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What's Inside

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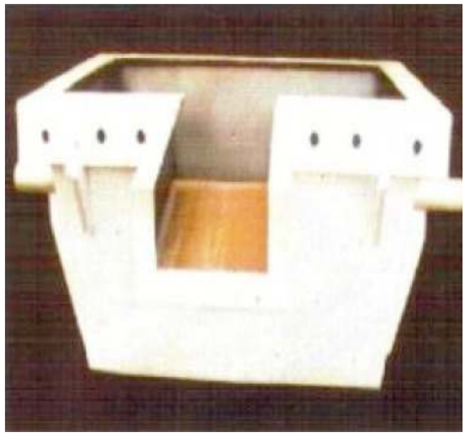

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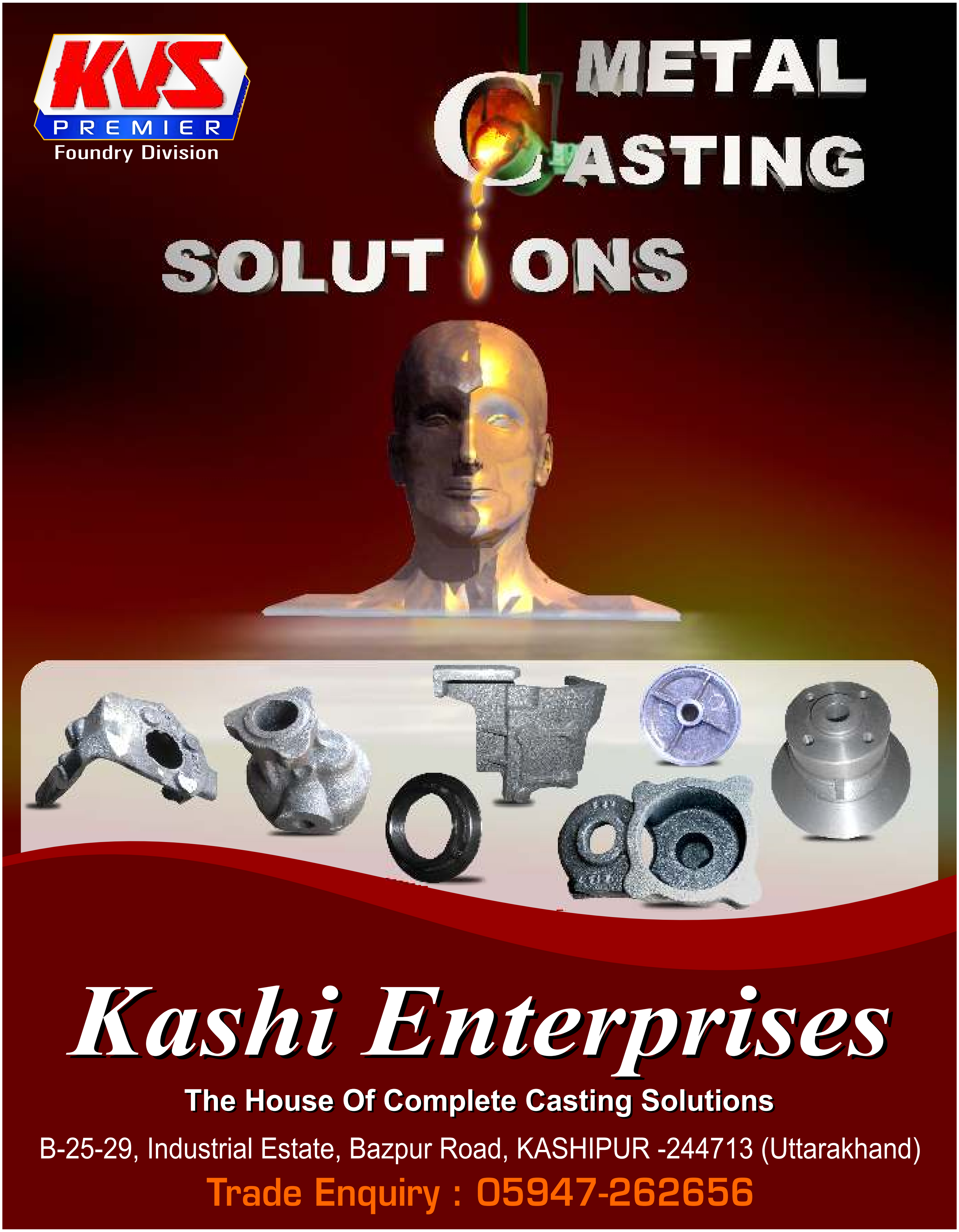
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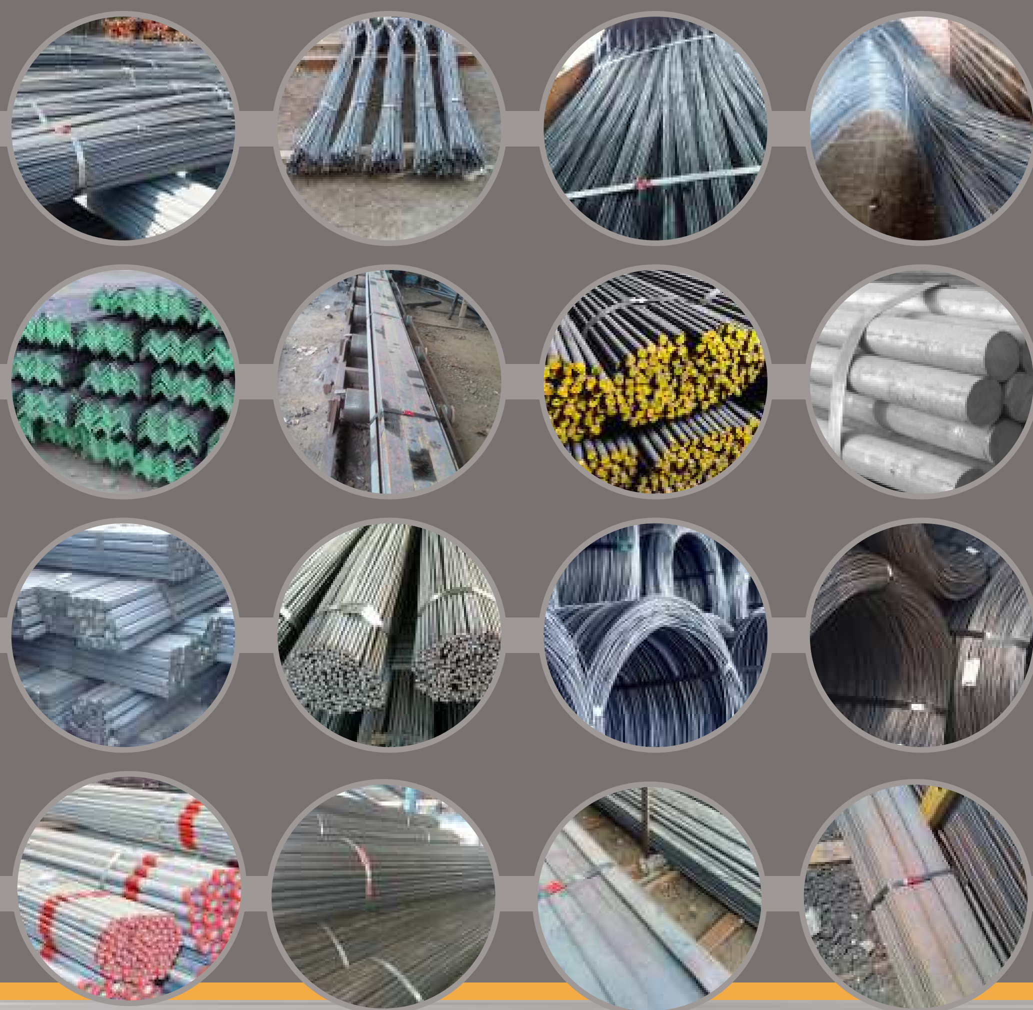

