Annual Issue

STEELWORLD

Devoted to Iron & Steel Industry

Vol. 27 No. 06 | June 2021

Registered-RNI No. 62719/94

www.steelworld.com

- RCP Singh - New Cabinet Minister for Steel

- AM/NS India aims to develop a global R&D centre at Hazira
- Dilip Oommen
- Tata Steel focuses on ecosystem restoration
- Govt. need to develop institutions under PPP model to tackle the pandemic crises

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Devoted to Iron & Steel Industry

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D. A. Chandekar
Editor

Dear Readers,

It is said that if one has to predict the future, he will have to first study the past. How was the past one year for the economy and specifically for the steel sector ? Can we draw some conclusions and make some guestimations about the present fiscal by analysing past year's performance by iron & steel sector ? Let's see !

In July 2020, the covid pandemic was creating havoc all over the world and also in India. The steel industry, which was almost shut during the last quarter, was slowly trying to wake up. As such the steel demand in construction sector was never fully bottomed and it was the first sector which gave an upward push to our industry post covid. Also a good monsoon triggered tractor demand which gave an initial boost to almost shut auto industry. In next few months this industry really bounced back to almost pre covid sales levels. Of course pre covid period was one of the worst phases of auto sector. The iron & steel sector, was was operating at around 50 % capacity utilisation in the month of June 2020, achieved almost 75 % capacity utilisation by October. This was mainly because a fundamentally strong demand in construction sector, bouncing back of auto sector and the surge in exports for the first few months. It should also be noted that the eastern states, which account for higher steel production, never faced labour migration problem. Infact this migration was from western to eastern region and to some extent, the steel industry actually gained from it. Thus by end of the last year, most of the logistics disruptions were corrected and the steel industry was almost back to pre coved levels.

Though the demand was more or less restored, the balance sheets of the steel mills were damaged and would require a long period to wipe out the losses incurred during the peak covid period. Also the SMEs, which form the backbone of any economy, suffered great losses which were difficult to absorb. Indian government did announce a huge 20 Lac crore package and it did help SMEs to some extent, but still few had to pull down the shutter permanently. Nevertheless, pandemic, though a disastrous entity, taught us a lesson or two. It hastened the digitalisation process in the industry. Also, 'Work From Home' (WFH) evolved as a good alternative to office culture to such an extent that huge centralised offices may become obsolete even after the pandemic is completely over.

What lies next ? I think the steel industry in India stands on a very strong foundation of demand from domestic infrastructure, construction and auto sector (in that order) will surely remain bullish for a foreseeable future. The Indian economy is expected to grow at a robust rate of 7 to 8 % annually and will certainly provide the required support and the push for iron & steel sector in the country.

Write your comments :
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RCP Singh - New Cabinet Minister for Steel

Prime Minister Narendra Modi appointed Shri RCP Singh as the new Cabinet Minister of Steel on 8th July 2021 as a part of among the 36 new faces in his first cabinet expansion.

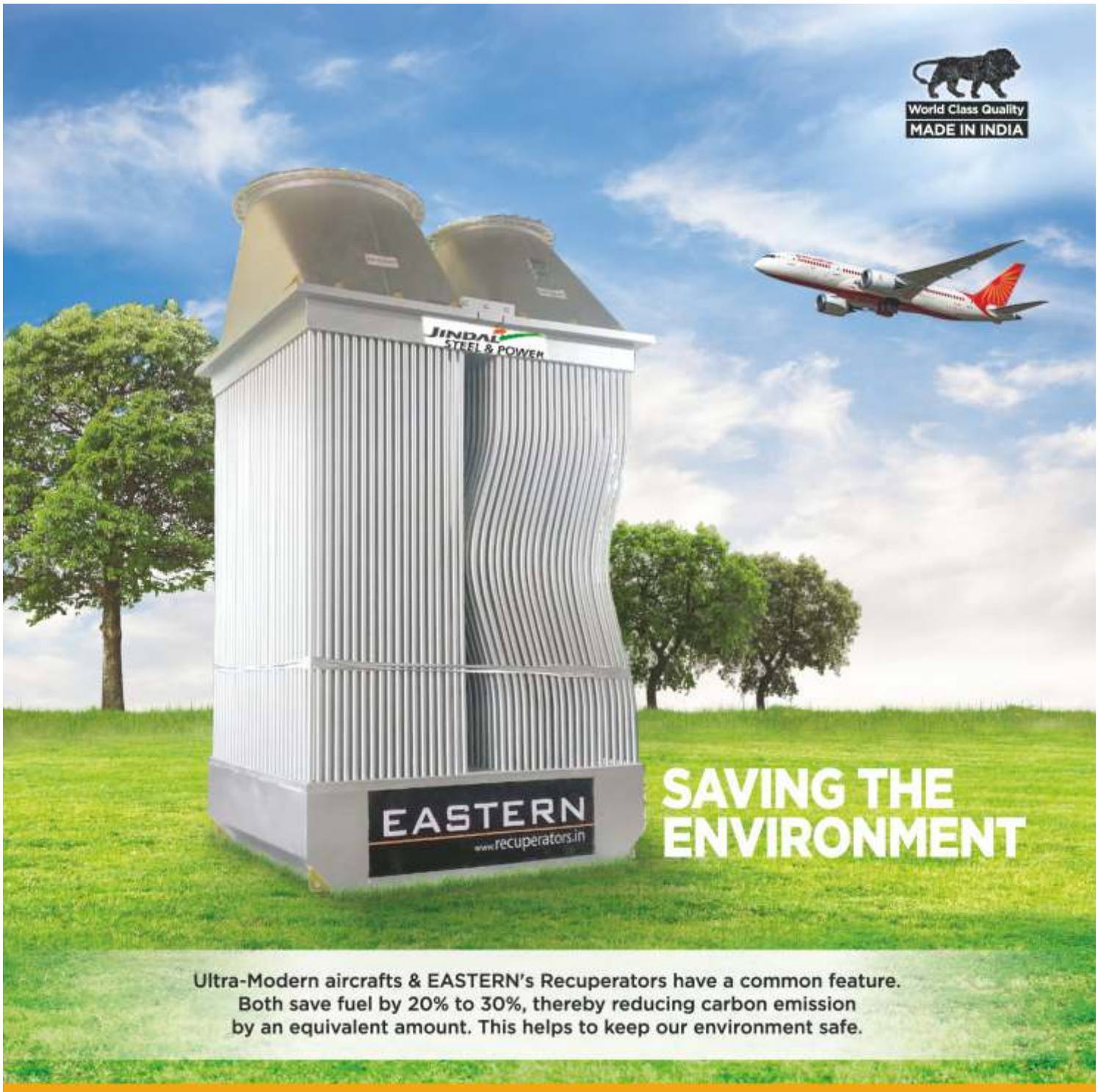
He was a UP cadre IAS officer before joining politics. Singh was born in Mustaffapur in Nalanda district, Bihar to Sukhdeo Narayan Singh and Dukhalalo Devi. He did his schooling from High School, Hussainpur, Nalanda. He graduated with a Bachelor of Arts (Honours) degree in History from Patna College and did Masters in International relations From School of International studies at Jawaharlal Nehru University, New Delhi.

After the resumption as Cabinet Minister of steel, RCP Singh has directed the public sector undertakings under his ministry to align their business activities to remain competitive in the market. He gave the directions while reviewing the performance of Steel Authority of India Ltd.

The steel minister on 2nd July 2021 held a virtual conference with SAIL chairman and CMDs of NMDC and MECON, to review the activities and performance of these state-owned entities and also directed to align their business activities to remain competitive in the market.

The other four PSUs are: Rashtriya Ispat Nigam Ltd (RINL), which manufactures steel; MOIL, which is into mining of manganese ore; KIOCL, which is a pellet maker; and MSTC Ltd, which provides e-commerce-related services across diversified industry segment offering e-auction/e-sale, e-procurement services and development of customised software/solutions.

The steel minister also reviewed the activities and performance of RINL, Rashtriya Ispat Nigam Ltd and its subsidiaries. The Minister noted the initiatives being taken by RINL to improve its performance. During this meeting, CMD, RINL made a presentation regarding its physical and financial performance, major ongoing projects, important initiatives, areas of concern and the way forward. The Minister enquired about the operationalization of Forged Wheel Plant and the likely date of supply of wheels to Railways. He advised RINL to take all measures to control cost and improve productivity. Steel Minister directed the companies to adopt efficient business practices and remain competitive in the space in which they operate.



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AM/NS India aims to develop a global R&D centre at Hazira

"Our continued focus on controlling both fixed and variable cost like procurement of natural gas, bulk raw materials, and other consumables prices which has helped us to enhance the efficiency gains across the business. All these initiatives have helped us reinforce our position as a premier manufacturer of high-quality flat steel products".

Dilip Oommen, CEO, AM/NS India

Dilip was appointed CEO AM/NS India (formerly Essar Steel) in December 2019. He has worked in the steel industry for 37 years. He joined Essar Steel in 2003 as chief operating officer and has a deep understanding of the company and its operations across India. He progressed through senior leadership positions across the company, and was appointed Managing Director and Chief Executive Officer in 2019. Oommen's international steel industry experience includes senior operational roles at Hadeed, a leading steel manufacturer in the Gulf, owned by Saudi Arabia's SABIC.He is a metallurgical engineer from the Indian Institute of Technology, Kharagpur.

D A Chandekar, Editor & CEO of Steelworld had an exclusive interaction with Mr. Dilip Oommen, CEO, AM/NS India to understand the on-going Covid pandemic effects on the AM/NS, its initiatives to support communities and the nation in this pandemic. Mr. Oommen also highlighted the future expansion plans as well. He further elaborated more on how its parents company - ArcelorMittal and Nippon Steel helping to bring more advance technology and research and development capabilities in India.

Excerpts :

How do you analyse AM/NS India performance despite of on-goingCOVID pandemic? Tell us about this incredible journey so far....

Since the inception of AM/NS India in December 2019, performance has been incredible. We have not only consistently delivered on targets but also in many cases surpassed them. Our continued focus on controlling both fixed and variable cost like procurement of natural gas, bulk raw materials, and other consumables prices which has helped us to enhance the efficiency gains across the business. All these initiatives have helped us reinforce our position as a premier manufacturer of high-quality flat steel

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products.

Of course, the global pandemic has brought significant challenges over the past year. During the first wave of the pandemic, we conducted regular reviews and reorganised our priorities. The well-being of our employees was the overriding priority. Although we suspended operations during the national lockdown as directed by government, we utilised the time to devise and initiate a comprehensive programme comprising COVID-19 health and safety guidelines, new standard operating procedures and a robust action plan to ensure safe resumption of manufacturing at our sites.

This ensured facilities were fully aligned with the government's safety parameters and enabled us to operate at full capacity by mid-May 2020, within six weeks of the nationwide lockdown. Towards the end of the year, we were even able to set new operational records, including our highest ever monthly production figures, in November.

Our actions and preparation last year have been hugely valuable in ensuring minimum disruption and maximum safety for both our employees and operations during the second wave of the pandemic this year. Temperature screening, wearing masks, maintaining physical distance and frequent washing of hands are now an integral and routine part of our lives at AM/NS India. We have vaccinated almost all our employees, their families and our business partners.

I feel both proud of and humbled by the contribution

each employee has made to our success, and the support and recognition we have received from customers, vendors and government. We have also benefitted hugely from the guidance of our parent companies, ArcelorMittal and Nippon Steel, during this time.

Our dedication to the needs of our customers has remained at the heart of our business development in recent months. We have diversified our portfolio with the addition of many value-added products. To improve AM/NS India's reach to customers, the company is also more than doubling its network of Hypermarts, a national chain of retail outlets that serves the micro, small and medium enterprises (MSME) segment, to 50 centres. The Hypermart model is an integrated platform for retail trade and last-mile sales of steel grades for MSMEs for a wide range of uses, including in fabricators, engineering goods and auto components.

Our focus remains on expanding capacity and market reach through an approach that puts emphasis on carefully matching the strengths of our products and services to the needs of the market. This ensures the greatest value to our customers.

We are committed to serving the nation in every possible way, be it in the fight against COVID-19 or reaching the national goal of achieving 300 million tonnes of steel capacity in the coming decade. With the strategy we have in place, I am confident about AM/NS India's long-term prospects.

Tell us more on AM/NS India's initiatives to support communities and the nation in this pandemic?

As a responsible corporate citizen, AM/NS India has been working closely with state governments to alleviate the healthcare crisis. While we started with the supply of medical grade oxygen, we have also converted nitrogen tankers for oxygen transportation to fast track delivery. Operating at over 150% capacity, we are supplying 260 metric tonnes of medical grade oxygen every day from our Hazira plant to medical establishments in Gujarat and neighbouring states. We

have also set up a COVID-19 hospital near our Hazira plant with 600-oxygenated beds, which is scalable upto 1000 beds and more. This facility has been equipped to provide uninterrupted direct supply of oxygen from our plant. We also provided six cryogenic tankers.

We also joined forces with the government of Odisha to provide 7000 units of medical grade oxygen cylinders and 2000 units of flow meters. The critical medical equipment was ordered to enhance oxygen distribution to other parts of the state.

Can you please highlight on AM/NS India's futuristic expansion plans…

We are in the process of enhancing the Hazira plant output to 18 million tonnes with a commitment of Rs 50,000 crore. The capacity enhancement will happen in a phased manner; and in the first phase, we intend to increase to 8.6 MTPA, then 14 MTPA with a plan to reach 18 MTPA.

We have also signed an MoU with the Odisha government to set up a 12 MTPA integrated steel complex, for which the feasibility study is being carried out. At Paradeep in Odisha, we are nearing the completion of a project to double our pellet plant's capacity from the current 6 MTPA.

What is your outlook for raw material prices, particularly for iron ore and coking coal, during the current year 2021?

Based on the movement of market indicators such as domestic iron ore prices and expected increase in supply during the course of the year, we may see a price correction over time.

However, any price correction is expected to be gradual rather than a sharp decline. There is a need to implement National Mineral Inventory (NMI) for iron ore as soon as possible so that the existing anomalies can be ironed out.

Why there is a rise in steel demand?

The rise in demand can be attributed to a number of factors, which compriseof mainlyencouraging government policies in India and the business environment both domestically and globally, coupled with an uptick in infrastructure and auto segments. As one of the most attractive emerging markets with among the lowest per-capita consumption segments, India is making accelerated investments, primarily driven by Govt spending. GDP growth rate of 6-7% in the medium term augurs well for the industry. Given these developments, I am not surprised by the surge seen in the recent past. Current demand momentum is expected to continue in the months to come.

Tell us about exports and serving domestic customers?

As a principle, we export only after catering to the domestic market demand. Exports peaked during the 2020 lockdown in India. However, as domestic demand rebounded, the percentage of exports declined drastically to negligible levels in Jan 2021. We will continue to serve the domestic demand before

exporting as the MSME customers remain a priority for us.

Could you please tell us the AM/NS India's outstanding debt position?

The liquidity and debt position of AM/NS India has been quite healthy, and we don't see any major changes in meeting our net debt targets in the near or medium term. We have a dual objective of debt reduction and funding for growth.

Your views on steel sector profiteering from the economic revival?

The price of Indian steel, in comparison to global prices, is lesser. Globally, commodity prices have increased. But steel price increases in India have been the lowest by far. In addition to this, the input costs have spiraled.

How is AM/NS India gaining from parents ArcelorMittal and Nippon Steel? Explain with reference to technology and research and development....

As being the global leaders in steel manufacturing, our parent companies ArcelorMittal and Nippon Steel possess the best research and development capabilities in the industry. Our parent companies are committed to maintaining and extending this advantage by anticipating and responding to major trends across technology, sustainability and society.

AM/NS India has inherited these technological capabilities and is reaping their many benefits, including innovative thinking and continuous improvements in the quality of our products,

services and processes. We also intend to develop a global research and development centre at Hazira, an extension of our current R&D unit, which is accredited by India's Department of Industrial and Scientific Research (Ministry of Science and Technology).

Currently, our use of technology extends to automation and IT tools, enabling us to directly manage every aspect of the manufacturing process, making us more energy-efficient, while emitting significantly less carbon during iron making, steelmaking and rolling processes.

Next-generation technology is supporting our efforts to realise a self-reliant India (Atmanirbhar Bharat). For instance, we have already developed high-strength steel for domestic automobile application, thick plates for boiler and pressure vessels, steel for use in defence equipment and abrasion-resistant steel for yellow goods.

Ongoing collaboration with India's premier technical institutes such as IITs, NITs, CSIRs allows us to take on challenges that require the complementary exchange of a diverse set of ideas and experience. Through these partnerships, and others, we are also designing pioneering solutions in raw materials, steel and process of metallurgy, by-product management and process of innovation for sustainability.

While the future looks promising for the steel industry and the country, it is

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crucial to take the advantage of new and emerging technologies will help us to achieve our goal.

How do you strategies your organization to make it ready for the future?

Post-acquisition of Essar Steel from ArcelorMittal and Nippon Steel adds immense value in every aspect of our operations. We continue to bring to India the best global practices which help us to set industry benchmarks.

One important element of preparing for the future is supporting the development and progression of our employees through training and skills development.

For instance, we recently signed a Memorandum of Understanding (MoU) with Birla Institute of Technology & Science, Pilani, to provide a sponsored B.Tech Process Engineering degree through a Work Integrated Learning Programme without the need for a career break.

We have also provided access for all employees in India to ArcelorMittal University, an online platform that offers life-long, continual learning to employees at all levels of the company and in all locations, in both office and shop floor positions. Training and development programs offered by ArcelorMittal University are not restricted to business. They also offer insight into the environmental, social and governance aspects of our industry.

