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हमारे सभी सदस्यों को गणेश चतुर्थी की हार्दिक शुभकामनाएँ

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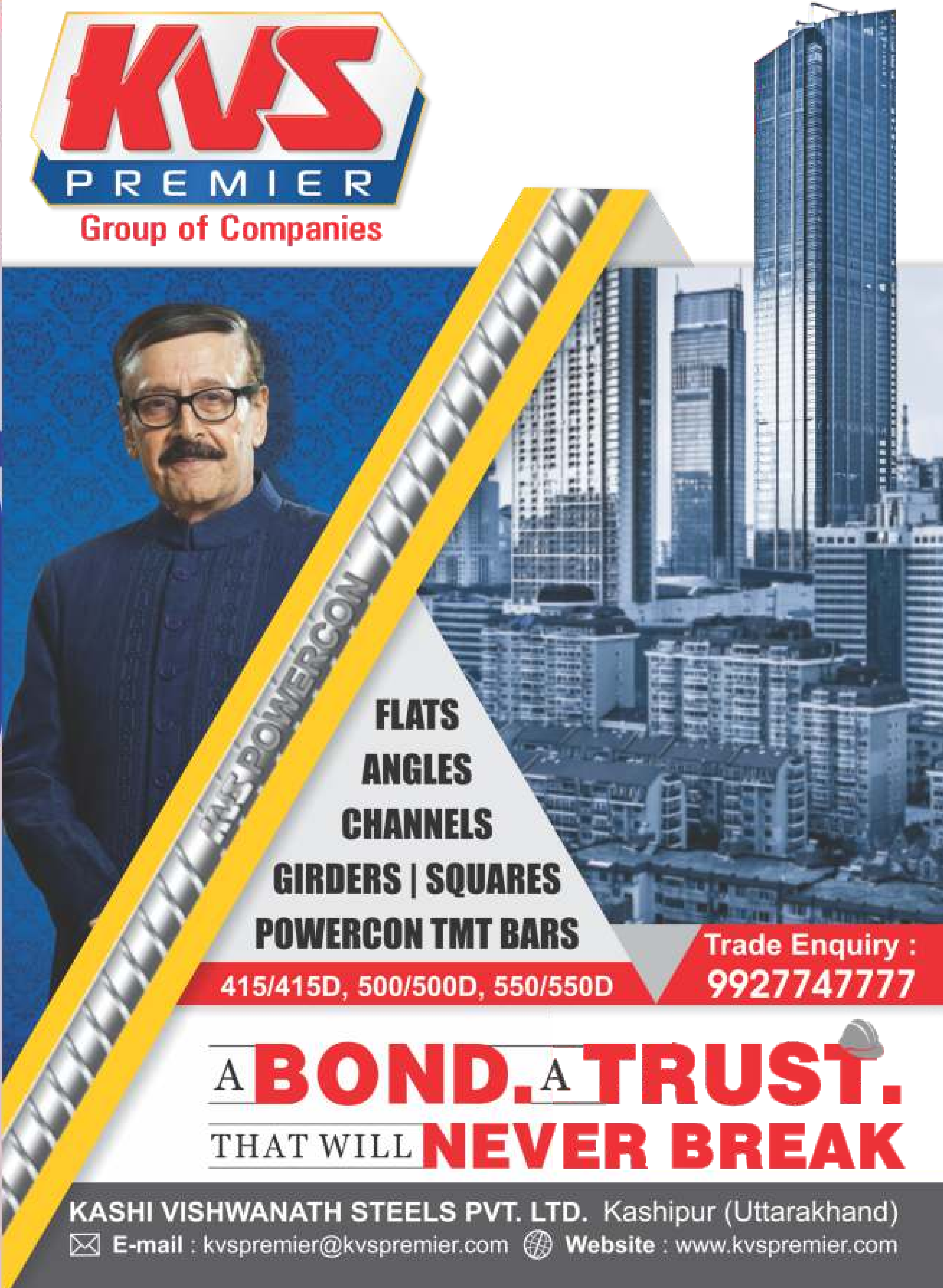


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ENVIRONMENT FRIENDLY STEEL

Contribution Towards Better Sustainability in Steel Industry

Kamal Aggarwal
Hon. Sec. General, AIIFA

Preamble : Steel is a surprisingly sustainable material as Innovative products can be manufactured out of steel for human need which can be recycled up to 100%. This means that fewer primary raw materials are used and resources are saved. The use of steel is therefore particularly suitable for green technologies and sustainable products for the protection of our environment. Steel Is mainly produced via two routes, the blast furnace, BOF route and the electric arc or induction furnace route. Every production process counts in the transition to better sustainability and reduction of resource consumption. Considering the importance of steel Industry In every aspects of human life and need, the best solutions at this moment are without a doubt taking advantage of renewable resources and recycling.

Every action in steel industry contributing to better sustainability is helpful no matter how unimportant it may seem. The Govt. can help in the transition to sustainability by legal adjustments and subsidies within the policy framework for projects that can reduce the harmful Impact of operational activities on the environment conserving natural resources which depends on the willingness of management and employees of the organization as part of their combined efforts. Steel manufacturing process consists of primary production, in which iron ore is converted to iron and then processed into steel, and secondary production, In which scrap steel Is recycled by melting. Most primary production occurs through the blast furnace–basic oxygen furnace (BF-BOF) route, though comparatively lesser amount of steel is produced from melting scrap and scrap substitute In electric arc furnace (EAF) or Induction furnace.

Green Steel & Sustainability : For the production of Green Steel, the electric furnace steel making, being more flexible, specialized, environment friendly, is regarded as a pioneer in terms of CO2 emissions, as this process emits the lowest CO2 emissions compared to the blast furnace route. Electric furnace can be started up or shut down depending on capacity utilization, ra material and supporting orders from customers. However, the production of Green Steel starts with the right scrap material. Close customer cooperation e.g. scrap can be returned directly from the customer/ supplier into the scrap cycle and individual scrap concepts are essential for this.

