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- Ferrous Scrap for EIF Steel Making Against Target, NSP – 17,

हमारे सभी सदस्यों को होली और महाशिवरात्रि की हार्दिक शुभकामनाएं

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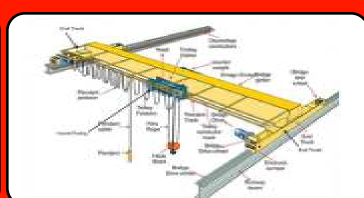
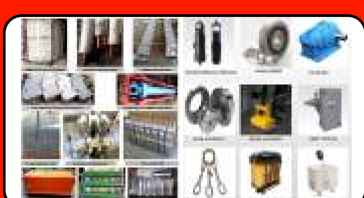
- Cable Reeling Drum
- Lining Vibrators
- Electrical Control Panel

EOT Crane

- Single Girder EOT Crane
- Double Girder EOT Crane

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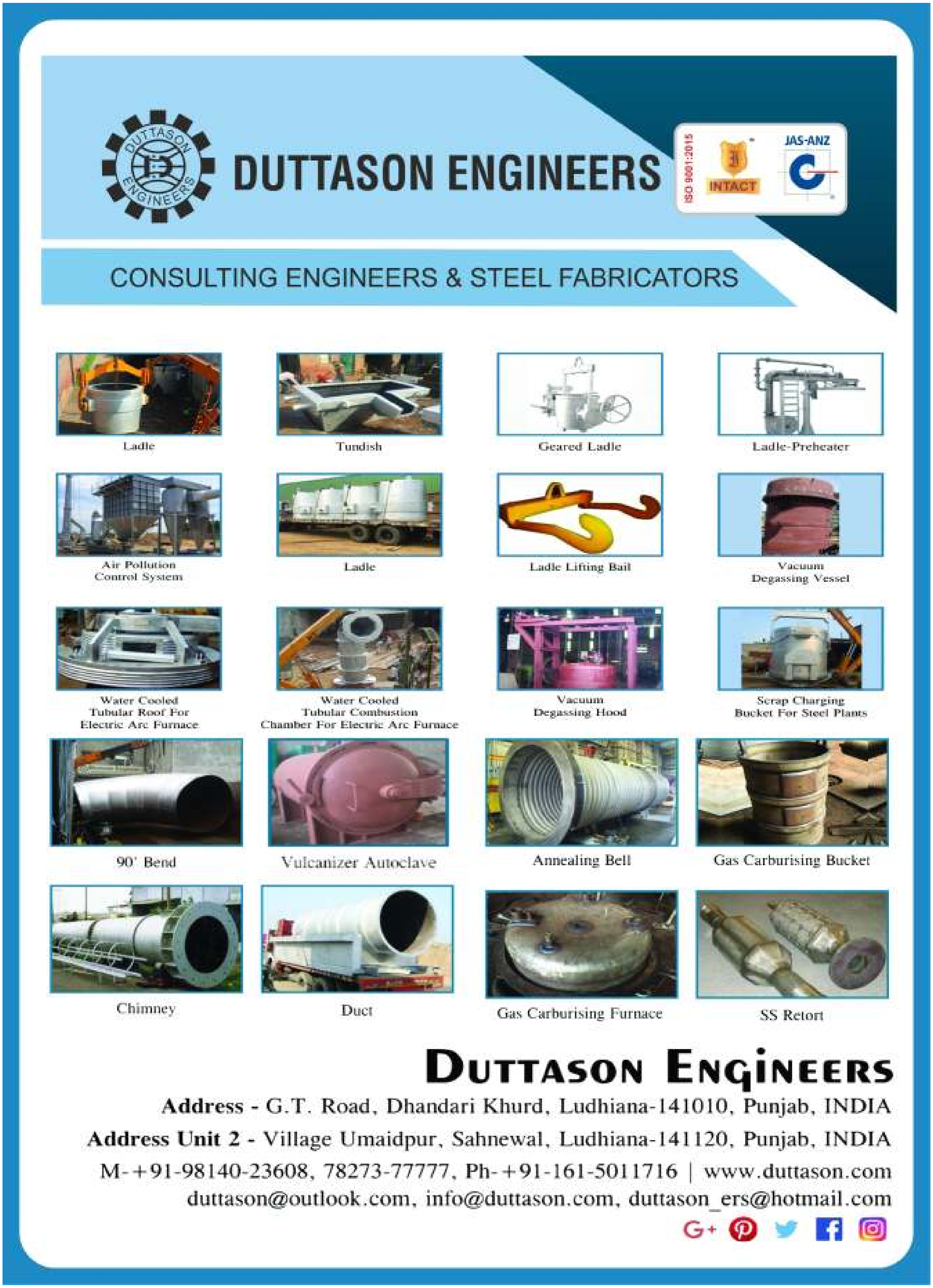
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Ferrous Scrap for EIF Steel Making Against Target, NSP – 17,

Kamal Aggarwal
Hon. Sec. General,AIIFA

Introduction: Steel is the most recycled material in the world. Making use of scrap and scrap substitute in electric steel making route is already established as cost and quality-competitive process compared to with BF-BOF processes and process adopted in many countries, although scrap based steel production rates widely varying from country to country across the globe. Steel production by the scrap-based EIF route is by far the largest source of new and green steel in the steel producing countries assisted by the higher availability of scrap in such a large and mature economy. Countries having low scrap recycling rate, are in favor of steel production from fossil fuel route i.e. BF + BOF,

This strongly hints at the potential for more scrap use in economies such as China, Japan and South Korea where steel recycling rates are much lower. Secondary steelmaking via scrap could be expanded in many nations, helping to decarbonize the steel sector as EIF emissions are lower than the primary BF-BOF steel-making route and even EAF route.. The energy consumption of BF-BOF processes is almost 10-15 times that of scrap-based production in addition, the direct CO_2 emission of a BF-BOF process using iron ore and coal is 30 times higher than a scrap-based process.

