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What's Inside

हमारे सभी सदस्यों को दीपावली की हार्दिक शुभकामनाएँ

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ENVIRONMENT FRIENDLY STEEL

infocus/chn

Defect free & Sound Ingots for Forging and Rolling

Kamal Aggarwal
Hon. Sec. General, AIIFA

Introduction - Mini steel plants producing alloy steel ingots mostly supply as raw material for feeding forge shop and rolling mills either in their own complex under their direct or indirect control as well as to other hot working units. The main charge as raw material for melting are **metallic's consisting of scrap and sponge iron**. Few Mini steel plants are happy in producing steel ingot apparently looking good but next processing units face lot of problems which are to be properly addressed by both the units by follow up and coordination on performance feed back followed by Actions.

Today, about 95% of all steel produced from Basic Oxygen Furnace or Electrical Route like Electric Arc or Induction Furnace as semi-finished products as ingot or continuous cast bloom/ billet or slab. Ingot casting 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, are making steel ingots from liquid steel by simply melting scrap and subsequently processed the same by forging or rolling followed by suitable heat treatment. However, considering quality improvement optimizing cost and maximizing productivity, mini steel plants running with induction furnace steel making have set up secondary refining units at their complex at many places.

Developments in steel production in IF units have resulted in producing clean and green 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. These grades have excellent mechanical properties like hardness, yield strength, fatigue strength and impact toughness focusing on even corrosion resistance and high temperature property products wherever needed. As raw material for next processing units like forging or rolling, Ingots must have internal soundness and free from defects. 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 providing 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 composition of specific steel grade against standard can only be achieved with a proper scrap selection and following standard operating practices and good quality scrap charging. Better quality and cleaner scrap in selective way, low level of residual elements may, though, lead to higher production cost but the same is mandatory for specific grades where restriction on cleanliness is imposed by user industries.

However, melting with low level of residual elements, tapping liquid steel in heated ladle as per standard tap temperature keeping grade wise super heat followed by argon purging and refining in secondary refining units are the primary tasks of melting units. Steel is poured into the mold at a temperature above the liquidus temperature. **The sensible heat contained in the liquid steel** represented by this temperature difference is known. as the superheat. Both ingot casting or continuous casting operations must develop superheat temperature practices for low, medium and high carbon equivalent steels (normally with superheat not exceeding a **maximum 20°C to 25°C** depending on C-content and strain rate.

In case of continuous casting, with a high superheat of ~ 40 °C, the central equiaxed parts of the slabs/ blooms/ billets consisted of randomly oriented fine dendrites but with a low superheat of ~ 10 °C, coarse globular structures formed. The mean carbon content measured with optical emission spectroscopy was of the order of 15% smaller with coarse globular structures than in fine equiaxed dendritic structures. Electron probe microanalysis of other alloying elements indicates that the negative segregation in the central zones is caused by

sedimentation of globulites. With superheat in the range ~ 20 - 40 °C, the equiaxed zone is bordered by a columnar to equiaxed transition (CET) zone. In this region a positive macro segregation of carbon and other alloying elements could be seen. These phenomena are important when considering the through-thickness properties of the cast products or final products.

Liquid steel, after getting final chemical composition, is tapped into refractory lined heated ladle which is then teemed (poured) into a series of ingot molds after argon purging. The liquid steel poured in mold decreases in volume during solidification and after solidification there is insufficient solid metal to fill the shell formed first in the mold causing formation of cavity at the last solidifying stage. While melting alloy steel or any forging quality steel or carburizing steel, the liquid steel has to be fully deoxidized before casting when no gas evolved during solidification as liquid steel is characterized by a high degree of chemical homogeneity free from gas porosity making steel ideal for critical applications. Certain amount of strong deoxidizers like Si, Al, Mn, addition help liquid steel to solidify calmly in ingot casting termed the product as fully-killed steel which are suitable in manufacturing any steel structures used to bear impacts, vibration or important welding.

Aluminum, ferrosilicon and manganese are common deoxidizing agents used in solidification. Aluminum forms aluminum oxide when reacting with the dissolved gases helping to form pin grain boundaries which prevent grain growth during heat treatments. Killed steel is harder than rimmed steel for the similar grades. Killed steels also suffer from deep pipe shrinkage defects. This treatment is necessary to reduce the oxygen content so that no reaction occurs between carbon and oxygen during solidification. This steel has more uniform chemical composition and properties than other steel. All alloy steels are typically killed steels and carbon contains equal or greater than 0.30 percent weight.

A variety of killed steel is known as semi-killed steel which are intermediate between killed and rimmed steels having variable degrees of uniformity in composition. In this steel more gas is evolved than killed steel, but lower than rimmed or capped steel. This is not the case with rimming steel where the shrinkage is compensated for by the formation of gas blowholes. Solidification conditions determine the structure, homogeneity and soundness of cast products, and the governing scientific principles find application over a wide range of fields.

The severity and distribution of shrinkage or cavity depends on several factors including the quality of steel, superheat at the time of pouring, method of pouring (whether direct or indirect) and the dimensions and taper of the mould. Such cavitations are also associated with impurities, which concentrate, by segregation forming an undesirable distribution of undesirable elements in the final ingots. It is thus important to influence the amount and position of cavities by reducing it to a minimum and locating it where it will be least harmful in the solidified ingot. After solidification of ingots, the ingot molds are stripped and the ingots are placed in a media or in any furnace for hot working for heating to equalize the internal and external temperature.

Final Metallurgical Operation in Melting Shop - Liquid Steel to 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. Temperature is decreasing in ingot casting due to cooling of the liquid steel with simultaneously phase change (liquid to solid), lowering the solubility of gasses, forming segregation etc.

