enlightening and thought - provoking. Thereafter the chapters made respective presentations that were very fruitful and informative. The meeting came with a set of recommendations and suggestions, to be published in the forthcoming issue of "METAL NEWS".

Hi-tech and Special Steels – A Profile

S C Suri
Life Fellow, IIM & Chairman
Technical & Publication Committee

I Introduction

Steel has multifarious usage, be it for the structural, for industrial buildings, roads, bridges or offshore oil drilling rigs, sheets for rural housing roofs and house-hold, buckets, electric transmission towers and oil transportation etc.

To satisfy the ever increasing demand of steel with improved property, newer steel making and processing methods have been developed. This has been done to reduce the impurity levels. Increasing attention is being paid towards product reliability better performance through quality improvement. The paper reviews the use of such hi-tech and special steels.

II Engineering Steels

These steels are used for components requiring critical and stringent levels of elasticity, strength, toughness, fatigue resistance, corrosion resistance, wear resistance, machinability and formability. Applications are found through out the automotive, aerospace, railways, oil, coal and gas extraction, power generation, defence, chemical, agriculture, construction and general engineering manufacturing industries.

There are several types of engineering steels like carbon, micro-alloyed and alloyed engineering steels including direct hardening, carburizing, nitriding, creep resistant, free cutting, cold forming and spring steels. The conventional process applied to engineering steel involve tube making, forming and machining from blooms, billets or bright bars, rods and wires.

III Steel for Railways

Developments in rail transport have been characterized by rising speed beyond 250 Km/hr, higher axle loads, longer and heavier trains, increased frequency, increased use of welded rails, conversion to diesel and electric operation, higher acceleration and more effective braking. Together it adds up to tougher service conditions and correspondingly stringent specification for the rails. With railway transport moving towards higher speed of rolling stock, new developments have taken place in manufacture of railway wheels and wheel sets. Other development on railway product development front are that we have the development of CORTEN steel, which is a high strength low alloy steel containing small quantity of P, Cu, Cr and Ni. This steel has special rust resistance characterization.

IV Automobile Steels

With the drive towards fuel efficiency and weight reduction, there have been dramatic changes in the materials used for automobile. This has led to development of high quality, high strength thin sheets that provide excellent press formability and development of several coated products.

Steels required for automobiles are mostly thin flat products, i.e. cold rolled sheets, hot rolled sheets and coated sheets.

V EDD Quality Steels

Al killed steels are now used for most difficult auto body applications. Al killed EDD

steels contain 0.02 – 0.05% carbon, 0.003 to 0.008% nitrogen, 0.02 to 0.03% Mn and 0.03 to 0.06% soluble aluminium. The levels of S, P and Si are generally below 0.02%. These steels have yield strength of 190 to 200 MPa. These steels have excellent formability characteristics.

VI High Strength Low Alloy (HSLA) Steels

These steels are micro-alloyed with Nb, V or Ti. These additions contribute to the strength partly by grain refinement and partly by precipitation of carbides and nitrides. The demand for such steels exists both in hot and cold rolled condition.

HSLA steels comprised a new class engineering materials which are low carbon steels modified with a small addition of Vanadium, Niobium or Titanium. These additions are generally less than 0.1%. HSLA steels exhibit a two or three times high yield strength ranging from 350 to 500 MPa. Since the percentage of alloying elements like Niobium, Vanadium or Titanium of less than 0.1%, these steels has also termed as micro-alloyed steels. These steels gain their strength mainly because of grain refinement and precipitation hardening.

VII Dual phase Steels

Dual phase steels owe their strength to the development of micro-structure of ferrite grains with up to about 15 Vol % of a hard second phase. Tensile strength up to 800 MPa or more may be produced with good combination of strength and strechability but with moderate drawability. These steels are required both in hot and cold rolled condition.

VIII Bake Hardening (BH) Steels

BH steels use carburizing in paint baking to increase the final strength of the formed part. In this way the higher formability at low initial strength is taken advantage of.