Would you like to throw some light on AMNS India's Hypermart model for retail trade ?

Small and medium sized businesses – typically a family affair, employing fewer than 100 - bore the brunt of the pandemic's economic fallout. This is the world of micro enterprise, the informal economy of casual employment, yet the cogs that ensure the functioning of the wider economy. That's why we decided to expand our Hypermart network during the pandemic. This dedicated sales platform for MSMEs has the making of a deeper ecosystem and already provides support services and credit lines to 320 MSMEs and growing. Direct access to Hypermarts means no intermediaries, thus enabling the MSMEs to save on costs.

AM/NS India launched its e-sales platform in December, 2020. This unique platform provides MSMEs with the flexibility to buy steel as per their requirements in quantities, size, and grades directly from the company at a competitive rate without compromising on the quality. Started in Madhya Pradesh as a pilot, the portal has been widely applauded by MSMEs as they are no longer dependent on the open market and there is a consistent supply of material directly from us. MSMEs contribute about a third of India's GDP, and if they grow, we all grow.

Could you please tells us more about ongoing industry challenges and demand outlook for 2021?

Over the years, many challenges faced by the industry, including that of the raw material concerns are being gradually addressed. Increasing demand and price in the global market is giving the Indian industry the required fillip. As India develops into a stronger economy, steel consumption is bound to increase. In that perspective, the industry remains very attractive. We expect the current trends of

steel demand to continue in the medium term. Definitely, 2021 looks firmer than expected in terms of demand.

Uttam Galva: investment plans and how this will help your operations?

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Technology Roadmap for Indian Iron & Steel Sector

A few days back, Sweden's SSAN, LKAB and Vattenfall jointly revealed that 100 Tons of sponge iron was produced with Hydrogen as a reductant at a Pilot scale in an initiative through HYBRIT (Hydrogen Breakthrough Ironmaking Technology). This fossil-free first step supported by the Swedish Energy Agency will set the ball rolling for the adoption of new ironmaking technologies worldwide.

A metallurgist would say this is possible for our country too. It is a tough challenge calling for a monumental change in many aspects of the steel industry. But it is entirely possible, and it will push our country to new heights with sustainable technological development.

There are many challenges we may face, and there is much scope for improvement in this sector. For instance, applying HYBRIT technologies entails designing and engineering modular equipment, which is a hurdle in itself. Currently, operative DRI modules and shaft furnaces use a mix of CO_2 and H_2 as reducing gases to produce sponge iron. HYBRIT replaces the mix with pure H_2. This calls for a modular redesign in order to achieve the desired temperature and counter-flow of iron ore pellet/CLO against a stream of hydrogen. H_2 being a lighter gas, its ability to penetrate the ore bed is high but residence time is low. Surely, an R&D project can be envisaged, and is required here. The question of how one produces the hydrogen gas also arises here. Will it be from fossil fuel?

Given the present structure of the Indian economy, we need to focus on coal in steelmaking for at least 30 more years. Thermal coal is abundant, and is widely used (versus coking coal). Unfortunately, thermal coal-based DRI kiln technology in India is quite old and no innovation has been made in it. It is a non-counter-flow technology of reductant and oxide. A lesser surface area is available for reduction. This results in the generation of energy-rich flue gas and consequently, a power plant attached to the kiln is often obligatory. Coal based DRI is normally melted in an induction furnace or an Electric arc furnace. It consumes a lot more energy in comparison to gas-based DRI or HBI. A huge quantity of energy may be saved if we produce hot metal by smelting instead of DRI produced in a coal kiln.

Rajib Paul,
Director, National Institute of Secondary Steel Technology

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Looking at the Chinese Iron and Steel sector we may notice only the large steel units and the mass produced steel. But it is at a different stage of growth and does a few things. They are not only doing nation building like India, but also capacity building (to become self-reliant) and expertise building (like the countries with a full-fledged R&D infrastructure in place). It doesn't allow any institution to keep a vacant position in any area of research when there is reluctance amongst researchers. Well-funded state machinery works to put people into that area of research. Here it must be also mentioned that the country also produces small quantities of various steels in varied shapes and sizes to meet the requirement of all steel consumers. 90% of it is value added steel. This is vital for India and its iron and steel industry. But even when they get imported to our country, it may not reflect as steel in the HS code.

Thus there is an urgent need to produce value added steels domestically in India. In order to tackle this problem, we first have to filter out consumers who import small quantities of steel. For this purpose we must conduct an extensive survey to identify them. Here it must be mentioned that in most of our integrated steel plants there is a reluctance to take orders of steel which is less than few heats or do not make a sequence in casting even though they are high-value products. There are also certain unconventional shapes which are not rolled. MSME steel units can be incentivised to enter these niche areas of steel making and shaping and develop high-value steel products.

When the steel sector was liberalised most steel units went on to produce reinforcing concrete bars (TMT). It is a commodity having a simple production process requiring little treatment and alloying. An induction furnace having a continuous billet caster and a rolling mill with a direct charging facility is enough (no ladle treatment station required). Unfortunately, low Capex has incentivised such steel units with reasonable margins. To encourage them to produce high-value steel requires dedicated machinery and a clear roadmap. Ultimately, this will also generate considerable employment opportunities for new metallurgists.

Moving to the topic of construction, it has been observed that steel intensive buildings and infrastructure is not popular. Steel intensive structures have low life cycle costs, are seismic resistant and are faster to build/dismantle. Despite this, there hasn't been a significant improvement in steel to cement ratios in buildings. Steel structures are as aesthetic and robust as concrete buildings under Indian climatic conditions.

An additional important issue troubling major steel plants is slag disposal. Uptil now, much of the slag produced was dumped in landfills. This has created a problem, now that land resources are in short supply. Ideally, the slag should be directed for use in road making, brick making, etc. It should be used as a product, as many countries already do, where the concept of "slag landfills" is non-existent.

India is poised for a giant leap forward in augmenting its domestic supply chain. A time will come when highway networks, *cabotage* and dedicated freight corridors require a huge number of containers for every supplier. Some may even need refrigerated ones to meet the requirement of a cold chain. So container manufacturing will require a large boost. Additionally, in our country about 20% of vegetables produced go to waste. This loss can be minimised and steel can be the solution.

Another area of interest can be electricity grids all over the country. We will be generating a few more gigawatts of electricity (renewable, nuclear, or fossil fuel based) and for that we will need giant transformers and substations. Also, transmission losses are enormous in India. Some may be due to pilferage but a considerable energy loss is due to the old transformers still in service. Many old ones are long due for replacement. All this will necessitate a supply of CRGO steel. Much interest has been shown towards the potential of CRGO steel, but there has been a reluctance in production. A huge push in terms of investment and acquisition of technology is imperative for a marked growth in its use and production. Moreover, this will cut our import dependence.

To sum up, implementation of all of the above must be considered in a sustainable way to propel us forward as a nation.

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Tata Steel focuses on ecosystem restoration

As industrial activity gains pace globally, materials from the environmental ecosystem are continuously being used and depleted. If we do not restore these materials, or conserve them, there will be no materials left for meeting the needs of future generations.

As such, restoration of the ecosystem has emerged as a fundamental element of ecosystem management. It involves assisting in the recovery of ecosystems that have been degraded or destroyed, as well as conserving the ecosystems that are still intact.

Today, habitat loss is the leading cause of both species extinctions and ecosystems decline. Two methods have been identified to arrest this trend. They are the conservation of currently viable habitat and the restoration of degraded habitat.

Sanjeev Paul
Vice President (Safety, Health & Sustainability)
Tata Steel

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services and contribute to the well-being of mankind as a whole. The United Nations General Assembly has declared the period 2021-2030 as the `UN Decade of Ecosystem Restoration'.

At Tata Steel, sustainability and restoration of the ecosystem is an integral part of the business and is driven by the Company's leadership, with an organisation-wide governance structure around it. Our policies demonstrate our commitment to sustainability leadership and guide us in formulating and implementing our long-term ecosystem restoration strategy. Tata Steel's commitment to sustainable development and growth is reflected in its `Vision 2007'.

Our philosophy of steel production is deep-rooted in the principles of zero harm, resource efficiency, circular economy, minimising the ecological footprint and care for the community and workforce. The sustainability approach of the Company is aligned with its overall vision to be the industry leader in the areas of Climate Change, Water, Waste and Biodiversity. Underpinning this approach are strategies on low-carbon transition, reducing dependence on freshwater consumption, maximising value from waste and exploring opportunities in the circular economy, enhancing biodiversity in areas where the Company has its operations, building a sustainable and resilient supply chain and customer-focused product stewardship.

Over the last few years, Tata Steel has taken several proactive measures aimed at the restoration of the ecosystem in and around its operational areas. These include restoration of wasteland at Baghakudar forest at Jamshedpur wherein 30,000 trees will be planted over an area of 7.2 Ha, rejuvenation of the CRM Bara Pond by creating a 5.6 Ha waterbody, ecological importance park developed on a municipal solid waste dumpsite in 12 Ha area and enhancing the local biodiversity and development of the 25 Ha Jugsalai Muck Dump as an eco-park.

Other major ecosystem restoration projects undertaken by Tata Steel include a Niche Nesting Project at Noamundi whereby 430 nesting boxes have been provided for the birds in the vicinity. Also, at Noamundi, progressive reclamation and regeneration of forest at a mined-out area spread across 126 Ha of land has been achieved. The area is today a habitat for local bird and animal species. Likewise, at West Bokaro, the Sir Dorabji Tata Biodiversity Park has been created on a mined-out area spread across 100 Ha of land.

Tata Steel's has partnered with the International Union for Conservation of Nature (IUCN) since 2013. This engagement is part of IUCN's Global Business and Biodiversity Programme. It seeks to encourage transformational and demonstrable change at the Company and sector levels and focuses on the importance of biodiversity conservation relevant to industry and, thereby, seeks to bring about positive gains for conservation at the local level. IUCN conducted a baseline survey of Tata Steel's locations and gave its recommendations on biodiversity management. This included biodiversity assessments, ground-level studies, secondary research, including stakeholder interactions, and understanding the ecosystem services provided by the biodiversity. The risks to biodiversity and ecosystem services from the Company's operations and community behaviour were identified and then used to develop Tata Steel's biodiversity conservation and management plans.

The Company's long-term philosophy is to strive to protect the environmental ecosystem, minimise the impact of its operations on the environment, promote resource efficiency optimally and guide investment decisions in a manner that minimises the impact on the environment.

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Raw materials shortage to dent steel mills' growth in India

The coronavirus (Covid-19) pandemic has caused severe damage to the entire steel industry. In the initial months of the Covid-19 spread, activities around steel consumption sectors were suspended following a nationwide lockdown. Panic spread all around as neither anyone had a clue to deal with the Covid-19 infected patients nor was discovered any medicine to control its spread. So, steel mills were locked down, market operations were suspended and work at construction and infrastructure sites came to standstill. All these immediate actions impacted steel production and consumption alike. On several occasions in the last two years, steel mills suffered sometimes with stockpiling at factories due to a sharp decline in its offtake from consumer industries and also transport disruption in inter- and intra-state movement. India's steel production is estimated to have declined by 15 per cent to 95 million tonnes (MnT) for 2021 due to a combined affect of raw material shortage and factory lockdown.

Dilip Kumar Jha
Industry Analyst

While unlocking after the devastating second Covid-19 wave, the government exempted infrastructure and housing projects which allowed work to begin at incomplete projects. Thus, market witnessed a sudden resurgence in steel demand towards the end of calendar 2020. In absence of adequate supply, steel prices skyrocketed which resulted into a sharp increase in the project cost. Since the operational activities at minesites were locked down during the first and second

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waves of the pandemic to prevent one-to-one contact and thus the pandemic spread, mineral production across various sectors affected sharply in the last two.

Coronavirus disease, a pandemic that shook the entire world, raised various concerns over the global availability of steel making raw materials throughout the year. While the demand of raw material i.e., iron ore for the Indian steel industry is met through domestic supply, coking coal supply is met mainly through import.

Iron ore scenario

Decline in iron ore output

After five years of positive growth, India's total iron ore production volume recorded a sharp decline this year. Production of this key steelmaking raw material in India declined by 15.1 per cent to touch 199.5 million tonnes (MnT)in 2020 compared to 235 MnT in the previous year. Data compiled by the Union Ministry of Mines show, Odisha, India's eighth-largest state (area-wise), took credit for the biggest chunk of the country's iron ore production at 109.5 MnT contributing thereby 54.9% in 2020. When compared with2019, Odisha's contribution to India's total iron ore production slumped by 18.28%in 2020. The primary factor that contributed to the fall in Odisha's iron ore output is the delay in exchanging ownership rights of the auctioned mining leases.

Similarly, contributions of other major iron ore producing states, including Chhattisgarh, Karnataka and Jharkhand, have also gone down significantly. The mineral production in Chhattisgarh dropped to 31.8 MnT in 2020, against 36 MnT in the last year. Similarly, iron ore output in Karnataka also dropped to 28.33 MnT in 2020 compared to 31 MnT in 2019 while its output in Jharkhand reportedly dropped to 24.70 MnT in 2020 against 27 MnT last year. Meanwhile, India's largest iron ore producing company National Mineral Development Corporation (NMDC) posted its output drop of 4.91% to 31 MnT in 2020. The decline in NMDC's iron ore output was the second consecutive year in a row. The company had reported its iron ore output at 33.1MnT in 2018and in 32.6 MnT in 2019. The public sector steel behemoth Steel Authority of India Ltd (SAIL)produced around 28.5 MnT of iron ore from its captive mines in 2020, a decline of a mere 1.72% from its level in2019. By contrast, the private sector captive miner, Tata Steel reported 12% increase in its iron ore production to 28 MnT in 2020 as against 25 MnT in 2019. However, India's largest private merchant miner, Odisha-based Rungta Mines' production dropped by half to 14 MnT in 2020 from 28 MnT reported in 2019.

Exports surge

India's iron ore exports shot up sharply in the calendar year 2020 on a pent up demand from Chinese steel mills for filling the pipeline inventory and also for immediate consumption in steel mills. The Union Ministry of Mines reported 67.9% to 53.88 MnT in 2020 compared to 32.1 MnT in the previous calendar year. Data from the Ministry of Mines show 113.73% increase in India's iron ore exports (excluding pellets) to 40.78 MnT while pellets exports increased by a negligible 0.61% to 13.1MnT in 2020. Analysts attribute the sharp increase in India's iron ore exports to its abnormally high prices in global markets deteriorating pipeline inventory at Chinese ports and also scarcity of its availability due to Covid-19 pandemic.

To cite an example, the yearly average of global iron ore fines (Fe 62%) prices increased to $108/tonne (MT) cfr China in 2020 as against $93.5/MT cfr China in 2019. Also, prices had touched as high as $167/MT, cnf China, in December 2020. Indian low grade iron ore export prices (Fe 57%) at the base Chinese port increased to $68/MT (cnf) in 2020 compared to $62/MTin the previous calendar year. Meanwhile, iron ore inventory at Chinese ports witnessed a significant fall from 130 MnT at the beginning of 2020 to as low

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as 108 MnT by June 2020. Interestingly, Odisha-based miners took full advantage of iron ore short supply and liquidated their entire low-grade stocks. Iron ore exports from Odisha, therefore, increased as 19 mining leases, which were put up for auction, were busy liquidating their inventories. The auctioned mining leases had roughly 40 million tonnes of inventory.

Coal scenario

Production increase to bridge supply deficit gap

To overcome the shortage of the the key steelmaking raw materials, the Centre is increasing domestic production of coalthrough allocation of more coal blocks. Also,it is pursuing with state governments for assistance in land acquisition and coordinated efforts with railways for smooth carriage.In order to enhance domestic output, 25% of coal production has been allowed for sale of coal for newly allocated captive coal blocks. Commercial mining, with a provision for 100% foreign investment, has also been allowed by the government.

Overall coal production in India declined by a marginal 2 per cent to 716.01 MnT for the financial year 2020-21 compared with 730.87 MnT of its output reported in the previous financial year through sustained programme of investment and greater thrust on application of modern technologies.

Coal India Ltd (CIL) and its subsidiaries reported 0.98% decline in India's coal production at 596.25 MnT compared to 602.13 MnTin the previous year and 606.89 MnT in 2018-19. Singareni Collieries Company Ltd (SCCL) is the main source for supply of coal to the southern region. The company produced 64.04 MnT of coal during 2019-20 as against 64.40 MnT during the corresponding period last year.SCCL production of coal during 2020-21 was 50.58 MnT, thus recording a decline of 21%. Small quantities of coal are also produced by Tata Steel, IISCO, DVC and other private and public sector miners.

Coal import

In India, coal can be freely imported (under Open General Licence) by the consumers themselves considering their needs based on their commercial prudence. Coking coal is being imported by SAIL and other steel manufacturing units mainly to bridge the gap between the requirement and indigenous availability and to improve the quality. Coal based power plants, cement plants, captive power plants, sponge iron plants, industrial consumers and coal traders are importing non-coking coal. Coke is imported mainly by pig-iron manufacturers and iron andsteel sector consumers using mini-blast furnace.

India's import of coal (million tonnes)

Financial year	Coking	Non-coking	Total	Coke
2015-16	44.56	159.38	203.95	3.07
2016-17	41.64	149.31	190.95	4.35
2017-18	47.00	161.27	208.27	4.58
2018-19	51.84	183.40	235.24	4.93
2019-20*	51.83	196.71	248.54	2.91
2020-21*	51.29	163.68	214.97	NA

Source: Ministry of Coal

* Provisional

Meanwhile, the Chinese coking coal production surged 392% in the last five years to the level of 611.1 MnT in 2020. Its share in the world coking coal production has increased from 26% to 56.1%. Australia, the second largest producer with an annual output of 191.1 MnT is also the largest exporter of the material, accounting to around 65% of the coking coal exports. While India, with meagre reserves and production of coking coal, does not figure in the world rankings. The expansion of our steel industry has made India emerge as a leading importer of the material next to Japan with a share of 17% globally. This is more than the imports of China and Korea which stand at 15% and 11% respectively. Over the last few years, the steel production surged by 36% while coking coal imports have gone up by nearly 65% in India.