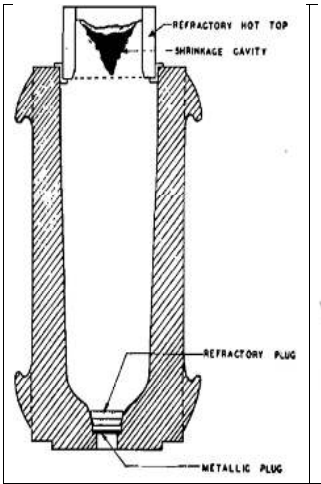


Image of Teemed Ingot

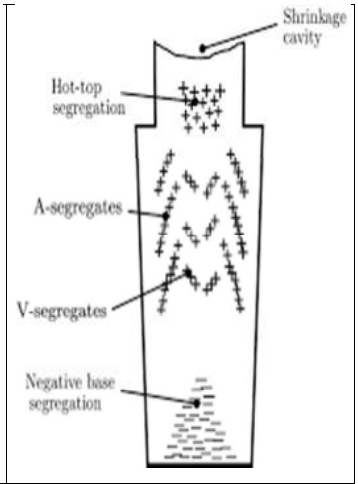


Image of Ingot Segregation

During casting of steel ingots, alloy, segregation occurs, whereby the concentration of solute is not constant throughout the casting causing by a

number of complex processes involving shrinkage effects as the casting solidifies and a variation in the density of the liquid as solute is partitioned. 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.

- **Purpose of ingot casting –** Ingot casting is to produce geometrically simple forms as solidified steel using vertical stable ingot moulds which are designed for further processing in forging or rolling by plastic deformation as hot working. During ingot casting of an alloy steel, segregation occurs, whereby the concentration of solute is not constant throughout the casting. This can be caused by a **number of complex processes involving shrinkage effects as the casting solidifies**, and a variation in the density of the liquid as solute is partitioned.

  This question is one of vital importance, as unless sound steel in the form of ingots is first obtained, sound steel in the finished forms of rail billets, rails, bars, sheets, and other forms cannot be expected. The working stresses demanded by modern conditions are so great, each year they probably approach nearer to the limit of safety, that without doubt those who produce steel will be compelled to pay the attention which this subject deserves. Moreover, the problem is not an insuperable one, as shown by the writer in the papers above referred to.

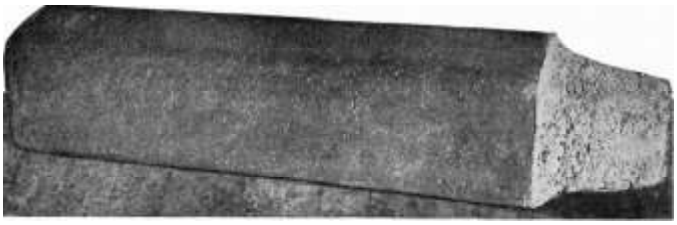
  The upper or head portion of the ingot should be kept fluid by the intense heat generated from liquid steel compared to already poured portion reaching bottom of mould so that such fluid steel passes into the body of the ingot below the head feeding and avoiding the shrinkage or piping which would otherwise occur. The result is the production of a sound steel ingot, free from blowholes, segregation and piping, and in which the waste portion, usually termed the discard is but little over 7 or 8 per cent.

- **Expectation of Forging & Rolling Units from Melt Shop -** Today's steel forging or rolling industries require a wide range of raw materials as ingot or in other shape materials, all of which must meet certain standards that limit the quality of the semi-finished products. In addition to imparting a certain shape and geometric dimensions. The forging process particularly eliminates defects in the initial semi-finished product as it breaks up coarse-grained dendritic structures and nonmetallic inclusions as well as small blow holes inside likely to be welded up by high reduction ratios.

  Steel ingots are subject to further processing steps where the most important operation being hot forging. There is no doubt that proper quality control and cost savings throughout the whole production process are key factors for a competitive production from melting to finished forging. The quality of the as-cast ingot is the starting point for all of the subsequent heat treatment and deformation steps. There is a need for a through-process methodology to predict possible defects and to optimize the whole process chain such as to get the best possible quality and lowest reject rate and metal loss.

  Most major quality problems in ingots originate from the casting process. Defects like shrinkage, porosity, segregation, non-metallic inclusions and cracks are initiated during teeming of the liquid steel and/or during solidification in the mould. There are various parameters of the casting process that can be modified in order to limit defects and, if not completely prevent their existence, reduce their number and appearance so that the product fulfils the quality specification.

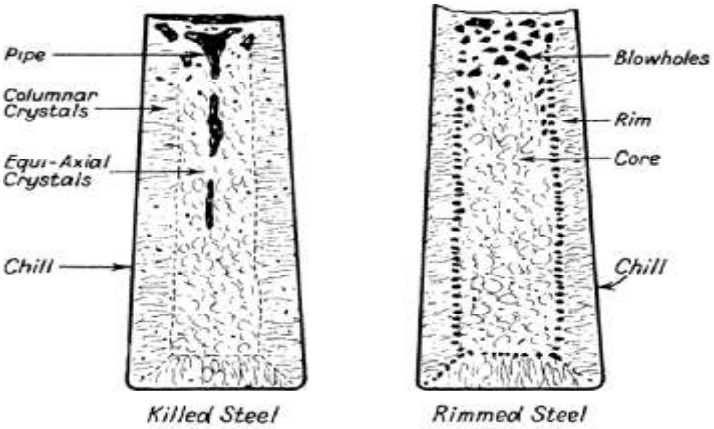
  Thus, the final product is characterized both by the inherited macro structural non-uniformity of the ingot and by the non-uniformity which results from plastic deformation. However, cracking may occur during hot forging of steel ingots originating from the cast microstructure or unsuitable forging conditions associated from non- uniform heating and soaking stocks.



  The intersection between the hot top (riser) and ingot is a critical region in which circumferential cracks could form during the primary stages of forging. The crack then propagates into the ingot and leads to high scrap formation. In figure below good ingot is likely to be forged successfully during hot forged and no crack is formed during forging. This ingot were cast under constant pouring rate of about 6-7 kg s i.e. the pouring rate in hot top is double confirms that increasing pouring rate in hot top of ingot resulted in

reducing crack susceptibility in the critical intersection of hot top and mould ingot.

Metallurgical Weakness Results in Ingot Defects - Many defects arise at ingot stage as a consequence of metallurgical weaknesses in combination with generated stress during transformation of solid from liquid after teeming when defect like panel crack forms mostly which affects aluminum-treated, plain carbon steel ingots over a range of compositions and ingot sizes. The loss of ductility in steel at intermediate temperatures, which is partly responsible for the problem should also be given enough f attention in mini steel plants.