IX Interstitial free (IF) Steels

Different auto body pressings of complex geometry have necessitated the use of steel grades with strength lower than even normal mild steel. These low strength steels with yield strength significantly lower than 170 MPa have enhanced formability. IF steels are vacuum degassed containing Ti/or Nb which combine with interstitial C&N to form TiC, TiN or Nb, CN precipitates. These steels contain no free C or N in solid solution in ferrite. Hence they have yield strength lower than those of aluminium killed steels and thus have better formability.

X Coated Steels

As the thickness of the steel sheet is getting progressively reduced for achieving weight reduction and thus fuel efficiency, the need to project for longer life has become more acute. Coated steel products is superior alternative than normally cold reduced products. These steels could be (a) hot dipped metallic coated steels. Or matte finished hot dip single or double side coatings. Besides metallic coatings, we can have organic coatings also which are in predominant use.

XI Steels for Defence Sector

Warship

There exists a wide range of environment in which a warship is likely to operate. The life of a warship is generally around 20 years. The hull portion and the electrical generation system account for one-third of the warship unit cost.

The hull is a welded steel structure and consists of a lower portion (the main strength-

deck) where the strengthening is provided by longitudinal frame. Typical steels of these applications contain a small percentage of Niobium and Vanadium which is generally around 0.003%.

For surface vessels, the yield strength of mild steel is sufficient for lightly loaded plates of up to 10 mm thickness.

XII Steels for Production of Plates for ship building

In conventional plates mill rolling the products especially the thicker sections have coarse grain. The present trend is towards having quality plates which have longer life for the ship-building materials. The properties are attained by thermo-mechanical rolling, normalizing and quenching of thicker plates.

XIII Vibration Dumping Steels

These steels were originally developed in Sweden and USA. These are laminated type of steel sheets. In which a thin resin layer is sand-witched between two steel sheets. The core resin exhibits outstanding vibration dumping performance. The skin sheet is cold rolled steel. The need for such steel is highest in the automobile sector. The other applications are in the field of bridges, ships and for manufacture of oil pans for trucks.

XIV Steels for Power Sector

In this category we have steels for boilers and heat exchanger tubes.

There have been remarkable changes in manufacture of technology in tubular products. In the boiler and heat exchanger tubes, the trend is to increase the life of tubes which can withstand higher pressure. The steels for heat exchanger tubes contain a high percentage of Chromium and a small percentage of Moly in addition to small percentages of Niobium, Vanadium and Nitrogen.

As for 9 Cr type steel, various grades have been studied for commercialization, the notable ones being 9 Cr 2 Mo with an addition of Nb, V or N which has a higher tensile strength than that of 225 Cr – 1 Mo steel enabling economic design of boilers.

XV Steels for Nuclear Power Reactors

In initial stages 304 stainless steel was used for tubular products for nuclear power reactors. In order to overcome the problem of stress corrosion cracking, extra low carbon steels have been developed.

The steels employed for pressure vessels of power reactor are of plain carbon low alloy, quenched and tempered variety. Chromium stainless steels and austenitic stainless steels are also used for nuclear power reactors.

XVI Steels for Electrical Applications

Extensive R&D works has been done in the field of electrical applications both in CRGO & CRNO variety. While the CRNO steel has been fully commercialized, we still have not stabilized the production of CRGO Steels.

XVII Steels for Nuclear Applications

Basically the nuclear reactors can be of the following types:

1. Pressurized water reactor

2. Boiling water reactor
3. Pressurized heavy water reactor
4. Gas cooled reactor
5. Liquid metal cooled breeder reactor

Low alloy steels are generally used for manufacture of large nuclear components. The low alloy steels contain varying proportions of Chromium, Nickel and Moly.

XVIII Stainless Steels

The stainless steels can be of different varieties namely Ferritic Stainless Steel, Austenitic Stainless Steel, Duplex Stainless Steel, Martensitic Stainless Steel etc. These different categories of stainless steel are known for their special properties and are being extensively used for various applications. Different categories of stainless steel contain varying percentage of Chromium, Nickel, Moly, Niobium, Copper and Titanium. The specific purpose for which a particular grade of stainless steel is used depends on the specific applications.