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ENVIRONMENT FRIENDLY STEEL

Defect Free Sound Ingot Production from Induction Furnace

Srikumar Chakraborty *
Abhijit Niyogi **

Introduction: Today, more than 93% of all steel semi-finished products are continuously cast. Ingot casting production is increasingly concentrated on special alloys and products, which can only be produced by ingot casting. Induction Furnace units in India, since late 60's, were making steel ingots from liquid steel by simply melting scrap and subsequently processed the same by forging and rolling followed by suitable heat treatment.

Developments in steel production in IF units have resulted in producing clean steel grades with a low level of impurities from 80's onward in India responding to the current and future market demands of alloy and special steels having excellent mechanical properties like hardness, yield strength, fatigue strength and impact toughness and/or an improved corrosion resistance. There is enough challenges before induction furnace steel making units to produce quality ingots for subsequent processing by forging or rolling with the driving force to provide different refined steel grades that can perform well in extremely challenging applications in critical areas even for highly corrosive medias.

It is well known that all refining processes during steel making in induction furnaces are limited, therefore the required steel chemistry of specific steel grade can only be achieved with a proper scrap selection which results in a limited product mix or higher production cost by using more expensive and cleaner scrap.

Ingot casting is final metallurgical operation in steel melting shop where cast ingot has to have high strength, minimal degree of segregations, adequate chemical composition within the standard specification having well surface quality. Number of reactions is possible after pouring the liquid steel in the mould (reaction with mould dressing, slag or atmosphere). Temperature is decreasing in cast steel (cooling of the melt) with simultaneously phase change (liquid to solid), lowering the solubility of gasses, etc.

Dragging the casting powder from the top surface caused by turbulent flow of the melt in the mould, or mould inner refractory dressing could decrease purity of the steel. The purpose of ingot casting is producing of geometrically simple forms as solidified steel using vertical stable ingot moulds which are designed for further processing by plastic deformation (rolling or forging).

Supply Chain Systems in Induction Furnace Units: In the induction furnace melting units, the response time of supply chain for supplying different items needed in melt shop is critical to maintain uninterrupted quality production and ultimately the success of the units. Units that fail to get timely support against their requirements from their vendors, suppliers and contractors may lead to loss of production affecting business and profitability for the unit resulting inability to meet the demands and requirements of their customers because of defaulting in supply chain.

IF units need timely availability of different categories of scrap mix, ferro-alloys for grades to be produced, refractory items, different sizes of moulds for ingot sizes, hot tops for fitting on mould, bottom pouring and anti-piping compound, argon gas and required number of trained persons/labors supplied by contractor etc. Management of IF units always keep in their mind about right delivery time of quality products and services after sales if needed.