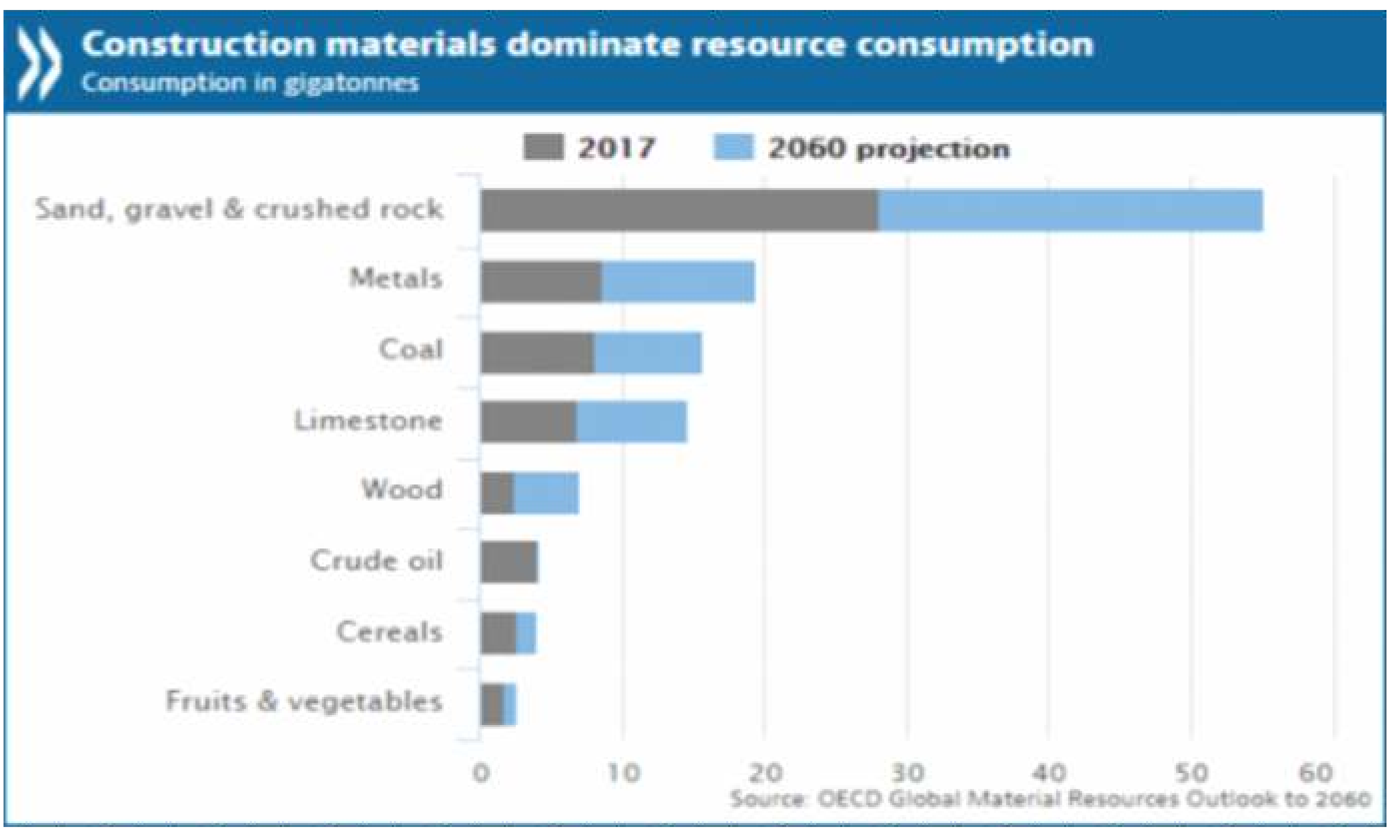
Since steel can be recycled up to 100%, corresponding concepts make a significant contribution to global resource-saving which Is based on an intensive exchange between the steelworks and the raw material supply company with the aim to optimizing the use of scrap, raw materials in the steel plant. More than 100 scrap groups lead to a resource-saving feeding of alloying elements into the melting shop. Further Improvements have been achieved by fragmentation and cleanliness of the scrap where energy consumption in the unit can be reduced by both the parameters.

Emissions intensity values are often sought by policy makers in management team who must decide questions related to energy, greenhouse gases, and competitiveness addressing methodology for the industry's boundary definition, conversion factors, and Industry structure. It may be noticed as base case of 2010, for the entire iron and steel production process in China's crude steel the emissions intensity was 2,148 kilogram (kg) CO_2/ tonne crude steel, comparatively same figures in Germany 1,708 CO_2/tone,1,080 kg CO_2/tonne crude steel in Mexico, and 1,736 kg CO_2/tonne crude steel in the U.S.The main reason during that period of lowest in Mexico CO_2 emissions intensity is large share of steel production using electric furnace steel making about 69.4%.

Steel is an environment-friendly and infinitely recyclable material that makes it a great contributor to sustainability. Mitigation of wastage from water to electricity, in iron & steel or any manufacturing process is also a way to contribute to the environment where necessary measures and care have to be taken to avoid or reduce dependence on these crucial sources establishing highly beneficial to the environment. The world's consumption of raw materials is set to nearly double by 2060 as the global economy expands rising living standards, placing twice the pressure on the environment that are seen today (Recent Report of OECD).

Issue of Major Raw Material Extraction : Without concrete actions to address these challenges, the projected increase in the extraction and processing of raw materials for iron & steel or other manufacturing industries and other biomass, fossil fuels, metals and non-metallic minerals is likely to worsen air / water / soil polluting and contributing significantly to climate change. The increase comes despite a shift from manufacturing to service industries and continual improvements in manufacturing efficiency, which has lessened the amount of resources consumed for each unit of GDP.

The recycling industry, currently a tenth the size of the mining sector in terms of GDP share, is likely to become more competitive and grow, but it will remain a much smaller industry than mining primary materials.



The extraction and burning of fossil fuels and the production of iron, steel, building materials are already major contributors to air pollution and greenhouse gas emissions. In the absence of new emissions-cutting policies, overall emissions in most of the production process is likely to grow in future. Report of OECD, shown below, indicating projection of resource consumption.

Harmful Effects of Pollutants : The steel Industry releases large amounts of pollutants into the air during all its processes—be it in handling raw material, operation in coke oven plant producing of iron and steel or disposing of solid waste. The main pollutants are **particulate matter, oxides of sulphur and nitrogen and carbon monoxide.** Steel plant operations are vulnerable to air pollution. This can be visualized by the huge consumption of coal, iron, limestone, dolomite, sulphur etc. During the process large amounts of emission (stack and fugitive) consisting of dust, gaseous pollutants like SO2, NOx etc. are generated.

To have an effective control over the pollutants first step for environmental management in major and main integrated steel plants consists of conducting an emission inventory or pollution survey by visiting, inspecting the plant at various processing locations such as raw material handling unit, blast furnace, coke oven, sinter plant, refractory plant, steel making, secondary reefing unit etc. to get a first hand information on the process and practices carrying out stacks monitoring ambient air quality to establish the nature, quality and quantity of pollutants, emitted at the sources.

Performance of pollution control equipments if any is to be monitored comparing it with emission standards so as to assess the necessity of controlling the emissions either at source by suitably altering the process parameters or by improving the efficiency of pollution control measures. Air pollution control equipment available in Indian steel plants are listed below followed by actions to maintain the standards.

1. Bag House in Raw Material Handling Plant,
2. Ventury Scrubber in Blast Furnace,
3. Electro Static Precipitators in Boiler, Stock House , Cast House and Basic Oxygen Furnace/ LD Converter, Secondary Refining units. (Ref: P.V. VISWANATHAN AND T.K. GANGADHARAN, Scientists NML)

The other important area in steel industry is treatment / suitable disposal of Solid waste like fly ash, acid sludge from by product plant, tar sludge, coke breeze, granulated B.F. slag, steel slag, calcined lime and dolomite dusts, steel scrap, etc. which are generated in huge quantities causing environmental degradation. Like industrial waste waters is to be suitably disposed or sold after analyzing/ checking quality, physical and chemical characteristics before dumping, selling or treatment.

The three main raw materials used to make pig iron (which is the raw material needed to make steel) for primary steel production in a blast furnace are the processed iron ore, coke (residue left after heating coal in the absence of air, generally containing up to 90% carbon) and limestone (CaCO3) or burnt lime (CaO), Blast furnace melts iron ore, lime, and coke in mixed condition and output product as liquid known as molten iron or hot metal. As molten iron still contains around 4% – 4.5% impurities such as carbon making metal brittle, they need to be eradicated. Iron ore, lime, and coke are placed into a blast furnace and melted.