The generation of stresses in ingots, which is also a great contributor to the quality problem has not given much attention in many plants who are only happy in making ingot and disposing same to forging units. The stress generated in a static-cast ingot during processing prior to forging or rolling is caused almost entirely by the volumetric expansions and contractions accompanying changing thermal gradients within the ingot. As the first step in calculating these stresses, it is therefore important to determine accurately the internal thermal state of the ingot as a function of time. Temperature distribution in ingot is other important area from teeming end to start of hot working in forging or rolling including solidification, cooling in the mold and in air, reheating in the furnace and subsequent air cooling.

Once the steel has solidified it is removed from the mold and a prescribed thermal handling cycle depending upon the steel composition, ingot size and temperature of released ingot from mould is given to bring at forging temperature for hot working operations. There are three primary types of cracking phenomena that may be experienced during the production of steel ingots:

1. Formation of solidification cracking of longitudinal nature readily visible to the naked eye during the ingot casting, solidification process in the released ingot from mould.
2. Trans-granular low-temperature stress cracks due to inadequate stress relief or tempering of ingots that have transformed into a brittle microstructure containing significant residual stresses due to thermal contraction and transformation-related volume changes.
3. Inter-granular failure occurring at high temperature causes reduction in ductility resulting cracks. higher temperatures.

Non-metallic impurities, such as slag, oxides, and sulfides that are present in the original ingot. Through rolling of raw material into billets or bar stock, these impurities form “stringers”, or lines. Often irregularly shaped and in groups Usually not objectionable, except when they occur in critical areas, on highly-stressed surfaces, or in unusual numbers

Various Other Ingot Defects Severely Affect Product Quality of Forged or Rolled Products

Conclusion – The goal of any mini steel plant has always been the making, shaping and treating steel of low-cost and high-quality products in a short time enhancing the all the characteristics. A quality and operation management method in every mini steel units , though varies from plant to plant in reality ,for steel production processes to detect abnormality of operation conditions sensitively in order to prevent leading to inferior quality has been developed by management and employees which are based on data analysis and clustering technique system based on standard method of production processes on the concept that the quality of products can be controlled at the target value if every operation condition is regulated at the target value, all the operation conditions of all the production processes are monitored and controlled using statistical process as there are number of operation conditions like scrap management, melting management, pit side management, Time-Temperature schedule management in forge shop and rolling mill and last the disposition management.

PRICE COMPARISION OCTOBER VS SEPTEMBER

RETAIL MARKET PRICE REPORT

KOLKATA

KEY ITEMS

BILLETS 100 MM	TMT 12 MMH.	R. COILS 2.50 MM	C. R. COILS 1.00 MM	G. P. SHEETS 0.63 MM
56,150	67,700	77,670	89,000	96,500
DIFFERENCE	DIFFERENCE	DIFFERENCE	DIFFERENCE	DIFFERENCE
5400	5450	5330	3000	1000

PRICE COMPARISION OCTOBER VS SEPTEMBER

All prices are in Rs per tonnes

ITEM	Kolkata (October)	Kolkata (September)		% CHANGE	DIFFERENCE
PIG IRON	56,300	52,030	↑	8%	4,270
BILLETS 100 MM	56,150	50,750	↑	11%	5,400
BLOOMS 150X150 MM	57,500	52,000	↑	11%	5,500
PENCIL INGOTS	53,340	49,840	↑	7%	3,500
WIRE RODS 6 MM	62,000	57,500	↑	8%	4,500
WIRE RODS 8 MM	61,500	57,500	↑	7%	4,000
ROUNDS 12 MM	63,000	58,000	↑	9%	5,000
ROUNDS 16 MM	61,500	57,500	↑	7%	4,000
ROUNDS 25 MM	61,500	57,000	↑	8%	4,500
TMT 10 MM	67,700	62,380	↑	9%	5,320
TMT 12 MM	67,700	62,250	↑	9%	5,450
TMT 25 MM	67,700	62,380	↑	9%	5,320
ANGLES 50X50X6 MM	62,500	57,000	↑	10%	5,500
ANGLES 75X75X6 MM	62,500	55,880	↑	12%	6,620
JOISTS 125X70 MM	62,000	55,000	↑	13%	7,000
JOISTS 200X100 MM	60,000	54,500	↑	10%	5,500
CHANNELS 75X40 MM	61,000	56,000	↑	9%	5,000
CHANNELS 150X75 MM	61,000	54,500	↑	12%	6,500
PLATES 6 MM	79,250	72,350	↑	10%	6,900
PLATES 10 MM	78,500	71,850	↑	9%	6,650
PLATES 12 MM	78,050	71,850	↑	9%	6,200
PLATES 25 MM	78,050	71,850	↑	9%	6,200
H. R. COILS 2.00 MM	78,000	72,500	↑	8%	5,500
H. R. COILS 2.50 M	77,670	72,340	↑	7%	5,330
H. R. COILS 3.15 MM	77,500	72,170	↑	7%	5,330
C. R. COILS 0.63 MM	90,250	87,250	↑	3%	3,000
C. R. COILS 1.00 MM	89,000	86,000	↑	3%	3,000
G. P. SHEETS 0.40 MM	98,500	96,500	↑	2%	2,000
G. P. SHEETS 0.63 MM	96,500	95,500	↑	1%	1,000
G. C. SHEETS 0.40 MM	99,500	97,500	↑	2%	2,000
G. C. SHEETS 0.63 MM	97,500	96,000	↑	2%	1,500
MELTING SCRAP H M S - I	45,750	41,750	↑	10%	4,000
MELTING SCRAP H M S - II	45,500	40,500	↑	12%	5,000
SPONGE IRON (COAL BASED)	35,670	32,840	↑	9%	2,830

PRICE COMPARISION OCTOBER VS SEPTEMBER

RETAIL MARKET PRICE REPORT

DELHI

KEY ITEMS

BILLETS 100 MM	TMT 12 MMH.	R. COILS 2.50 MM	C. R. COILS 1.00 MM	G. P. SHEETS 0.63 MM
57,820	67,210	81,810	88,570	97,890
DIFFERENCE	DIFFERENCE	DIFFERENCE	DIFFERENCE	DIFFERENCE
4700	6440	6360	1450	2610

