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Technology of Steel

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Editorial

Steel experts round the world expect the demand for steel to grow by 4.5 per cent in 2021. In the year 2022 however, steel demand may expectedly rise further by 2.2%.

Recovery in the demand of steel during this year has been more robust than expected, leading to upward revisions of forecast. Considering this robust recovery, steel demand globally, only with the exception of China will expectedly reach , at a much quicker pace, its pre-pandemic level.

A strong manufacturing activity, buoyed with an easy demand has contributed to this intense recovery in demand. The developed economies have however, outperformed all expectations by a larger margin than the developing economies. In the emerging economies, especially in Asia, the recovery momentum was interrupted by the resurgence of the pandemic.

India has however, traversed towards a gradual recovery after the strict lockdown in 2020; the country's economy got another shock from a more severe second wave in April-June, 2021, which caused output across all sectors to dwindle. From July again, a stronger recovery has resumed for all sectors. As a result, India's steel demand suffered only a minor downward revision and will show a sturdy recovery in 2021. The nation's steel demand will reclaim the 100 million tonnes mark this year as per industry estimates.

With the turn of events in the country's steel industry, the days ahead are thought to be lighted with a positive radiance. The Hon'ble Union Minister of Steel is confident of the gently rising demand. The country, maintaining the second position in the global steel arena, has a domestic demand that looks up. Only the per capita consumption has been somewhat low. However, it is a fact that the requirement and consumption of steel is increasing in the country with the kind of infrastructure development work going on .

This month has witnessed a flurry of activities of the ace steel producers. Government too has rendered a considerable fillip for the Production linked Incentive (PLI). The Union steel ministry is likely to seek applications soon from interested parties to take part in the Rs. 6,322-crore PLI scheme that seeks to promote production of speciality steel within the country from the middle of the next month.

AMNS India is contemplating manufacturing speciality steel under the PLI Scheme, its Chief Marketing Officer (CMO) has conceded. This development has taken shape after the Government of India notified on October 22, 2021.

During the month, Arcelor-Nippon has expressed plans to to invest –1 trillion in India over 10 years while JSW plans to set up modern colour coated steel manufacturing facility in Pulvama.

The steel companies are busy with newer plans and technologies that they seek to abreast in order to outsmart the challenges coming up before them time and again.

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And the slippage continues

worldsteel data indicates that at a monthly level, world production declined 6.5% in September 2021 over August 2021, pulled down by the stringent production curbs in China, where production dipped 21% in September 2021 over August 2021. On a year-on-year (yoy) basis too, global production dipped 9% in September 2021.

WORLD ECONOMY AT A GLANCE

- Market Economics reports indicate that October 2021 saw the rate of expansion in global manufacturing production crawl to its weakest level, with growth facing severe crisis in raw material deliveries, resulting input shortages, rising cost inflation and a slowing down of trade flows. As per the reports, the J.P.Morgan Global Manufacturing PMI stood at 54.3 in October 2021, marginally up from 54.1 of September 2021.
- Of the 31 nations for which October 2021 data were available, the Euro area remained a bright spot though rates of expansion slowed along with those of the US and the UK. The Chinese slowdown entered into its third successive month while Japan recorded moderate growth. Among the largest emerging markets, India saw a sharp output growth acceleration, while Brazil sank back into contraction territory.

Key Economic Figures

Country	GDP 2020: %change*	Manufacturing PMI	
		September 2021	October 2021
India	-7.0	53.7	55.9
China	2.3	50.0	50.6
Japan	-4.8	51.5	53.2
USA	-3.5	60.7	58.4
EU 28	-6.6	58.6	58.3
Brazil	-4.1	54.4	51.7
Russia	-3.1	49.8	51.6
South Korea	-1.0	52.4	50.2
Germany	-4.9	58.4	57.8
Turkey	1.8	52.5	51.2
Italy	-8.9	59.7	61.1

Source: GDP: official releases; PMI- Markit Economics, *provisional

- Input costs increased at the fastest pace in over 13 years in October 2021, while average output charges rose to the greatest extent on record.