The pollution problems are taken place in iron & steel industry at different processing stages releasing large amounts of pollutants into the air during all its processes— be it handling of raw material, producing iron and steel or disposing of solid waste. Blast furnace, by-product coke ovens and sinter plants cause heavy pollution, but the heaviest is from coal-based sponge iron plants.

- **Raw Material Transformation Areas :** The raw materials for iron and steel making are iron ore, coal/coke, limestone, natural gas and a variety of other materials such as fluxes, oil, etc., as well as air and water. The main transformation processes in iron and steel Industry products are described below:

- **Iron ore -** Ore mining which is naturally occurring and mined from geological deposits, both at open cast sites and underground which is frequently undertaken by the industry itself or by enterprises closely associated with the industry.

- **Mining Operation -** The ores are treated according to type, quality and process requirements where operations include crushing, screening, beneficiation, and in some cases calcining and drying. Specific quality of ore is required for direct reduction, depending on the design of the process employed. Advanced magnetic, chemical, and physical processing may be needed to treat ores in certain circumstances.

- **Scrap -** Scrap consists of ferrous rejects or wastes collected from sources within the steel industry itself i.e return scrap, engineering and other industries using iron and steel as basic inputs, from manufactured goods containing iron and steel completed end of life or useful life or its collection from sources outside the industry. Depending on its origin, scrap often contains other materials usually termed as tramp element/ residuals which may interfere with the steel making process or may affect quality of the product.

- **Fluxes -** The main fluxing materials used in the Industry are limestone/lime, dolomite and fluorspar. Limestone is quarried and crushed to suitable size. Some limestone is converted to lime by heating in kilns.

- **Coke-making -** The other major raw material is coke, coking coal, is also mined from natural deposits but this is normally done by the coal. Coking is traditionally associated with iron and steel and foundry operations but not universally so. The special type of coking coal is washed, crushed and screened in preparation for blending prior to charging to the coke-making process.

  Majority of coke is produced in the traditional vertical slot oven from which the by-products of coal distillation can be recovered. In the area of new technology, improvements to conventional coking operations are being developed in the form of improved charging techniques, e.g. pipeline charging of coal, slot ovens and in a new concept of producing coke directly from briquette. The continuous process of coking is used with recirculation of the gas, after washing and by-product removal, for heating purposes. Dry quenching with an inert gas, such as nitrogen or carbon dioxide, with recuperation of energy in the form of steam is also practiced at some integrated works. The metallurgical coke is sized and screened when smaller size coke breeze, is used as a fuel in the iron ore agglomeration and larger sized coke being used in the blast furnaces as fuel.

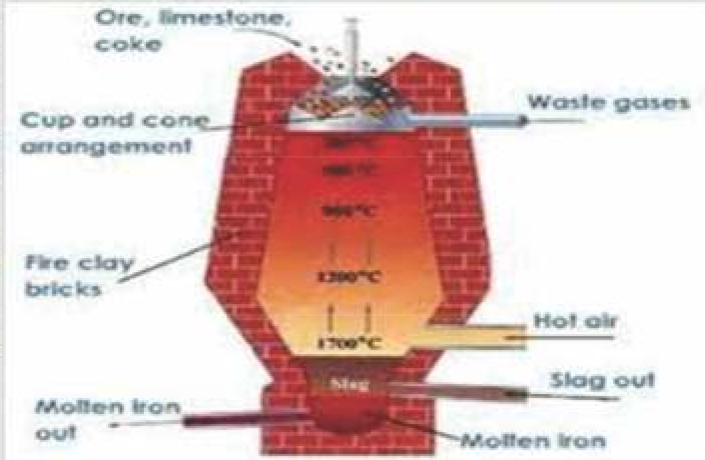
Pollution Prone Areas in Steel Making

Iron Ore Mining

Coal Mining

Conversion of Coal to Coke

Pollution Prone Areas in Steel Making

	
Blast Furnace & Pig Iron Making	**BOF Steel Making**

Prior to charging iron ore as major raw material in blast furnace, it is generally agglomerated to give suitable size and strength of material. Sintering or pelletizing are normally used in this process. In the sintering process the finely crushed iron ore is mixed with coke breeze or, in some cases coal, and the appropriate fluxing materials. At the sinter plant the mixture is spread on a continuous grate (sinter strand), ignited from the tip of the surface by a gas or oil fired ignition hood, and air is drawn through the bed of material so that in burning of the coke breeze the mix is fused into a porous but strong material (sinter).

The sinter is broken up and screened in readiness for charging in the blast furnace, the fines being recycled within the process. In pelletizing the iron ore fines, a suitable binding agent added so that pellets can be formed which are then dried and heated in a kiln to between 1200 and 1370◦ C to achieve agglomeration of the iron ore particles. The control of moisture content is important to ensure the strength of the pellets. The direct reduction process requires predominantly pellets, as feed material, briquetting is also ore preparation treatments for certain processes. In nodulizing, ore fines are heated in anoil or gas fired rotary kiln. The ore agglomerates into lumps near the fusion point of 1260 to 1370◦ C. Nodules are not used in the blast furnace. For the briquetting process ore fines are mixed with a binder and compact between rotating rollers.

In hot briquetting, the ore is heated to between 870 C and 1040◦C and then briquetted in a press at heavy loads of 45 to 55 tons. The main process used for reducing iron ore to metallic iron is the blast furnace which in essence a large vertical shaft charged from the top with iron ore, sinter or pellets, together with coke and fluxing material such as limestone. To achieve the necessary temperatures and reducing conditions, heated air is injected at the base of the furnace. Molten iron is tapped from the bottom of the furnace, as is the liquid slag formed by the fluxes and gangue in the iron ore float at the top.

Iron can also be produced in electric reduction furnaces. Molten iron is passed on refining in the steel making process or cast and solidified into pig iron from pig casting machine. The gas given off from the furnace contains carbon monoxide and can be collected and cleaned for use as a fuel. A recent industrial innovation is direct reduction of iron ore in the solid state, which is achieved either with gaseous (e.g. natural gas) or solid reductants (e.g. coke or coal). Various processes are in existence. In some, the direct reduction is carried out on naturally sized ore. In others,, the iron ore is formed into pellets prior to being heated in a kiln in the presence of the reducing agent. The product, sponge iron or pre-reduced pellets, is used as a substitute for steel scrap in electric arc or induction furnaces.

Direct reduction is very much a developing technology which has not yet seen its full potential. It is clearly an attractive alternative to conventional iron making, where adequate supplies of low cost hydrocarbon fuels are available as reductant. The steel making processes commonly in use today which utilize molten iron as a charge material in the basic oxygen furnace even in electric arc furnace to reduce power consumption. Presently 55-60% of the world's steel production is produced from the basic oxygen furnace (BOF)/ EOF & Other Process, 40-45% by electric arc / induction furnace and open hearth furnace almost phased out.