As against the ever rising requirement, India's coking coal reserves have been stagnant over the years. The vulnerability of the steel sector springs from the low availability and poor quality of the material in the domestic market. India's total coal reserves have shown an increase of about 7 billion tonnes during 2014-16, but there has hardly been any addition to coking coal reserves and there is no

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increase in the prime coking coal category. The prime coking coal reserves stand at 5.313 billion tonnes and proved prime coking coal reserves are 4.614 billion tonnes. Total coking coal reserves including proved, indicated and inferred increased by only 333 million tonnes, from 34.07 billion tonnes to 34.403 billion tonnes in 2016.With meagre reserves and production combined with inferior quality of coking coal that is available in the domestic market, the expansion of steel industry in India has seen increasing import of coking coal. Currently about 80% of coking coal consumption is being imported. As per National Steel Policy (NSP) 2017 objectives, domestic availability of washed coking coal has to be increased so as to reduce import dependence on coking coal from 85% to 65% by 2030-31.In 2015-16, of the total demand of 62.75 MnT of coking coal, 44 MnT was imported. If domestic supply remains at the present level, coking coal imports may go up to about 75 MnT by 2020-21.The import dependency is expected to reach 160 MnT a year if the steel ministry's target of 300 MnT of crude steel is to be achieved.

Import dependence on coking coal will continue to remain in India. The growth in coking coal imports has been driven by the growth in steel production in the country. The growth of steel demand, in turn, is dependent on the growth in infrastructure and user industries namely construction, automobiles, capital goods and consumer durables. All these factors lead to higher imports of coking coal, the extent of which depends on the mobilisation of the resource within the country.

What hinders usage of indigenous metallurgical coal is high ash, low coking properties. Even though by reducing ash of Indian coking coals through several beneficiation processes, it cannot be proportioned to substitution with imported coking coal.

India's total import of coal and coke declined by 12.62 per cent to 215.92 MnT for 2021 compared to 247.10 MnTlast year. During 2021, India's non-coking coal import stood at 141.02 MnT as against 170.75 MnTin the previous financial year. The country's coking coal import, however, remained flat at 49.44 million tonnes for 2021 as against 49.17 MnT imported during 2020.

Steps taken to ramp up production

To meet immediate needs of steel mills, the government has taken several steps to ramp up production of raw materials and finished steel to increase their domestic availability and bridge the demand-supply mismatch leading to increase in prices of iron and steel in recent months. In a de-regulated, open market scenario, the domestic steel price is determined by market forces of demand and supply, trends in prices of raw materials and is also influenced by global conditions. The government attributes a number of factors for a sharp increase in the prices of iron ore. Measures taken by the government to increase availability of iron ore include mining and mineral policy reforms to enhance production/availability of iron ore, ramping up production and maximum capacity utilisation by the government mining companies, grant of permission to SAIL to sell 25% fresh fines and 70 million tonnes dumps and tailings, accelerating auction of iron-ore fines by SAIL and early operationalisation of forfeited working mines of Odisha by the state and central public sector undertakings etc.

Meanwhile, the government has taken several steps to secure coking coal supplies for the domestic steel industry and is making efforts to diversify the raw material's import sources. While output of iron ore, another key raw material for the steel industry, in the country is sufficient to meet the current demand, the entire demand of coking coal is not met from domestic production as the availability of high-quality coking coal (low-ash coal) in the country is limited and, thus, no option is left but to resort to import of coking coal. Efforts are being made to import coking coal from the US, Russia and Mongolia to diversify the coking coal import sources.

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Govt. need to develop institutions under PPP model to tackle the pandemic crises

We lose lives in pandemics and natural disasters because we are not prepared to meet these events. These catastrophes are mitigated when we are prepared to face these. For instance, earthquakes no longer bother Japan, tornadoes no more worry Taiwan and Hong Kong; similarly, we have conquered pandemics like the cholera and the plague. The key to these is preparedness and for this, we need institutions. Left to individual laboratories to develop vaccines, or to entrepreneurs to produce oxygen concentrators, or to individual promoters to add hospital beds, we hear the same refrain that the pandemic is a one of affair and demand for such things will not be sustained in future. Only, a central government agency could make a demand forecast which then sets a horizon for the investors to plan for the market. For preparedness, therefore, our main task would be demand forecast and which can be made with an agency with access to data. The Joint Plant Committee and the Ministry of Steel are such institutions; we use the data from the former and the legitimacy of the latter to generate numbers such as 300 million tonnes of steel, unrealistic perhaps and adjusted to the reality principle by constantly shifting out the time horizon from 2015, to 2020 and then 2030. It is immaterial if the target is practical or not. It is important that the target is created and legitimized so that the productive facilities are developed. We needed a central planning agency forecasting demand to be prepared for the Covid 19.

Dr Susmita Dasgupta

Former Jt. Chief Economist, ERU, Ministry of Steel

Hence the model of the steel industry in terms of the Joint Plant Committee and the Ministry of Steel may be the key to meeting disasters as well.

The construction sector is the overwhelming consumer of steel anywhere in the world. Innovations in this sector are likely to have deep as well as wide implications on the raw material economy, production capabilities and ancillaries. A case in the point is the light frame steel structure. The next thing in steel innovation, the LGFS (Light Gauge Frame Structure) is tardy in catching on despite the promise of increasing steel consumption by as much as three times the present volumes. A possible reason is the lack of an industry association. Sponge iron, pellets, iron ore beneficiation and coal

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gasification are innovations which have and can in the future change the deep structures. Yet, among the above mentioned, only sponge iron and pellets have emerged into visible presences while iron ore beneficiation and coal gasification, perhaps more important now than ever before has less presence. A reason for this is the association. Unless industries have associations, it is difficult for new products and new innovations to be widely applied in any industry, whether it is health or agriculture or transport. Associations help create "entrepreneurial bulk". The Indian steel industry has a proliferation of associations; when compared to the absence of associations for the LGFS and a lack of acceptance of this wonder technology due to the want of a concerted effort to assure consistency in supply and the adequacy in application, we are losing opportunities. Hence, industry association is the next important institution for any industrial segment.

The third important set of institutions are the journals. The industry associations have their journals and there are stand alone and independent journals too. Technologies, markets, industry news are regularly circulated through these journals. These journals also host Seminars, now webinars where ideas and experiences are presented and shared. The journals create a discursive platform for developing common talking points, unity of vision and a concertation of action. These help an industry grow its end users and develop a supply chain.

Government, industry associations and journals form the holy trinity for the growth of any industry, whether it is steel or for that matter any other economic and innovative activity. The Indian steel industry may well be a model for us to consider and replicate in the health, education, disaster management and in fact, every other.

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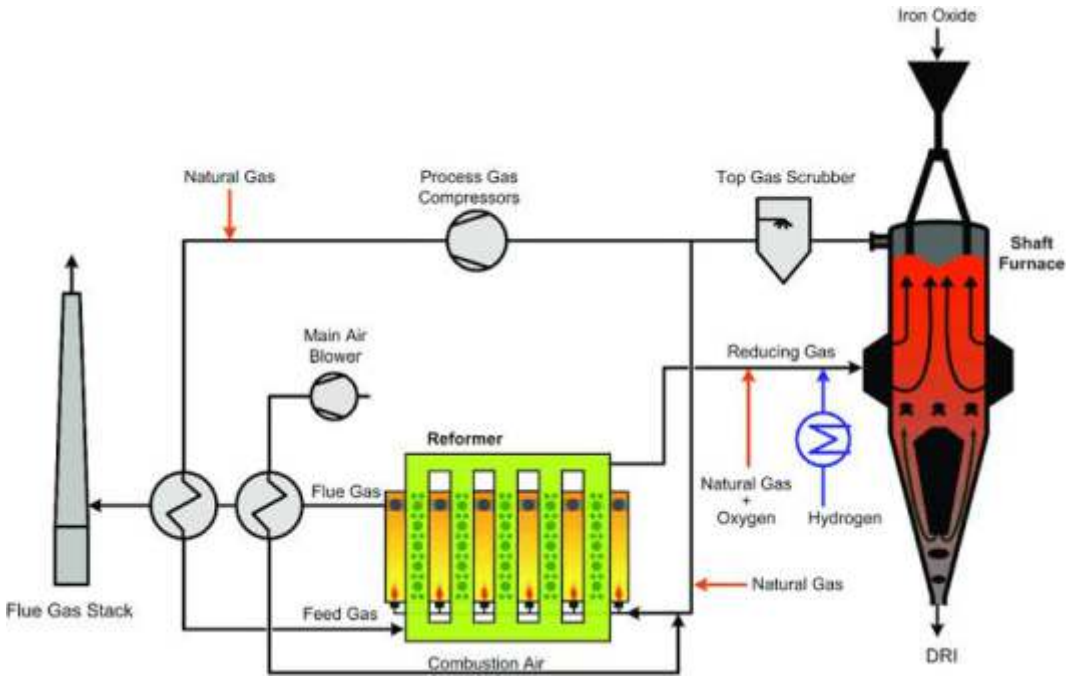


Emerging 'Green' Technology for Steelmaking

Since ancient times we have produced steel by reducing Iron Ore with either coal or Coke or other carbon based reducing agent, which process has only slightly been refined but essentially the same principles, and for every tonne of Steel Produced we release approx 2 tonnes of Carbon Dioxide into the atmosphere.

It is true that some attempts have been made to capture the Carbon Dioxide and other gaseous emissions, but has its own drawbacks and we are all aware about them, so it is time to look at the reduction process in light of modern technologies available.

As our understanding of Chemistry and Reduction Process has developed we should look afresh and deeper into the current processes and improve the situation for a lower pollution footprint.

One emerging technology looks at the bond between the Fe and the Oxygen atom, which is quite a strong bond and when broken results in tremendous release of energy, and the process uses microwaves of the resonant frequency of the Oxygen atom, so that the Oxygen atom vibrates so violently that it breaks the bond and lease behind the Fe only.

The energy of the breaking of the bond melts the Fe left behind and only some Carbon and other allowying elements have to be added to produce the requisite grade of steel.

This process results only in the emission of Oxygen.

In pilot plant tests conducted at a unit in Mumbai, with good results and is now being scaled up for commercial application.

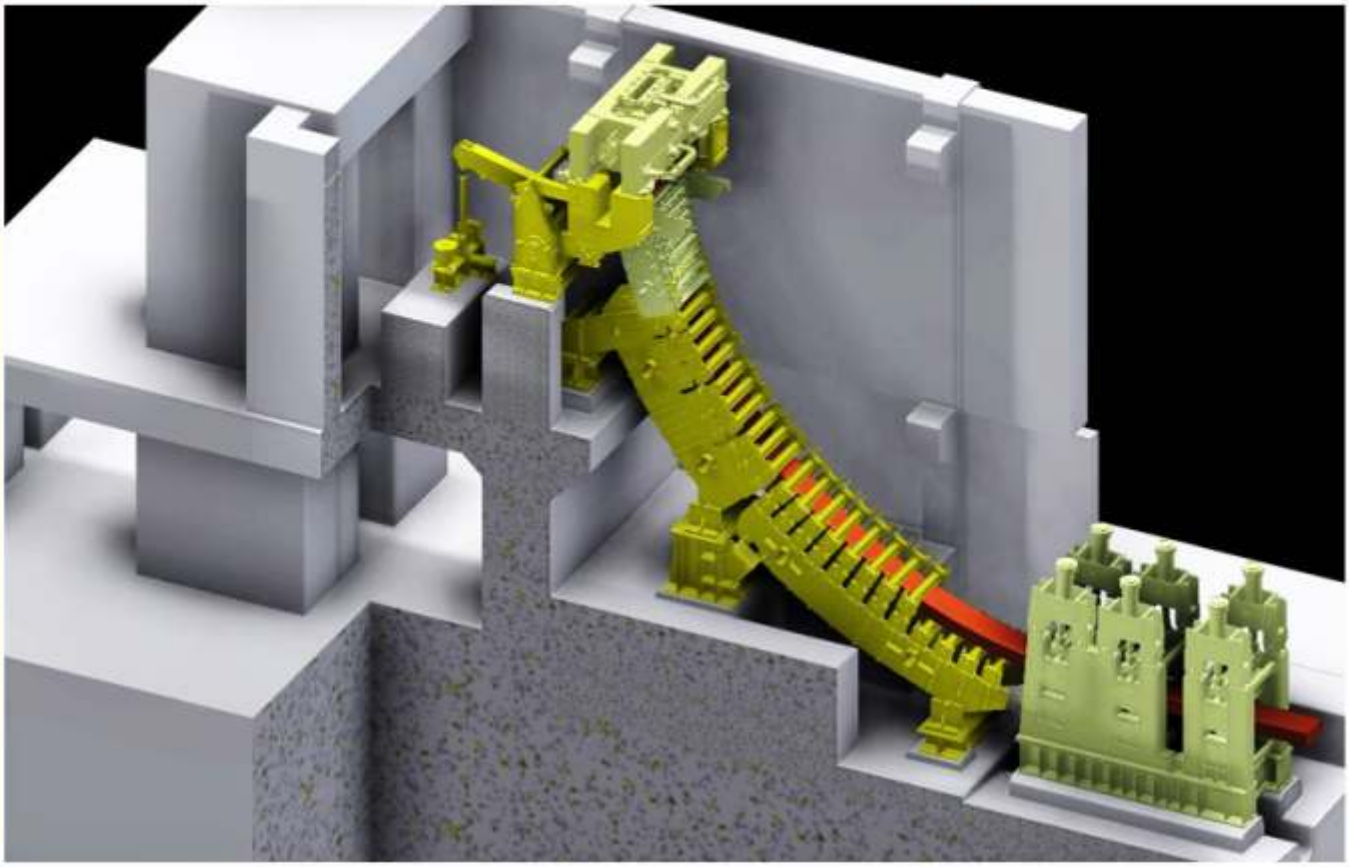
Another possibility being examined is the use of alternate reducing agent like Hydrogen gas for substituting for Carbon, and it results in the emission of Steam.

Haresh Melwani
Mine Owner

The Hydrogen used for the process is via electrolysis of water using renewable energy, and substantial work is ongoing in developing efficient electrolysis protocols.

Already commercial scale steel plants using Hydrogen as reducing agent in Europe and the product will soon be available in the markets.

We are already seeing a quantum jump in electricity generation via Renewable sources as also the cost of generation is coming down to levels virtually comparable to that of generation via fossil fuels, and further work in this field will bring us closer to really GREEN STEEL.



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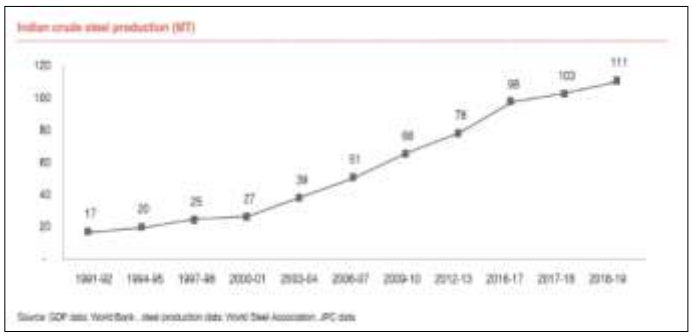
Process

Role of Engineering and Consultancy Companies in the Development of Indian Steel Industry

Steel Industry in India has witnessed many ups and downs to reach the present production level of about 112 million tons per year in 2019-20. India can now look to a bright future of steel industry. The industry should therefore start planning for the increase of steel production to meet the anticipated high demand.

The influence of the pandemic on steel industry in India can be seen as a short term decline in demand. By the end of 2020 and now in the middle of 2021 a strong growth in steel demand is evident. Comparing the global scenario, steel demand in India is still far below global average. However, it only indicates vast scope for increasing the steel production. When we plan to increase the steel production in India, we should look at the past history when difficulties were faced to acquire land, arrange funds and find skilled manpower. Proper planning can help to overcome such difficulties. Simple and low cost solutions need to be explored to increase production in medium and small units. A substantial increase in production can achieved by such methods.



The need to increase production is very much in the notice of Government of India also. This is visible from the Government's National Steel Policy released recently. The Government has announced a policy for providing preference to domestically manufactured Iron & Steel products in Government procurement. Steel ministry has expressed the vision of increasing steel production levels to 300 million tons by 2030.

The contribution has to come from both the integrated steel plants and medium and small steel plants.

Integrated Steel Plants

Though big expansion plans are on the drawing boards of major steel giants, fresh investments are still under hold for various reasons. Other difficulties like acquiring of land and finding skilled manpower are also foreseen. If the plans are realised, a contribution of about 100 million tons can be expected.

Indian steel industry is used to opt for low cost solutions to increase production. Some of the easy solutions are discussed in this article which could be adaptable to medium and small steel plants to achieve the required production levels. These solutions could also help to control process cost and quality of finished product. Engineering and consultancy companies can contribute in this direction and play an important role in providing low cost solutions to steel industry.

Dr. Sudarshan Singh,
CMD,
ANT Steel Engineers (Asia) Pvt. Ltd.

Medium and small steel plants

Just like integrated steel plants, secondary steelmakers are also planning expansion/ revamping programs as the pandemic situation is getting normalised. Key challenge in the success of technology up-gradation is chalking out a cost effective plan with optimum/minimum investment.