XIX Steel for Chemical Process Industries

In chemical process industries, we use either stainless steel of austenitic grade or high performance alloys which are of Nickel, Chromium, Moly variety. These alloying elements range even up to 30% of these alloying elements. High performance alloys offer better corrosion resistance.

In the chemical industry, stainless steel is generally used for corrosion resistance applications.

XX Conclusion

With rapid industrialization requirement of high tech and special steels has grown. Bulk of these steels is presently being imported. It is necessary that possibility of manufacturing these steels within the country is examined. Our steel plants shall require additional facilities for their production.

There is also an urgent need to have a detailed demand supply analysis. We should also have a detailed review as to what additional facilities we need in our steel plants so that bulk of these steels can be indigenously produced.

****

Master Metal

P K Chatterjee
Life Member & Chairman Building Committee,
IIM Delhi Chapter

It is believed that human race came across this metal in the Stone Age. Study of ancient people and their behaviour signals that about sixty centuries ago, the ancient Egyptians made ornaments from it. The ornaments were probably dearer than those made from gold, for this metal was rarer than gold. Man could find it only in meteorites.

About twenty centuries later, man struggled to procure this metal from ore probably in the plains of Egypt or Mesopotamia. Archaeologists after great efforts found fragments of tools made from this metal in the great Pyramids of Cheops. Greeks and the ancient people of

Caucasus came upon this metal over three thousand years ago. Chinese came to know this metal after about five hundred years. Indians conquered it over 1500 years ago. The Harappan civilization used a variety of minerals and metals, including this metal. The significance of minerals and metals in Indian civilization was also referred to by Chanakya in his famous "Arthashastra" dating back 320-620 AD. The pillar of this metal in Delhi made over fifteen hundred years ago is a metallurgical wonder since it has not rusted at all over all these years. The aborigines of America and Australia learnt about it as late as about five hundred years ago.

Where and how it came to be known, this new metal seized the place of stone for making tools and weapons. It was used to make axes, hammers, ploughs, utensils, swords and also ornaments. It also ousted Bronze which had given its name to a whole age in man's history. Now the new metal gave its name to a new age. Historians do not extend this age to include our time. They stop somewhere in the beginning of the Christian era. But this does not imply that it has fallen out of use since then. Rather during the past millennia, it has found thousands of new uses and revealed its versatility.

In the 18th century its uses were limited to weapon, anchors, nails, files, knives, saws and axes.

In the 19th & 20th centuries, the number of product from this metal grew tremendously.

In 1779 England built its first bridge from this metal.

In 1787 the first vessel made from this metal was launched

In 1788 the first forty miles of water pipes made from the same metal were laid in Paris.

All of present day civilization hinges on the several thousand million tons of this material extracted from ore and made into various machines and structures.

The name of this metal, the chief one on man's history is IRON.

Iron is a good mixer. Except alkaline and alkaline earth metals and in most cases, silver, mercury, gallium, lead and bismuth, it makes alloys with all other metals. However, the most important of all alloys is that of iron and carbon. It makes a whole range of steel. There is a little bit of steel in everybody's' life.

About 850 million tons of crude steel was produced and consumed in year 2000, about 1150 million tons in year 2005 and about 1330 million tons in 2008. The commanding status of steel as a material for the uplift of mankind is well established.

Victor Hugo has said – no one can stop an idea whose time has come. Thus, the many sided growth of a versatile material like steel cannot be stopped. It will thrive.

Rudyard Kipling had articulated many years ago:

Gold is for the mistress, Silver for the maid,

Copper for the craftsmen cunning at his trade

"Good" said the Baron, sitting in the hall,

"But, Iron – cold iron, is the master of them all"

The emotional thought expressed in the above rhyming verse shall continue to prevail.

……..