Steel Melting and Refining: The medium frequency coreless induction furnace is the most flexible steel melting unit and is widely used in the mini steel plants producing carbon and alloy steels where small sized scrap or scrap substitute melted from cold and successive heats produced of widely differing analyses. Melting is rapid since high power can be applied due to induced current with strong stirring action in melt and a slag cover cannot be maintained and there is no refining stage. Alloying elements are added as per composition of steel grade and temperature adjustment can be rapidly made. High alloy steels are frequently made in the induction furnace since the melting losses of expensive alloying elements are low. Extra-low carbon stainless steels can be melted without pick-up of carbon.

Induction furnaces are refractory lined vessels that utilize electrical current flowing through copper coils to create an electromagnetic or induction field on the inside and outside of the coil. When electrical current from the coils is passed through the metallic furnace charge, joule heating creates thermal energy that melts the charge. Any metallic charge or molten metal mass passing through this induction field will generate heat internally and will eventually melt or will rise in temperature in the case of molten metal. The magnetic currents that arise in the molten metal produce an intense stirring action, thus insuring a homogenous liquid.

During the melting process, insoluble non-metallics or metallic oxides are generated from oxidation products, dirt, sand and other impurities from the scrap, erosion and wear of the refractory lining, oxidized ferroalloys, and other various sources. These non-metallics remain in the liquid metal as an emulsified "slag" until such time as they increase in size and buoyancy, coalesce and float on the liquid metal where they can be removed. Almost without exception, these generated slag will normally deposit in the upper portion of the lining or on side crucible walls. These areas are at a much lower temperature than the center of the furnace walls.

Insoluble metallic oxides and sulfides that remain suspended within the molten metal will eventually deposit in areas where there is an interruption in the mechanical flow of the molten metal in the induction field. This normally corresponds to the midway point of the active power coil, along the vertical sidewall on the refractory lining. Eventually the clogging or restriction of furnace capacity will render the furnace useless and will affect the melting electrical efficiency.

In past, a lot of trials and studies have been conducted in Induction Furnace at different places in order to improve refining part of process in the furnace itself but results still are not comparable with EAF steel making process. Chemical composition of the molten steel is not easy to control, and can not achieve the chemical refining, steel, excessive phosphorus and sulfur content of crude steel will affect the quality of steel, such as toughness and strength. Therefore, direct reduced iron ore charged in IF should have lower phosphorus and sulfur content and accordingly coal used in DRI should be low phosphorus and sulfur content. Induction furnace of molten steel is heavily dependent on the quality of the quality control of raw materials into the furnace by maintaining the correct proportions, adding a solvent such as dolomite and ensure the quality of the refractory lining to avoid pollution caused by molten steel.

In case of mainly rebar production via induction furnace route, phosphorous content in steel normally comes in a range of 0.02-0.03% with carbon content in range of 0.18-0.22%. Sulphur removal in steel is not possible in induction furnace melting due to low slag basicity and low slag volume. However, refining in EAF process is also limited not due to lack of refining capability but mainly due to the presence of high oxygen content and higher oxides content in the slag.

Induction furnace melting with concast facility, at many places, is used in rebar production with required carbon content mostly in range of 0.20%-0.25% and with required phosphorous content of max 0.035% . For high quality grade alloy steel and stainless steel production, several mini steel plants have standardized their process through ingot route for small heat size using selective scrap, good quality ferro-alloys developing process standards.

The characteristics popularized induction furnace steel making -

- High and relatively narrow melting vessel (low d / h ratio),
- Low crucible wall thickness, Low slag temperature, Strong and Powerful bath agitation.
- Low Overhead Cost
- Emission level almost Nil

High density and lower melting loss have popularized the shredded scrap as charged material to be the best input material for induction furnace inspite of tramp elements like Al, Cu, Ni, Zn, Cr etc. Complete or partial removal of Al, Zn and Cr is possible by oxygen but is limitation in the melting process of induction furnace. Aluminium, zinc and chromium could be removed completely or partially by oxygen which is one limitation more for their application in induction furnace process.

The main and perhaps only challenges faced by induction furnace units in making steel are:

1. Availability of proper and good quality scrap/ scrap substitutes and other raw materials,
2. Reduction of Electrical energy consumption for scrap melting ,
3. Good Teeming Practice for sound and defect free Ingot,
4. Supporting orders as heat lot size.

Pouring temperature for steels : The temperature at which steel castings are poured is at least 50°C above the liquidus temperature. Further superheat is needed to allow for cooling Table below indicates variation of liquidus temperature with carbon content for Fe-C alloys and effect of Alloying elements –Ref: Foseco Hand Book Page 144-145.

%C	Liq. Temp	%C	Liq. Temp	Depression of Liq Temp Caused by presence of 0.01% of Alloying Elements	
0.05	1533	0.55	1490	P	0.300
0.10	1528	0.60	1486	Mo	0.020
0.15	1524	0.65	1483	S	0.250
0.20	1520	0.70	1480	Si	0.080
0.25	1515	0.75	1477	Mn	0.050
0.30	1511	0.80	1473	Cu	0.050
0.35	1504	0.85	1470	Cr	0.015
0.40	1502	0.90	1466	Sn	0.080
0.45	1498	0.95	1463	Ni	0.040
0.50	1494	1.00	1459	V	0.030

Example : Steel Grade with composition as

C.06,Si1.0,Mn1.2,P.030,S.020,Cr18.0,Mo2.0,Ni10.5

would have a liquidus temp of 1532-(8.0+6.0+0.90+0.50+27+4+42) = 1532-88.4 = 1444°C. The Pouring Teperature should be at least 1444+50(Super Heat) say 1500°C

Impact of common Impurities in Steel : Steel quality is affected by the presence of elements and gases which need to be controlled at the specified limits against the standard.