For green field projects, the project cost and production capacity are very important factors for long term sustainability of the plant. However, the need for improvements in production/utilization of existing plants with minimum investment is without doubt an urgent matter.

Most of the ups and downs seen by Indian steel industry were due to their high cost of production. Low cost solutions based on scientific

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and practical approach are quick and safe investments for small units.

Technology Up-gradation

If we look at the development of steel industry in China during the last decade of 20th century, technical institutions played a very important role by working hand in hand with the industry. Low cost solutions were tried successfully. In India, engineering and consultancy companies, rich with knowledge, experience, data, can play the similar role as played by technical institutions in China.

Role of Engineering & Consulting firms including Research Institutions,

Stressing the crucial role of **Engineering & Consulting firms including Research Institutions** in today's competitive world, the importance of a reliable, updated and pertinent database can never be undermined. With the vast experience combined with scientific analysis and engineering expertise, these engineering and consulting organizations are required to work out (this is the need of the day) quick, accurate and low cost solutions for each small or big plant that will help boost production in meeting expected demands.

Selection of technological changes is required to be adoptable to the local skills for quick process stabilisation. The selection should also be based on the appropriate process requirements meticulously worked out by the engineering and consultancy companies and not by other agencies.

For medium and small steel plants and rolling mills in India several improvements can be taken up as "low cost solutions" and choosing the most appropriate technology.

Examples of some of the easy and quick solutions which may help the Indian steel industry to increase production, improve quality and keep control on process cost can be stated:

- Mechanization and changes in plant and equipment layout for boosting speeds
- Identification and correction of mismatch of production capacities of individual units
- Improvements in yield by reducing material waste due to process loss.
- Adopting multiple strand rolling (slit rolling) for smaller sizes to make a balance of production capacity.
- Scientific review of roll pass design to improve overall performance
- Use of improved materials for rolls and guiding equipment in rolling mills
- Minimizing downtime by adoption of quick roll change and constant pass line
- Adopting direct rolling for utilization of heat energy of hot billets for rolling process
- Research for achieving global benchmarks in productivity, quality, raw

  material consumption, energy consumption and water consumption
- Segregation of scrap in melt-shops and stricter control on inputs
- Improvement in quality of steel produced through the various routes of

  steel making including the Induction Furnace route.
- Tundish technology for quality improvement
- Replacement of mill stand DC motors by AC motors. (Either one stand or one group of stand)
- Regenerative control of roughing mill AC slip ring motor.
- Improve the existing power factor of plant to get the benefits of reduction in maximum demand and thereby reduction in power bill.

Upgrading of existing facilities and optimising of existing production capacities will only help to increase the production level substantially in India.

Online Training Programs

The research institutes, engineering companies and consultants have a very important role in today's pandemic situation. Online learning is the most viable platform for them to ensure minimal impact of the pandemic on the industrial training. The training classes have to be customized to bridging gap between the shop floor thumb rules and scientific knowledge.

With the economy normalizing, online training will become key growth drivers for the industry in the future.

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Industry 4.0 – Concept to implementation in Steel Industry

Overview

Integrated Steel Plants demand process integration as a part of extended automation – basically extending the automation carried out as part of Industry 3.0. The impact that raw material and process parameters have on finished product quality and productivity necessitates close monitoring and control to reduce rejections, wastage, and lower productivity by linking business and process automation in ways never done before. Industry 4.0 is the answer.

The basic Industry 4.0 technologies – Sensors, IIoT, WiFi, Internet, and Cloud – are well known. But building solutions that will survive the harsh environments of Steel Industry is the key. Special design and implementation considerations must be deployed, while delivering targeted business and operations benefits.

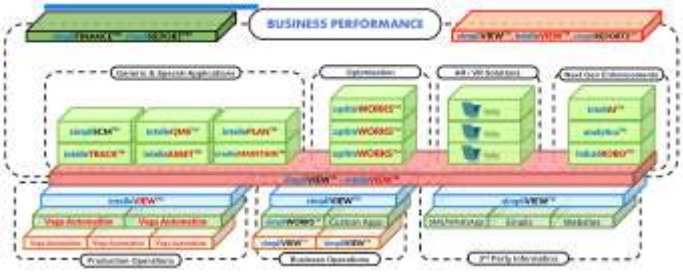
Vega's **intelleWORKS**™ implemented at a mini steel plant of 0.5 Mn TPA capacity, based on Industry 4.0 and integration with Business Automation, helped the customer derive a great value in quality, productivity and efficiency. In collaboration with the customer, keeping long-term goals in mind, the overall solution concept was arrived at with a vision to be the first Industry 4.0 compliant manufacturer in its class. The layered architecture was based on Data Acquisition, Data Processing and Intelligence to optimise the processes. The modular nature of **intelleWORKS**™ enabled the customer to take a multi-staged approach to meet complete Digitalisation.

The architecture that drives Vega's solutions is as below:

Yatin Purandare
Chairman and MD, Vega Innovations and Techno consultants

Figure - Vega's Solution Architecture (Copyright Vega Innovations and Technoconsultants Pvt. Ltd.)

The mapping of the products below exhibits how this architecture can be realised in practice.



Data Acquisition

The first initiative is to collect plantwide data and bring it at a central place without manual intervention.

The primary purpose is to get visibility of Process Data across the plant. This gives the respective Process Owners information about their process's effects on downstream processes.

The second purpose is to do away with manual generation of daily reports and MIS. This process is digitalised to make it happen automatically and in Real Time. These Real Time reports, referred usually as Dashboards, are targeted for respective Process Teams to get the information delivered 'Anywhere' - on individual mobile devices.

Exception and Consolidated report per shift per day is automatically generated and published for the Managers to get the required inputs to help take corrective actions for the improvement.

Vega deployed intelleVIEW™ IoT platform to acquire data from each individual process automation systems, Sensors and IoT devices and third-party applications including web apps.

A representative list of daily reports as below, for each process independently and also consolidated at a plant level, are automatically generated.

- Production/ Productivity, Yield, Raw Material Consumption, Electricity Consumption - A quick information for Padta calculations.
- Electricity Consumed, Load Factor, Power Quality Parameters such as PF, Harmonics.

Advance Report gives a drill down data at each section and equipment level.

- Process Disturbance - Idle Time, Process Delays, Cobbles. Advance Report gives a drill down data at each section and equipment level.

The immediate benefit is avoidance human errors, prevention of delays in getting information, and overcoming challenges of accessing information 'anytime, anywhere' due to mobility and Cloud based technology.

Material Traceability

The is the second initiative. The aim is to create a transparent quality process to increase customer confidence and satisfaction, make entire plant aware of the Finished Product quality parameters and use such information in individual and integrated process information. The modules of Vega's **intelleWORKS**™ helps customer achieve this.

Product Genealogy is a key demand by the Customers to understand the consistency of and traceability to the root level of finished product quality. Automation the existing manual process of generating records, gives the Customer confidence in quality management as well as adherence to international standards such as BIS.

A QR/Bar code Label on the finished Product allows the customer to trace-back the product up to Heat Data for Chemistry, Grade, and mechanical properties.

A Scrap and Sponge Iron input management software **simpliRECYCLE**™ is installed for Scrap Process House along with batching, gradation and internal transport after grade weighing to Furnace charging platform. This cumulative tonnage per day is used for Melt yield calculations.

The Induction Furnace Level 1 automation is integrated with **intelleTRACE**™ to generate a HEAT NUMBER, plot all relevant data of power consumption, stage wise temperature measurement, slag removal time and various chemistry samples for the given heat. Direct integration with Spectrometer through bar coded heat samples (Lollipops) allows to track the heat chemistry per furnace and crucible.

The tap-to-tap time monitoring and calculations of number of heats enabled to derive at refractory life management model.

The tapped heat is transferred to a ladle with unique ID to ensure predictable travel from tapping to caster platform through weighing and purging stations. The Ladle idle time is reduced by sequencing Heat with Casting demand with optimised Load Factor.

The unique ID of ladle carried heat data such as Chemistry to the casting platform and the weight data gave molten material weight of the heat. The accumulated molten metal weight and input raw material weight on daily basis helped to understand Melt Yield and Calibrate the grade mix for optimum yield and power consumption.

The Ladle transferred to Caster platform transferred heat data to casted billet. The weighing system on casting platform is used to measure the flow rate of ladle and generate Ladle demand to achieve

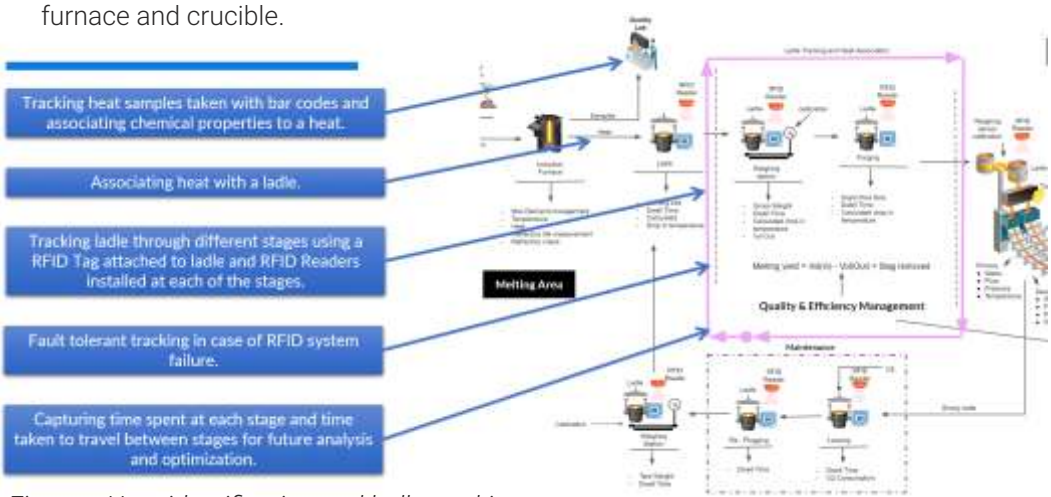


Figure - Heat identification and ladle tracking

seamless and break-less casting.

The Caster Level 1 system along with additional IoT devices and sensors, is integrated with **intelleTRACK**™ to get the Casting parameters for a given Heat and relate the Heat and Casting data to individual billet. The Casted billet chemistry was linked through Spectrometer integration and by creating UID through Bar Code for each billet sample.

The Reheating Furnace (RHF) controls are integrated to learn when and which islets are progressed to the Mill from RHF. The chemistry for such billets is tracked through Furnace Tracking software. The Heat Data for the billet is passed to **intelleTRACK**™ when the billet is ejected.

The tracking of Caster Billet and RHF billet is traced throughout the transfer path up to rolling mill.

The Casted and RHF billet is Tracked throughout in rolling and downstream processes till bundle formation along with Process Parameters and Quality Control Laboratory Data for each sample.

A consolidated data of the finished product/ products is captured, and a Bar Code label is generated for each bundle.

Process Optimisation

The third initiative is to identify areas of continuous improvements in Productivity, Quality and Efficiency. Then each of these areas to be embarked upon as projects.

Billet Sequencing Machine Learning and Artificial Intelligence

Purpose is to improve Hot Metal Consumption in Hot Rolling or Integrated Steel Plant.

The data collected from Caster, Reheating and idle time report gives the present productivity and hot metal consumption. With purpose of feeding the rolling mill with 3-7 secs billet to billet gap needs Machine Learning and Artificial Intelligence to define the Casting Billet Cut Length, Casting Speeds, Transfer Roller Tale and Chain Speeds and introduction of RHF billet whenever the expected Mill Idle time is more due to unavailability of casted billet.

The solution is designed to

- Maximise the use of Casted billet to get better hot metal consumption and thus reduce the cold billet generation and its reheating cost
- Use of billets in sequence to get the best through put from Rolling Mill and thus increase Rolled Production.

Operator Less Bar Handling

This involves cooling bed Robotic Control after shear with Machine Learning and Artificial intelligence.

Purpose is to reduce the Cobbles from Shear to Cooling Bed as the parameter settings here are completely operator dependant and need a continuous calibration. This demands high skill of operator else results into a greater number of cobbles due to mishandling of braking and uneven parking.

Vega used a solution based on tracking of billet under rolling, length data pre and post optimisation and introduced special sensors with intelligent IoT system to regulate the parameters per bar such as start braking and breaking speed to achieve,

- Parking on Cooling Bed in +/- 100 mm
- Parking of Random Piece on Cooling Bed in +/- 150 mm
- Zero Cobble in Shear to Tail rake Area
- Zero Cobble on Cooling Bed
- Avoid accident situation of non-braking of Random

The Solution resulted in,

- Improvement of Yield as the Cobbles in the area are eliminated.
- Improvement in Rolling Mill Up Time
- Increased Operational Speed to increase the productivity as Bar Handling is not dependant on operator which was a bottleneck earlier due to operator limitation.
- Consistency in operation.

Quality Management System -

Based on the collected data from various processes, linked with quality labs and

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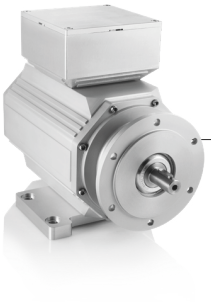

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finished product label, various quality reports are generated automatically and are attached to despatch details. Vega's **intelleQMS**™ software module compiles the data at various stages and generates various quality reports such as,

- Raw Material and billet Gradation, Chemistry and inspection Report
- BIS Report with reference to Lot No., Heat Number and Bundle Number.
- Test Certificate per lot of despatch and attached to Auto Generated E-Invoice through simpliDELIVER™ module used for Logistics Management.

The above eliminates manual operation in data collation to publishing required data to the Customer. All the reports are shared along with Invoice in printed form and a Bar Code on the Invoice and/ or bundle enables user to download such reports from Web Portal.

The quality deviation or exception alerts are generated in real time for the Process Managers to take required corrective actions and avoid the rejections.

Energy Management System -

The **intelleVIEW**™ Plaform gathers entire Electricity Consumption Data of the plant with sampling rates of 3 secs. Each Process, Section, Equipment energy data is captured and is correlated with individual process production to get Consumption Per Ton Per Process.

Vega's **intelleENERGY**™ module helps to analyse many conservation aspects such as,

- The Load Factor Monitoring System allows the user to track trends and suggests the available time for shutdown without losing on the benefits of Load Factor maintenance.
- The Power Quality Data such as PF and Harmonics is generated at Plant, Process, Section and Equipment to understand weak links in the distribution system and take corrective actions to reduce the losses. Similarly, the data is further used to understand each equipment's operating factors with reference to the production and thus generates MIS for improvements in Energy Saving area.

Asset and Maintenance Management System -

One of the key aspects of getting optimum plant performance is PLF (Plant Load Factor) or PUF (Plant Utilisation Factor). The more the uptime of the equipment, more is the PUF resulting in higher productivity at the same cost. This needs a stringent meticulous and intelligent Maintenance Management.

Vega's **intelleASSET**™ and **intelleMAINTAIN**™ modules offer Asset Life Cycle Management and Centralised Maintenance Management without any Human Data Entry.

The Process Data collected in above processes is added with Equipment Data on its running, wear out, lubrication/ oiling cycles. The actual data is compared with the equipment specific Life Cycle, Maintenance Cycle data and necessary Alarms are generated. The Maintenance Teams get Alerts for actions to be taken for Preventive maintenance. For routine life cycle changes/ replacements, automatic Job Order creation for Maintenance teams linked with spare parts, tools availability through Inventory Management module simpliSTOCK™.

The collected data over a period is analysed through algorithms for Predictive Maintenance of each equipment and thus help to avoid emergency real downs. Historic records for real down help in timely maintenance.

Performance Management

The ultimate requirement is to understand financial repercussions in terms of rejection, wastage, Yield Loss, Conversion Costs is the prime importance. The process data collected in **intelleWORKS**™ modules and business data extracted from **simpliWORKS**™ modules are integrated through **simpliREPORTS**™ module for getting preliminary Business Intelligence. User configurable Reports and Dashboards allows the customer to analyse the business and process to optimise the profitability.

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Crisis Myth Busters - A win-win proposition

If the current world events have taught us anything, it is, *to be prepared for the unprepared* and be adaptable to minimize the damages. In retrospect, we can always ponder on what went wrong and point fingers. However, the best of talents can be overwhelmed by the pressure of time and the tsunami of challenges that the crisis brings with it. But, with the correct perspective and preparedness level, an organization can possess the ability to be resilient and react and respond quickly during a crisis.

To get to the correct perspective, we must bust some common myths and misconceptions that surround the notions of crisis:

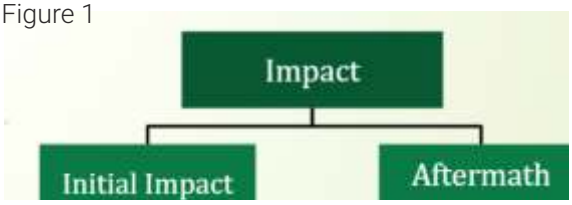
NOTION # 1

- It will not happen to our organization: Crises do not occur very often therefore; organizations believe that they are invulnerable towards them. But, if proper preparedness to respond to the crisis is not adopted into the business operations, organizations are more likely to be vulnerable to them than resilient. Organizational resilience is defined as the organization's ability to face disruptions and unexpected events and manage these risks to survive and prosper. Furthermore, anatomically, organizational resilience is divided into two types: static and dynamic. Static resilience is based on preparedness and preventive measures to minimize threats in terms of probability of occurrence and potential impact, while Dynamic resilience is more focused on the effective management of unforeseen crises to shorten unfavorable aftermath and maximize the organization's speed of recovery.