However, a considerable amount of steel (approximately 54%) is produced in India by electric steel making processes like induction furnace (26%) and arc furnace (28%) by melting scrap and scrap substitutes like sponge iron, DRI etc. The advantage of the induction furnace is a clean, energy-efficient and well-controllable melting process compared to most other means of metal melting. While increased steel production costs have affected steel producers all around the world, local small units are also feeling the heat as well, though perhaps to a lesser extent.

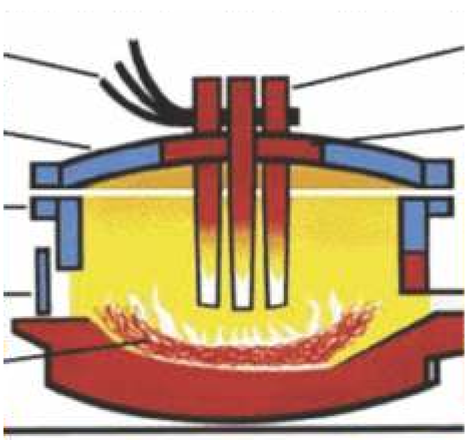
Induction furnaces today are far more efficient also more eco-friendly than traditional steel making furnaces, though highly energy intensive, producing far less emissions and pollutants and thus opening up a fantastic marketing opportunity to producers making the unit as "eco-friendly". than those from even as little as 10/15 years ago, using significantly less energy and producing far less waste than their older counterparts. Further, present day's customer procure small lot situated nearer to steel producing units. More than 3500 grade steel with different physical, chemical and environmental properties produced globally varying ranges of thickness, size and shape designated for specific applications. 75% of existing steel grades out of 3500 not existed 20 years ago. (Ref: World Steel Association)

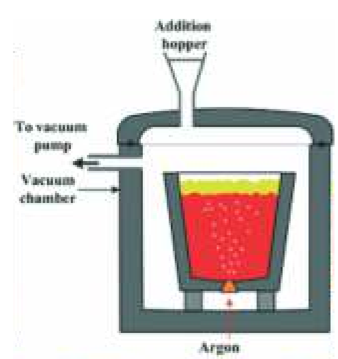
- **Iron & Steel Slag Utilization :** The major wastes produced in integrated steel plants include BF Iron Slag Steel Melting Shop (SMS) Slag accounting for nearly more than half a ton for each ton of steel produced in integrated steel plant. Most of the steel plants are utilizing 100% of the iron slag produced (mostly in cement making and some portion as aggregate, both of which are permitted in BIS or IRC Standards Specifications) while others are closer to reach the 100% utilization. The utilisation of SMS slag is limited due to its Phosphorous content, High Free lime content and Higher specific weight. The steel industry is finding ways and means to utilize the steel slag in other applications like construction & road making, soil conditioning, rail ballast. However there are problems and issues. The steel slag need to be properly aged and ground to very fine size before it can be explored to be utilized, which incur substantial cost. There are lack of guidelines for use of steel slag as replacement of natural aggregates in construction activities and road-making. Use of aggregates in Rail Ballast is governed by RDSO standards. However, the RDSO standards do not presently allow use of iron and steel slag. Steel industry is pursuing the matter with RDSO. Ministry of Steel is funding the following R&D projects for promoting utilization of steel slag in various end uses.

- **Consciousness for Green Product & Role of Management :** Today's environmentally-conscious customers want to 'be green' and will more often than not choose to purchase products and materials from manufacturing plants and steel mills which boast environmentally friendly practices. So induction melting furnace save money and it can also be leveraged to increase profitability of the plant.

- **Rules & Regulation and Govt. Supports :** Iron & steel industry in India are covered under the Environment Protection Act (EPA) as well as Environment Protection Rules & Regulations enacted & published by Ministry of Environment & Forest (MoEF&CC). At the beginning, the entrepreneurs are required to obtain statutory clearances from the Union/State Governments required under the EPA for setting up of any new iron & steel plants or its substantial expansion. Further, the steel companies are required to install specified pollution control equipments/facilities and also operate well within the prescribed Standards/Norms in respect of air, water and noise pollutions as also solid waste generation & utilization. These are monitored by Central/State Pollution Control Boards. MOS helps & facilitates formulation/amendment of Norms and standards.

- **Conclusion :** Earth gives us everything in nature but humanity is under threat of extinction if proper care and timely actions not taken for protecting environment reducing the harmful impact on the environment reducing consumption of natural resources using sustainable materials in production of steel making/ shaping/ treating and various manufacturing activities in eco-friendly ways since steel is at the core of a green economy, in which economic growth and environmental responsibility work hand in hand. The steel industry believes that sustainable development must meet the needs of the present without compromising the ability of future generations to meet their own needs which only will ensure a green economy delivering prosperity of country, nations and industry. As most priority industry in building nation, steel is essential to the technologies and solutions meeting society's everyday needs – now and in the future, being central to our construction and infra-structure industry, automobile and transport systems, housing, manufacturing sectors being critical for enabling and driving a green economy by efficient usage of all the needed raw materials for sustainable steel production and recycling as permanent resource because it is 100% recyclable without loss of quality and has a potentially endless life cycle of strength making the metal as unique and innovative.





USE OF ENERGY EFFICIENT OPERATING PRACTICES

P. Mishra, Sr. *Exe. Director, AIIFA*

1.0 ABSTRACT :

Iron and steel industries is the one of the largest consumers of energy. Due to steady increase in the input cost, the cost of production has increased many folds. Cost of energy accounts nearly one-third of production cost of steel in India. Hence it is imperative to upgrade the design of equipment/process and the operational parameters in rolling of steels for optimal uses of energy and better quality of product, to survive in present competitive scenario of steel industry. Most attention is required in reheating furnace and mill technology of the rolling mill.

2.0 REHEATING FURNACE:

Reheating furnace plays an essential role in the hot rolling mill production plant. The purpose of a reheating furnace is to provide properly heated billets at the discharge end of the furnace, before they are further processed in the mill. It is therefore desirable to improve the furnace efficiency for saving more energy and have more yields of possible way of improvement is by controlling the reheating process precisely.

The energy optimization in a reheating furnace in rolling becomes essential to reduce the cost of product and to be price competitive. It enhances the profitability and also improves the quality of the product. Optimization of the process parameters for improving productivity and thus reduction of specific heat consumption is the most important and least cost approach for energy saving. The present walking beam furnace has been developed with state of art technology with low specific fuel consumption of 280 Kcal/ton and scale loss limited to 0.6%.

2.1 TYPE OF FURNACE:

Both the basic types of furnaces viz,

a) **Batch furnaces:** As the name indicates, in batch furnaces, the entire batch of materials (billet/bloom/slabs) is charged and heated to the desired temperature at a time

.b) **Continuous furnace:** Material is charged from one end and the heated material is discharged from another end.

- **Pusher type.**
- **Walking beam furnace.**

2.2 Purpose of heating metal for rolling is –

1) Softening of metal suitable for rolling.
2) Providing a sufficiently high initial temperature so that rolling process is completed in fully austenitic temperature region.
3) Surface scaling for removal of surface defects.

For the energy efficient rolling practice, the reheating furnace plays a vital role. It not only improves the yield of the product, but improves the mechanical properties of the final product. The modern furnaces are fully computerized to avoid over/under heating for achieving fuel efficiency.