1. **Sulphur, considered to be most harmful in steel, forming brittle iron-sulphide as thin film separating the pearlite and ferrite grains which reduces the strength of steel giving rise to hot short or cold short.** Efforts are made by IF units to keep it to a minimum of about 0.0 25% but may be as high as 0.5% in cheap grade steels. Since Manganese Sulphide is stronger than Iron Sulphide and provided that there is enough Manganese present the Sulphur will all combine with it in preference to the Iron. It is common practice in melt shop to add eight times Manganese required to combine with the Sulphur. Iron Sulphide melts below the working temperature of Iron.
2. P**hosphorous combining with** Iron forms a Phosphide though increases the hardness and tensile strength of Steel but seriously affects the ductility and impact resistance. Both P and S tend to segregate and concentrate in the grain boundaries during freezing and affect steel quality.
3. Silicon, in almost all the steels found in small quantities as 0.1% - 0.3% acting as an oxidizing agent. In some special steel grades, it may be as low as 0.03% or as high as 1,0%. It forms a Solid Solution in Iron slightly raising the strength and hardness of Steel.
4. Lead is added to few grades to improve the machinablity of the steel where tool life improves but this

practice has been stopped totally because same damages furnace. To improve machinability, S or Se is added in specific grades.

5. Manganese in steel, acting as powerful and most effective de-oxidant, produces perfectly sound steel free from blow holes and gases increasing depth hardness of hardened Steel. It retains austenitic condition as non-magnetic, even after quenching in water after heating to 1000◦ C, with between 11% and 15% alonwith about 1% Carbon having remarkable resistance to abrasion.
6. Tin, this metal should be avoided as it forms a low melting point brittle film round the grain boundaries making steel practically useless.

Gaseous Impurities : IF units try to maintain the allowable level of Oxygen, Nitrogen. Because of harmful effect on product quality in the form of hair line cracks, gas cavities and flakes, IF units try to keep minimum level of Hydrogen in liquid steel using argon purging and vacuum degassing.

The demand for cleaner steels increases every year. In addition to lowering non-metallic oxide inclusions and controlling their morphology, composition and size distribution, clean steel requires lowering other residual impurity elements such as sulfur, phosphorus, hydrogen, nitrogen and even carbon, and trace elements such as As, Sn, Sb, Se, Cu, Pb, and Bi

Table below shows the influence of common steel impurities, their formation and influence on mechanical properties. Ref: EVALUATION AND CONTROL OF STEEL CLEANLINESS REVIEW Lifeng ZHANG, Brian G. THOMAS Dept of Mech. Engg., University of Illinois at Urbana-Champaign 144 Mech. Bulg., 1206 W. Green St. Urbana, IL 61801, USA

Element	Form	Mechanical Properties Affected
S,O	Sulphide & Oxide Inclusion	● Ductility, Charpy Impact value, An-Isotropy ● Formability (Elomgation, Redn in area, Bendability ● Cold Forgeability & Bendability ● Low Temp Toughnes ● Fatigue Strength
C,N	Soild Solution, Settled Dislocation, Pearlite and Cementite, Carbide and Nitride Precipitate	● Solid Solubility (enhanced), Strain Ageing(enhanced), Ductility and toughness lowered
P	Solid Solution	● Solid Solubility(enhanced),Hardenability (enhanced), Temper Brittleness, ● Separation, Secondary Work Embrittlement

Argon Purging in Ladle: Inert gas argon stirring is widely employed in ladle before ingot casting in IF units. During argon purging in liquid steel, argon gas forms many bubbles after entering the steel bath through the porous plugs. The raising argon bubbles lift the liquid metal with them forming a gas liquid plume. If the velocity of the plume is large enough and the slag layer is not too thick a bare metal surface will appear. This bare metal surface region is called an "open eye". The gas-liquid plume and the open-eye play very important roles in ladle refining. A good slag-metal contact around the open-eye makes faster slag-metal reaction and separation of inclusions from the liquid steel to the top slag is promoted by the argon bubbles. **On the other hand, a vigorous gas stirring can lead to emulsification of slag and metal which would be a potential source of inclusion formation** . Experienced operators and metallurgists recognize the importance of accurate and consistent argon gas stirring in the ladle. Clean steel and good cast ability depend on a consistent and gentle rinse stir.

As a common practice, IF units stir molten steel by argon purging from bottom for temperature homogenization where low volumes of an inert gas, such as argon, typically 0.03 to 0.06 m^3 /ton, are injected into liquid steel in the ladle to cool the steel to a uniform and suitable ingot teeming temperature or continuous casting. It is generally recognized that uncontrolled argon stirring may have a deleterious effect in that excessive agitation may excessively expose the steel to the atmosphere or oxidizing slag to reduce the steel's cleanliness.

At the argon purging point, few units make trimming addition of final de-oxidant or alloy additions, if required, in the ladle during or after argon stirring. The stirring action is usually very turbulent. The argon treatment is used to assist in mixing the deoxidant or alloy addition, thus achieving better recovery of the added elements, and is intended to produce chemical and temperature homogeneity.

- **Secondary Refining Units like VD, LRF or AOD** : Few units have installed secondary refining facilities but same has got only partial success in combination with smaller capacity melting furnace. Normally, where capacity of IF exceeds 10T, the refining is quality and cost effective.