NOTION # 2

- The impact of crises is unpredictable along with the crises themselves: It is a common misconception that crises are unpredictable, this notion causes us to invite surprise and fear when we are confronted by them. However, according to renowned Professor Dr Luigi Norsa, it is observed that 80% of crises are smoldering, while 20% are sudden in nature.

Figure 1



Ms. Micol Norsa
Subject Matter Expert, Academy of Crisis Management and Auditing, Rauch Education,
The United States of America.

Ms. Devika Band
Research Scholar, Academy of Crisis Management and Auditing, Rauch Education,
The United States of America

NOTION # 3

- Insurance can bail organizations from anything: Getting good insurance is considered to be the magic tool that should be invested in, to bail out of a crisis. While it is imperative to get one, other intangible losses like reputation are incurable. Such incurables are observed to have resulted in longer aftermaths. Thus, to minimize such losses, it is important to integrate crisis preparedness measures into daily operations. Additionally, according to the Oxford Metrica study, as illustrated in Figure1, a crisis will likely bring an initial impact of up to thirty percent in value. If this is dealt with poor management the loss is likely to increase, up to total business closure in some cases. But, with proper preparedness levels in place, it is found that value loss can be kept from escalating and the organization can emerge as a re-coverer.

NOTION # 4

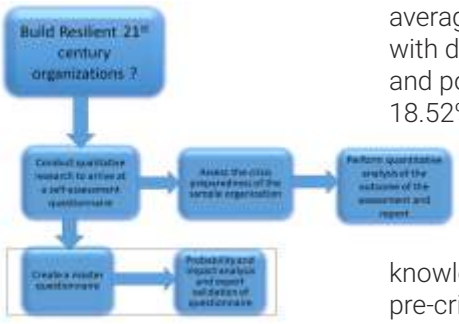
- Managerial ability is not important: When the crisis is at the organization's doorstep, it is the manager's ability alone that helps cast aside the dark clouds of the crisis and pave the way for the organization's road to recovery. The managers must have the knowledge and skills of crisis management to anticipate, prepare and respond to face potential crisis events. Sadly, the current management portfolio thrusts on achieving

financial targets, leaving little room for training in the principles of crisis management which ideally should have equal prominence.

From the above myths, it can be inferred that the crisis preparedness level of managers is a crucial factor in building resilient organizations. Many researchers thrust on the need of training the company management representatives on the aspects of crisis management. The first step in this direction is to understand their current level of awareness on the various aspects of crisis management and, thus assessing their current crisis preparedness. Hence a double-blind, mixed study of qualitative and quantitative methods was used to assess the current crisis preparedness level for a sample of managers. This further ideated to develop of a self-assessment questionnaire based on the qualitative analysis of the case studies of the resilient organizations. After which the quantitative analysis methods were deployed, to examine the results of the questionnaire. A graphical representation of the research methodology is presented in Figure 2.

Figure 2

Algorithm of the Research Methodology



The graphical analysis of the responses from the questionnaire is depicted below in Figure 3. The graph shows the percentage of executives who correctly answered each of the question numbers. Further, it categorizes the questions into pre-crisis, during, and post-crisis through a yellow, orange, and red color scheme respectively. This was done to get a deeper understanding of the preparedness level of the managers about the various phases of a crisis. The value of the coefficient of determination or R2 is 0.675 which is neither too high nor too low from the statistical point of view, indicating that 67.5% of the variation in the data can be modeled by the regression model. The black line of best fit depicts a negative trend as the test moves further into various phases of crises, indicating that the level of awareness of the managers decreased as the crisis progressed further in the stages. Percent correct was the highest for questions focusing on the pre-crisis phase with an average of 44.44% for the category. On the other hand, questions focusing on them during and post-crisis phase had a lower average percent correct, with during being 22.22% and post-crisis being 18.52%. This indicates that the executives in this sample had a fairly good knowledge of handling a pre-crisis phase but lacked awareness in dealing with during and post-crisis scenarios. The category average of pre-crisis is highest in the three categories but, a value of 44.44% is pretty low, indicating that management still needs to be empowered with training on pre-crisis management scenarios.

Figure 3

Question Number vs. Percent Correct

The few executives who fared well on the preparedness test have a better awareness of the respective phases of crisis management. It is beneficial for them to help identify their blind spots and build their awareness and subsequent competency levels of skills in other aspects to increase their chances of managing a crisis well.

Every crisis can turn into an opportunity as it offers high visibility to the organizations to demonstrate their value. This study helps management executives build a credible and strong reputation for their organizations by using crises as an opportunity by proving their capability to navigate through tough times. This factor can boost the share-holder confidence in the organization, leading to its growth and making it financially better as compared to its pre-crisis times. Additionally, the assessment helps executives and companies identify their areas of improvement, a win-win proposition.

Conservation of Mineral Resources with special reference to Iron ore

INTRODUCTION

India is blessed with rich and huge quantity of iron ore deposits. Since the inception of steel industry, the plants have been using rich iron ore deposits, not requiring any beneficiation. With the increase in demand & upcoming of new steel plants, the situation has changed.

It is realised now that without processing the generated fines & low grade iron ore deposits, industry cannot achieve it's goal.

While doing so, it is also important that we must recover maximum iron ore content from the feed ore and conserve our deposits.

WHY CONSERVATION OF MINERAL IS IMPORTANT

Any natural resource is a gift from nature that men cannot create/generate. Thus any natural resource has to be utilised effectively. In India, the threshold value of iron ore mining has been reduced to 45% Fe. This is an evident proof that how we are utilising our natural resource.

Many countries are now looking forward for conservation of minerals. As an example, China beneficiating low grade hematite ore of < 22% Fe to produce concentrate grade of > 63% Fe.

After mining operation, mines are left in very poor conditions which also contain 35% - 55% Fe distributed over the mining areas in patches. These ores must also be processed & utilised.

We must learn and start beneficiating all kind of Fe containing waste, generated during mining operation and the low grade deposits. With the new available technologies has become possible.

Also, we should target on the utilization of waste tailing. This can happen only when the Fe content in rejects are reduced to certain required level.

In present scenario, following is scope;

N. S. Rathor
Consultants

1. Beneficiation of generated fines of all grades.
2. Beneficiation of overburden generated during mining operation.
3. Beneficiation of low grade iron ore deposits.
4. Beneficiation of dumped Slimes.
5. Beneficiation of dumped Tailing.
6. Adopting technologies for utilization of concentrate fines & micro-fines in sinter production.
7. Tailing generated while extracting the useful grades of iron ores can be utilised for many applications. If tailing grade is reduced to below 15% these can be utilised as clay for:

- Back filling of mines & green field development.
- Land reclamation.
- Conversion of barren land into fertile land for agriculture or forestation.
- Use for making building material like clay bricks, roof tiles etc.

N. S. Rathor Consultants

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Phone - +91-9826702652 e-mail: rathorns@gmail.com

The team leader Narendra Singh Rathor has more than 50 years of rich experience in the field of Fertilizer, Cement and Beneficiation & Pelletization. Has setup many benchmark in process techniques which are being followed by many industries.

Specialized Services for Iron Ore Beneficiation & Pelletization

1) Mineral Beneficiation (Iron ore, Manganese ore & Non-ferrous Mineral).
2) 90-95% recovery of micro fine iron ore particles (Especially 20 micron to 2 micron).
3) Complete know how for Integrated Pellet and DRI plant model.
4) Evaluation of running plants, process and equipments for further scope of improvements.
5) Energy saving (both electric & fuel).
6) Troubleshooting and capacity enhancement of plant & machinery.
7) Supervision of installation, commissioning of imported equipments for which O.E.M. services are not available.
8) Solution for 100% utilization of iron ore fine concentrate in sintering process.
9) Fe reduction in tailing & waste utilization.
10) Training & development of skilled / technical manpower for efficient operation of plant and machinery.

		
SPIRAL CONCENTRATOR	**HYDROCYCLONE**	**MULTI DECK SCREEN**
		
PERMANENT MAGNETIC SEPARATOR	**VACUUM CERAMIC DISC FILTER**	**VERTICAL SHAFT FURNACE FOR PELLETIZATION**

SMS group expects positive outlook for 2021 after challenging business year

“With our wide range of 'bridge' technologies developed for the decarbonization of the industry, we can support our customers in every phase of the transformation to climate-neutral steel production. This applies to both existing plants and the development of new ones.” Growth in the service and Digitalization business Besides decarbonization”

- Order intake declined by 40 percent on the previous year to EUR 1,885 million
- Significantly more stable development in service business and digitalization orders – growth strategy confirmed
- Pooling of decarbonization competences from SMS and Paul Wurth
- Planned reduction of personnel costs by approximately another EUR 100 million to secure the future of German sites
- Outlook: signs of growing market recovery in 2021; significant rise in order intake in the first half of the year SMS group particularly felt the impact of the coronavirus pandemic in its business with new plants.

Burkhard Dahmen
CEO, SMS group

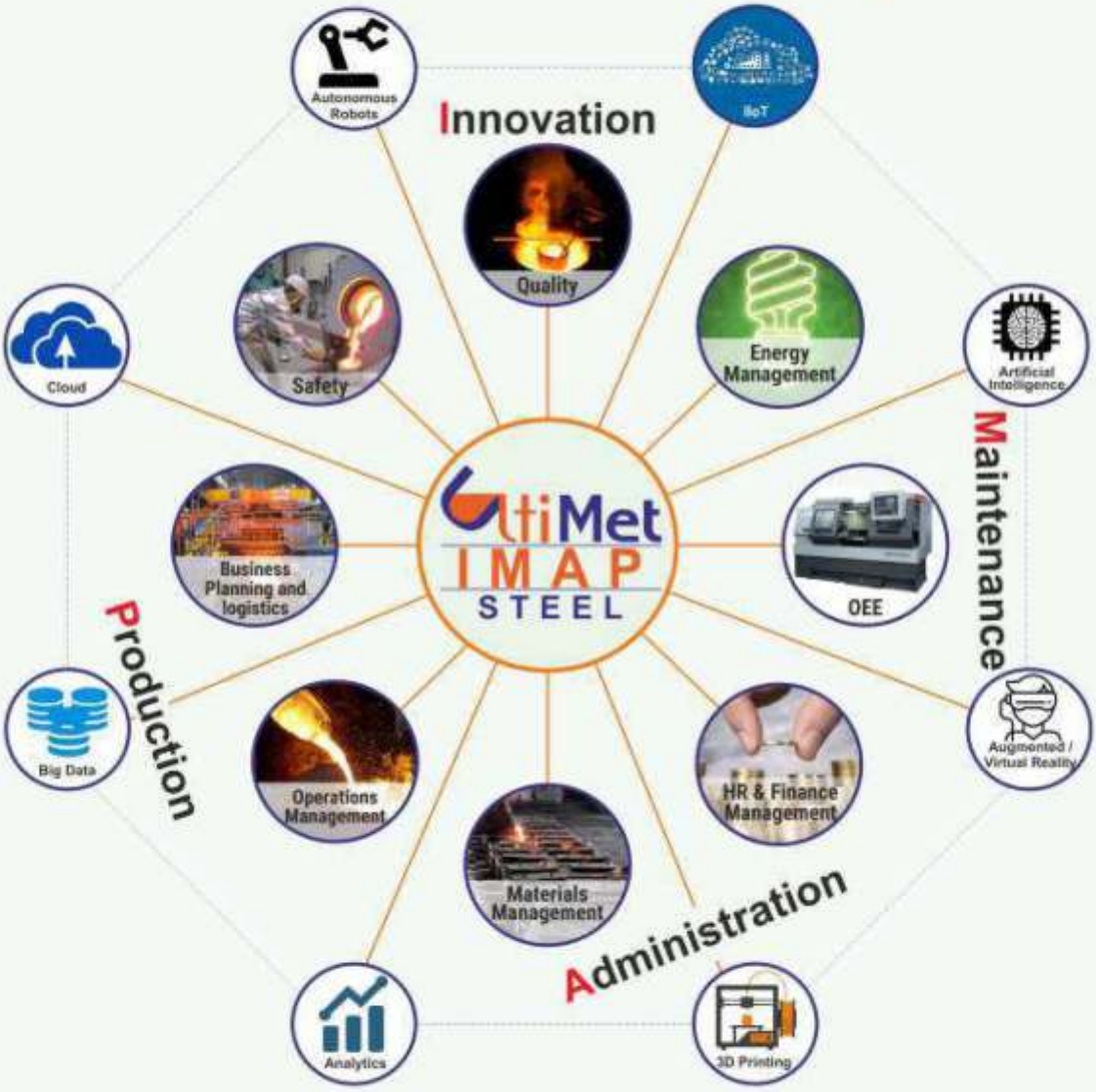
In the 2020 business year, order intake fell by around 40 percent compared to the previous year to EUR 1,885 million. The service business, which is included in this figure, proved considerably more stable, decreasing by only 10 percent to EUR 665 million.

Make your Steel Plant future-ready

End-to-End Industry 4.0 Smart Solutions from

UltiMet

Facilitating Metals Industry to go Digital



Contact us

Ulti-Met Technologies Pvt. Ltd.

Facilitating Metals Industry to go Digital

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Outlook

The order backlog declined to EUR 3,028 million. This means that orders remain at a high level, though they no longer ensure full capacity utilization in all product areas.

Table : can be extract from PDF

Even though the instrument of short-time working was used at a very early stage, the 2020 result was impacted by the consequences of the coronavirus pandemic and by provisions for the restructuring measures in Germany. As a result, SMS closed the business year with a clear loss: the pre-tax result stood at EUR -165 million. Net liquidity, on the other hand, was bolstered by around 4 percent to EUR 863 million. Investments more than doubled compared to the previous year, totaling EUR 83 million.

Restructuring to secure competitiveness on the global market For the coming years, SMS expects its core business of metallurgical plant construction to see stable development, though remaining short of its pre-pandemic level. To strengthen the competitiveness of the German sites and adjust the cost structure to the lower level of capacity utilization, personnel costs will have to be cut by approximately another EUR 100 million. Talks with the trade union IG Metall have already commenced. Pooling of decarbonization competence The global steel and non-ferrous metals industry is facing a great transformation challenge. Due to the ambitious environmental and climate targets that have been set in all key steel regions of the world, steel producers are coming under growing pressure to innovate and invest. The complete acquisition of Paul Wurth S.A. by SMS in April 2021 has led to all research and development activities in metallurgy and hydrogen technology being brought together under one roof.

SMS group is now in a position to offer the entire range of technologies relevant to the decarbonization of metallurgical processes. SMS group CEO Burkhard Dahmen says: “With our wide range of 'bridge' technologies developed for the decarbonization of the industry, we can support our customers in every phase of the transformation to climate-neutral steel production. This applies to both existing plants and the development of new ones.” Growth in the service and Digitalization business Besides decarbonization, the Digitalization, Automation and Technical Service businesses remain the key drivers of new orders. There is a growing trend toward integrated service packages, for example in the form of performance-based agreements. In addition, the 2020 business year saw an expansion of the service business via strategic buyouts: the acquisition of Vetta Tecnologia S.A. now enables SMS to offer its customers energy management solutions for the highly complex production chains in the metals industry.

Positive outlook: turnaround in the current business year Many customers are currently reviving projects that had been put on hold and investing in new plant technology. SMS group's regional focus, which assures greater proximity to markets, has already been bearing fruit. For the current business year, SMS expects order intake to rise clearly and sales to return to the level of 2019. For the next three years, SMS forecasts a significant recovery in its business, driven in particular by digitalization projects, the further expansion of the service business and the market launch of the joint ventures Primobius (battery recycling) and BOXBAY (port logistics). Dahmen: “We see that we have chosen the right growth strategy and that it will continue to be successful as we emerge from the pandemic. We are determined to return to our path of profitable growth in the current business year.”

Networking Steel & Metal Industry - Worldwide

Monthly Publication
Trade Shows
B2B Industry Portal
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Complete Visibility in Global Iron & Steel Sector

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Email : info@steelworld.com | info@metalworld.co.in
Website : www.steelworld.com | www.metalworld.co.in

Construction market trends

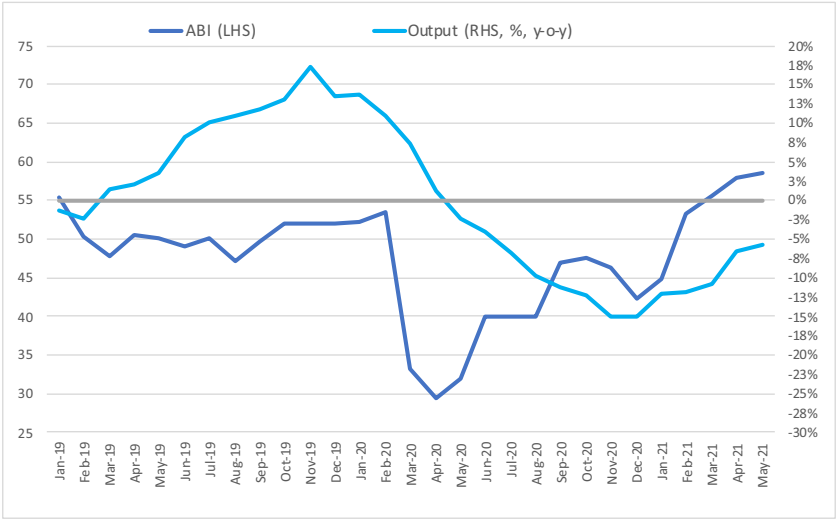
United States

Confidence in the private non residential sector improving. Decline in residential permits from January 2021 peak leading to slowdown in residential output.

Private residential output flat m-o-m (29% y-o-y) in May and building permits down -3% m-o-m (35% y-o-y). Private non-residential output down -1% m-o-m with y-o-y decline narrowing to -5.8%. The Architecture Billings Index (ABI) expanded for the fourth straight month and to 58.5 (> 50, expansion).