PRICE COMPARISION OCTOBER VS SEPTEMBER

All prices are in Rs per tonnes

ITEM	Delhi (October)	Delhi (September)		% CHANGE	DIFFERENCE
PIG IRON	57,820	53,280	↑	9%	4,540
BILLETS 100 MM	57,820	53,120	↑	9%	4,700
BLOOMS 150X150 MM	58,780	55,230	↑	6%	3,550
PENCIL INGOTS	57,940	52,630	↑	10%	5,310
WIRE RODS 6 MM	63,720	61,360	↑	4%	2,360
WIRE RODS 8 MM	62,540	60,180	↑	4%	2,360
ROUNDS 12 MM	66,120	59,450	↑	11%	6,670
ROUNDS 16 MM	65,730	59,450	↑	11%	6,280
ROUNDS 25 MM	65,540	59,450	↑	10%	6,090
TMT 10 MM	68,160	62,560	↑	9%	5,600
TMT 12 MM	67,210	60,770	↑	11%	6,440
TMT 25 MM	66,980	61,210	↑	9%	5,770
ANGLES 50X50X6 MM	66,580	59,190	↑	12%	7,390
ANGLES 75X75X6 MM	66,310	58,990	↑	12%	7,320
JOISTS 125X70 MM	64,830	58,680	↑	10%	6,150
JOISTS 200X100 MM	64,300	58,970	↑	9%	5,330
CHANNELS 75X40 MM	66,500	60,330	↑	10%	6,170
CHANNELS 150X75 MM	65,910	58,700	↑	12%	7,210
PLATES 6 MM	83,050	75,520	↑	10%	7,530
PLATES 10 MM	83,050	75,670	↑	10%	7,380
PLATES 12 MM	83,050	76,410	↑	9%	6,640
PLATES 25 MM	83,780	76,110	↑	10%	7,670
H. R. COILS 2.00 MM	82,640	76,000	↑	9%	6,640
H. R. COILS 2.50 M	81,810	75,450	↑	8%	6,360
H. R. COILS 3.15 MM	81,810	75,380	↑	9%	6,430
C. R. COILS 0.63 MM	88,950	87,500	↑	2%	1,450
C. R. COILS 1.00 MM	88,570	86,780	↑	2%	1,790
G. P. SHEETS 0.40 MM	99,530	96,520	↑	3%	3,010
G. P. SHEETS 0.63 MM	97,890	95,280	↑	3%	2,610
G. C. SHEETS 0.40 MM	1,00,300	96,400	↑	4%	3,900
G. C. SHEETS 0.63 MM	98,140	95,860	↑	2%	2,280
MELTING SCRAP H M S - I	46,380	40,840	↑	14%	5,540
MELTING SCRAP H M S - II	46,020	39,480	↑	17%	6,540
SPONGE IRON (COAL BASED)	48,270	41,780	↑	16%	6,490

PRICE COMPARISION OCTOBER VS SEPTEMBER

RETAIL MARKET PRICE REPORT

MUMBAI

KEY ITEMS

BILLETS 100 MM	TMT 12 MMH.	R. COILS 2.50 MM	C. R. COILS 1.00 MM	G. P. SHEETS 0.63 MM
56,820	65,900	84,380	90,880	99,830
DIFFERENCE	DIFFERENCE	DIFFERENCE	DIFFERENCE	DIFFERENCE
3570	6590	6350	1870	2530

PRICE COMPARISION OCTOBER VS SEPTEMBER

All prices are in Rs per tonnes

ITEM	Mumbai (October)	Mumbai (September)	% CHANGE	DIFFERENCE
PIG IRON	59,590	56,050	6%	3,540
BILLETS 100 MM	56,820	53,250	7%	3,570
BLOOMS 150X150 MM	55,180	53,220	4%	1,960
PENCIL INGOTS	53,570	52,510	2%	1,060
WIRE RODS 6 MM	65,730	62,190	6%	3,540
WIRE RODS 8 MM	65,140	61,600	6%	3,540
ROUNDS 12 MM	68,520	61,530	11%	6,990
ROUNDS 16 MM	68,280	61,300	11%	6,980
ROUNDS 25 MM	68,280	61,300	11%	6,980
TMT 10 MM	65,560	60,120	9%	5,440
TMT 12 MM	65,900	59,310	11%	6,590
TMT 25 MM	65,460	58,870	11%	6,590
ANGLES 50X50X6 MM	66,110	58,250	13%	7,860
ANGLES 75X75X6 MM	66,510	57,570	16%	8,940
JOISTS 125X70 MM	65,740	58,220	13%	7,520
JOISTS 200X100 MM	66,640	58,040	15%	8,600
CHANNELS 75X40 MM	67,520	61,760	9%	5,760
CHANNELS 150X75 MM	67,700	59,330	14%	8,370
PLATES 6 MM	85,120	78,330	9%	6,790
PLATES 10 MM	86,000	78,330	10%	7,710
PLATES 12 MM	87,830	80,240	9%	7,590
PLATES 25 MM	84,770	77,250	10%	7,520
H. R. COILS 2.00 MM	85,140	78,080	9%	7,060
H. R. COILS 2.50 M	84,380	78,030	8%	6,350
H. R. COILS 3.15 MM	84,380	78,030	8%	6,350
C. R. COILS 0.63 MM	91,420	89,550	2%	1,870
C. R. COILS 1.00 MM	90,880	88,920	2%	1,960
G. P. SHEETS 0.40 MM	1,04,490	98,010	7%	6,480
G. P. SHEETS 0.63 MM	99,830	97,300	3%	2,530
G. C. SHEETS 0.40 MM	1,05,700	1,00,720	5%	4,980
G. C. SHEETS 0.63 MM	1,00,980	97,820	3%	3,160
MELTING SCRAP H M S - I	50,150	43,020	17%	7,130
MELTING SCRAP H M S - II	49,820	42,280	18%	7,540
SPONGE IRON (COAL BASED)	42,780	36,890	16%	5,890