INDIAN FOUNDRY INDUSTRY- Procurement Challenges

Neeraj Gupta
Member, Technical and Publication Committee,
IIM Delhi Chapter

The operation of a ferrous foundry is constituted by number of unit operations. If a foundry unit has to fulfill current technological norms and financial aspirations, proper planning leading to procurement are 24X7 jobs requiring dexterity and tenacity. A foundry requires very diverse raw materials; we shall focus on procurement of metal in the following paragraphs as this is the biggest expenditure head:

The procurement manager of a foundry has to be extra careful as melting - a unit operation here- tends to homogenize the metal. The mechanical and chemical properties of the final product are strongly influenced by the melt chemistry. The range of the mass percentages of various alloying elements and their strong impact on the product properties is mentioned below:

Iron	C %	Si %	Mn %	S %	P %	Others %	Brinell Hardness	Tensile Strength Min, Psi	Uses
Grey	3.30-3.60	2.30-2.60	0.50-0.80	0.20 max	0.30 max	-	192 max	-	General Purpose
Grey	3.10-3.50	1.90-2.30	0.60-0.90	0.125 max	0.12-0.18	-	163-228	30,000	Motor Blocks
Grey	3.50-3.90	2.20-3.10	0.40-0.80	0.10	0.30-0.80	-	222-267	-	Piston Rings
Grey	2.90-3.20	0.90-1.10	0.65-0.90	0.05-0.12	0.20-max	1.00-1.50 Ni 0.50 Cr	200-240	40,000	Heavy Machine bases
Grey	2.60-2.80	2.20-2.50	0.90-1.00	0.08 max	0.08 max	0.75-1.00 Ni 0.10-0.20 Cr 0.75-1.25 Mo	220-240	60,000	Diesel engines crank shafts
Chilled	3.25-3.60	0.50-0.65	0.40-0.60	0.15max	0.30-0.45	-	-	-	Freight Cars Wheels and rolls
White Malleable	2.20-2.40	0.90-1.10	0.35-0.50	0.12max	0.14 max	0.03 Cr max	Over 320 As cast	50,000	General Purpose
Cupola Malleable	2.70-3.20	0.60-0.80	0.45-0.60	0.15 max	0.15 max	-	-	-	Pipe fittings
Ductile	3.60-4.20	1.25-2.00	0.35	-	0.08	0.00-1.00 Ni 0.05-0.08 Mg	140-200	60,000	Shock resisting parts, pressure castings, valve and pump bodies
Ductile	3.20-3.80	2.25-2.75	0.60-0.80	-	0.10	1.5-3.5 Ni 0.05-0.08 Mg	200-270	80,000	Heavy duty machinery, Gears, Dies, Rolls

This can be readily seen that the cumulated mass percentage of alloying elements remains from a low of 4 % to a maximum of 9 % only in these iron varieties which have vastly different properties, BHN from 140 to 320 implying a swing of more than128 % and Tensile strength in between 30,000 Psi and 80,000 Psi showing a swing of more than 167 %. **The importance of controlling the percentages % of alloying elements cannot be over emphasized!**

Keeping the above in mind, let us have a look at the constituents of metal charged to the melting furnace of a foundry, these are Pig iron and ferrous scrap. Pig Iron has got very limited sources (Integrated steel plants or Merchant producers) and is purchased in lots of almost uniform chemical composition. The pig iron is generally consumed with in few months of production and therefore is a product of contemporary technology.

On the other hand, the scrap may have been generated during any of the very large number of activities: e.g. Ship Breaking, Building Demolition, Tractors and other Agricultural Machinery completing useful life, junking of automobiles, re-laying of sanitary pipe lines etc and generally carries residual oil, paints, grease, lime and dirt. Any metal coming as scrap to a foundry stock yard may have been cast only few days back (engine blocks of cars met with an accident) or may be centuries old (faucets from an ancient building demolished). Vastly different technologies and raw materials may have been utilized when these were produced. They may have very different geographical origins. This is readily seen that the variation in the chemical composition of scrap will be more frequent and in a much wider range compared to Pig iron.

Pig Iron is and should be preferred over scrap for the reasons of uniformity in chemical composition, cleanliness, higher bulk density (3.7 MT/M^3 compared to 0.8-1.0 MT/M^3 for scrap) which reduces the charging time and lowers Hazardous Air and water pollution.

In the melting furnace of any foundry all these materials melt together and get homogenized to produce a composition that is a weighted average. Some losses and some pick up of alloying elements are definitely there. The percentage of an alloying element gained or lost depends on production process and are within the purview of production department.