GLOBAL CRUDE STEEL PRODUCTION

Having already crossed the 1 billion tonne mark, world crude steel production stood at 1461 million tonnes (mt) in January – September 2021, up by 7.8% over same period of last year as per provisional data released by World Steel Association (worldsteel). While the volume growth at a cumulative level indicated the diminishing impact of COVID-19, yet at a monthly level, world production declined 6.5% in September 2021 over August 2021, pulled down by the stringent production curbs in China, where production dipped 21% in September 2021 over August 2021. On a year-on-year (yoy) basis too, global production dipped 9% in September 2021.

World Crude Steel Production: January-September 2021*

Rank	Top 10	Qty (mt)	% change
1	China	805.89	2.0
2	India	87.29	23.3
3	Japan	72.13	17.9
4	USA	64.36	19.8
5	Russia	56.44	6.2
6	South Korea	52.89	6.7
7	Germany	29.91	16.1
8	Turkey	29.87	15.0
9	Brazil	27.17	20.2
10	Iran	19.32	-8.6
	Total: Top 10	**1245.25**	**6.1**
	World	**1461.23**	**7.8**

Source: worldsteel; *provisional

- China remained the leader in world crude steel production which stood at 805.89 mt during January-September 2021, up 2% over same period of last year. The nation accounted for 76% of Asian and 55% of world crude steel production during this period.
- With a 6% share in total world production, India (87.29 mt) reported a yoy production growth of 23.3% during this period and remained the 2nd largest producer during this period.
- Japanese crude steel production (72.13 mt) was up 17.9% yoy during this period and the country was the 3rd largest crude steel producer in the world.
- USA remained at the 4th largest spot, with production (64.36 mt), up 19.8% yoy while Russia (56.44 mt, up 6.2% yoy) was the 5th largest crude steel producer during this period.

- Crude steel production in the EU (27) countries stood at 115 mt during this period, up 20% yoy.
- At 1061 mt, Asian crude steel production was up 5.5% during this period and the region accounted for 73% of world crude steel production during this period.
- The top 10 countries accounted for 85% of total world crude steel production during this period and saw their cumulative production go up by 6.1% yoy.

NEWS AROUND THE WORLD

THE AMERICAS

- The US DoC has determined that revocation of CVD on CR steel flat products from China and South Korea will likely lead to a continuation or recurrence of countervailable subsidies and has set subsidy rates accordingly. For China, the same has been set at 256.44% for Angang Group Hong Kong Co Ltd, Benxi Iron & Steel (Group) Special Steel Co Ltd, Qian'an Golden Point Trading Co Ltd and all others while for Korea, the subsidy rate stands at 4.04% for Hyundai Steel Co Ltd, 51.80% for Posco and 13.19% for all others.
- Mexico's Ahmsa is back in the market after restarting its hot-rolling mill after 2-week maintenance during which the accumulated stock of slab will now help it to meet market demand more effectively.
- Ahmsa has announced measures intended to reduce its consumption of natural gas after an increase in global prices with plans to replace it with gas generated in the steelmaking process.
- Nucor Corp has announced the launch of a line of net-zero carbon steel products under the brand name Econiq which represents "the first of its kind at scale for the United States steel industry," and will be provided across its complete product line.

ASIA

- China's daily steel output in September 2021 dropped to the lowest level seen since January 2019, as power rationing dented steel production in at least 12 provinces amid sluggish demand from real estate and manufacturing.
- Tangshan introduced stricter production cuts at steel mills, coking plants and rerollers from Thursday October 28, to improve air quality, the municipal government said in a notice to manufacturers. It listed production restrictions at 23 integrated steel mills in the city, with the extent of the cuts based on the mills' environmental protection levels and their steelmaking equipment. The restrictions will only be lifted once air quality improves, the notice added.
- The growth rate of China's total social financing, a proxy for the economy's liquidity, continued on a downtrend in September, after it peaked at a13.7% yoy expansion in October 2020, to 10% yoy as per the the People's Bank of China. The growth rate was 10.3% in August and 10.7% in July.

- Indonesia's Krakatau Steel is hoping to begin operations at its heavily delayed 1.2 mtpa BF in Q3 2022.
- South Korea plans to suspend concessions made to the UK after the latter extended safeguards on steel imported from the former by up to three years.
- Malaysia's Amsteel Mills Sdn Bhd has sold Antara Steel Mills Sdn Bhd to Singapore-based Esteel Enterprise for $122 million.
- Japan's Nippon Steel is seeking Yen 40 billion ($352.6 million) in damages from China's Baoshan Iron & Steel, and domestic automaker Toyota Motor over claims of patent infringement relating to non-oriented electrical steel sheets.