The NSP, 2017, with Vision to create a globally competitive steel industry that promotes inter-sectoral growth. The policy's mission is to create an environment that enables Self-sufficiency in the production of clean and green steel by giving policy support and guidance to MSME steel producers and industries dealing business with steel, the private sector, central public sector enterprises and boost sufficient capacity additions. Development of internationally competitive manufacturing capabilities. Increase in the domestic demand for steel. Cost-efficient production and domestic availability of iron ore, coking coal, natural gas, and sufficient availability of ferros scrap for secondary steel sectors .Investment in overseas asset acquisitions of raw materials.

It is a comprehensive document, the brain child of Govt. of India for development and economic growth, which has detailed the targets to achieve in the Country's steel sector aiming to attain a steel production capacity of 300 MT by 2030 from which crude steel production would be 255MT with 85% capacity utilization. It has a long-term vision to enhance domestic consumption, providing export opportunities, production of high-quality steel making the sector globally competitive.

Task in Front of EIF Steel Units: Steel production only from induction furnace in 2021 is about 38% of Country's total steel production. Maintaining same proportionate ratio, IF units have to produce total about 85-86 MT with make up plan for another about 53 MT by capacity expansion, improving productivity. Accordingly IFs in all the 4 zones need to prepare their own action plans to meet the share against NSP target. Problem faced by the units of all the zones are 1.Availabilty of good quality Scrap as rusty scrap cause higher power consumption affecting quality, 2. High Power Rate causing higher production cost.3. Otherwise all the activities can be properly handled slowly by the management jointly with Supply Chain Management.

STATE-WISE CAPACITY & PRODUCTION OF OTHER PRODUCERS DURING 2019-20

Capacity & Production '000 tonnes- Table-I

Region	State/UT	No. of Working Units	Working Capacity	Production
WESTERN	Chhattisgarh	72	6458	5432
	Dadra And Nagar Haveli	19	296	285
	Daman And Diu	3	46	46
	Goa	12	481	423
	Gujarat	56	2454	1482
	Madhya Pradesh	9	553	438
	Maharashtra	46	4331	3155
	Region total	217	14619	11262
EASTERN	Arunachal Pradesh	3	125	29
	Assam	6	131	67
	Bihar	15	803	540
	Jharkhand	41	2230	1799
	Meghalaya	5	181	92
	Odisha	42	3088	2402
	Tripura	1	30	12
	West Bengal	36	4654	3179
	Region Total	149	11242	8120
NORTHERN	Delhi	2	16	12
	Haryana	7	106	78
	Himachal Pradesh	25	1139	864
	Jammu And Kashmir	8	189	114
	Punjab	115	4162	2971
	Rajasthan	36	1176	749
	Uttar Pradesh	46	1617	1198
	Uttarakhand	42	1559	1077
	Region Total	281	9964	7063
SOUTHERN	Andhra Pradesh	25	1791	1538
	Karnataka	24	2031	784
	Kerala	29	480	304
	Puducherry	10	340	210
	Tamil Nadu	97	2586	1764
	Telangana	26	1443	1154
	Region Total	211	8671	5753
	GRAND TOTAL	**858**	**44496**	**32198**

State Wise IF Performance I Against Capacity (Ref: AIIFA,ND) Shown in Above Table

The Summary of Zone wise EIF Performance **is shown below in the Table – II The available data furnished by AIIFA, New Delhi , IF steel production in zones varies between 66.3% to 77.04% and average of total production capacity as 72.36.**

IF units have to produce total about 85-86 MT with make up plan for another about 53 MT by capacity expansion, improving productivity .From the above production rate as forwarded by AIIFA,ND, to achieve target of NSP-17, the zones have to contribute together about 53MT where proportional increased production at the same rate would be around be ;

Western Zone - 35%, Eastern Zone - 25%, Northern Zone - 21%, Southern Zone – 18% of 53MT.

Zone	Units	Capacity	Production	% capacity Utl
Western	217	14619	11262	77.04
Eastern	149	11242	8120	72.23
Northern	281	9964	7063	70.89
Southern	211	8671	5753	66.3
Total	858	44496	32198	72.36

Table-II

Year wise Ferrous Scrap Import By Major Countries (million tonnes)

Country	2017	2018	2019	2020	2021
Turkey	20.980	20.660	18.857	22.435	24.992
EU18/27	3.071	2.818	2.893	4.094	5.367
USA	4.036	5.030	4.268	4.512	5.292
India	5.365	6.330	7.053	5.383	5.133
Rep of Korea	6.175	6.593	6.496	4.398	4.789
Pakistan	5.123	6.013	4.337	4.535	4.156
Taiwan	2.819	3.629	3.523	3.616	3.088
Thailand	1.741	1.724	1.094	1.401	1.653
Malaysia	0.644	0.980	1.532	1.396	1.533
Indonesia	1.857	2.510	2.614	1.420	1.462
Belarus	1.353	1.497	1.280	1.331	1.136
Canada	2.115	3.471	2.129	1.031	0.815