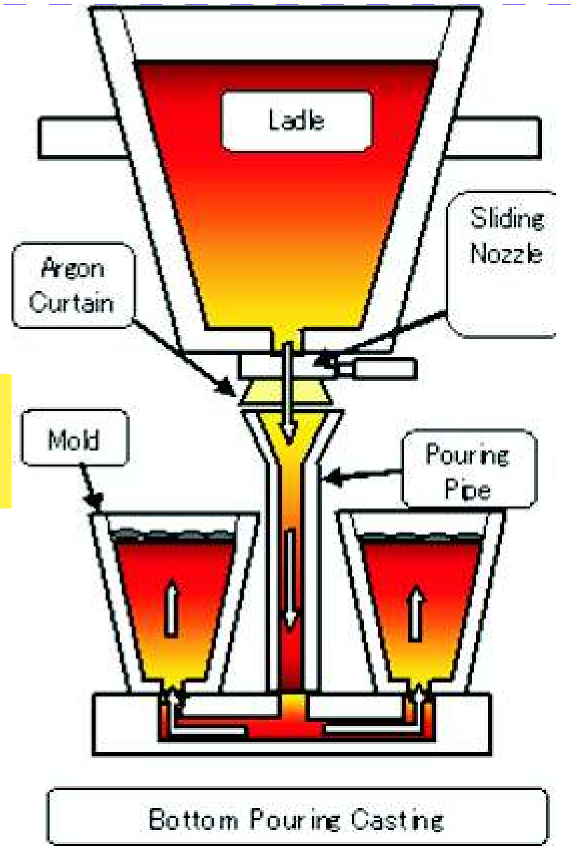
- **Hot Top Fitting in Mould** : In teeming liquid steel into ingot molds, it is desirable that as great a proportion as possible of the resultant ingot be a metallurgical sound product. Recoverable metal comprises that portion from the bottom of the ingot up to the highest cross-section level free from flaws. Unsoundness in an ingot may comprise pipe, cavities that may be either macroscopic or microscopic, or loose inter-granular structure present within the interior of the ingot. Furthermore, impurities in the metal teemed into the mold tend to concentrate toward the central axis of the ingot as well as rising upwardly towards fitted hot top at the mould (**shown in the attached picture**). Excessive amounts of the impurities along the axis are not desirable. Due to these and other flaws, it is a necessary practice in the steel industry to crop the upper end of cast ingots since flaws and unsound structure are concentrated within the upper portions thereof. Ordinarily, carbon steel ingot is cropped, leaving a recovery of less than 90% of substantially sound steel. However, many metals have a higher volume of contraction during solidification than does carbon steel or a low alloy steel. As the coefficient of volume contraction increases, the problem of producing ingots with a high proportion of sound metal increases many fold.

Following the completion of refining operations in the process of manufacturing steel, the molten steel is teemed into a cast iron mold where the steel is allowed to solidify into ingots. As the metal cools in the mold, imperfections such as pipe are formed in its interior by shrinkage and entrapped gases. For example, when a fully killed steel is teemed into either a big end-up or a big end-down mold, a deep cone-shaped cavity, known as pipe, forms in the upper end of the ingot as a result of shrinkage of the metal during cooling.

The formation of pipe due to metal shrinkage in steel ingots has been found to be preventable by the application of a hot-top to the mold for retaining and feeding molten metal to the shrinking ingot. The refractory material from which such a hot-top is generally constructed or with which it is lined absorbs heat from the metal less rapidly than the cast iron walls of the mold so that the top of the ingot remains molten until after the remainder of the ingot has solidified. An overlying pool of liquid steel is thus furnished which feeds metal down into the ingot to overcome the shrinkage due to solidification of the metal.

- **Bottom Pouring Process** : The increasing demand for quality steels has led to the evolution of bottom pouring technology for casting steel ingots. This process constitutes of a set up involving pouring sprue and runner system to deliver liquid steel into one or more cast iron moulds through the bottom nozzles. Bottom teeming is very common for small ingots two or more ingot moulds are filled at the same time, and typically, each small ingot mould has only one bottom nozzle.

While for the bottom teeming of large ingots, the optimal method is to pour only one ingot mould, with multiple nozzles at the mould bottom. In the tradional bottom teeming process of small steel ingots (**shown in the attached picture**), a bag of casting powder is placed on the bottom or hung about 30 cm above the bottom of the mould before pouring. After the teeming starts, when the liquid steel enters the mould, the contacted powder receives maximum heat from the meniscus and produces a fused or molten slag layer. The functions of this liquid/fused slag layer in bottom teeming process are:



1. Protection from the atmosphere,
2. Thermal insulation of the meniscus,
3. Absorption of the non-metallic inclusions

However, this slag layer may cause undesirable problems meanwhile, such as slag entrapment, which leads to formation of defects in the final products. It has been proved that during gas stirred ladle metallurgy, due to the rising gas bubbles from a bottom gas jet, a plume zone and an 'open eye' (slag less area) at the top of the plume can be formed.

For the bottom teeming process, the liquid jet from bottom nozzle has a similar effect on the surface behavior as the submerged gas jet. (Mathematical modeling work by Z. Tan et al. shows a hump on the surface above the bottom nozzle, H.F. Marston, in his experiment, observed an 'open eye' on the surface as well as slag entrapment at the early stage of teeming. The basic problems that must be resolved casting steel it consists in obtain of homogeneous ingots from chemical point of view structural and mechanic properties.