The major factor, however, for controlling the melt chemistry (from any properly managed foundry furnace) remains the charge metal chemistry. This depends on how pro active the procurement manager is. His knowledge about the subject and markets and his coordination with the production department (which provides the ideal range within which it requires the charge metal chemistry) plays a very important role.

The person/s entrusted with the purchase of metal for an Indian foundry unit today has to be much more aware and hard working compared to say twenty years before. In this period **many changes- political, economical, technologica**l etc. - have taken places which have made great impact on the purchasing scenario. The much increased connectivity has made Pig Iron and scrap highly mobile commodities in the world market.

Technological Changes:

(a) Earlier there generally used to be a dedicated blast furnace in the integrated steel plants catering to the requirements of the foundry consumers. The ever increasing size of the Blast furnaces in the integrated steel mills has made these plants less flexible and therefore less interested in catering to the demands from foundry units. The reason is that foundries require a much larger and more frequent variation in grades and that too for smaller lots compared to basic pig iron (Generally used in house for steel production). **The enormous blast furnaces can follow almost fixed schedules- lot of headache saved for the production department- if foundries are not to be catered!**

(b) The reintroduction of the mini blast furnace in Brazil using eucalyptus based charcoal. Brazil has today more than 100 simple mini blast furnaces running on charcoal and controls about 6 % export of the foundry grade merchant Pig Iron exports on the world level. Such

units have now become successful in India also e.g. the furnaces of Tata Metaliks Ltd. etc. These are more flexible in catering to the varying demands of foundries.

Political Changes:

(a) A big change in the merchant pig iron market occurred with the disintegration of USSR. This lowered internal demand of iron and steel and caused both Russia and Ukraine to enter the merchant Pig Iron business in a serious manner. Russia remains a dominant supplier of pig iron to the world markets. Turkey and USA are the other dominant and consistent players. Japan and China being occasional players but whenever they are there, they hugely influence the prices.

(b) Lowering of trade barriers across the world has also resulted in increasing the mobility of Pig Iron and scrap

Policy Changes:

With the liberalization of the economy, many whole sellers and retailers today cater to the demands of the foundry units. Small foundries are generally the biggest beneficiaries of the ready supplies of Pig Iron from the stockyards of these traders.

Life Style Changes:

With the increasing awareness regarding the hazardous effect of pollution in Europe and USA, many Foundry Facilities have either closed down or shifted to developing countries. This has resulted in surplus capacity of Pig Iron and therefore exports of pig iron from Europe also have started.

Competition from EAFs:

Pig iron is being increasingly utilized by EAF also. For the EAF units it is used for the reasons of clean source, additional supplies and increasing production rates. The notion that the lower Fe content of iron (95%) compared to steel scrap is a disadvantage for EAFs, but it is not really so. In steel scrap rust, paint, oil, grease and dirt constitute some percentage. The Delphi report says that consumption of cold pig iron in EAFs is continuously increasing. Thus the EAF industry is another important player influencing the raw material market of Foundries. An efficient purchase manager today has to have an idea not only about the trends in his own industry but also for EAFs! (The pig iron links these two industries together)
Throughout the world the long term pricing of pig iron is controlled by availability of scrap, which itself is governed by inflation and recession cycles, the world politics, wars and peaceful times, consumer preferences in the developing and developed countries (Which also decide the life of a machinery or automobile before it is scrapped) etc.

To summarize, an efficient purchase manager today must have at least a basic idea of metallurgy, technological changes, political changes, life style changes, other industries purchasing the same raw materials, inflation & recession cycles - to say the least - so as to make his purchases most economical and his raw material inventory optimal. In light of the above discussion, let us now discuss the average profile of a procurement manager of an Indian iron foundry.

The shocking fact is that most Indian foundries do not have dedicated manager for procurements! The reason is easy to understand. Out of approximately 5000 Indian foundries today, 80 % are in small scale sector and about 10 % in the medium scale sector. **These are generally family owned concerns** and **managed by a single person or a couple of persons**.