Private non-residential output vs ABI

Source: US Census, American Institute of Architects



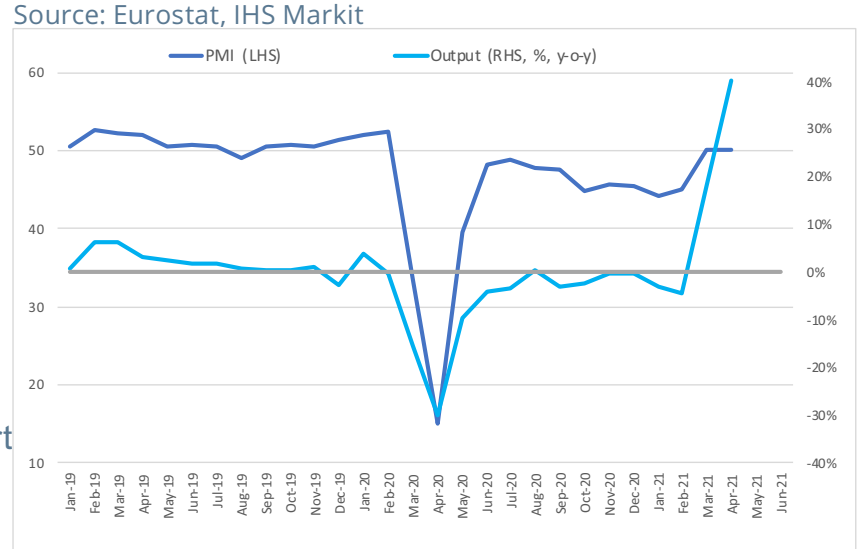
Europe

Construction improves from COVID lows with housebuilding driving the expansion.

Eurozone construction down -2% m-o-m in April (40% y-o-y). The IHS Markit Eurozone Construction PMI remained at 50.3 in June and expaned for the fourth straight month (> 50, expansion).

Eurozone construction output vs PMI

Source: Eurostat, IHS Markit



Knowledge part

McKinsey & Company

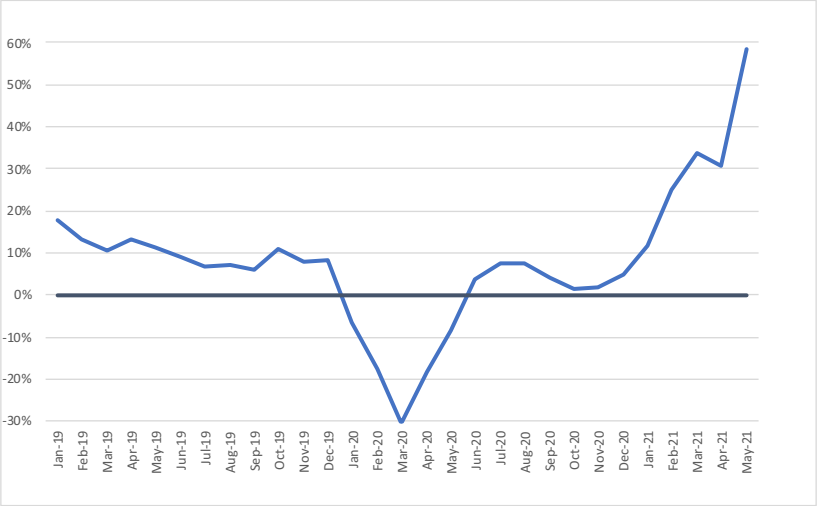
Source : WSA

China

Chinese real estate market bounced back in May.

The 3 month moving average y-o-y growth in newly started floor space jumped by 60% in May and real estate floor space sold was up 110%.

Floor space started (3 month moving average, %, y-o-y)
Source: National Bureau of Statistics of China

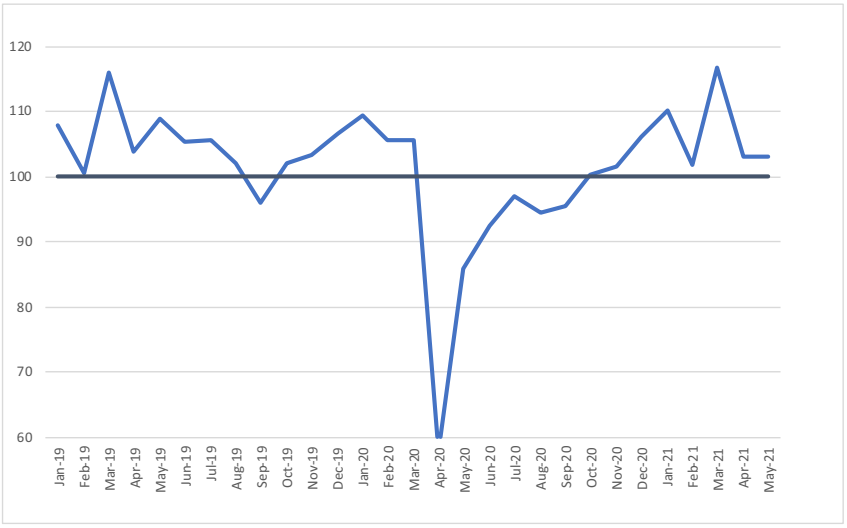


India

Core sectors output sees strong growth due to weak base of comparison but underlying activity generally weak

The weighted average of eight core industries output increased by 20% y-o-y but declined -4% m-o-m.

Weighted average of eight core industries industrial production (%, y-o-y)
Source: Ministry of Commerce & Industy, India



Source : WSA

Crude steel production by process, 2020

	Million tonnes	Oxygen %	Electric C%	Open hearth %	Other C%	Total C%
Austria	6.8	90.0	10.0	-	-	100.0
Belgium (e)	6.1	68.2	31.8	-	-	100.0
Bulgaria	0.5	-	100.0	-	-	100.0
Croatia	0.0	-	100.0	-	-	100.0
Czechia	4.5	95.4	4.6	-	-	100.0
Finland (e)	3.5	68.1	31.9	-	-	100.0
France	11.6	67.5	32.5	-	-	100.0
Germany	35.7	67.7	32.3	-	-	100.0
Greece	1.4	-	100.0	-	-	100.0
Hungary	1.5	78.2	21.8	-	-	100.0
Italy	20.4	15.3	84.7	-	-	100.0
Luxembourg	1.9	-	100.0	-	-	100.0
Netherlands	6.1	100.0	-	-	-	100.0
Poland	7.9	50.1	49.9	-	-	100.0
Portugal	2.2	-	100.0	-	-	100.0
Romania (e)	2.8	73.3	26.7	-	-	100.0
Slovakia	3.4	95.8	4.2	-	-	100.0
Slovenia	0.6	-	100.0	-	-	100.0
Spain	11.0	27.5	72.5	-	-	100.0
Sweden	4.4	67.0	33.0	-	-	100.0
United Kingdom	7.1	80.9	19.1	-	-	100.0
European Union (28)	139.2	57.6	42.4	-	-	100.0
Turkey	35.8	30.8	69.2	-	-	100.0
Others	4.2	47.4	52.6	-	-	100.0
Other Europe	40.0	32.5	67.5	-	-	100.0
Russia(e)	71.6	65.9	32.1	2.0	-	100.0
Ukraine	20.6	75.6	5.5	19.0	-	100.0
Other CIS	8.0	47.7	52.3	-	-	100.0
CIS	100.2	66.5	28.2	5.3	-	100.0
Canada (e)	11.0	54.3	45.7	-	-	100.0
Mexico	16.8	17.3	82.7	-	-	100.0
United States	72.7	29.4	70.6	-	-	100.0
USMCA	100.5	30.1	69.9	-	-	100.0
Argentina	3.7	55.0	45.0	-	-	100.0
Brazil	31.0	75.2	23.3	-	1.4	100.0
Chile	1.2	69.2	30.8	-	-	100.0
Venezuela	0.0	-	100.0	-	-	100.0
Others	2.9	6.8	93.2	-	-	100.0
Central and South America	38.8	67.9	31.0	-	1.2	100.0
Egypt(e)	8.2	1.5	98.5	-	-	100.0
South Africa	3.9	52.6	47.4	-	-	100.0
Other Africa (e)	5.3	9.4	90.5	-	0.1	100.0
Africa	17.4	15.3	84.7	-	0.0	100.0
Iran	29.0	8.7	91.3	-	-	100.0
Saudi Arabia	7.8	-	100.0	-	-	100.0
Other Middle East (e)	8.6	-	100.0	-	-	100.0
Middle East	45.4	5.6	94.4	-	-	100.0
China(e)	1 064.8	90.8	9.2	-	-	100.0
India	100.3	44.5	55.5	-	-	100.0
Japan	83.2	74.6	25.4	-	-	100.0
South Korea	67.1	69.0	31.0	-	-	100.0
Taiwan, China	21.0	60.6	39.4	-	-	100.0
Other Asia (e)	52.4	28.2	66.0	-	5.7	100.0
Asia	1 388.7	82.6	17.2	-	0.2	100.0
Australia	5.5	74.0	26.0	-	-	100.0
New Zealand	0.6	100.0	-	-	-	100.0
Total of above countries	1 876.3	73.2	26.3	0.3	0.2	100.0

The countries in this table accounted for approximately 99.9% of world crude steel production in 2019.
(e)= estimate

Continuously-cast steel output 2018 to 2020

	Million tonnes			C% Crude steel output		
	2018	2019	2020	2018	2019	2020
Austria	6.6	7.1	6.5	95.7	96.1	96.1
Belgium	8.0	7.8	6.1	100.0	100.0	100.0
Bulgaria	0.7	0.6	0.5	100.0	100.0	100.0
Croatia	0.1	0.1	0.0	100.0	100.0	100.0
Czechia	4.6	4.3	4.3	95.3	96.6	96.5
Finland	4.1	3.5	3.5	99.6	99.5	99.5
France	14.9	14.0	11.3	97.0	97.2	97.1
Germany (e)	41.2	37.8	34.3	97.1	95.3	96.2
Greece	1.5	1.4	1.4	100.0	100.0	100.0
Hungary	2.0	1.8	1.5	100.0	100.0	100.0
Italy	23.2	22.0	19.3	94.7	94.9	94.7
Luxembourg	2.2	2.1	1.9	100.0	100.0	100.0
Netherlands	6.8	6.7	6.1	100.0	100.0	100.0
Poland	9.9	8.8	7.8	97.2	98.1	98.7
Portugal	2.2	2.0	2.2	100.0	100.0	100.0
Romania (e)	3.5	3.4	2.7	97.6	97.7	97.7
Slovakia	4.8	3.9	3.4	100.0	100.0	100.0
Slovenia	0.5	0.5	0.5	80.8	80.2	80.3
Spain	14.1	13.4	10.8	98.3	98.3	98.2
Sweden	3.9	3.9	3.7	83.1	83.0	83.0
United Kingdom	7.1	7.1	7.0	98.3	98.5	99.1
European Union (28)	161.9	152.0	134.7	96.9	96.6	96.8
Turkey	37.3	33.7	35.8	100.0	100.0	100.0
Others	5.1	5.0	4.2	100.0	100.0	100.0
Other Europe	42.5	38.7	40.0	100.0	100.0	100.0
Russia(e)	59.2	59.2	59.1	82.0	82.5	82.5
Ukraine	11.4	11.6	13.6	54.0	55.7	66.2
Other CIS	7.7	8.0	7.9	99.2	99.3	98.6
CIS	78.3	78.8	80.6	77.5	78.3	80.4
Canada	10.5	10.1	8.6	78.1	78.2	78.1
Mexico	20.2	18.4	16.8	100.0	100.0	100.0
United States	85.0	87.5	72.6	98.2	99.7	99.8
USMCA	115.7	116.0	97.9	96.2	97.4	97.4
Argentina	5.1	4.6	3.6	99.7	99.7	99.6
Brazil	34.7	31.9	30.4	97.9	98.0	98.1
Venezuela	0.1	0.1	0.0	100.0	100.0	100.0
Other Latin America	4.9	5.0	4.1	100.0	100.0	100.0
Central and South America	44.8	41.6	38.1	98.4	98.4	98.4
Egypt(e)	7.8	7.3	8.2	100.0	100.0	100.0
South Africa	6.3	6.1	3.9	100.0	98.8	100.0
Other Africa (e)	3.7	4.0	5.3	99.9	99.9	99.9
Africa	17.8	17.3	17.4	100.0	99.5	100.0
Iran	24.5	25.6	29.0	100.0	100.0	100.0
Saudi Arabia	8.2	8.2	7.8	100.0	100.0	100.0
Other Middle East (e)	10.5	10.5	8.6	100.0	100.0	99.9
Middle East	43.2	44.3	45.4	100.0	100.0	100.0
China(e)	914.3	980.4	1 049.4	98.4	98.5	98.6
India (e)	95.2	97.0	87.2	87.1	87.1	87.0
Japan(e)	102.7	97.7	81.9	98.5	98.4	98.4
South Korea	71.5	70.4	66.2	98.6	98.6	98.7
Taiwan, China	23.1	21.9	21.0	99.6	99.5	100.0
Other Asia (e)	43.2	47.8	52.4	100.0	100.0	100.0
Asia	1 250.0	1 315.2	1 358.1	97.5	97.6	97.8
Australia	5.7	5.5	5.5	100.0	100.0	100.0
New Zealand	0.7	0.7	0.6	100.0	100.0	100.0
Total of above countries	1 760.6	1 810.1	1 818.3	96.5	96.6	96.9

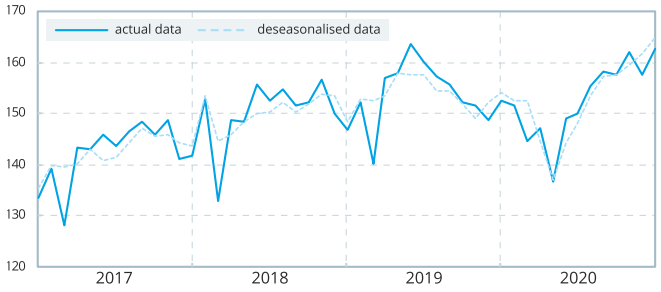
The countries in this table accounted for approximately 99.9% of world crude steel production in 2019.
(e) = estimate

Source : WSA

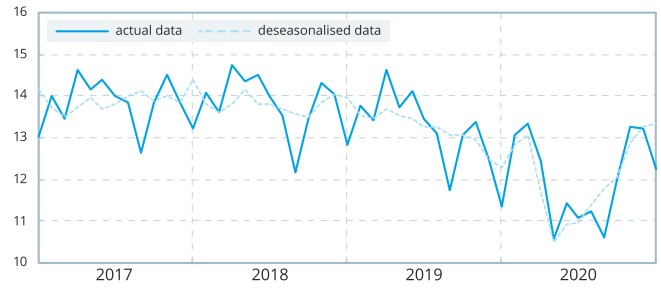
Monthly crude steel production 2017 to 2020

million tonnes

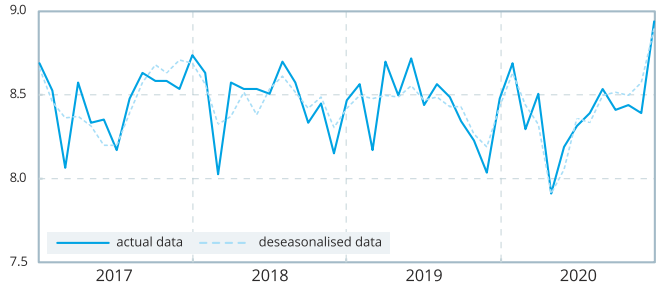
Total 65 reporting countries*



European Union (28)



CIS (6)

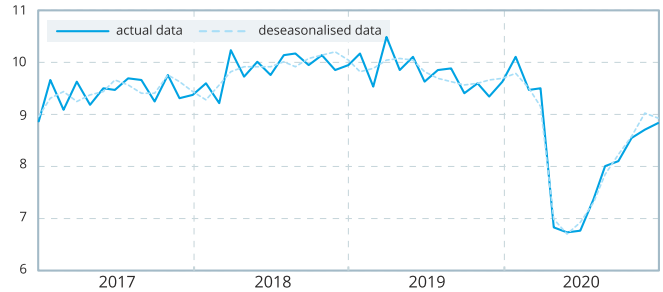


***The 65 reporting countries:**
Argentina, Australia, Austria, Belgium, Bosnia-Herzegovina, Brazil, Bulgaria, Belarus, Canada, Chile, China, Colombia, Croatia, Cuba, Czechia, Ecuador, Egypt, El Salvador, Finland, France, Germany, Greece, Guatemala, Hungary, India, Iran, Italy, Japan, Kazakhstan, Libya, Luxembourg, Macedonia, Mexico, Moldova, Netherlands, New Zealand, Norway, Pakistan, Paraguay, Peru, Poland, Portugal, Qatar, Romania, Russia, Saudi Arabia, Serbia, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Taiwan, China, Thailand, Trinidad and Tobago, Turkey, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Venezuela, and Vietnam.