Year wise Ferrous Scrap Export By Major Countries (million tonnes)

Country	2017	2018	2019	2020	2021
EU27/28	20.085	21.656	21.730	17.449	19.400
USA	15.016	17.332	17.685	16.874	17.906
UK *				6.829	8.297
Japan	8.208	7.402	7.651	9.371	7.301
Canada	4.409	5.107	4.369	4.512	4.863
Russi	5.320	5.591	4.099	4.728	4.140
Australia	1.979	1.968	2.325	2.083	2.224
Singapur		0.775	0.750	0.506	0.685

- **Brexit (source BIR)**

Constraint Faced by IF Units (Common View): High Energy Charge, Scrap Volume & Quality where scrap quality is related to formation of slag build-up affecting electrical efficiency. More energy is required to melt rusty or dirty scrap, such as steel bales with a light bulk density and oily or contaminated cast-iron borings, compared to melting clean, dry, chunk-steel scrap. Light-density scrap limits the amount of power that can be applied, thereby extending the time required to melt the charge affecting productivity.

Both the **steel scrap and iron scrap** is used. Iron scrap brings carbon to the furnace bath. One of the significant economic forces driving IF operations today is the necessity to reduce melting costs improving operating efficiency., enhancing existing capacity utilization at least al level of 85% from the present rate of average 72.3% (as indicated in the Table). Often, these approaches may not yield the same result. For example, purchasing relatively inexpensive good quality slag or rust-free ferrous scrap likely to reduce raw material costs, improving steel quality and furnace productivity.

In arc furnace melting, the furnace is constantly losing heat, both to the cooling water and by radiation from the shell and the exposed metal surface when electrical energy is expended to replace this heat loss resulting a longer melting time and occurrence of greater furnace inefficiency. On the other hand, Induction furnaces are ideal and highly efficient for scrap melting, alloying a wide variety of steel grades with minimum melt losses. Since no arc or combustion is used, the material is heated to a temperature no higher than what is required to melt it. This can prevent the loss of valuable alloying elements, no harmful pollutants are emitted during the melting process and heat spreads throughout the furnace in efficient ways, speeding up the operation.

Dirty or contaminated scrap tends to deposit a slag layer on the furnace refractory. This occurs at or just below the liquid metal level in the crucible restricting the amount of power that is drawn by the furnace. The effective reduction in the furnace internal diameter also may make charging more difficult and protracted, again affecting furnace efficiency. To minimize problems associated with slag build-up many IF units resort to operating at a higher metal temperature than is necessary or undertake an occasional high-temperature melt to reduce the build-up, again increasing energy consumption. This wasteful use of energy can be prevented by using fluxes to minimize or eliminate build-up, thus units try to avoid sla build up, Productivity is improved by keeping furnace volume constant; and reduce electrical consumption.

The high energy consumption contributes to the threat of climate change along with global warming, Units try to maintain minimum melting time. In induction furnace, the main charge materials are metallics consisting of scrap and sponge iron. Both the steel scrap and iron scrap is used. Iron scrap brings carbon to the furnace bath. Pig iron is also sometimes used in some furnaces for the purpose of introducing carbon to the bath. The size of the scrap is important to ensure the charge does not bridge. On an average, each piece is not to have a dimension greater than 33 % of the furnace diameter and no dimension is to exceed 50 % of the furnace diameter. The feed rate of the system is to be able to deliver the full charge into the furnace within 65 % to 70 % of the actual melt cycle.

The ratio of these materials used for producing a heat depends on their relative availability at the economic cost at the plant location. In case of induction furnaces using high sponge iron to scrap ratio, a carburizer (e.g. anthracite coal or petroleum coke) is also added for controlling carbon content of the bath. Metallics are charged in the furnace either mechanically or manually

Scrap based melting process EIF & EAF powered by electricity from renewable energy reduces carbon emissions to almost zero. Thanks to the declining cost of renewable energy making process also cost-competitive when powered 100% by renewables. Under the International Energy Agency's (IEA) Net Zero Emissions by 2050 (NZE) scenario – an emissions target that more and more steel manufacturers have pledged to reach – a “radical technological transformation” in the steel sector underpinning a shift from coal to electricity.

By 2050, almost 50% of post-consumer scrap is expected to be traded, with the main exporter being China and major importing regions like Africa, India, and other developing Asian countries. The result will provide valuable insights on scrap availability and capacity development at the regional level for producers contemplating new investments. Regional availability, quality, and trade patterns of scrap will influence production route choices, possibly in favor of secondary routes. Also, policy instruments such as carbon taxation may affect investment choices and favor more energy-efficient and less carbon-intensive emerging technologies.

In this scenario, coal's share of energy likely to drop from 75% in 2020 to 22% in 2050 (assuming carbon capture use and storage is available), and by 2030 technologies that are already on the market – including scrap-EAF/ EIF – deliver 85% of emissions savings in the steel sector.

Scrap steel reaches 46% share of input in steel manufacturing globally by 2050 in this scenario. China is by far the world's largest steel producer – whatever impacts the Chinese steel sector impacts the industry globally. In 2020, China produced 57% of the world's crude steel with 91% manufactured via the BF-BOF process. Just 9% was produced via EAFs, significantly lower than the global average of 26%. Under the IEA's Announced Pledges Scenario (APS) – which reflects China's targets to reach net zero emissions in 2060 and peak carbon emissions before 2030 – output from scrap-based EAFs nearly doubles by 2030 and more than triples by 2050.With the increase in performance requested by users in the last twenty years, steel makers have had to improve their melting operations dramatically. Numerous chemical elements are now controlled or eliminated at levels of 50 ppm and below.