Bottom pouring casting of steel ingot has been found to be closely related to the quality of ingots improving the yield of ingot production, which is crucial for the steel making process in the competitive market. The formation of non-metallic inclusion and entrapment of mold flux has been considered to be affected by the flow pattern in the gating system and molds by many researchers. The flow pattern of steel in the gating system and molds during the initial filling stage. A special attention should be made in choosing refractory at the center stone, the horizontal runner near center stone and the vertical runner at the elbow. This is where the wall shear stress values are highest or where the exposure times are long.

Bottom Pouring Compound : This compound, as an additive, is to be added to a mold in bottom pouring ingot-making for improving the ingot skin. Generally, in bottom pouring ingot making, several problems such as refractory inclusions a formation of solid shell and oxidation of molten steel surface etc do arise. Use of this teeming compound, the free floating powdered flux, as suspended inside the ingot mould when comes into contact with the hot liquid forms slag which moves towards the surface of the ingots.

The best way to add the bottom pouring compound is to suspend a bag containing the powder at an optimized distance such as 300 mm (12 in.) above the ingot bottom before teeming. An alternative procedure is simply to drop the bag of powder into the ingot mold before the start of pouring, whereupon the incoming steel ruptures the bag and the powder distributes itself over the surface of the steel. In this method, however, the steel is prone to engulf the powder producing defects at the bottom of the ingot. Bartholomew et al. recommend use of "board flux." This board is placed flat on the mold bottom and minimizes splash while it floats on the rising meniscus, progressively breaking down into a flux, with the same properties as a powdered mold flux which has given better result minimizing inclusions.

The following methods can be used to minimize inclusions from entering the ingot mold and becoming entrapped during bottom-poured ingot casting:

1. Minimize refractory erosion by optimizing steelmaking and steel refining,
2. Fully deoxidize the steel (to lower dissolved oxygen levels) and avoid high-Mn steels,
3. Minimize re-oxidation materials (MnO and FeO) from slag carryover,
4. Use pure refractory with minimal silica,
5. Design runners to minimize flow impact and velocity across on sensitive refractory,
6. Avoid air re-oxidation, especially during transfer operations, by using optimized flow conditions and effective sealing systems that include inert-gas shrouding,
7. Optimize ingot geometry and negative taper to encourage inclusion floating and lessen turbulence and entrapment,
8. Increase superheat entering the mold and optimize filling rates to avoid spouting,
9. Use ceramic foam filters at the runner system near the in-gate,
10. Use board top compounds to prolong surface solidification time and lessen slag entrainment (when using powder bags, suspend them near the bottom, but just above the ‘‘spout’’ height), and
11. Reheat ingots using temperature-time cycles that avoid precipitation of inclusions.

The surface of molten steel is completely covered with teeming compound to form thin layer of molten slag and layer of powder, thereby the surface of molten steel is prevented from oxidation, the slag layer quickly melts these floating matters on the surface of molten steel such as deoxidized substance, refractory particles etc to keep the surface always clean and powdery layer heat-insulates the surface of molten steel completely to keep the solid shell changeable in shape reducing surface defects, such as cracks, slag patches, blowhole etc improving yield.

This slag as it moves upward absorbs the inclusion and impurities from steel, thus producing cleaner and better quality steel. It also provides enough lubrication between hot steel and ingot mould, thus ensuring better ingot surface. The powdered layer at top also provides insulating layer on the top surface of hot liquid, thus preventing atmospheric reaction with hot steel and temperature loss at ingot head. better ingot surface. The powdered layer at top also provides insulating layer on the top surface of hot liquid, thus preventing atmospheric reaction with hot steel and temperature loss at ingot head, the benefits of use of this powder are summarized as:

1. Improves steel cleanliness by absorbing inclusions and impurities.
2. Prevents heat loss by providing insulating layer thus ensuring uniform temperature gradient across.
3. Improves Ingot surface quality.
4. Prevents atmospheric contact of hot liquid.
5. Increases overall yield of the Ingot.

Anti Piping Compound : During teeming liquid steel, it is necessary to maintain the upper portion of the molten metal in the mould at as nearly the same temperature as the molten metal in the lower layers as possible. This prevents the forming of undesirable pipe on the surface of the metal by keeping the upper portion of the metal in the molten state by preventing loss of heat there from.

In the production of ingots from liquid steels by pouring into mould, the shrinkage of the metal in the body of the mould as it cools and solidifies requires that molten metal should feed from feeder heads, risers, hot tops, or the head of an ingot mould, to compensate for such shrinkage. If this is allowed to take place undisturbed, there is formed a substantial central cavity in the head metal, a phenomenon known as pipe.

To avoid or minimize this, it is well known practice to apply to the surface of the metal in the mould a so-called anti-piping or hot topping compound as a composition of which the ingredients ignite and react exothermical1y when fired by the heat of the liquid syeel. The heat thus generated delays the solidification of the head metal reducing or totally eliminating the pipe formation.

Continued.....

Steel Consumers' Council meet in Bengaluru

Infrastructure, growth in automotive sector, and increased urbanisation are expected to push demand for steel.

“India, as an emerging economy, is on a growth trajectory and is expected to witness significant increase in steel demand,” said a release from Steel Ministry on the eve of 27th Steel Consumers' Council meeting in Bengaluru.