2.3 Problem associated with Heating:

- Achieving the desired minimum temperature consistent with achieving the correct temperature and metallurgical properties at the finishing stand of the mill.
- Minimizing temperature difference between surface and center to a desired level as low as 15oC.
- Minimizing local cold spot (skid mark) due to water cooled skids.
- Avoiding overheating and burning of metal.
- Elimination of scratches on the bottom surface of boom/billet/slab in pusher type furnace.
- Avoiding thermal stresses and cracks.
- Minimizing scale formation, decarburization.
- Effect of Sulphur in fuel, which cause severe scaling.

3.0 Operational energy efficient improvement practices in furnace and mill

Operational improvement are the most vital factors for fuel saving and improvement in the quality of heating. Any improvement or the modification in the design of furnaces has to be appropriately adopted in the operational practice to gain the benefits.

Successful implementation of most of operational improvement depends upon the operating personnel. Such important practice is -

- Optimal operation of combustion system

The basic requirement for good combustion of fuel in reheating furnace is:

- Complete combustion of fuel
- Desired flame configuration
- Minimum oxygen in the outgoing product of combustion
- No occurrence of overheating of furnace elements
- Minimum pollution.

The excess air in flue gas should be kept at minimum level. The excess air should be set in such a way that there is no un-burnt fuel in the flue gas. To achieve complete combustion of fuel with minimum excess air, factors such as type of burner, fuel, combustion air pressure and its preheat temperature are very important. The walking beam furnaces have oxygen analyzer to trim and control the oxygen in flue gas. The heat loss is higher at higher excess air resulting in higher fuel consumption. The scale loss is also high at higher excess air. Figure-1 shows the rate of fuel saving against excess air-fuel ratio (m).

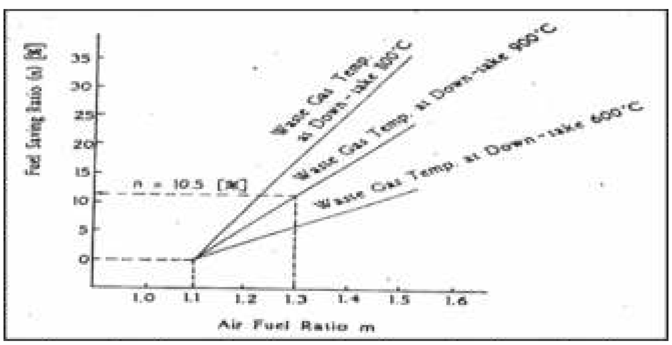


Fig-1 Rate of Fuel Saving by Reducing Air-Fuel Ratio

- Optimization of thermal regimes

The basic requirement of heating of stock in the reheating furnaces is that the metal should reach the desired level of temperature within the permissible tolerances. It is also necessary to make the metal ready only when it is to be discharged for rolling. Heating the metal much before it reaches discharge end leads to high fuel consumption and scale loss as the stock remains in high temperature zone for a longer period. In case of continuous pusher type or walking beam furnaces, it is necessary to maintain required temperature profiles along the length of the furnace such that the metal will be ready when it reaches the discharge end. In case of batch-operated furnaces, the stock is heated at prescribed rate of rise of temperature (known as RAMP heating mode or step heating mode) with the help of programmable temperature controllers.

- Furnace pressure regimes

The pressure inside the reheating furnace is normally maintained at 0.5 to 1.0 mm WC, to avoid ingression of atmosphere air. This is achieved by operating the chimney damper in auto/computer mode in walking beam. The pressure inside the reheating furnaces is normally maintained positive at skid level in soaking zone. When the furnace pressure exceeds the normal limits, flame shoots out of the doors causing heat loss and damage of furnace walls. More detrimental effect is the loss of combustion air. Thus, both high and low furnace pressure will result in increased fuel consumption.

- Hot charging of material

Hot charging of the material is one of the most efficient fuel saving measures. However, this requires suitable facilities in the shop and good synchronization of rolling with the feeding mill. In hot charging, the available sensible heat of the stock can reduce the heat requirement in the furnace considerably, thus improving fuel saving. The walking beams furnace have facilities to choose the charging temperature of slabs/billets/blooms and computer accordingly chose the heating curves and set zones temperatures for optimum heating. Fig-2 shows the how hot charging makes a furnace energy efficient.

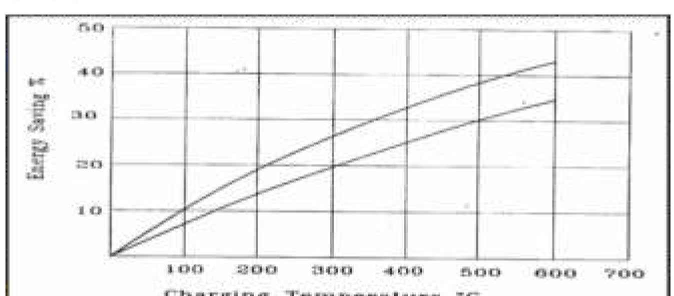


Fig-2 Potential for Fuel saving by hot charging of slabs/blooms

It is important to note that the benefits of hot charging are tangible only when the thermal regimes are adjusted suitably, otherwise only overheating/ melting of stock takes place. The regimes can be adjusted only when a considerably number of blooms/slabs are charged continuously. It is practically impossible to work out regimes for hot charging where it is intermittent and temperature of input stock is widely varying. In some plants to supply consistently uniform temperature of stock, hot boxes are used.

- Furnace productivity

Furnace productivity is one of the important factors, which affects the specific fuel consumption in the furnace. There is an optimal level of productivity at which the furnace should be operated to derive maximum thermal efficiency. The under loading of the furnace results in high fuel consumption. To avoid the under loading, it is essential to run minimum numbers of furnaces.

- Hearth Coverage

Optimisation of rolling schedule can increase the hearth coverage of a furnace, leading to increased furnace throughput and reduced energy consumption. However, the potential reduction in energy consumption will depend significantly on design of furnace and the feasibility of improving hearth coverage.

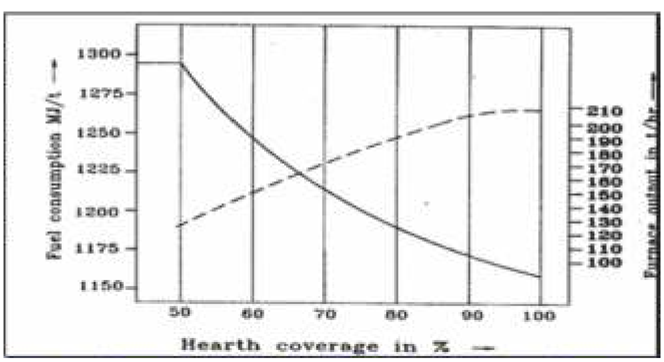


Fig-3 shows the effect of hearth coverage on furnace productivity and specific fuel consumption.

- Use of Coil Box

During rolling in the finishing stands of the HSM the tail end of the transfer bar will experience a temperature drop. Normally, it is necessary to compensate for this temperature drop by increasing the speed of mill during rolling, which results in increased energy use. The coil box reduces temperature loss and reverses the transferbar between the roughing and finishing mills thus eliminating the temperature rundown and reducing the electrical energy requirement of mill by ~10%. The use of a coil box also allows lower drop out temperature from the furnace, which would result in a ~5% reduction in fuel saving at the furnace for a 50oC reduction in drop out temperature.