PRICE COMPARISION OCTOBER VS SEPTEMBER

RETAIL MARKET PRICE REPORT

CHENNAI

KEY ITEMS

BILLETS 100 MM	TMT 12 MMH.	R. COILS 2.50 MM	C. R. COILS 1.00 MM	G. P. SHEETS 0.63 MM
61,070	66,520	82,740	97,550	1,04,680
DIFFERENCE	DIFFERENCE	DIFFERENCE	DIFFERENCE	DIFFERENCE
6950	6950	4410	3200	3680

PRICE COMPARISION OCTOBER VS SEPTEMBER

All prices are in Rs per tonnes

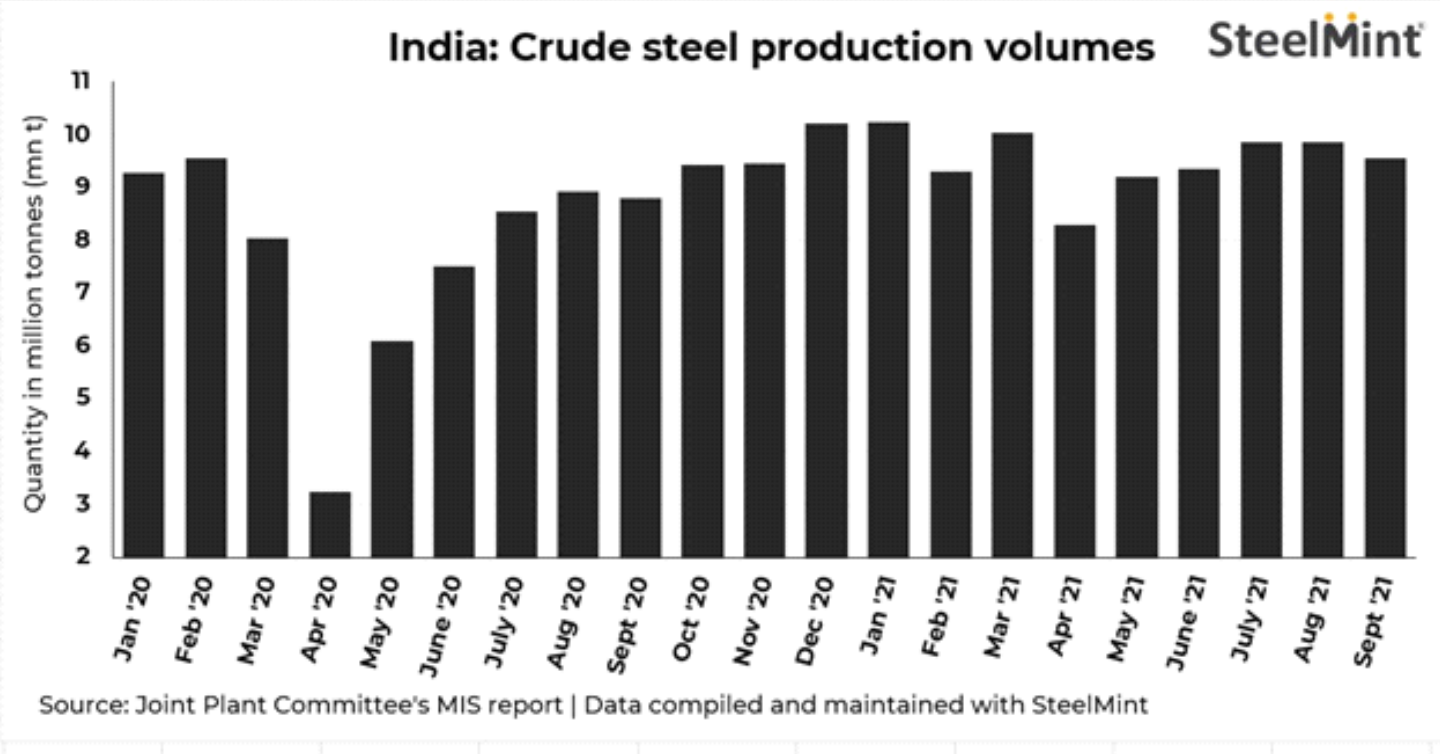
ITEM	Chennai (October)	Chennai (September)	% CHANGE	DIFFERENCE
PIG IRON	53,100	49,790	7%	3,310
BILLETS 100 MM	61,070	54,120	13%	6,950
BLOOMS 150X150 MM	NA	NA		#VALUE!
PENCIL INGOTS	56,020	50,940	10%	5,080
WIRE RODS 6 MM	68,510	63,610	8%	4,900
WIRE RODS 8 MM	68,030	63,130	8%	4,900
ROUNDS 12 MM	68,370	60,540	13%	7,830
ROUNDS 16 MM	68,370	60,540	13%	7,830
ROUNDS 25 MM	68,370	60,540	13%	7,830
TMT 10 MM	67,010	59,780	12%	7,230
TMT 12 MM	66,520	59,780	11%	6,740
TMT 25 MM	66,520	59,780	11%	6,740
ANGLES 50X50X6 MM	66,960	58,910	14%	8,050
ANGLES 75X75X6 MM	66,960	58,360	15%	8,600
JOISTS 125X70 MM	66,960	59,260	13%	7,700
JOISTS 200X100 MM	67,150	59,630	13%	7,520
CHANNELS 75X40 MM	68,960	60,560	14%	8,400
CHANNELS 150X75 MM	67,150	59,240	13%	7,910
PLATES 6 MM	82,210	77,860	6%	4,350
PLATES 10 MM	82,210	77,860	6%	4,350
PLATES 12 MM	84,290	78,940	7%	5,350
PLATES 25 MM	85,960	78,420	10%	7,540
H. R. COILS 2.00 MM	85,260	79,030	8%	6,230
H. R. COILS 2.50 M	82,740	78,330	6%	4,410
H. R. COILS 3.15 MM	82,740	78,330	6%	4,410
C. R. COILS 0.63 MM	98,320	95,120	3%	3,200
C. R. COILS 1.00 MM	97,550	94,530	3%	3,020
G. P. SHEETS 0.40 MM	1,05,610	1,01,590	4%	4,020
G. P. SHEETS 0.63 MM	1,04,680	1,01,000	4%	3,680
G. C. SHEETS 0.40 MM	1,08,390	1,02,360	6%	6,030
G. C. SHEETS 0.63 MM	1,07,680	1,01,540	6%	6,140
MELTING SCRAP H M S - I	45,040	42,660	6%	2,380
MELTING SCRAP H M S - II	43,860	42,090	4%	1,770
SPONGE IRON (COAL BASED)	41,820	36,190	16%	5,630

STEEL SECTOR NEWS

With coal issue resolving, crude steel output may improve in Nov

Production: With the coal supply issue being gradually resolved, the non-power sector is in a better position compared to the previous few months. Coal India has resumed offering coal via auctions to the non-power sector from November. Smaller mills had been severely impacted by scarce coal supply and skyrocketing prices. Local scrap supply is tight but furnaces have the alternative of sponge iron to fall back on. Local sponge iron prices have also seen a drop, which would support higher production in November..