Effects of Residual or Tramp Elements in Scrap: Many residual elements exist and play a role in steel in the form of segregation. Most of the residual elements have strong segregation ability in steel; the segregation process of these elements can occur not only in the solidification process of liquid steel, but also in the subsequent solid phase transformation, but it needs a long diffusion time. The main segregation elements in the riser of ingot are s, P and C, followed by Sb, N, As, H and Sn. The hardness of this part of material is higher than that of other parts of ingot after segregation. Compared with the solidification segregation, the residual elements will produce grain boundary segregation during solid phase transformation or heating. For example, the second temper brittleness of steel is mainly caused by grain boundary segregation of P, Sn, As and Sb.

Maximum Limit on Residual Elements (Ref: BS 970)

Element	C&-Mn Steel	Non Aust. Stn. Steel	Aust. Stn. Steel
Nickel	0.40	-	-
Chromium	0.30	-	-
Molybdenum	0.15	0.30	1.30
Niobium	-	-	0.20
Titanium	-	-	0.10
Copper	-	0.30	0.70

Residual elements (Cu, Ni, As, Pb, Sn, Sb, Mo, Cr, etc.) are defined as elements which are not added on purpose to steel and which cannot be removed by simple metallurgical processes. The presence of residual elements in steel can have strong effects on mechanical properties. There is therefore clearly the need to identify and to quantify the effects of residual elements in order to keep these effects within acceptable limits. Residual elements, or at least some of them, have an influence on processing conditions and regimes, from casting to the final annealing, and possibly on all mechanical properties.

Aluminum is extensively used for steel deoxidation. In order to improve the toughness behaviour at low temperatures (- 40◦ C; - 60◦ C) in offshore steel structures. Developments have been made with controlled Ti additions forming nitrides or oxides inclusions. For adequate distribution of these inclusions, **Al must be controlled at level 0.025-0.035. Another example is the particular case of cold rolled thin sheets of stainless steels. The presence of slivers and inclusion alignments on the surface of the finished products can be avoided by limiting the presence of aluminates.** **Arsenic** as trace element is often associated with Sn and Pb. in Ferrous scrap melting, Iron ores containing **Arsenic are the sources of pollution, Bismuth, similar to Arsenic behaves like that way**. Boron Limited additions are very effective, but excessively high levels (30 ppm - 50 ppm) can generate a reverse effect. (liquation phenomena during welding of stainless steel) Close control of the content in the liquid steel is needed.

Boron, Two major applications of Boron additions are: + Quenched and tempered steels for higher yield and tensile strengths in moving equipments like, cranes, bridges, penstocks. **Depending on the type of steel and carbon content, the amount of boron can be as little as 3ppm to make a difference**

Calcium, Inclusion shape control is used in steel in order to improve properties through the thickness and Hydrogen Induced Cracking resistance. This is generally achieved by Calcium injection in the ladle of liquid steel. As a result, inclusions of the oxy-sulfide type containing Ca are observed in the final product. **Close control of the ratios between Ca, S, 0 at levels below 20 ppm is needed.** Calcium treatment is also extensively used in order to improve the cast ability of liquid steel through the nozzles of the continuous casting machine.

There is debate over the potential for using scrap steel in producing some of the highest-quality grades, due to impurities such as copper in scrap steel, but these grades compromise a small portion of overall steel mill production. In 2020, the share of the automotive section – the most quality-sensitive category – was only 12% of total global steel consumption whereas, the bulk of global steel production is for building and infrastructure products where impurities are less of an issue and these can be manufactured via scrap in EIF/-EAF processes The quality of steel will not matter in this areas.

Copper being one of the major intrinsic residual impurities in steel possesses the tendency to induce severe microstructural distortions if not controlled within certain limits having effects on the mechanical properties of construction steel with a view to ascertain its safe limits for effective control. Research activity has shown results that presence of copper beyond limit of hot rolled profiles with varied copper concentrations in the range of 0.12-0.39 wt. %. Reduction percentage in tensile strength, impact energy and hardness respectively as copper content increases from 0.12 wt. % to 0.39 wt. %. The steel's abysmal performance is due to the severe distortion of the microstructure occasioned by the development of incoherent complex compounds which weaken the pearlite reinforcing phase. **It is concluded that the presence of copper above 0.22 wt. % is deleterious to construction steel performance**.