- Unfired preheat Zone

The length of modern walking beam reheating furnaces is in the range of 40-50m and there is 18-20m unfired preheating zone. One of the biggest influences on furnace efficiency is the length of unfired preheat zone. Within this zone, excess energy in the waste gas is transferred to the slab/blooms/billets while still retaining sufficient energy to allow economic preheating of combustion air. In a conventional furnace operating with cold charge slabs/blooms the waste gas temperature on the entry to the recuperator is in the range of 850 - 1000oC, whilst for a furnace with 20m unfired preheat zone this is reduced to the order of 700oC it means that energy released to the waste gases can be reduced by ~30%, leading to an overall reduction in energy use of ~10%. The benefits of a long unfired preheating zone decreases when the temperature of charged slabs/blooms increases.

- Recovery of waste energy

After the transfer of sensible heat into the slabs/blooms/billets being heated in unfired zone of walking beam, the next largest energy sinks are the sensible heat in cooling water and in waste gas. Efficient furnaces will operate so as to minimize these, after which economic recovery is carried out. Minimizing the losses to cooling water and the waste gas encompasses conventional energy conservation technologies, such as increased levels of skid pipe insulation, as well as standard combustion improvement such as excess air control and combustion air and fuel preheating via recuperator. Of these latter techniques, combustion air preheating is most commonly practiced. The advantages of preheating of combustion air are saving in fuel, increase in flame temperature. Figure-4 shows the rate of fuel saving by preheating of combustion air. Energy recovery from skid system can be used to heat water or to produce steam depending on the necessities of the mill.

Fig-4 shows the fuel savingof 20% at the combustion temperature 400oC and the waste gas temperature of 900oC

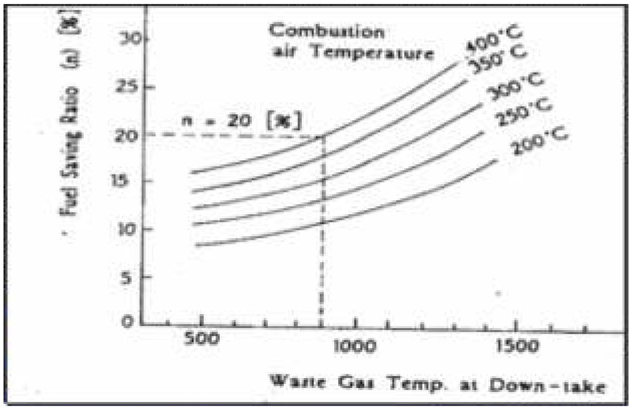


Fig-4 Rate of fuel by preheating combustion air

- Thermal cover of roll table in the mill

Thermal cover along the tables between the roughing and finishing mills will save ~70% of the transfer bar temperature drop, considering a transfer bar thickness of 25mm, a roughing mill exit temperature of 1060oC and a finishing mill entry temperature of 1030oC. As with coil box, thermal cover may also allow lower furnace drop out temperatures.

- Computer/combustion Control model

Computer/combustion control model optimize the sensible heat that slabs/blooms/billets absorb and can be applied along the full length of a furnace to achieve the desire drop out temperature with minimal fuel use. When firing zones are not fully isolated and, therefore, not subject to individual control, this leads to inefficient fuel use due to uncontrolled flow of waste gas within the furnace atmosphere. Computer models can combine information concerning fuel CV, excess air in furnace atmosphere and firing zone temperatures as well as other parameters such as slab/bloom/billets entry temperature, maximum hearth coverage and mill status etc. The main advantage of process control system is their ability to optimize the ramping of furnace set point temperatures over time during unscheduled delays on mill. Additional advantages include the potential to decrease furnace set point temperatures during periods of low production and the observed reduction in scale build up, resulting from lower mean discharging temperatures, leading to increased yield application of these models can reduce the energy consumption by 3-7%.

- Discharge Temperature

The fuel consumption in a reheating furnace depends not only on the mean discharge temperature, which itself dependent on the size of the slabs/blooms as well as the quality of the steel but also on production time, the schedule downtime and the delay time. Thus, higher discharge temperature will increase fuel consumption, scaleformation and reduce furnace efficiency. Adherence of optimum thermal regimes and delay strategy will ensure optimal discharge temperature resulting in reduction in fuel consumption and scale formation.

Burning and Reheating temperature for different carbon content in steel

Description	Temperature for different carbon content						
Carbon content in percentage	0.1	0.2	0.3	0.5	0.7	0.9	1.1
Burning Temperature in oC	1490	1470	1410	1350	1280	1220	1180
Reheating Temperature in oC	1350	1320	1280	1250	1180	1120	1110

- Using higher mill speed

To save the power consumption, the spare capacity of motors can be utilized to increase the mill speed of rolling. This also saves the specific heat consumption as time taken for rolling cycle will be less and due to higher finishing temperature of the finished product, it will require to have the less discharge temperature.

- Using bigger diameter roll

Roll housing always has a cushion, which can be utilized for bigger diameter roll

The selection of max./min. diameter vis-a-vis stand size

Type of stand	Dia of pinion	Stand opening Max.	Stand opening Min.	Dia of roll Max.	Dia of roll Min.	Max. Take-off
	mm.	mm.	mm.	mm.	mm.	mm.
Horizontal	500	600	480	535	480	55
Vertical	450	520	380	420	380	40
Horizontal	400	500	380	420	380	40
Horizontal	350	470	340	370	340	30
Vertical	350	460	340	370	340	30

- Running mill concept

Generally, it is seen that at the start of the shift, mill is stopped by the takeover shift by operational personnel to know the pass/tackles condition, tightening of the tackles and to know the roll gap, as well as by mechanical staff to know the equipment condition for mill checking, without knowing that furnace is ready to deliver the metal and stoppage at this juncture will affect the furnace health and also causes wastage of the energy. Running mill concept is evolved to avoid such practice and if it not very much required, then these activities can be clubbed during roll/pass changing time.

- Establishing communication system between furnace and mill proper

It is very important for an energy efficient mill to establish a well effective communication system between mill and furnace. Any planned/emergency stoppage should be communicated at least 30 minutes before to furnace heater to take the appropriate action in time to reduce the intake of gas to the furnace. Likewise delays from finishing, which will cause stoppage of mill should also be communicated in advance to furnace. The advance communication system will help in this regard to achieve the establishment of the effective system.

- Idle running of the mill

Idle running of mill for longer time should be avoided to save the power consumption of the mill.

- Automatic stoppage of mill drives/roll tables

Provision is to be made in the mill for automatic stoppage of the mill drive and roll table if some cobble or in case of interruption in the rolling.

STEEL SECTOR NEWS

SC seeks Centre's reply on PIL alleging export of iron ore in pellet form by evading export duty

24 September 2021

Supreme Court bench took note of the plea of NGO 'Common Cause' and asked the Centre to file its response within four weeks

The Supreme Court Friday sought response from the Centre on a PIL alleging export of iron ore in pellet form by some private firms by evading export duty.