The primary mills are operating at well over 90% capacity and production is expected to improve further with global coking coal prices expected to cool down. SteelMintexpects production to return to the usual 10-10.5 mn t per month from November.



Consumption: The peak season for construction, consumer durables and auto salesstarts from October. November should be better compared last month, pushed up by festive demand.

However, the challenge lies in rising steel prices.Construction players may wait and watch. Some say even individual house owners may defer their building plans by a quarter especially since all non-ferrous material prices are also high, raising the cost of construction.

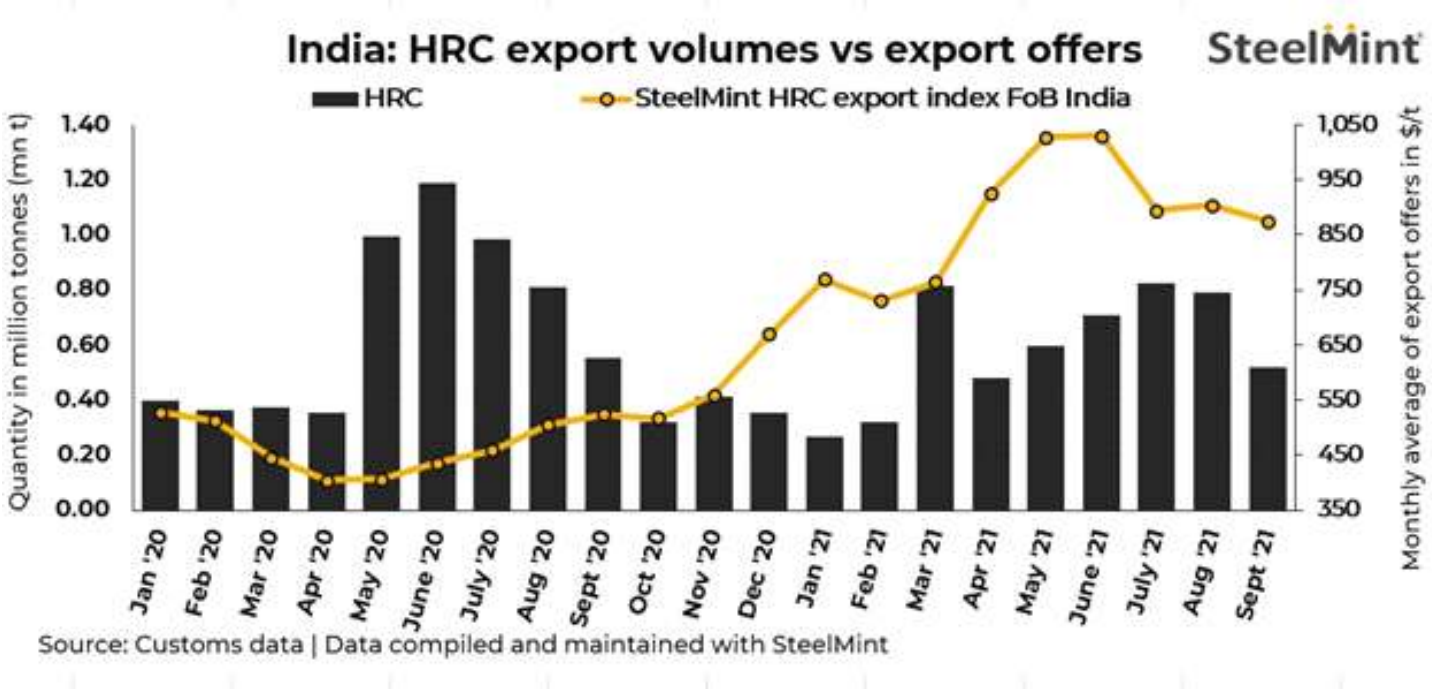
Prices: Primary steel mills raised prices for flat steel by INR 2,000-2,500/tonne (t) for Nov'21 on the back of surging prices of input materials like coking coal, met coke and ferro alloys.

Mills are also mulling a hike in rebar prices, by around INR 1,000/t, SteelMint overheard. However, they may watch the induction furnace (IF) players' price movements (INR INR 54,000-55,000/t) first. BF-route rates are hovering at INR 60,000/t.

But, with the coal issue, a big price influencer for the IFs, being gradually resolved, the smaller mills may not have a

reason to raise prices from here.

Exports: November export volumes may not touch 2 mn t because of a few factors. Demand from Vietnam and South East Asia is dull.There have been no significant bookings in last three months with nil in last four weeks. Sporadic HRC deals were concluded since August but to non-traditional destinations like the UAE, Nepal and South Korea. Volumes ranged from 15,000-65,000 t and prices from $850-960/t CFR levels. November looks bleak.



Steadily declining Chinese offers are luring South EastAsia away from India. Average weekly imported HRC offers to Vietnam from China dropped from $985/t CFR in mid-August to $910/t CFR in the second week of October. Indian offers to Vietnam reduced from $928/t CFR in August to $890/t in September although these inched up to $910/t CFR in October.

Europe quotas have been exhausted and the residual shipments will last till December, it is heard.

Inventory: Larger mills liquidated substantial inventory at the beginning of October and are now comfortably placed. The liquidation happened since the trade segment rushed to stock up fearing prices would rise further since global prices had increased, China is restricting output and coal prices were skyrocketing. Thus, some amount is being held at the stockist level.