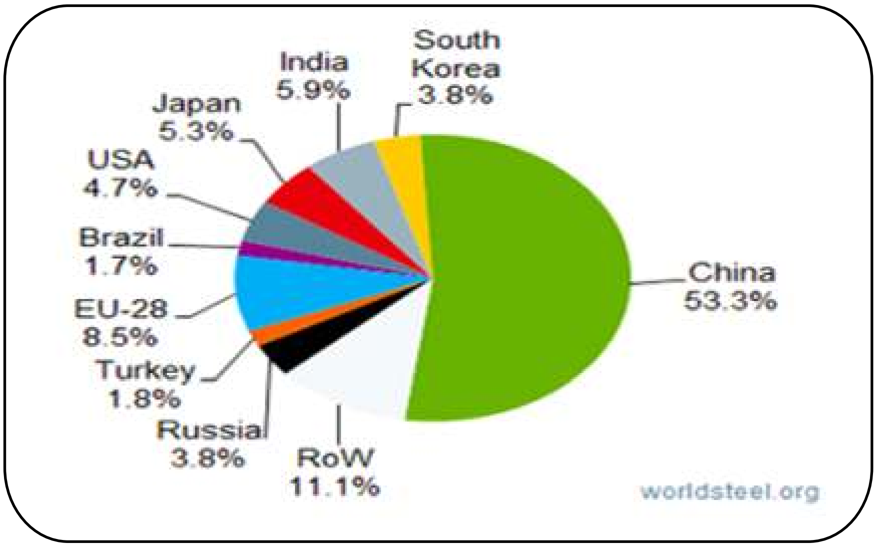
The truth is that today much of the steel scrap having high intrinsic value as substitute can be potentially recovered by 100% recyclability without losing any property. The challenge to society is that steel demand is much greater than the steel scrap that is available to make new steel, with only an estimated quarter of steel demand met from steel scrap. Only when the world has sufficient buildings, infrastructure, equipment, vehicles and products to meet the needs of a fully developed world, should iron-ore-based steel production be phased out, answer No. as this will take time: though steel deployed in many mature economies has plateaued, there is still strong demand growth for steel in the developing world as they converge with developed world standards. The world is also in the middle of a transition to a carbon-neutral economy that will accelerate the replacement of many energy and manufacturing assets, infrastructure, and buildings globally boosting steel demand.

In induction furnace, the main charge materials are metallic's consisting of scrap and sponge iron. Iron scrap brings carbon to the furnace bath. One of the significant economic forces driving IF operations today is the necessity to reduce melting costs improving operating efficiency., enhancing existing capacity utilization at least al level of 85% from the present rate of 72.3%. Often, these approaches may not yield the same result. For example, purchasing relatively inexpensive good quality rust-free ferrous scrap likely to reduce raw material costs, improving steel quality and furnace productivity.

The gap between demand and supply of scrap can be reduced in the future and the country may be self-sufficient by 2030 from the Scrap Policy decided by Govt. of India. In the past 60 years, the melting of various ferrous charge metals in coreless induction furnaces has changed. As the quality of the metallic charge constituents steadily deteriorated, slag-related melting problems such as slag build-up became widespread. Slower melting rates and less efficient use of the coreless induction furnace result.

Set up of Sound Scrap Management Systems: Continuous efforts for scrap generation and improvement focusing on technology, safety, environment evolving responsive ecosystem will, hopefully, fulfill in achieving target envisaged in NSP. The success will come from development of involved industries who are to take share responsibilities for scrapping end of life item/products, collection, dismantle, shredding in an organized way meeting all the statutory norms.

Country-Wise Contribution (%) in Global Steel Production



The availability of scrap is a major issue in India and in 2017 the deficit was to the tune of 7 million Tons. This was imported at the cost of more than Rs. 24,500 crores (approx.) in 2017-18. The gap between demand and supply of scrap can be reduced in the future and the country may be self-sufficient by 2030 from the Scrap Policy decided by Govt. of India. ,Using scrap metal reduces the need for mining new "virgin" material, thereby conserving natural resources and not disrupting land and natural habitats. Reducing the use and cost of energy is better for the environment but it also holds down manufacturing costs which passes on savings to consumers

The availability of scrap is a major issue in India and only in 2017 the deficit was to the tune of 7 million Tons. This was imported at the cost of more than Rs. 24,500 crores (approx.) in 2017-18.

Success will be coming from creation of effective scrap collection, dismantling centers and scrap processing centers, either by independent entrepreneurs or through Joint Ventures between Corporate entities and/or PSUs. Initiatives of State Govt. providing land considering logistic and other related supports will expedite entire activities. For, the development of well-ordered channels for the flow of materials, it is critical that the roles and responsibilities of different stakeholders in such a shared responsibility and roles should be clearly spelt out for involved agencies following the guidelines issued from time to time by MoEF&CC:

In the past 60 years, the melting of various ferrous charge metals in coreless induction furnaces has changed. As the quality of the metallic charge constituents steadily deteriorated, slag-related melting problems such as slag build-up became widespread. Slower melting rates and less efficient use of the coreless induction furnace result. The world is also in the middle of a transition to a carbon-neutral economy that will accelerate the replacement of many energy and manufacturing assets, infrastructure, and buildings globally boosting steel demand.

Although metal is one of the most commonly recycled materials today, only about 30 percent of used metal actually makes it into the recycling process. With the overwhelming benefits to consumers, manufactures and the environment, there is widespread agreement that we should all strive to increase metal recycling

India will import about 30mn t/yr of ferrous scrap by 2030 to meet the government's vision of achieving 300mn t/yr of steel capacity, Material Recycling Association of India (MRAI) president Sanjay Mehta told *Argus*. The country produces 25mn-30mn t/yr of ferrous scrap domestically.

"Domestic scrap generation is definitely increasing because of higher construction and engineering activities, and will touch about 35mn-40mn t of production in the next seven to eight years, but it will not be sufficient and the country will have to import more," Mehta said on the sidelines of the Indian Material Recycling Conference last week.

The cities of India are among the most polluted in the world. This is a cause for concern, but what is more concerning is that many Indian firms, committed to reducing pollution and environmental degradation, recycle only a small portion of what is recyclable. Unlike plastic and paper, India has a low level of metal recycling awareness. Regardless, recycling metals is just as important for the environment as recycling paper, plastic, and other commonly recycled items. Here's how metal recycling may help the environment:

In the past, the melting of various ferrous charge metals in coreless induction furnaces has changed. As the quality of the metallic charge constituents steadily deteriorated, slag-related melting problems such as slag build-up became widespread. Slower melting rates and less efficient use of the coreless induction furnace result.