These owners/managers prefer dividing their time between various activities e.g. purchasing, selling, realizations from customers, HR, finances, legalities, maintenance etc. rather than having separate managers for these operations. One reason for this is small size of business which may not allow affordability but another equally valid reason is lack of understanding of the impact of improper purchasing on the product quality. To compensate for lack of technical knowledge required for procurements, higher attention is paid towards purchasing at lowest possible rates without worrying much about the resulting charge metal chemistry. There is therefore a shift towards "tonnage only" approach rather than a judicious product mix with higher value addition per ton produced. The average value addition in an Indian foundry unit, despite cheaper human input, is therefore much lower compared to developed countries or even some fast developing countries like turkey which are pro active on this issue. The things have to change fast if Indian foundries have to take up the challenge of becoming Global hubs for castings.

The Academic Institute may take initiative for designing some short duration technical courses aimed at assisting the Indian foundry managers in procurements.

A Brief on Corex & Finex Iron Making Process

G I S Chauhan
Life Member &
Member, Executive Committee, IIM DC

Finex Process

Finex is an innovative iron-making process developed by **POSCO** and **Siemens VAI** for the production of hot-metal based on the direct use of iron-ore fines and non-coking coal.

The production of hot metal is simplified because the sintering and coking steps, necessary the blast-furnace route, as eliminated.

Development Process

- POSCO started R&D work on blast furnace replacement process from 1992
- Setting up a 150 TPD Pilot Plant in 1997
- A Demonstration plant (0.6 MTPA) commissioned in June 2003
- Commercial Pant (1.5m MTPA; 4,300 T/D) set up at Pohang, S. Korea; commissioned in April 2007; in regular operation

Salient Features

- Usage of low grade ore and low rank coals
- Direct use of non-cocking coal as reducing agent and energy source
- Iron ore can be charged in the process in form of lump ore, pellets and sinter
- Actual Usage of Coal in 1.5 MTPA Plant - ~ 730 Kg (+150Kgs as PCI)/THM
- Capital and operating costs are lower by 20% & 15% resp. as compared to conventional Blast Furnace route
- Significant reduction in emissions of SOx, NOx and dust, as compared to BF route

Future

- POSCO India Plant to be based on Finex Process
- POCO feels that adoption of Finex process will result in lowest cost of production of hot metal in India

Corex Process

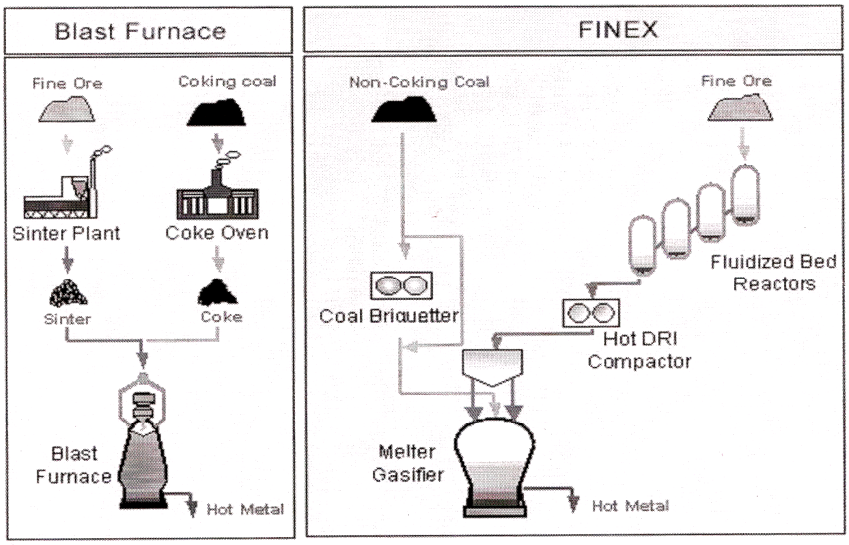
A industrially and commercially proven direct smelting reduction process that allows production of Hot Metal directly from iron ore ad non-coking coal.