A bench comprising Chief Justice N. V. Ramana and Justices Surya Kant and Hima Kohli took note of the plea of NGO 'Common Cause' and asked the Centre to file its response within four weeks.

Lawyer Prashant Bhushan, appearing for the NGO, referred to the apex court judgements on mining and export of iron, saying that even a Parliamentary committee has said that export of iron ore should not be permitted at the cost of domestic companies.

To discourage the iron ore export, imposition of 30% export duty has been provided, Mr. Bhushan said, adding that the ore has been exported in pellet form without paying the duty.

The bench rejected the objection of lawyer M. L. Sharma, who had filed the PIL on the same issue, as a caveator that the NGO being represented by Mr. Bhushan has “stolen” content of his plea and should not be entertained.

“Your (Sharma) petition is already there. Notice has been issued on that. Does it stop (Mr.) Bhushan from filing another case... We are allowing his petition and it does not mean that we are disallowing your plea,” the bench said.

"Why we respect you in that you expose things for good causes. But others are also entitled to file PILs. He (Mr. Bhushan) is filing this petition which will support your cause also," the CJI told Mr. Sharma at the end of the proceedings.

In January this year, the top court had issued notice to the Centre and 61 iron exporting firms on Mr. Sharma's PIL seeking a direction to the CBI to register an FIR and probe the alleged duty evasion by them in exporting iron ore to China since 2015.

The plea had said that the companies be prosecuted for alleged evasion of export duty by declaring wrong tariff code to export the iron ore under the Foreign Trade (Development and Regulation) Act, 1992.

***

Steel minister asks SAIL to sell surplus iron ore lying across its captive mines

22 Sep, 2021

Ministry of Steel has directed the State-owned steel authority of India to sell the stock of 70 million tonnes of iron ore dump fines/tailings lying across its captive mines.

The Union Steel Minister Ram Chandra Prasad Singh on Wednesday chaired a review meeting on the status of the Disposal of Iron Ore fines by Steel CPSEs with the representative of Steel CPSEs viz. Steel Authority of India Ltd. (SAIL NSE 3.17 %) and National Mineral Development Corporation (NMDC NSE 1.53 %) along with officials in the Ministry of Steel

"Since Ministry of Mines has permitted (SAIL) to sell the stock of 70 MT of dump fines/tailings lying across different captive mines of SAIL, these stocks should be disposed of at the earliest and made available to the industry," Singh said.

A concrete plan of action needs to be prepared and acted upon, he added.

The minister has asked SAIL to prepare a roadmap with clear timelines for the disposal of iron ore fines either by selling it in the open market or by using it for their captive use. NMDC was also advised to prepare a similar roadmap for enhancing their products and expanding their customer base. Earlier, Chairman, SAIL and CMD, NMDC briefed about their present and future action plan for the disposal of iron ore fines along with ramping up their production to ensure more surplus raw material in the market.

Source: The Economic Times

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India : Production, consumption likely to improve in Sept

Production : In Aug'21, crude steel outputdecreased 2% m-o-m to 9.6 million tonnes (mn t) while finished steel production inched up 1% to 8.9 mn t, as per JPC. But, in terms of crude steel output,SteelMint expects Sept'21to be a better month because many of the smaller mills, which had to opt for temporary shutdown or were operatingat a lower capacity, will resume production since raw material prices have dropped significantly. SteelMint's weekly Odisha iron ore fines (Fe 62%) index moved down by around INR 1,200/t to INR 6,900/t (ex-mines, including royalty, DMF and NMET). Prices have declined by INR 2,300/t since end-Jul'21. Therefore, the mills' marginswill be higher which will encourage higher production levels in September.

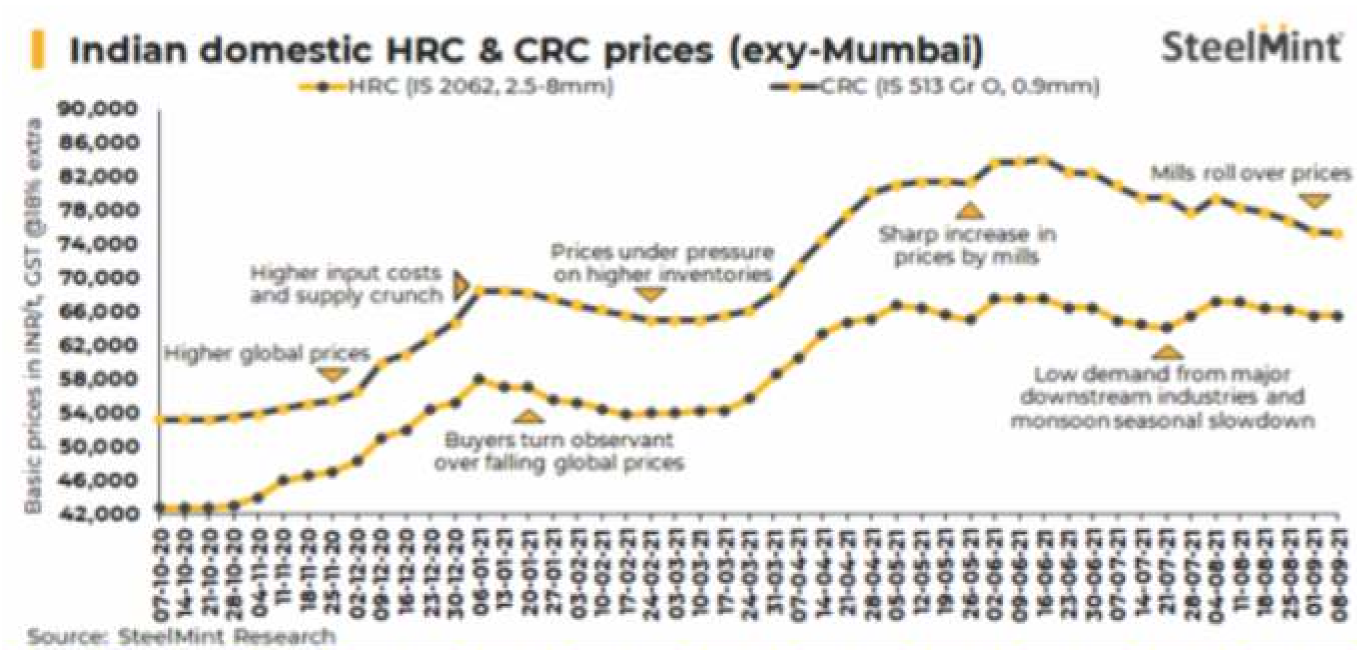
The secondary mills are now operating at 60-70% capacity, a marked improvement from the previous 40-50% when Covid's second wave had surged.

Where the primary segment is concerned, JSW Steel's 5-mntpa Dolvi plant is likely to get commissioned around September which can add around 1 mn t. The plant will not immediately attain full capacity, which will be gradually ramped up, it is understood.

Demand: Finished steel consumption, as per JPC, dropped 3% to 7.8 mn t. However, September is generally better compared to the preceding months because the monsoon impact decreases. The only red flag is the auto sector where some major vehicle manufacturers are opting for production cuts to tide over the semi-conductor shortage. Construction demand would be better in the current month and push up longsofftake compared to flats.