The cleanliness of the metallic charge (usually consisting of sand-encrusted gates and risers, or rust- and dirt-encrusted scrap) has a negative effect on melting cycle, furnace capacity, and electrical efficiency. The quality of scrap also significantly affects the type of slag formed during melting.

In a coreless induction furnace, insoluble slag residuals can deposit along the refractory walls within or slightly above the active power coil (see Figure 1, above.). Because these oxides and non-metallics are not soluble in molten metal, they become entrained and float in the molten metal as an emulsion. When emulsion flotation effects become great enough, non-metallics rise to the surface of the molten metal and agglomerate as a slag. Once the non-metallics coalesce into a floating mass on the liquid metal they can be removed. A suitable fluoride-free flux such as Redux EF40 will accelerate this flotation process.

When slag contacts a refractory wall that is colder than the melting point of the slag, this will promote the slag to adhere to the lining. The adhering material is called build-up. High melting-point slags are especially prone to promoting build-up. If not prevented from forming or not removed early during formation, build-up will reduce the overall efficiency and capacity of the furnace.

Stages of Recycling Ferrous Scrap:

Steelmaking from Induction Furnace will continue to grow because of the lower capital and operating expenses feeding close and nearby industries using steel products as input material. The IFs units are capable of producing almost all the steel as environmental clean grades of Carbon Constructional, Alloy Constructional, Tool & Die Block Steel, Ball Bearing, Creep Variety Grades, Stainless Steels etc.. The use of the IF is the most effective way of reducing carbon dioxide emissions because of comparatively usage of lower energy needed in melting scrap. Set up of IFs will increase as new small scale mini steel plants even replacing EAFs for greater advantages and control even in rural and consumer based areas.

Ferrous scrap, the raw material used in IF will remain as most important inputs used, but reduced iron in the form of DRI and hot briquetted iron/ Sponge Iron will also become a larger component as the raw materials as charge mix for IF steel making. Increasing availability from domestic producers will be a factor in this trend as will the increasing need for low-residual feedstock for the production of clean and high-quality steel products, special-bar quality steels required to compete in the higher end markets.

Recovering & Recycling Technology of Ferrous Scrap:

The increasing investments in infrastructure driven by urbanization has surged the domestic demand of metal leading to the change in the situation both in rural and urban areas. As the consumption of steel and alloy steel is increasing in India, steps toward a circular economy have been backed by several companies entering the ferrous scrap recycling industries by the continuous support and encouragement from Govt. of India for scrap recycling business. Recycling is the basis for a circular economy to roll on. Accordingly, it is necessary to make the use of raw materials much more resource - efficient than before and to use them as purposefully as possible instead of consuming them. A key approach to this is the circular economy, because metals can basically be reused “infinitely,” mostly without any loss of quality

Ferrous Scrap Recycling Stages: Important steps for recycling are:

1. Collection of Iron & Steel Equipments, Structures which have attained end of life (EOL), from Auto Sector, Ship Building Industry, Rly & Defense Production Units, Engineering and

various manufacturing units..

2. Sorting of Products i.e. removal of Non-Metal, Harmful Trace / Residual Elements.

3. Process and Shredding to sizes suitable for furnace charge.

4. Steel Making in Melt Shop with the help of scrap and scrap substitutes, Bring the Melt to National / Inter-National Specification like BS, AISI/ ASTM, Gost, Afnor etc.

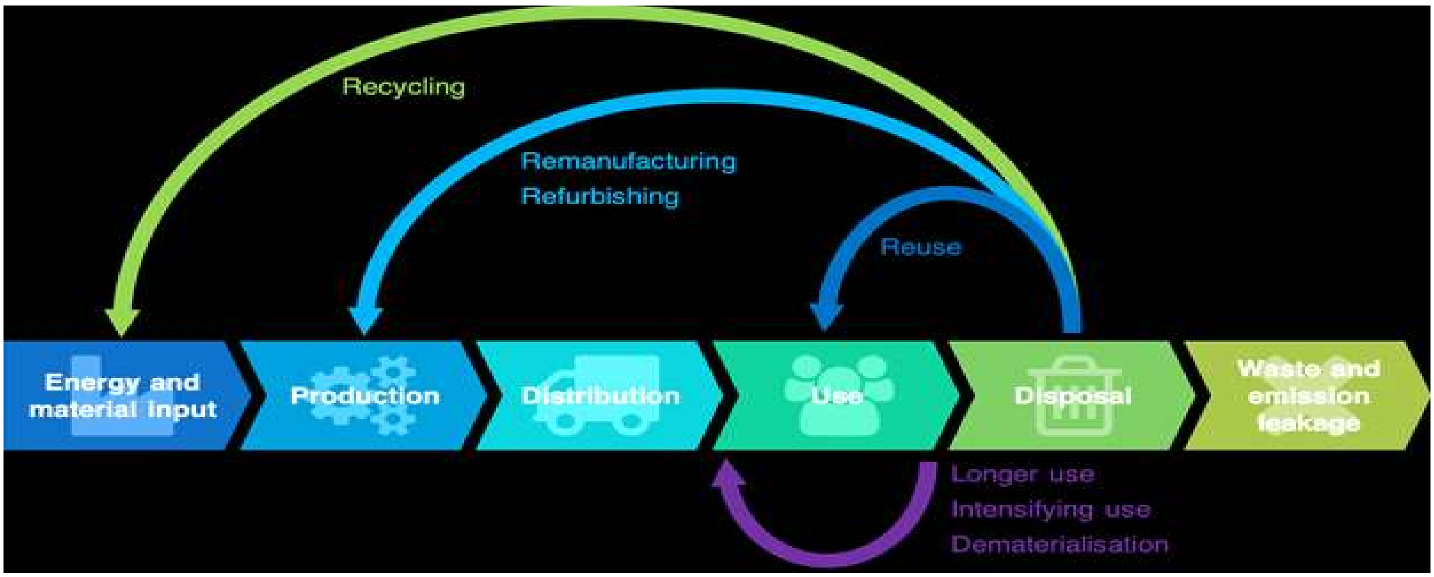
5. Refine the liquid steel through Secondary Refining to meet Steel quality,