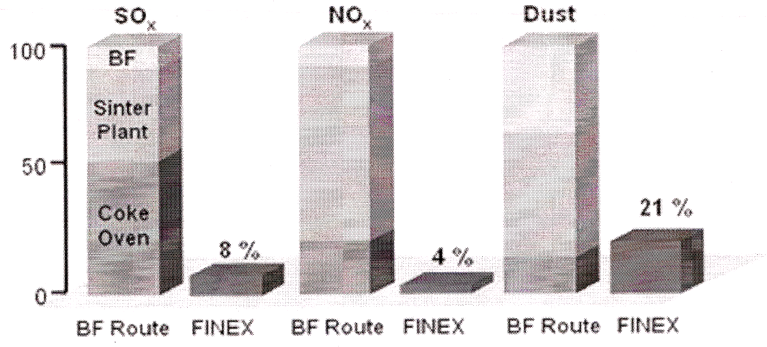
Salient Features

- Direct use of non-coking coal as reducing agent and energy source
- Iron ore can be charged in the process in form of lump ore, pellets and sister.

Status of Commercialization

- POSCO, Korea — One C2000 module (0.6 to 1.0 MTPA)
- BAO Steel China — One C3000 module (1.6 to 1.5 MTPA)
- JSW Vijayanagar — Two C2000 modules
- Saldana, S. Africa — One C2000 module





Gur Iqbal S Chauhan
10July2010

Uranium Mining & The Superstitions

L Pugazhenthy
Past President, IIM &
Executive Director, ILZDA, New Delhi

The State of Meghalaya has about 20 percent of India's uranium resources; much of the state is unexplored & many areas are still being surveyed by the Dept of Atomic Energy (DAE). Recently the Union Government decided to drill for minerals around Meghalaya's

Balpakram National Park. This was done after a month long survey by the DAE which traced uranium in the region, far away from the Garo hills. Immediately after the drilling commenced, the local population - NGOs teachers, students etc. - started opposing the operation, the reason being "superstitions". Their contention is that "the area is home to the sprits of the dead & the sprits are reborn in the different avatars. The sprits come out in the forests in the night; mining would disturb the sprits & prevent them from being reborn. The Khasi tribal population will diminish". A small part of the population says radiation hazards will also affect the life severely. The Nuclear Power Corporation of India, the country 's only nuclear power generation company has set itself a target of increasing its installed capacity to 20000 MW from the current 4120 MW in the next five years. At present the share of nuclear energy in India is only 3% in installed capacity. And this is likely to go to 25% by 2050; by 2020, 40000 MW of nuclear capacity may come up. The Government is keen on attracting private investment in manufacturing nuclear plants, importing fuel & reactors from various international companies. The country needs to exploit its uranium resources fully. As India is currently on a leaf frog journey of economic growth, it is strange that pecuniary considerations, superstitions, parochial issues etc., come up frequently, thus blocking our onward march.

News Relating to SAIL (A Maharaatna PSU Company)

Mr. C. S. Verma takes charge as SAIL Chairman

Mr. Chandra Shekhar Verma, 51, has taken charge of the office of Chairman, SAIL on 11 June 2010. On his arrival at Ispat Bhawan, he was accorded a warm and cordial welcome by the employees of SAIL Corporate Office with the traditional tilak ceremony. Mr. Verma later held interactions with SAIL. Directors and the Union Steel Minister and Secretary (Steel). Prior to his assignment, Mr. Verma was Director (Finance) of Bharat Heavy Electricals Ltd. (BHEL), India's largest engineering and manufacturing enterprise in the energy-related/infrastructure sector. His prudent financial management and strategic deployment of scarce resources had strengthened the competitive position of BHEL. As Director (Finance) of BHEL since September 2005, Mr. Verma also had the distinction of spearheading the joint venture initiatives of the company with various state GENCOs. His efforts resulted in the signing of four such agreements with Tamil Nadu, Karnataka, Madhya Pradesh and Maharashtra that would leverage the sale of 7 supercritical thermal power plants of BHEL. He also played a key role in the finalization of various technology agreements of BHEL with Alstom, Siemens, GE and Sheffield Forgemasters.