RUSSIA, MID-EAST, AFRICA, AUSTRALIA

- Severstal has acquired over 40 patents and patent applications from American steel alloy diffusion technology developer Arcanum Alloys and will launch a pilot for the production of diffusion alloyed rolled steel by the end of 2021 at its flagship Cherepovets Iron and Steel Works.
- Severstal has become the first company in Russia to join ResponsibleSteel, the global multi-stakeholder standard and certification initiative with a mission to maximize steel's contributions to a sustainable society.

EU AND OTHER EUROPE

- European steelmakers are targeting cutting by 95% their CO2 emissions by 2050 compared with 1990 levels, to contribute to broader international climate goals.
- Acciaierie d'Italia, Italy's largest flat steel producer, is targeting production of 6 mt of crude steel next year at its Taranto works.
- Turkish long steel producer Ekinciler Demir Celik is planning to raise its steel melt shop and bar rolling mill capacity and build a new wire rod rolling mill.
- The European Investment Bank (EIB) gave ArcelorMittal a Eur280 million loan to fund its European research and development on decarbonization which will support its decarbonization projects over 2021-2023.
- The transition toward greener steel production in Europe has become more apparent following the announcement of two new carbon surcharges from Austrian steelmaker, Voestalpine and German mill, Thyssenkrupp. As end-users seek greener steel alternatives, sources have said carbon surcharges will be intrinsic to the future steel cost structure.
- The UK steel industry has welcomed a move that injected GBP 50 million ($68 million) of new funding into Liberty Steel UK to enable the restart of its core Rotherham EAD as it would ease supply amid rising demand.
- Saarstahl Ascoval has produced its first low-carbon emissions billets, at its Saint-Saulve mill in northern France, with the semifinished products to be rolled into wire at parent Saarstahl's works in Bubach, Germany.

- BMZ is conducting a major upgrade at one of its three EAFs, with a view to reduce atmospheric emissions, currently employing about 60% of its steelmaking capacity.
- Voestalpine is investing EUR188 million ($217 million) to build a new 2 mtpa integrated pickling line in its CRM 3 at its steelmaking site at Linz, targeted to start in late 2023.
- Thyssenkrupp Steel has delivered its first batches of its low-carbon intensity "bluemint" steel, in what the company describes as a significant milestone in its path towards production of climate-neutral steel.
- Klöckner has signed a distribution deal with Swedish fossil-free steel venture H2 Green Steel to distribute up to 250,000 mtpa of green steel from 2025.
- Salzgitter will start supplying low-emissions certified steel to German appliance maker Miele Group, starting next month, for a pilot program.

[Source Credit: Fastmarkets Metal Bulletin, Platts, leading news papers (India news)]

WORLD STEEL PRICE TRENDS

After reaching record-breaking highs at the end of 2020, global steel prices continued to show moderation and signs of a return to "normalcy" with most markets reporting either a softening or a stability at a reduced level. The trend continued in October 2021 as well. Nonetheless, as seen before also, they remained on strong grounds during the 3rd quarter of the year, impacted by rising demand, stringent supply and a volatile raw material (read iron ore, scrap) market. Of potential concern are the steel market developments in China, where production cuts – both on-going and upcoming – are expected to impact global demand-supply to a significant level in the coming days. If that materialises, then it would be only a matter of time before global trade flows and global steel price trends, stand to be affected to a similar degree.

Long Product

- Domestic steel rebar prices remained steady in the USA in October 2021, with imports reported to go up marginally but with nil impact on prices. Transactions, as per Fastmarkets Metal Bulletin, were quoted around $985/t at month-end.
- October 2021 rebar prices in the EU moved north marginally, with demand remaining even. Transactions, as per Fastmarkets Metal Bulletin, were quoted around €800-820/t ($928-951) in Northern Europe, and around €745-760/t ($864-882) in Southern Europe.
- Chinese rebar prices saw some gain in October 2021 riding on rising demand. Transactions, as per Fastmarkets Metal Bulletin, were quoted around 5,220-5,250 yuan/t ($817-822) in Shanghai and around 5,150-5,180 yuan/t in Beijing.
- Russian rebar prices in October 2021 moved north in view of depleting stocks, price rise by steel majors and stringent supply. Fastmarkets' assessment of steel

reinforcing bar (rebar) domestic, cpt Moscow, Russia was around 62,000-75,000 roubles/t ($888.46-1,074.75) including 20% value-added tax.