6. Cast the Liquid Steel either as Ingot or Concast Bloom/ Billet or Roll/ Forge small ingot produced from Ifs

7. Process the Products Through Hot Rolling or Forging,

8. For Property Requirements, Follow Heat Treatment Process of Final Products to Meet Property Requirements

9. Inspect, Test & Dispatch to Customers.



Recycling Process Flow

Ferrous Scrap Recycling Process

Shredding M Operation in Recycling

Segragated Scrap

Recycled Ferrous Scrap Products

The scrap metal recycling market is poised to grow by 340.73 million t during 2023-2027, accelerating at a CAGR of 8.15%. The market is driven by increase in prices of raw materials, rise in role of metal recycling in key end-user industries, and rising concern about impact of mining on environment. Ref: -The "Global Scrap Metal Recycling Market 2023-2027" report, **ResearchAndMarkets.com's, Dublin**.

Top 10 Metal Recycling Countries From Around the World: Success rate of recycling at **USA** s is only 34%, and sends only 1/3 of its waste into the recycling pool—which is well below many other countries worldwide. The other top performers are **Austria** performing at 63% , the highest level of recycling which is beyond imaginations recycling programs have evolved, Austria's overall performance in terms of municipal solid waste recycling has been stable and at a very high level for the past decade, according to the European Environment Agency (EEA).“Austria has a long tradition of diverting waste from landfills and has a long-established recycling system waste) generated in the country is either recycled or incinerated,” as published in the Municipal Waste Management Report released by the EEA.

According to a report compiled by Planet Aid—an organization that unites communities to bring about worldwide environmental and social change—**Germany** isn't too far behind Austria. Germany sends 62 percent of its waste through the close-loop process, keeping it from landfills. And, **Taiwan** is keeping pace, hitting the top margin with a 60 percent success rate of recycling.

However, in an alternative approach, the recycling effort of **Cairo, Egypt**, reflects even greater success than the aforementioned locations. Their system has no established official or contemporary recycling facilities yet, 80 percent of everything that is gathered is recycled. **Brazil** recently broke global records for its aluminum recycling at 98.4% level mainly from packaging industries.

Following Austria, Germany and Taiwan on Planet Aid's list: another top recycling country is **Singapore**, sending 59 percent of its trash to be reused and recycled. Next up: **South Korea** recycles 49 percent of tossed goods. The **United Kingdom** hits the 39 percent mark with that percentage going into recycling. Lastly, closing out our top ten are **Italy –** recycling 36 percent of its trash – and **France** following closely behind with 35 percent.

The aforementioned locations are the top ten recycling countries in the world for varying reasons with their own unique approaches to the processes. As it seems, in order to implement a high success rate for a nationwide recycling program, the community requires one or all of these qualities: organization—be it through legislation, industry, or entrepreneurs—incentive: a personal motive or financial necessity, and cultural habit-building practices.

Today's 15 percent of ferrous scrap usage, will increase to almost 25 -30 percent in the next five years, with the Vision of 2047 [ministry plan], that means the percentage of scrap for production of steel should go up to 50 percent. North America's most recycled materials, with over 60 percent of steel being recycled annually since 1970. Steel's production by-products also has a high rate of recycling, with 90 percent of the co-products used in steel production—including slag, water, gas, and dust—also being reused or recycled.

Steel in Construction Sector: Since steel consumed by construction industries, therefore, recycling of ferrous scrap in this area has to be considered as construction is one of the most important steel-using industries, accounting for more than 50% of world steel demand.

Reusing reclaimed structural steel, as opposed to the common practice of recycling by remelting scrap, offers significant environmental benefits and potential cost savings. Steel has excellent credentials for the circular economy, both as a material that is strong, durable, versatile and recyclable and as a **structural framing system** that is lightweight, flexible, adaptable and reusable.

The growing pressure to think more about the impact of construction materials, as well as national and international projects that have successfully reused structural steel, the Steel Construction Institute is in the process of developing a protocol to help facilitate the reuse of structural steel sections reclaimed from existing building structures. Structural steel sections are inert, robust and dimensionally stable elements that are generally bolted together to form structural assemblies which are inherently demountable. As such, they are seen as an obvious candidate for reclamation and reuse, as opposed to re-melting. Reusing structural steel yields significant environmental savings compared to recycling at a time when there is growing pressure on the construction industry to be more resource-efficient, reduce waste and to lower embodied carbon impacts.