However, mills may start piling up stocks in the absence of adequate export shipments. Also, stockists need to liquidate the inventory bought in early October at INR 65,000-66,000/t ($870-883/t) levels while current offers are nearer to INR 71,000/t ($950/t).

Indian steel buyers should pay attention to coal prices

Nov 12,2021

China is in the midst of a well-documented coal shortage. Reduced output in the key mining region of Shanxi is being exacerbated by a de facto ban on imports from Australia. Consequently, Chinese coal buyers are scrambling to secure supplies ahead of the winter period.

Prices for thermal and coking coal are skyrocketing as the effects of the supply crunch spill over into other countries. In India, the second largest steel producer in the world, the MEPS price assessment for domestic hot

rolled coil is at an all-time high.

Global coal market dynamics are poised to maintain upward pressure on Indian steel values in the short term. Here's why:

1. Rising coking coal costs are countering plummeting iron ore prices

   Iron ore prices, which had reached a historical peak in May 2021, nosedived throughout the third quarter. However, a reduction in input costs, for Indian BOF route steelmakers, failed to materialise.

   Scarcity caused coking coal values to treble between May and October of this year. Consequently, raw material expenditure for oxygen furnace mills remains double what it was in early 2020. To avoid profit margin erosion, domestic steelmakers are likely to keep their selling prices firm.

2. Half of coal fired plants have critical stock levels as winter approaches

   Over 70 percent of India's electricity generation comes from thermal coal-fired power stations. Recent Central Electric Authority data showed that approximately half of these plants have either critical, or super-critical, coal stock levels. In response, state-run Coal India Ltd is decreasing shipments of domestically mined coal to non-power customers, including steelmakers.

   Energy generation for households, ahead of the winter period, is the government's priority. Therefore, reduced power for rolling mills, resulting in lower production, may lessen the availability of domestic steel.

3. Australia's cyclone season has begun

   Indian steelmakers fulfil 70 percent of their coking coal requirements through imports. Of these externally sourced volumes, Australian miners supply more than 70 percent. Most domestically mined coal is unsuitable for use in blast furnaces, due to its high ash content.

The Indian steel industry is extremely sensitive to the supply and price dynamics of Australian exports. Recent projections by Australia's Bureau of Meteorology indicate that the number of tropical cyclones, between November 2021 and April 2022, will be slightly above average.

Poor weather may cause disruption to port operations and damage to docks. Export volumes could fall and prolong coal shortages. Therefore, raw material costs are expected to remain firm, and limit any downward trend in Indian finished steel prices.

What's next for India's coal consumption?

India's coal shortages come at a pivotal time for the country. At the United Nations COP26 summit in Glasgow, India pledged net zero carbon emissions by 2070. Meanwhile, the Indian National Steel Policy of 2017 is targeting an ambitious 300 million tonnes of annual crude steel production by 2030.

The carbon emission targets present an enormous challenge for the steel industry, where coal is the cornerstone of production, and coal requirements are expected to grow exponentially. Costs of both thermal and coking coal are likely to heavily influence domestic steel prices, in the long term.

Source : Metal Junction

Domestic steel demand and consumption increasing: Union minister Ram Chandra Prasad Singh

Nov 01, 2021

Union Steel Minister Ram Chandra Prasad Singh said the domestic demand for steel is "very good" and its consumption is also increasing in the country.

Singh was speaking at a press meet on the sidelines of the inauguration of the second Vertical Shaft, Chikla Mine and various other facilities of the Manganese Ore India Limited (MOIL) based in Nagpur.

Replying to a query on the situation of domestic steel demand in India, Singh said, "The domestic steel demand is very good and the country is at number two in the world. However, our per capita consumption is little less. Our per capita consumption is around 74 kg and 14 to 15 kg in rural area."

He said that the requirement and consumption of steel is increasing in the country with the kind of infrastructure development work going on in the country.

To a query on the conflict between tribals and mining industry, Singh said that locals' interests have to be taken care of when negotiations take place.

When mining is done or industry is set up, the locals also get employment and overall development is carried out of that region, he added.

"We have to provide better alternatives to them and take their suggestions to create a win-win situation for both," he said.

Source : Metal Junction

Steel Imports Up 34.9% Year-To-Date Through September

Oct 27, 2021

Based on preliminary Census Bureau data, the American Iron and Steel Institute (AISI) reported today that the U.S. imported a total of 3,237,000 net tons (NT) of steel in September 2021, including 2,469,000 net tons (NT) of finished steel (up 16.7% and 17.1%, respectively, vs. August final data). Through the first nine months of 2021, total and finished steel imports are 23,806,000 and 16,684,000 net tons (NT), both up 34.9%, vs. the same period in 2020. Annualized total and finished steel imports in 2021 would be 31.7 and 22.2 million NT, up 44.2% and 37.8%, respectively, vs. 2020. Finished steel import market share was an estimated 25% in September and is estimated at 21% over the first nine months of 2021.

Key finished steel products with a significant increase in imports in September compared to August are line pipe (up 111%), oil country goods (up 104%), reinforcing bars (up 70%), cut lengths plates (up 44%), wire rods (up 33%), tin plate (up 27%), plates in coils (up 22%), standard pipe (up 18%), cold rolled sheets (up 17%) and hot rolled sheets (up 16%). Products with a significant year-to-date (YTD) increase vs. the same period in 2020 were hot rolled sheets (up 106%), plates in coils (up 81%), wire rods (up 56%), sheets and strip all other metallic coatings (up 53%), cut lengths plates (up 52%), oil country goods (up 37%), heavy structural shapes (up 29%), cold rolled sheets (up 28%), hot rolled bars (up 26%), wire drawn (up 24%), sheets and strip hot dipped galvanized (up 20%), tin plate (up 17%) and reinforcing bars (up 13%).

Source : Metal Junction

Steel prices to ease in 2022 as rally is over

Nov 25,2021

Steel price is forecast to retreat in 2022 as the rally is over globally, but US prices are likely to see some upside with the signing of President Joe Biden's Infrastructure Bill into law in November.

Fitch Solutions on 23 November its note revised up steel prices for 2021 to $950 per tonne, from a previous forecast of $920 per tonne, but the price is forecast to drop to $750 per tonne in 2022.