Low consumption

Though India is on the way to emerge as the second largest steel producer in the world, the domestic steel consumption remains at about 68 kg per capita, which is much below the global average of 208 kg.

The National Steel Policy 2017 projects that India is expected to reach steelmaking capacity 300 MTPA by 2030-31. in this regard the Ministry of Steel is striving to boost per capita steel consumption by promoting various usages, where steel would definitely be superior to other alternate material, besides various policy interventions such as amendment to GFR.

“It may also be mentioned here that the implementation of the Policy for Preference to Domestically Manufactured Iron & Steel Products (DMI&SP) in government procurements, is going to increase the consumption of domestic steel,” the ministry release said.

Consumers' meet

The ministry is holding its 27th Meeting of the National Steel Consumers' Council under the Chairmanship of Union Minister for Steel, Chaudhary Birender Singh, at Bengaluru on June 29 (Friday).

The meet's theme is 'Demand Drivers for Growth of the Indian Steel Sector' and is third such meeting being held during the tenure of the NDA Government at the Centre. The earlier two meetings were held at Mumbai and Bhubaneswar had covered the Western and the Eastern Regions of the country.

Steel Consumer Council Meetings are held to understand the sentiments of the market, by having a close interaction with the steel consumers and related associations on various aspects such as supply, availability, quality and market trends.

Source: The Hindu Business Line

It's steelmakers against miners in Karnataka over iron ore

A war of sorts has broken out between miners and steelmakers in Karnataka over iron ore sales and prices.

A few days after FIMI – the industry body representing miners like the state-owned NMDC – alleged that steelmakers in the state were buying iron ore from outside Karnataka, steel companies have put the blame back on their mining counterparts.

Miners, led by NMDC, have taken the matter to the central government, complaining that their stocks are lying idle, even as steelmakers buy iron ore from neighbouring states like Odisha and Chhattisgarh, or import from abroad. The miners have asked the government for permission to export the ore, as presently they are not allowed to sell mines outside the state.

But steelmakers have a different view. “Since 2016, NMDC, which produces almost half of the state's output of 25 million tons, has been following a differential pricing policy, leading to a higher price of iron ore in Karnataka," Seshagiri Rao, Joint Managing Director & Group CFO, JSW Steel, told Moneycontrol.

Officials from the industry add that NMDC's iron ore in Karnataka is priced Rs 700 per ton higher than the one in Chhattisgarh, and Rs 2,000 a ton higher than the rate in Odisha.

"Moreover, iron ore found in Karnataka is inferior and companies need to spend more in beneficiation of the ore. On the other hand, ore from Odisha or the imported one, gives us a gain of Rs 2,000 per ton, despite the additional logistics cost," Rao added.

A mail sent to NMDC remained unanswered.

Demand-supply gap

Karnataka is one of main iron ore mining states in the country, along with Chhattisgarh and Odisha. But with increasing instance of illegal mining, the Supreme Court had banned ore extraction in the state in 2011. The ban was lifted in 2013, and since then the mining limit has been raised to 35 million tons a year. The last hike came in December last year.

The ban led to a demand-supply gap, and steelmakers allege that the miners made the most of it. “NMDC deviated from the previous norm of uniform pricing across the country and resorted to differential pricing.

“KISMA, which represents those who buy iron ore, had made several representations to NMDC to address this concern, but it made no difference,” said an official from the steel industry.

KISMA had earlier also approached the Supreme Court and the CCI, but got a unfavourable ruling.

Low grade

The steel industry is also miffed that they were asked to pay a higher rate for ores of lower grade.

Of the three major iron ore mining states, Karnataka has the lowest quality of the raw material. “But the miners continue to ask for higher rates.”

JSW Steel has over the years sourced ore from other sources, including from neighbouring Odisha or imported from overseas markets.

Sources from the industry added that some of the private miners have corrected prices, but not NMDC. “Contrary to this, NMDC further increased the prices earlier this month,” alleged a steel executive.

“While private miners now sell up to 90 per cent of their production, NMDC's utilisation is down to 20 per cent of production,” said an official.

Source: moneycontrol

Odisha has potential to produce 100 MT steel: Minister

Union Steel Minister Chaudhary Birender Singh today said mineral rich Odisha is capable of producing 100 million tonne of steel to enable the country to achieve the goal of churning out 300 mt by 2030.

"Odisha is rich in minerals and mines and has a potential to produce 100 million tonnes of steel out of 300 million tonne envisaged in National Steel Policy by 2030-31," Singh said during a visit to Kalinganagar industrial area in Odisha's Jajpur district.

Describing Odisha as a major steel producing state, contributing more than half of steel production in India, the Union Steel Minister said enhanced production from Kalinganagar and Odisha is important to achieve the common objective of producing 300 million tonne steel by 2030.

Kalinganagar is a major industrial hub. Around 15 steel plants are located in this region which include public sector plants like Neelachal Ispat Nigam Limited (NINL) and private plants like TATA Steel, Jindal Stainless Ltd, Visa Steel and MESCO, he said.

Singh expressed the hope that Kalinganagar builds potential to develop downstream facilities which include ferro alloy plants, duct iron pipes, steel furniture, power component manufacturing as well as stainless steel units.

The minister, who interacted with MDs/CEOs of major steel units, said India has become the second largest producing nation in 2018. In 2017-18, India has produced more than 100 million tonne of steel, he said.

Noting that Indian steel industry has come out of the difficulties faced during 2014-15 and 2015-16 due to various policy interventions by the government, Singh said National Steel Policy was notified during 2017 giving direction and fillip to the domestic industry.