Spanning nearly 29 years, Mr. Verma's career profile also covers stints as Director (Finance) of ITI Ltd., as Group General Manager of Indian Railway Finance Corporation, and as General Manager of Delhi Stock Exchange (DSE), besides experience of working in a Financial Institution for about nine years. Fellow member of the Institute of Company Secretaries of India (FCS) and of the Institute of Cost & Works Accounts of India (FICWA), Mr. Verma is a Commerce Post-Graduate with a Master's degree in Business Administration and Bachelor's degree in Law & Legislatures. He has received many awards during his career, including 'best CFO Award' of CNBC-TV 18 in the infrastructure sector for the year 2008-09 and 'Top Rankers Excellence Award for Best Professional' for the year 2008. During his tenure in BHEL, the company received the first prize in 'ICWAI National Award for Excellence in Best Cost Management Practices'. SAIL, which has been recently accorded the status of 'Maharatna' by the Government of India, is currently preparing for divestment of 10% of its equity in two tranches and is implementing a Rs. 60,000 crore modernization & expansion plan in its plants and mines. With Mr. Verma at its helm and his vast knowledge and experience in support, SAIL is poised to attain greater heights.

(Courtesy: SAIL NEWS February – June issue)

SAIL is now a 'Maharatna'

The Government of India has accorded the status of 'Maharatna' to Steel Authority of India Ltd (SAIL) through a memorandum issued on 19th May 2010. Three other Central Public Sector Enterprises – Indian Oil Corporation Limited, NTPC Limited and Oil & Natural Gas Corporation Limited – have also received 'Maharatna' status. The objective of the Maharatna Scheme, which was introduced by the Government on 4th February 2010, is "to delegate power to the Boards of identified large-sized Navratna CPSEs so as to facilitate expansion of their operations, both in domestic as well as global markets". SAIL fulfilled all the eligibility criteria set by the Government for achievement of Maharatna status as given below:

- Having Navratna status
- Listed on Indian stock exchange, with minimum prescribed public shareholding under SEBI regulations.
- An average annual turnover during the last 3 years of more than Rs. 25,000 crore.
- An average annual net worth during the last 3 years of more than 15,000 crore.
- An average annual net profit after tax during the last 3 years of more than 5,000 crore
- Significant global presence or international operations

Subject to the condition that its Board has the requisite number of non-functional Directors, SAIL has been delegated the following powers as a Maharatna:

1. To incur capital expenditure on purchase of new items or for replacement, without any monetary ceiling.
2. To enter into technology joint ventures or strategic alliances.
3. To obtain by purchase or other arrangements, technology and know-how.
4. to effect organizational restructuring, including establishment of profit centres, opening of offices in India/abroad, creating new activity centres, etc.
5. to create below Board level posts upto E-9 level and to wind up all below Board level posts. The SAIL Board will have powers to make all appointments, effect internal transfers and re-designation of all below Board level posts.
6. To structure and implement schemes relating to personnel and human resource management and training.
7. To raise debt from the domestic capital markets and from international markets, the latter being subject to the approval of RBI/Department of Economic Affairs, as may be required, and should be obtained through the Ministry of Steel.
8. To make equity investment to establish financial joint ventures and wholly owned subsidiaries and undertake mergers & acquisitions, in India or abroad, subject to a ceiling of 15% of the company's net worth, limited to Rs. 5,000 crore in one project. The overall ceiling on such investments in all projects put together will not exceed 30% of the net worth of SAIL. While normally the investment would be done directly by SAIL, in cases where it proposes to invest through a subsidiary into another joint venture, and also provide the additional capital for this purpose, the above stipulations would be in the context of SAIL.
9. The SAIL Board shall have the powers for mergers & acquisitions, subject to the conditions that (a) it should be as per the growth plan and in the core area of SAIL's functioning, and (b) the Cabinet Committee on Economic Affairs would be kept informed in case of investments abroad. Further, the powers relating to mergers & acquisitions should be exercised in such a manner that it should not lead to any change in the public sector character of SAIL.
10. SAIL Chairman is empowered to approve business tours abroad of functional Directors up to 5 days duration (other than study tours, seminars, etc.) in emergency, under intimation to the Secretary, Ministry of Steel.

The performance of SAIL as a Maharatna will be reviewed annually by the Inter-Ministerial Committee, and thereafter by the Apex Committee headed by the Cabinet Secretary.

(Courtesy: SAIL NEWS February – June issue)