More recently, there has been a push towards the concept of the circular economy all over the world with a roadmap developed to support a shift towards a resource-efficient, low carbon economy. Increased structural steel reuse will support both of these aims and stimulate new business opportunities with potential profit opportunity through structural steel reuse.

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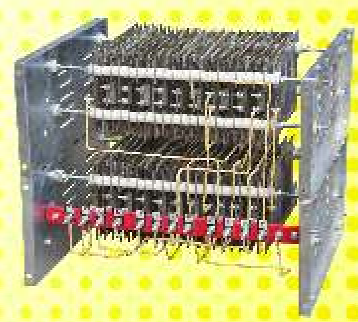

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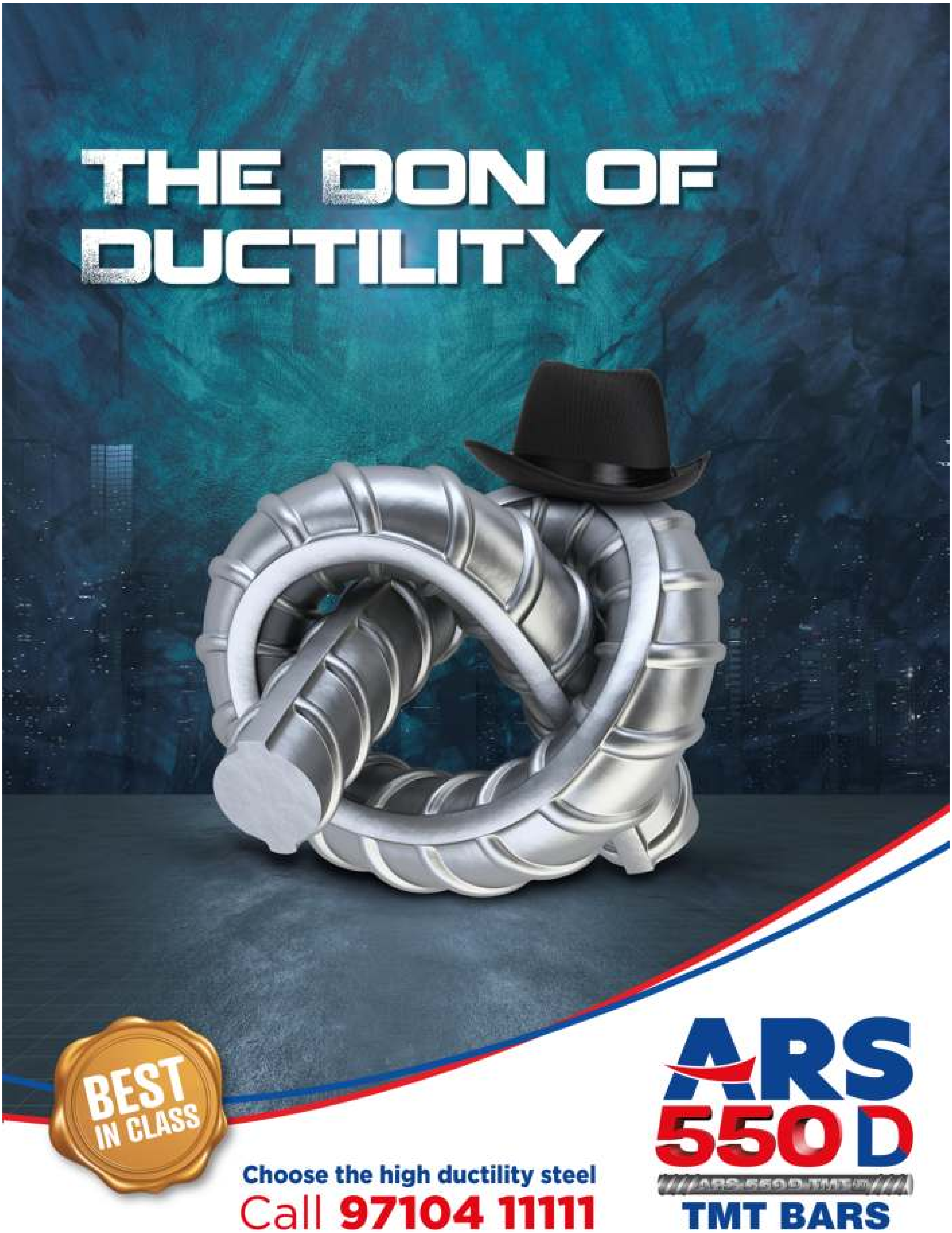
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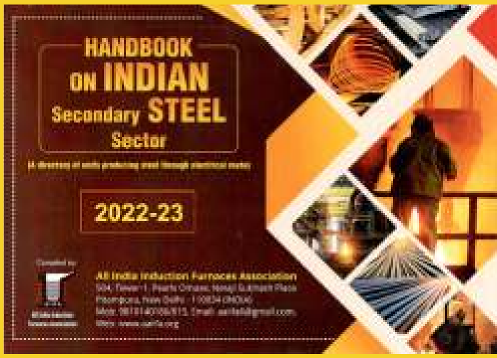

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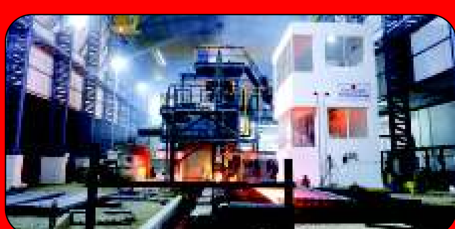

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