“Our forecast for prices to start cooling in the second half of the year has played out, with European and Asian prices declining throughout the second half of 2021, while US steel prices have started to stabilise starting October from the exceptional rally since the fourth quarter 2020,” the firm said.

On the supply side, Chinese steel production in 2022 is expected to rebound slightly following significant year-on-year declines from July-September as a result of the Chinese energy crisis that dented industrial production in order to reduce pressure on the power grid.

Fitch revised downwards Chinese steel production growth forecasts from 9% year-on-year to 2.5% in 2021 and from 7% year-on-year to 5% year-on-year in 2022.

“As government intervention in the coal sector has worked to ease the energy crisis in China, we expect steel production to start rebounding from the steep declines in the third quarter 2021,” the firm said.

Outside China, the US has significantly lagged behind global peers in restarting capacity following Covid-19 disruptions and production cuts. Going forward, Fitch expects more US supply to come back online and imports to improve over the coming months, gradually stabilising US steel prices in 2022.

Fitch expects China's steel demand growth from the construction industry to have largely peaked in the first half of 2021. While ongoing projects and new public infrastructure projects will continue to buoy steel demand during 2022-2025, the firm did not expect the strong demand impact that had stemmed from an acceleration of government stimulus since April 2020 to support the country's post-Covid recovery to return in 2022 onwards.

“With major construction projects reaching completion and the pipeline of new projects thinning with the Chinese Government focusing on tightening credit lines, Chinese steel demand from the construction sector is likely to weaken going forward,” Fitch said.

In addition, there is rising risks to the Chinese property market following financial difficulties faced by Evergrande. If Evergrande's difficulties spark contagion for a large number of Chinese property developers that may not be directly exposed, steel demand would be further hampered.

In contrast to China, Fitch is more upbeat for its outlook for steel demand in the US.

“President Biden's infrastructure plan will involve traditional as well as new infrastructure with spending spanning over eight years. Thus supporting steel demand along with other green metals like copper for a time to come,” Fitch said.

Alongside traditional infrastructure like bridges, ports, roads and pipelines, Biden's plan addresses climate change through a wide range of projects involving electrification, advanced manufacturing, clean technology, electric vehicles charging stations, broadband, and renewable energy.

European steel demand is also expected to rebound following the collapse seen in 2020 due to Covid-19. Fitch expects consumers, especially large automakers and electronic producers to prefer European steel compared with Chinese steel going forward to lower their emission. This is because European steel is mainly low-carbon steel produced at electric arc furnaces using scrap metal, while Chinese steel is mainly produced at blast furnaces requiring coking coal and iron ore.

“We also expect more localisation of supply chains in the coming years leading to Western downstream industries consuming greater amounts of European steel compared to Chinese exports. This will be bolstered by rising prices of international steel that will make exports less attractive,” it added.

Fitch maintains its view for global steel prices to ease from current levels to average $750/tonne in 2022 and $535/tonne over 2023-2025.

“Ultimately, we expect that a combination of slowing Chinese steel consumption growth and rising global steel market protectionism prompting greater production in affected countries to loosen the market and drag prices lower in the medium term,” it said.

Chinese domestic steel demand is expected to slow overall in the coming decade compared to the last as the country shifts its economy away from heavy industry and towards the service sector resume. This will drag down domestic steel prices in China and the global average.

Source : Metal Junction

World Steel Association: October 2021 crude steel production Down by 10.6%

Nov 24,2021

World crude steel production for the 64 countries reporting to the World Steel Association (worldsteel) was 145.7 million tonnes (Mt) in October 2021, a 10.6% decrease compared to October 2020.

Africa produced 1.4 Mt in October 2021, up 24.1% on October 2020. Asia and Oceania produced 100.7 Mt, down 16.6%. The CIS produced 8.3 Mt, down 0.2%. The EU (27) produced 13.4 Mt, up 6.4%. Europe, Other produced 4.4 Mt, up 7.7%. The Middle East produced 3.2 Mt, down 12.7%. North America produced 10.2 Mt, up 16.9%. South America produced 4.0 Mt, up 12.1%.

Source : Metal Junction

Steel prices could rise 'much higher' in coming years, Indian steelmaker says

Nov 23,2021

Steel prices could climb "much higher" over the next decade compared with the previous decade, Tata Steel CEO T.V. Narendran tells CNBC.

The long-term average price for hot-rolled coil steel over the coming years likely will exceed $600/metric ton, after averaging $400-$450/mt in the last 7-8 years, Narendran says, noting prices were $750/mt in China and $850/mt in southeast Asia on Friday.

China's steel exports have been cut in half to ~60M tons/year and could fall further as the country pursues its net-zero carbon emissions goals, while steel demand is not being driven by China for "the first time in many years," as growth in steel consumption this year will come from countries other than China, according to the Tata Steel head.

Steel names rose across the board in today's trading: TMST +13.1%, STLD +6.2%, NUE +6%, X +4.3%, CLF +3%, RS +1.4%, MT +0.5%.\

ETF: SLX

Narendran says steel prices also could be lifted by increasing carbon costs in Europe and by increased U.S. infrastructure spending.

Source : Metal Junction

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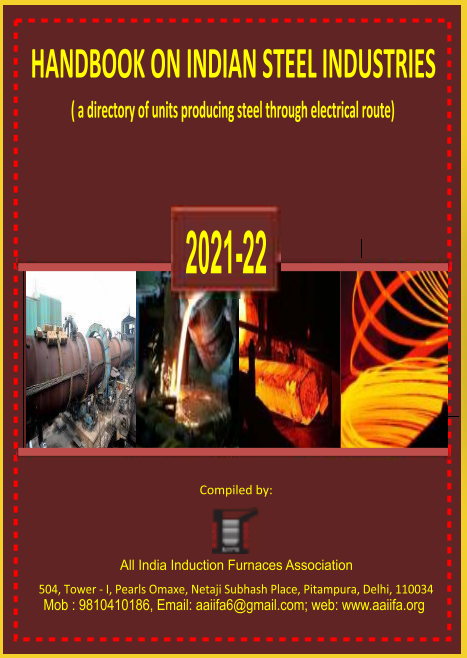

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