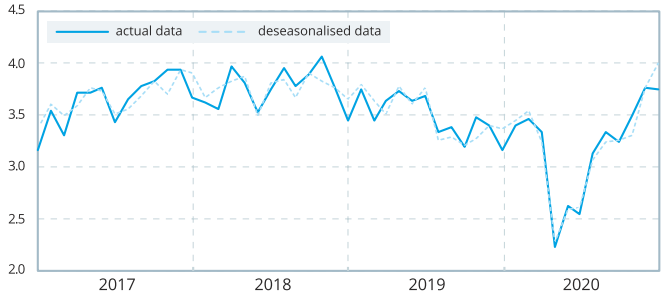
In 2020, these 65 countries accounted for approximately 98% of world crude steel production

million tonnes

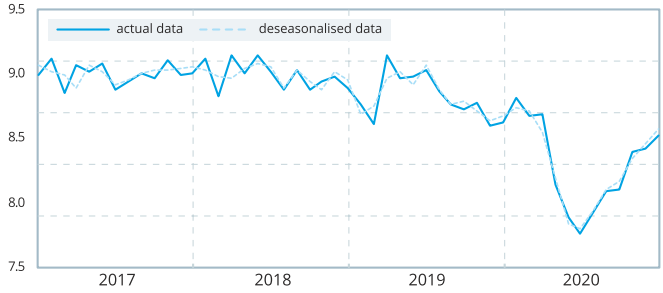
USMCA



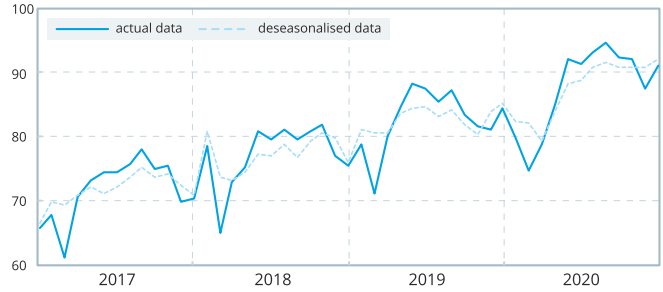
Central and South America



Japan



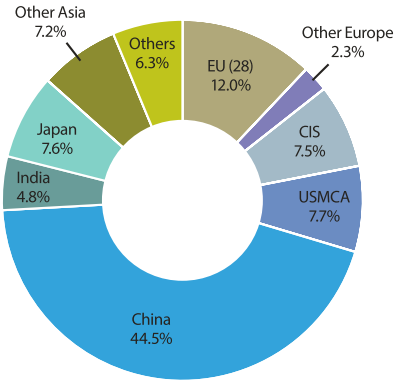
China



Source : WSA

Steel production and use: geographical distribution 2010

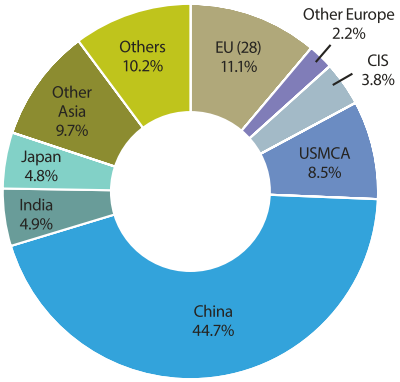
Crude steel production
World total: 1 435 million tonnes



Others comprise:

Africa	1.2%	Central and South America	3.1%
Middle East	1.4%	Australia and New Zealand	0.6%

Apparent steel use (finished steel products)
World total: 1 315 million tonnes

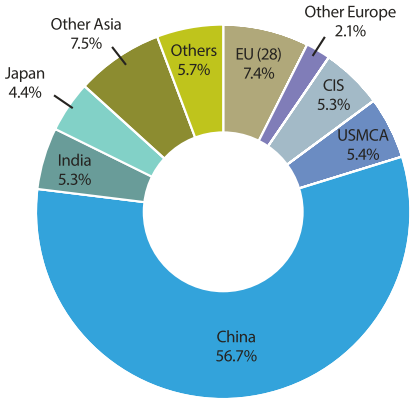


Others comprise:

Africa	2.4%	Central and South America	3.5%
Middle East	3.7%	Australia and New Zealand	0.6%

Steel production and use: geographical distribution 2020

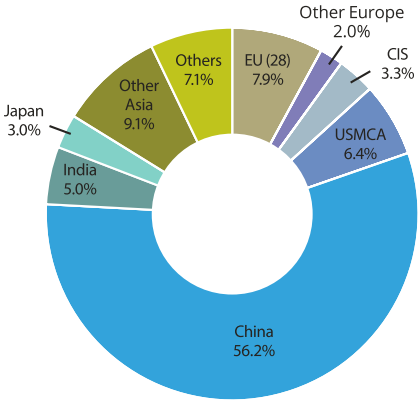
Crude steel production
World total: 1 878 million tonnes



Others comprise:

Africa	0.9%	Central and South America	2.1%
Middle East	2.4%	Australia and New Zealand	0.3%

Apparent steel use (finished steel products)
World total: 1 772 million tonnes



Others comprise:

Africa	2.0%	Central and South America	2.2%
Middle East	2.6%	Australia and New Zealand	0.3%

Source : WSA

Apparent steel use 2016 to 2020

million tonnes, finished steel products

	2016	2017	2018	2019	2020
Austria	3.8	4.1	4.2	4.0	3.6
Belgium-Luxembourg	4.4	4.6	4.6	4.6	4.3
Czechia	6.9	7.2	7.6	7.2	6.6
France	13.0	14.1	14.3	13.6	11.6
Germany	40.5	41.0	39.6	35.1	31.1
Italy	23.7	24.8	25.3	25.0	19.9
Netherlands	4.0	4.0	4.8	4.6	4.3
Poland	13.1	13.6	14.9	13.6	12.9
Romania	4.1	4.2	4.6	4.5	4.2
Spain	12.6	13.3	13.8	13.2	11.7
Sweden	3.9	4.1	4.1	3.8	3.5
United Kingdom	10.9	11.0	10.8	10.2	9.0
Other EU (28)	17.2	17.7	19.1	19.0	17.8
European Union (28)	158.1	163.7	167.7	158.6	140.6
Turkey	34.1	36.1	30.7	26.1	29.5
Others	6.5	6.6	6.8	6.9	6.5
Other Europe	40.6	42.7	37.5	32.9	36.0
Russia	38.7	41.1	41.4	43.6	42.5
Ukraine	4.2	4.6	4.7	4.7	4.6
Other CIS	8.1	9.0	9.5	10.1	11.1
CIS	51.1	54.6	55.5	58.3	58.2
Canada	13.4	14.0	14.1	13.0	12.2
Mexico	25.5	26.5	26.0	24.6	21.7
United States	91.9	97.7	99.8	97.6	80.0
USMCA	130.7	138.3	139.9	135.2	114.0
Argentina	4.2	4.9	4.8	3.9	3.6
Brazil	18.5	19.5	21.2	21.0	21.2
Venezuela	0.7	0.5	0.2	0.1	0.1
Others	16.3	17.2	16.7	16.9	13.7
Central and South America	39.7	42.1	42.9	41.9	38.6
Egypt	11.7	10.2	11.1	10.4	9.7
South Africa	5.0	5.2	5.1	4.8	4.0
Other Africa	21.0	19.6	20.5	24.1	22.0
Africa	37.6	35.0	36.6	39.3	35.6
Iran	19.1	20.0	19.6	18.5	17.2
Other Middle East	34.0	33.2	31.7	31.8	28.8
Middle East	53.1	53.2	51.3	50.3	46.0
China	681.0	773.8	836.1	911.9	995.0
India	83.6	88.7	96.7	102.6	88.5
Japan	62.2	64.4	65.4	63.2	52.6
South Korea	57.1	56.3	53.7	53.2	49.0
Taiwan, China	18.3	17.7	17.8	17.6	18.5
Other Asia	102.8	100.4	103.8	103.2	93.0
Asia	1 005.0	1 101.2	1 173.5	1 251.8	1 296.6
Oceania	6.9	6.6	6.6	6.6	6.1
World	1 522.8	1 637.3	1 711.6	1 775.1	1 771.8

Apparent steel use per capita 2016 to 2020

kilograms, finished steel products

	2016	2017	2018	2019	2020
Austria	438.6	464.3	470.7	444.4	405.1
Belgium-Luxembourg	367.5	379.3	383.3	381.0	352.5
Czechia	649.8	676.6	712.6	673.6	616.3
France	201.4	217.8	219.5	209.4	178.2
Germany	492.2	496.0	477.0	420.8	370.9
Italy	390.7	409.5	417.1	412.5	328.6
Netherlands	236.8	233.9	283.3	269.9	251.9
Poland	346.1	358.4	392.8	359.8	339.9
Romania	205.3	213.2	234.4	234.4	220.9
Spain	269.7	284.2	296.3	283.3	250.1
Sweden	393.8	416.6	407.5	378.7	350.0
United Kingdom	164.2	164.9	161.2	151.8	132.1
Other EU (28)	235.0	242.2	261.2	260.1	244.9
European Union (28)	310.2	320.5	327.8	309.4	273.9
Turkey	426.9	445.3	372.3	312.6	349.6
Others	191.8	193.4	213.1	213.7	203.7
Other Europe	356.9	371.1	327.7	285.1	309.3
Russia	266.7	282.2	283.8	298.5	291.4
Ukraine	94.9	102.5	105.8	105.8	105.5
Other CIS	80.7	88.7	92.7	97.5	105.7
CIS	176.1	187.5	189.9	198.6	197.7
Canada	367.2	382.2	380.6	347.0	323.1
Mexico	206.7	212.4	206.0	193.0	168.4
United States	284.4	300.6	305.0	296.6	241.8
USMCA	270.8	284.2	285.3	273.7	229.0
Argentina	96.7	112.0	108.8	87.5	79.5
Brazil	89.8	93.9	101.2	99.4	99.9
Venezuela	22.7	17.4	5.9	4.2	3.0
Others	72.9	75.5	72.6	72.5	58.0
Central and South America	78.9	82.8	83.7	81.0	73.9
Egypt	123.7	105.5	112.4	103.1	94.7
South Africa	88.4	90.9	87.7	82.6	67.0
Other Africa	19.7	18.0	18.3	21.0	18.6
Africa	31.0	28.1	28.7	30.1	26.6
Iran	240.1	247.4	239.1	223.0	204.9
Other Middle East	239.6	230.5	215.0	211.6	188.6
Middle East	217.4	214.1	203.2	196.1	176.3
China	481.6	544.6	585.6	636.0	691.3
India	63.1	66.2	71.5	75.1	64.2
Japan	486.6	504.9	514.2	498.3	415.7
South Korea	1 119.5	1 102.1	1 049.6	1 039.0	954.9
Taiwan, China	773.9	745.7	749.7	740.9	777.0
Other Asia	91.6	88.2	90.1	88.5	78.8
Asia	247.3	268.6	283.8	300.3	308.6
Oceania	173.9	161.8	160.7	158.5	145.4
World	204.1	217.0	224.5	230.3	227.5

Source : WSA

Pig iron 2019 and 2020

million tonnes

	Production 2019	Production 2020	- Exports 2020	+ Imports 2020	Apparent = Consumption 2020
Austria	5.7	5.3	0.0	0.0	5.3
Belgium-Luxembourg	4.8	3.6	0.1	0.1	3.7
Czechia	3.6	3.5	0.1	0.0	3.5
Finland	2.3	2.3	0.0	0.0	2.3
France	9.9	7.7	0.0	0.1	7.8
Germany	25.5	22.5	0.3	0.2	22.4
Hungary	1.2	1.0	0.0	0.0	1.0
Italy	4.6	3.4	0.0	1.1	4.5
Netherlands	5.9	5.4	0.6	0.4	5.3
Poland	4.4	3.5	0.1	0.2	3.6
Romania	2.1	1.8	-	0.0	1.9
Spain	3.9	2.9	0.0	0.2	3.0
Sweden	3.2	2.9	0.0	0.0	2.9
United Kingdom	5.6	5.2	0.0	0.0	5.2
Other EU	3.1	3.0	0.0	0.1	3.1
European Union (28)	88.9	77.0	1.1	2.6	78.5
Turkey	9.9	10.0	0.0	1.1	11.1
Others	2.4	1.9	0.0	0.0	1.9
Other Europe	12.3	11.9	0.1	1.1	13.0
Kazakhstan	3.2	2.8	0.1	0.0	2.7
Russia	51.1	51.9	4.8	0.0	47.1
Ukraine	20.1	20.4	3.1	0.0	17.3
Other CIS	-	-	0.0	0.1	0.1
CIS	74.3	75.1	8.0	0.1	67.2
Canada	6.3	5.2	0.1	0.0	5.2
Mexico	3.8	2.4	0.0	0.2	2.6
United States	22.3	18.3	0.1	4.5	22.7
USMCA	32.5	26.0	0.2	4.7	30.5
Argentina	2.0	1.9	-	0.0	2.0
Brazil	26.3	24.5	3.7	0.0	20.8
Chile	0.6	0.7	-	-	0.7
Other Latin America	0.2	0.2	0.0	0.0	0.2
Central and South America	29.1	27.3	3.7	0.1	23.6
South Africa	3.8	2.1	0.4	0.0	1.7
Other Africa	0.5	0.4	0.0	0.0	0.4
Africa	4.3	2.5	0.4	0.0	2.1
Iran	2.5	2.5	-	0.0	2.5
Other Middle East	-	-	0.3	1.0	0.7
Middle East	2.5	2.5	0.3	1.0	3.2
China	850.9	887.5	0.0	5.6	893.1
India	74.2	67.8	0.4	0.0	67.4
Japan	74.9	61.6	0.5	0.0	61.1
South Korea	47.5	45.4	0.1	0.1	45.4
Taiwan, China	14.5	13.4	0.0	0.2	13.6
Other Asia	16.9	17.1	0.3	0.3	17.0
Asia	1 078.9	1 092.8	1.4	6.2	1 097.6
Australia	3.7	3.7	0.0	0.0	3.7
New Zealand	0.7	0.6	-	0.0	0.6
Other Oceania	-	-	-	0.0	0.0
Oceania	4.3	4.3	0.0	0.0	4.3
World	1 327.1	1 319.4	15.3	15.8	1 319.9

Direct reduced iron production 2016 to 2020

million tonnes

	2016	2017	2018	2019	2020
Germany	0.6	0.6	0.6	0.5	0.5
Sweden	0.1	0.1	0.1	0.1	0.1
European Union (28)	0.7	0.7	0.7	0.6	0.6
Russia	5.8	7.2	7.9	8.0	8.5
Canada	1.4	1.6	1.7	1.4	1.2
Mexico	5.3	6.0	6.0	6.0	5.2
United States	1.8	3.0	3.4	3.2[e]	3.5
USMCA	8.5	10.6	11.0	10.7	9.8
Argentina	0.8	1.2	1.6	1.1	0.5
Peru	0.0	-	-	-	-
Trinidad and Tobago	1.5	1.6	1.7	1.9	1.5
Venezuela	0.7	0.5	0.4	0.4	0.3
Central and South America	3.0	3.3	3.7	3.4	2.3
Algeria	-	-	0.1	1.5	2.2
Egypt	2.6	4.7	5.8	4.4	4.8
Libya	0.7	0.6	0.6	0.9	0.8
South Africa	0.7	0.9	0.8	0.7	0.2
Africa	4.0	6.2	7.3	7.5	8.0
Bahrain	1.3	1.3	1.6	1.5[e]	1.5
Iran	16.0	19.4	25.7	28.5	30.2
Oman	1.4	1.5	1.5	1.8	1.8
Qatar	2.5	2.5	2.5	2.4	0.8
Saudi Arabia	5.9	5.7	6.0	5.8	5.2
United Arab Emirates	3.5	3.6	3.8	3.7	3.0
Middle East	30.6	34.1	41.2	43.6	42.4
India	24.6	29.5	34.2	36.8	33.6
Indonesia	-	0.0	0.2	0.1[e]	0.2
Malaysia	0.7	0.6	0.7	0.6[e]	0.6
Asia	25.2	30.1	35.2	37.5	34.3
World	77.9	92.2	106.9	111.3	106.0

[e] = estimate

Source : WSA

Iron ore 2019

million tonnes, actual weight

	Production	- Exports	+ Imports	= Apparent consumption
Austria	2.8	0.0	4.5	7.3
Belgium-Luxembourg	-	0.0	6.2	6.2
Czechia	-	0.0	5.3	5.3
France	-	0.0	13.9	13.9
Germany	1.2	0.4	37.1	37.8
Italy	-	0.0	6.7	6.7
Netherlands	-	21.1	29.4	8.3
Poland	-	0.0	6.4	6.4
Romania	-	0.3	2.8	2.5
Slovakia	-	0.0	4.8	4.8
Spain	-	0.2	5.6	5.4
Sweden	29.1	22.3	0.1	6.9
United Kingdom	-	0.0	7.7	7.6
Other EU	-	0.3	4.6	4.3
European Union (28)	33.1	44.7	134.9	123.2
Bosnia-Herzegovina	1.4	0.0	0.0	1.4
Norway	1.6	1.8	0.0	-0.2
Turkey	6.6	1.4	10.1	15.3
Other Europe	-	0.0	2.5	2.5
Europe	42.7	48.0	147.5	142.2
CIS	184.5	75.6	9.4	118.4
Canada	58.5	52.2	16.6	22.9
Mexico	20.6	1.1	2.4	21.8
United States	48.0	11.3	6.0	42.7
USMCA	127.0	64.6	25.0	87.4
Brazil	389.6	340.4	0.3	49.5
Chile	10.0	8.4	0.3	1.9
Peru	10.1	19.3	0.0	-9.2
Venezuela	2.6	1.1	-	1.5
Other America	0.3	1.4	10.2	9.1
Central and South America	412.6	370.6	10.8	52.8
Liberia	4.4	4.6	-	-0.2
Mauritania	10.5	12.9	-	-2.4
South Africa	70.5	66.8	0.5	4.2
Other Africa	6.8	0.5	12.9	19.2
Africa	92.2	84.7	13.3	20.8
Middle East	61.2	28.2	34.7	67.7
China [1]	241.3	14.7	1 069.1	1 295.8
India	232.8	31.2	2.1	203.7
Japan	-	0.0	119.6	119.6
South Korea	0.4	0.0	74.7	75.0
Other Asia	19.2	47.7	76.7	48.2
Asia	493.6	93.6	1 342.2	1 742.2
Australia	918.7	836.2	0.8	83.3
New Zealand and Other Oceania	3.2	2.3	0.1	1.0
World	2 335.7	1 603.9	1 583.9	2 315.7