Representatives of steel manufacturers spoke about iron ore availability. Industry representatives also mentioned about increased need for utilising iron ore fines for pellet manufacturing so that precious iron ore can be preserved, an official statement said.

The minister discussed in detail the challenges to the growth of Indian steel industry, such as logistics in terms of development of ports and increasing capacity of railways, creating dedicated freight corridors to move raw materials as well as finished goods, it said.

The Union Steel Minister expressed confidence that both the Central government and state government together will find solutions at policy and operational level to achieve higher level of production in Odisha.

Source: Business Standard

Steel Ministry fears US tariff on imports will result in cross dumping

The Steel Ministry has suggested two options to the Commerce Ministry for the latter's meeting with the United States Trade Representative (USTR) for resolving the issue of 25 per cent import tariff on steel imposed by the US.

Stating that the US move could lead to cross dumping into the country, the Ministry as well as domestic industry representatives said there are two options before the USTR — the first is to have a 25 per cent duty levied on all imported steel, and the second is to cap the quantity of steel that the US administration will allow to be imported into the country.

Domestic steel manufacturers are pinning hopes on the meeting between representatives of the Commerce Ministry and the USTR which is scheduled to be held in less than a fortnight in the US. There has already been one round of meeting with the American representatives in June-end. The approach to put a cap on imports is being preferred by the domestic industry as it allows 75 per cent of the subject steel to be consumed in the US and just 25 per cent to be left for a possible dumping into other countries. Effectively, the USTR could consider the annual steel imports as a reference point and could put a cap on allowing imports up to 75 per cent of the reference quantity for the time period the duty is enforced.

India's steel exports to the US are not substantial (less than one million tonne out of a total domestic production of 100 million tonne). But, domestic manufacturers fear that a 25 per cent duty might result in dumping from South Korean firms that export nearly 8 million tonnes of steel to the US annually. "The 25 per cent duty barrier will make all imported steel uncompetitive in the US and raise fears of dumping into other nations," a steel industry representative told BusinessLine.

On its part, India has already imposed anti-dumping duty to prevent imports of major steel products, mostly from China and Taiwan. But, these duties are far from effective in the present scenario. A steel sector representative said, "Domestic firms fear that the existing anti-dumping measures in India are inadequate as global prices of steel have risen considerably."

Dumping duty

In April last year, the Directorate-General of Anti-Dumping under the Ministry of Commerce had issued a final recommendation to fix the import price of hot rolled coil at $489 a tonne, hot rolled plates and sheets at $561 a tonne and cold rolled coils at $576 a tonne.

"The price of hot rolled coil is presently hovering at around \$600 a tonne, while the anti-dumping duty is \$489 a tonne. Since the import price is higher, the current duty levels are not effective," the steel sector representative said.

The dumping duty is the price difference between the landed cost and the price indicated by the Centre.

Source: The Hindu Business Line

'Need ₹10 lakh cr. to raise steel output'

Investment needed to achieve India's steel production capacity target of 300 MT, says Steel Minister

SPECIAL CORRESPONDENT
BENGALURU

India would require ₹10 lakh crore of investment to achieve its target of reaching 300 million tonnes (MT) steel manufacturing capacity by 2030, Union Minister of Steel Chaudhary Birender Singh, said on Friday. The country, he added, had saved ₹5,000 crore worth of foreign exchange through the government's efforts to boost domestic substitution of high-end steel imports.

"What we projected is... [for] the creation of 300 million tonnes, we would be requiring ₹10 lakh crore," the Minister said in an interaction with correspondents of *The Hindu* and *BusinessLine* on Friday.

Steely resolve: India will ask steel plant machinery makers to set up local plants and JVs, says Mr. Singh. ▪ BHAGYA PRAKASH K

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"And out of that ₹10 lakh crore ... if we don't have the machinery made in India then this ₹4 lakh crore is to go out of the country in the shape of foreign exchange," Mr. Singh added.

"So, we're organising a conclave in the near future, in a month or so, where we will be calling all the important machinery suppliers for steel plants. We would like that they should put up their plants so that we can purchase from them and share with us their technology in the shape of JVs.

"This would be the most important venture as regards transfer of technology. I know that certain companies have shown a lot of interest, wanting to put up plants. This is how the 300-million-tonne target is achievable," he said.

India was the world's third-largest steel producer in 2017, according to the India Brand Equity Foundation (IBEF). The growth in the steel sector has been driven by the domestic availability of raw materials such as iron ore and cost-effective labour.

India is projected to become the second largest steel producer by 2018 based on increased capacity addition in anticipation of upcoming demand and the new steel policy, approved in May 2017, is expected to help boost India's steel production.

Mr. Singh said the ₹5,000 crore saving had been achieved through an increase in output of high-end steel for infrastructure, automobile, defence and medical equipment sectors. The government's initiatives had reduced imports by 36% to 7.48 million tonnes, he said.

"We are on the job of substitution of high-quality steel," the Minister said.

The goal was to ensure a reduction in India's dependence on other countries.

Mr. Singh said demand for domestic steel would rise once the vehicle scrappage policy came into effect.

India's crude steel output grew 5.87% year-on-year to 101.227 million tonnes in 2017. Crude steel production reached 93.183 MT during April-February 2017-18, according to IBEF. Total consumption of finished steel stood at 81.943 MT during April-February 2017-18.

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