Prices : Steel Mint's benchmark prices of 2.5-8 mm IS 2062 HRCs fell by around INR 800/tonne (t) to INR 65,000-66,000/t (exy-Mumbai), while CRC (IS 513 Gr O, 0.9mm) prices dipped by INR 1,300/t to stand at INR 75,000-76,000/t (exy-Mumbai). Most mills rolled over prices for September. Howevertrade-level rebates may be offered towards the middle or latter half of the month since raw material prices have corrected.

Dull auto sector and exports demand may pressure prices.



Exports : As of now, mills do not have much bookings for October shipments, especially for HRCs. The reasons are that being European quotas have been exhausted and South East Asia is still in Covid throes.

Indian mills have been consistently exporting more than 1 mn t of flat steel since March, of which HRCs comprised around 8 lakh tonnes. However, HRC exports will likely drop to 5-6 lakh tonnes in September and Steelmint's assessment is October HRC exports will be even lower because the regular markets are not buying.

Inventory : Long mills are comfortable since these have moved to an extent. Flats, largely driven by exports, are under pressure. If mills can manage to book October shipments then the pressure will ease. Trade level channels are weighed down by inventory too. However, the situation can change swiftly with a single positive trigger in the form of a sudden exports uplift.

Source: Steel Mint

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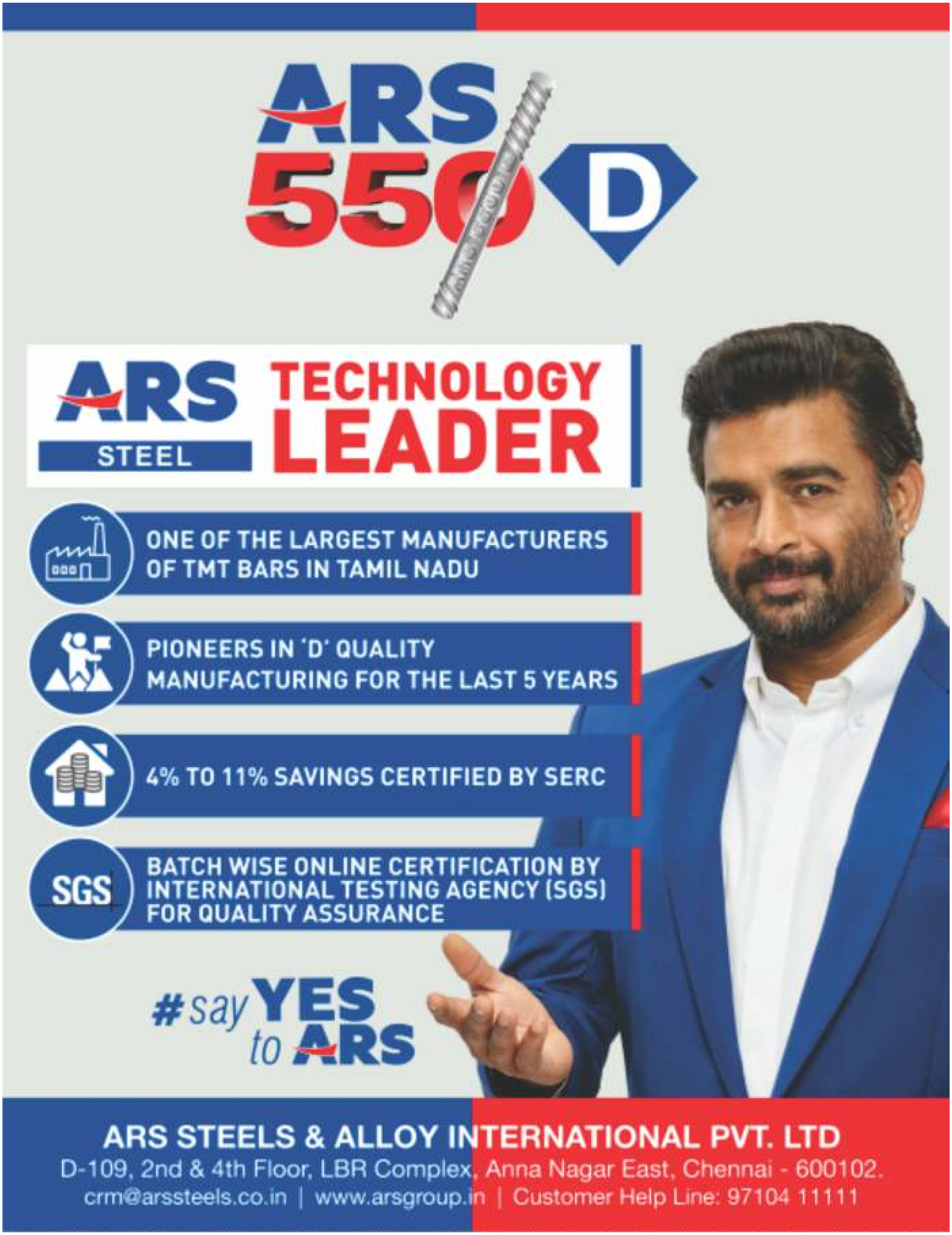
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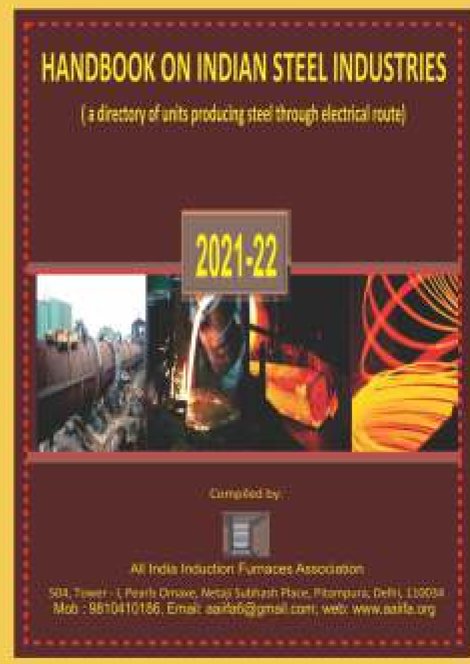

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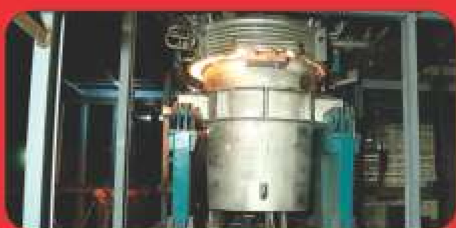

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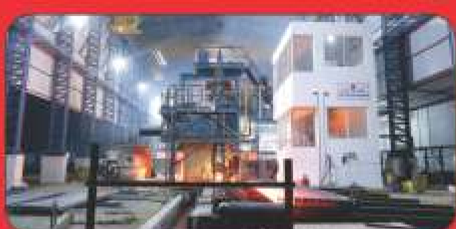

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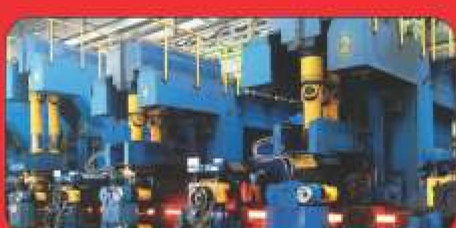

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