[1] Production adjusted so that Fe content is similar to world average
Source: RMG

World trade in iron ore by area, 2020

million tonnes

Exporting region / Destination	European Union (28)	Other Europe	CIS	USMCA	Other America	Africa and Middle East	Asia	Oceania	Total imports	of which: extra-regional imports
European Union (28)	31.1	2.5	23.3	22.8	19.1	18.0	0.1	0.1	117.0	85.9
Other Europe	2.0	0.0	2.5	0.2	5.7	0.4	6.7	-	17.5	17.5
CIS	0.0	0.0	11.2	-	-	0.0	-	-	11.2	0.0
USMCA	1.1	0.0	0.4	8.5	3.7	0.1	0.0	0.0	13.9	5.4
Other America	0.0	-	0.3	1.1	4.4	0.4	0.2	-	6.3	1.9
Africa and Middle East	7.7	0.4	1.3	1.9	17.7	10.0	0.8	-	39.8	29.7
China	3.4	0.9	44.7	19.0	263.4	53.7	69.3	715.9	1 170.4	1 101.1
Japan	0.0	-	0.9	7.3	27.6	3.7	2.3	57.7	99.4	97.2
Other Asia	0.5	-	1.9	6.8	30.8	8.4	30.0	103.6	182.1	152.1
Oceania	0.0	-	-	0.0	0.1	0.9	0.0	-	0.9	0.9
Total exports	45.7	3.8	86.6	67.5	372.5	95.6	109.3	877.4	1 658.4	1 491.7
of which: extra-regional exports*	14.7	3.8	75.4	59.0	368.1	85.6	7.8	877.4	1 491.7	
Net exports (exports-imports)	-71.2	-13.7	75.4	53.7	366.2	55.8	-1 342.6	876.5		

* Excluding intra-regional trade marked

Source : WSA

Trade in ferrous scrap 2019 and 2020

million tonnes

	Exports		Imports	
	2019	2020	2019	2020
Austria	1.1	1.2	1.2	1.2
Belgium	3.8	4.0	4.5	4.6
Bulgaria	0.4	0.4	0.2	0.2
Czechia	2.3	2.2	0.4	0.4
Finland	0.5	0.7	0.0	0.0
France	6.6	6.1	1.5	1.5
Germany	7.9	7.7	4.0	3.8
Greece	0.0	0.1	0.9	0.8
Italy	0.5	0.7	5.4	5.2
Netherlands	6.3	6.3	3.2	3.6
Poland	2.1	2.2	0.8	0.7
Slovakia	0.8	0.8	0.1	0.3
Spain	0.6	0.6	4.0	3.3
Sweden	1.5	1.4	0.2	0.2
United Kingdom	8.1	6.8	0.3	0.4
Other EU	7.0	7.6	5.3	5.4
European Union (28)	49.6	48.9	32.0	31.5
Turkey	0.2	0.2	18.8	22.4
Others	1.8	2.0	1.0	1.1
Other Europe	2.0	2.2	19.8	23.5
Kazakhstan	1.0	0.5	0.0	0.0
Russia	3.7	5.2	1.0	0.5
Ukraine	0.0	0.0	0.0	0.0
Other CIS	0.1	0.1	1.6	1.5
CIS	4.9	5.8	2.7	2.0
Canada	4.4	4.5	2.1	1.0
Mexico	0.8	0.7	1.5	2.1
United States	17.7	16.9	4.3	4.5
USMCA	22.9	22.1	7.9	7.7
Brazil	0.7	0.7	0.2	0.1
Other Central and South America	1.5	1.1	0.8	0.5
Central and South America	2.2	1.9	1.0	0.6
South Africa	0.5	0.3	0.1	0.1
Other Africa	1.3	0.8	3.3	3.1
Africa	1.9	1.1	3.4	3.2
Middle East	3.4	2.1	1.1	1.0
China	0.0	0.0	0.2	0.0
Japan	7.7	9.4	0.1	0.0
South Korea	0.2	0.3	6.5	4.4
Taiwan, China	0.1	0.1	3.5	3.6
Other Asia	3.5	2.4	25.2	19.2
Asia	11.5	12.1	35.6	27.2
Australia and New Zealand	2.9	2.7	0.1	0.1
World	101.2	98.9	103.5	96.9

World trade in ferrous scrap by area, 2020

million tonnes

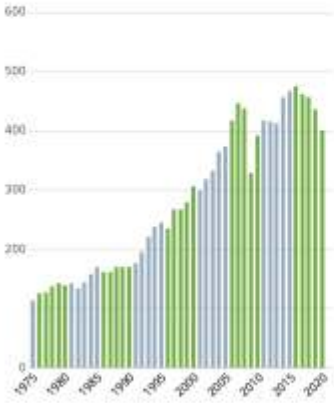
Exporting region / Destination	European Union (28)	Other Europe	CIS	USMCA	Other America	Africa and Middle East	China	Japan	Other Asia	Oceania	Total imports	of which: extra-regional imports
European Union (28)	26.4	1.7	0.4	0.4	0.1	0.3	-	0.0	0.0	0.0	29.4	3.0
Other Europe	15.1	0.2	2.9	4.3	0.2	0.8	-	-	0.0	0.0	23.6	23.3
CIS	0.3	0.0	1.5	0.0	0.0	0.0	-	-	0.0	0.0	1.8	0.3
USMCA	0.8	0.0	0.0	6.8	0.0	0.0	-	0.0	0.0	0.0	7.6	0.8
Other America	0.0	-	-	0.5	0.2	0.0	-	-	0.0	0.0	0.7	0.5
Africa	2.1	0.0	0.2	0.6	0.0	0.1	0.0	0.0	0.0	0.0	3.1	3.0
Middle East	0.3	0.0	-	0.4	0.0	0.1	-	0.0	0.0	0.1	1.0	0.9
China	0.0	-	-	0.0	-	-	0.0	0.0	0.0	-	0.0	0.0
Japan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	0.0
Other Asia	4.0	0.2	0.8	8.9	1.5	1.9	0.0	9.4	2.5	2.4	31.4	28.9
Oceania	0.0	0.0	-	0.0	-	-	-	-	0.0	0.1	0.1	0.0
Total exports	48.9	2.2	5.8	22.0	2.0	3.2	0.0	9.4	2.6	2.7	98.8	60.9
of which: extra-regional exports*	22.5	1.9	4.3	15.2	1.8	3.0	0.0	9.4	0.1	2.6	60.9	
Net exports (exports-imports)	19.6	-21.4	4.0	14.4	1.3	-0.8	0.0	9.3	-28.8	2.6		

* Excluding intra-regional trade marked

Source : WSA

World steel trade in products 1975 to 2020

million tonnes

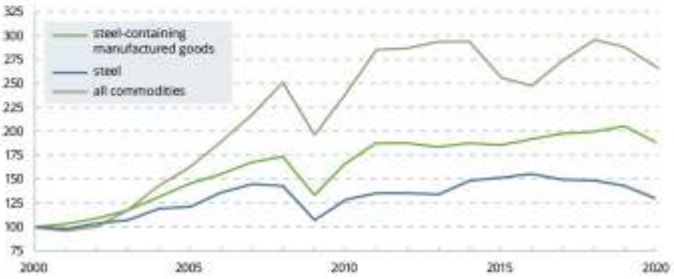


Year	Exports	Production	Exports share %
1975	114.7	506.9	22.6
1980	140.6	578.7	24.3
1985	171.0	599.0	28.5
1990	171.0	654.0	26.2
1991	177.1	660.0	26.8
1992	196.1	658.0	29.8
1993	222.5	664.9	33.5
1994	238.6	656.2	36.4
1995	246.6	685.6	36.0
1996	236.4	687.1	34.4
1997	267.9	730.1	36.7
1998	268.7	713.4	37.7
1999	280.8	725.8	38.7
2000	307.5	783.6	39.2
2001	300.5	785.9	38.2
2002	318.0	837.1	38.0
2003	333.6	899.1	37.1
2004	368.3	985.6	37.4
2005	373.3	1 065.5	35.0
2006	418.5	1 161.3	36.0
2007	446.8	1 255.4	35.6
2008	438.5	1 250.4	35.1
2009	330.1	1 155.9	28.6
2010	392.7	1 337.6	29.4
2011	418.7	1 435.4	29.2
2012	416.0	1 458.2	28.5
2013	412.6	1 542.4	26.8
2014	457.4	1 562.6	29.3
2015	467.4	1 514.6	30.9
2016	476.8	1 522.1	31.3
2017	462.9	1 619.0	28.6
2018	457.2	1 702.0	26.9
2019	438.8	1 746.9	25.1
2020	400.7	1 751.4	22.9

Exports are of finished and semi-finished steel products. Production of finished steel, where not available from national sources, is calculated from crude steel production taking into account the continuous casting ratio.

World volume of trade 2000 to 2020

Quantum indices 2000 = 100



World steel exports by product 2016 to 2020

million tonnes

	2016	2017	2018	2019	2020
Ingots and semi-finished material	54.3	60.2	61.8	56.1	56.9
Railway track material	3.1	2.7	2.6	4.9	4.4
Angles, shapes and sections	24.0	22.1	22.7	21.5	19.6
Concrete re-inforcing bars	21.4	18.3	18.8	19.1	19.3
Bars and rods, hot-rolled	40.3	21.2	18.7	15.2	12.8
Wire rod	30.3	27.0	27.6	26.8	25.3
Drawn wire	8.7	8.9	9.0	8.8	8.8
Other bars and rods	5.8	5.9	6.4	5.6	4.5
Hot-rolled strip	3.3	3.9	3.8	3.2	2.8
Cold-rolled strip	4.2	4.5	4.5	4.0	3.7
Hot-rolled sheets and coils	86.1	85.0	78.9	78.4	75.2
Plates	34.1	33.2	33.3	32.8	29.5
Cold-rolled sheets and coils	35.6	37.4	35.7	32.5	18.2
Electrical sheet and strip	4.2	4.5	4.6	4.1	3.9
Tinmill products	7.2	7.0	6.8	6.9	7.0
Galvanised sheet	45.0	46.2	44.7	43.0	37.1
Other coated sheet	18.8	18.0	17.9	18.2	18.1
Steel tubes and fittings	37.2	41.9	41.2	40.9	32.5
Wheels (forged and rolled) and axles	1.0	0.8	0.9	0.8	0.7
Castings	1.1	1.2	1.3	1.3	1.1
Forgings	0.9	1.0	1.1	1.0	0.9
Total	466.7	450.7	442.2	425.2	382.3

Exports include intra-EU trade, trade between countries of the CIS, and trade between USMCA countries. The figures are based on a broad definition of the steel industry and its products, including ingots, semi-finished products, hot-rolled and cold-finished products, tubes, wire, and unworked castings and forgings. The above table comprises the exports of 62 countries, which represents approximately 96.1 per cent of total world trade in 2020.

Source : WSA

World trade in steel by area 2020

million tonnes

Exporting region / Destination	European Union (28)	Other Europe	CIS	USMCA	Other America	Africa and Middle East	China	Japan	Other Asia	Oceania	Total imports	of which: extra-regional imports
European Union (28)	95.8	8.4	12.9	0.2	0.6	1.1	2.1	0.3	6.9	0.1	128.4	32.6
Other Europe	7.8	0.8	6.1	0.0	0.7	0.1	0.9	0.6	1.1	0.0	18.2	17.4
CIS	1.0	0.5	10.3	0.0	0.0	0.0	1.6	0.0	0.4	0.0	13.8	3.5
USMCA	4.7	0.8	2.6	14.4	4.5	0.6	1.3	2.1	5.0	0.3	36.4	22.0
Other America	0.9	1.4	1.0	2.8	3.0	0.0	3.1	1.1	1.1	0.0	14.5	11.5
Africa	3.5	3.6	4.1	0.1	0.5	1.8	8.3	1.1	2.6	0.0	25.5	23.6
Middle East	1.3	4.4	3.3	0.1	0.2	5.9	5.1	1.0	4.3	0.0	25.7	19.8
China	1.4	0.2	2.6	0.4	1.5	3.0	-	5.0	23.8	0.0	37.9	37.9
Japan	0.0	0.0	0.0	0.0	0.0	0.0	0.9	-	4.2	0.0	5.1	5.1
Other Asia	1.9	1.5	7.9	0.4	0.4	2.4	27.5	18.3	27.3	0.3	88.0	60.7
Oceania	0.2	0.1	0.0	0.1	0.0	0.0	0.7	0.2	1.2	0.2	2.7	2.5
Total exports	118.5	22.0	50.9	18.5	11.4	14.9	51.4	29.8	77.8	1.1	396.3	236.6
of which: extra-regional exports*	22.6	21.1	40.6	4.0	8.4	7.2	51.4	29.8	50.5	0.9	236.6	
Net exports (exports-imports)	-10.0	3.7	37.1	-18.0	-3.1	-36.3	13.5	24.8	-10.1	-1.7		

* Excluding intra-regional trade marked

Major importers and exporters of steel 2020

million tonnes

Rank	Total exports	Mt
1	China	51.4
2	Russia	31.5
3	Japan	29.8
4	South Korea	27.6
5	European Union (28) (1)	22.6
6	Germany (2)	21.2
7	Turkey	18.5
8	India	17.1
9	Ukraine	15.2
10	Italy (2)	14.9
11	Belgium (2)	12.9
12	Brazil	10.6
13	France (2)	10.2
14	Taiwan, China	10.0
15	Malaysia	8.4
16	Netherlands (2)	8.3
17	Spain (2)	7.9
18	Vietnam	7.0
19	Canada	6.9
20	United States	6.3

Rank	Total imports	Mt
1	China	37.9
2	European Union (28) (1)	32.6
3	United States	19.9
4	Germany (2)	18.2
5	Italy (2)	15.5
6	Vietnam	13.6
7	Turkey	12.5
8	France (2)	11.8
9	South Korea	11.5
10	Poland (2)	10.8
11	Belgium (2)	10.4
12	Indonesia	9.3
13	Spain (2)	8.7
14	Saudi Arabia	8.6
15	Netherlands (2)	7.8
16	Taiwan, China	7.3
17	Canada	6.8
18	Philippines	6.6
19	Czechia(2)	6.4
20	Malaysia	5.8

Rank	Net exports (exports - imports)	Mt
1	Russia	26.4
2	Japan	24.8
3	South Korea	16.1
4	Ukraine	13.9
5	China	13.5
6	India	12.1
7	Brazil	8.7
8	Turkey	6.0
9	Egypt	4.4
10	Germany (2)	3.0
11	Taiwan, China	2.7
12	Austria (2)	2.6
13	Malaysia	2.6
14	Belgium (2)	2.5
15	Luxembourg (2)	1.6

Rank	Net imports (imports - exports)	Mt
1	United States	13.6
2	European Union (28) (1)	10.0
3	Saudi Arabia	7.2
4	Philippines	6.6
5	Vietnam	6.6
6	Poland (2)	5.6
7	Indonesia	4.2
8	Israel	3.3
9	Bangladesh	2.5
10	Uzbekistan	2.5
11	United Arab Emirates	2.4
12	Myanmar	2.4
13	Pakistan	2.3
14	Kenya	2.2
15	Hong Kong, China	2.1

(1) Excluding intra-regional trade
(2) Data for individual European Union (28) countries include intra-European trade

Source : WSA

राष्ट्रीय इस्पात निगम लिमिटेड
(भारत सरकार का उद्यम)
विशाखपट्टणम इस्पात संयंत्र

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RINL recently launched a new customer friendly initiative i.e. "RINL eSuvidha" – a Online Retail Portal to procure steel by customers all over India.

"RINL eSuvidha"

- Desktop/Mobile enabled website for customers across the country, to logon and access RINL-VizagSteel's Quality products in a convenient, transparent & efficient manner.
- Portal enables RINL to offer quotation against the customer's enquiry and the customer can confirm the order on the portal itself.
- Facilitates the customer to book order-on-line for quantities, make payment on-line for getting the material at their door steps.
- Provides a hassle free access to purchase quality steel products from RINL –Vizag Steel from any part of India.

The principal products of RINL-Vizag Steel includes TMT Rebars, Wire Rod Coils, Rounds, Structurals, Squares & Flats. Manufactured from 100 % virgin steel with stringent tolerances in both physical and chemical properties, RINL-Vizag Steel is the preferred steel for a wide array of customers.

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उत्पाद श्रेणियाँ व उपयोग
PRODUCT MIX & APPLICATIONS

WIRE RODS

5.5mm - 45mm Dia

Wire drawing, Bright bars, Fasteners etc.

ROUNDS

16 - 90mm Dia in straight length

Fasteners, Forging, Re-rolling, Railways, Construction etc.

'VIZAG TMT' REBARS

8mm - 36mm Dia

Construction - Reinforcement etc.

BILLETS / BLOOMS

Billets : 65mm, 77mm, 90 mm, 125mm RCS
Blooms : 150 x 150, 200 x 200, 250 x 250
320 x 250mm

Forging, Re-rolling, General Engineering purposes etc.

'VIZAG UKKU' STRUCTURALS

Angles	50 x 50 x 6 - 110 x 110 x 10mm
Channels	100 x 50 - 200 x 75mm
Beams	125 x 70 - 150 x 75mm
Flats	80 x 12 - 100 x 20mm

Construction, Fabrication, Auto Leaf Springs etc.

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