Flat Product

- October 2021 saw US HRC prices remain steady with transactions, as per Fastmarkets Metal Bulletin, quoted around $1,900 per short tonne at month end.
- European HRC market remained stable in October 2021 with both buyers and sellers engaging in limited trading and waiting for prices to follow a trend path. Transactions, as per Fastmarkets Metal Bulletin, were quoted around €1,007/t in Northern Europe and around €900/t in Southern Europe.
- Chinese HRC prices moved north in October 2021, helped by gains in the futures market and a pick-up in spot buying activity. Transactions, as per Fastmarkets Metal Bulletin, quoted around 5,330-5,340 yuan/t in Shanghai and around 5,300-5,350 yuan/t in Tangshan at month-end.
- Active buying interest, limited offers from mills and export sales activity pushed Russian flat steel prices in October 2021. Fastmarkets' assessment for steel hot-rolled sheet, domestic, cpt Moscow, Russia, was 72,000-75,000 roubles/t ($1,034-1,077), inclusive of 20% value added tax.

[Source Credit: Fastmarkets Metal Bulletin]

SPECIAL FOCUS

India leads global DRI production in 2021 so far

Provisional worldsteel report indicates that global DRI output stood at 76.35 mt in January-September 2021, up 10.9% over same period of last year. Such production growth was driven by India (28.99 mt, 38% share, up 21%) at the number one spot and Iran, where production stood at 22.46 mt (29% share), down 1.2% over same period of last year. The two countries together accounted for 67% of global DRI output during this period. Together, the top five countries accounted for 86% of the world DRI production during this period and saw their cumulative output go up 9.2% over same period of last year.

Global DRI Production

Rank	Country	Jan-Sept. 2021* (mt)	Jan-Sept.2020 (mt)	% change
1	India	28.99	24.04	20.6
2	Iran	22.46	22.74	-1.2
3	Russia	5.70	5.77	-1.2
4	Mexico	4.38	3.76	16.5
5	Saudi Arabia	4.27	3.97	7.6
	Top 5	**65.80**	**60.28**	**9.2**
	World	**76.35**	**68.86**	**10.9**

Source: worldsteel *provisional

worldsteel SRO projects stable growth in global steel demand

The October 2021 edition of the Short Range Outlook (SRO) of the World Steel Association (worldsteel) has projected a stable demand growth in steel sector for 2021 and 2022. In its latest SRO, the worldsteel forecasts that steel demand will grow by 4.5% in 2021 and reach 1,855.4 mt after 0.1% growth in 2020. In 2022, steel demand will see a further increase of 2.2% to 1,896.4 mt. The current forecast assumes that, with the progress of vaccinations across the world, the spread of variants of the COVID virus will be less damaging and disruptive than seen in previous waves.

As per the SRO, strong manufacturing activity bolstered by pent-up demand is the main contributor and was led by the developed economies which have outperformed than the developing economies, reflecting the positive benefit of higher vaccination rates and government support measures. While the manufacturing sector's recovery remained more resilient to the new waves of infection than expected, supply-side constraints, as per the SRO, have led to a levelling off of the recovery in the second half of the year and are preventing a stronger recovery in 2021. But with high backlog orders combined with a rebuilding of inventories and further progress in vaccinations in developing countries, the SRO expects steel demand will continue to recover in 2022. As per the SRO, persistent rising inflation, continued slow vaccination progress in developing countries and further growth deceleration in China all pose risks to this forecast.

INDIAN STEEL MARKET ROUND-UP

The following is a status report on the performance of Indian steel industry during April-September 2021, based on provisional data released by Joint Plant Committee (JPC) in its MIS Report for April-September 2021. It is to be noted that total finished steel includes both non-alloy and alloy (including stainless steel) and all comparisons are made with regard to same period of last year.

Performance of Indian steel industry

Item	April-September 2021*(mt)	April-September 2020 (mt)	% change*
Crude Steel Production	57.159	43.960	30.0
Hot Metal Production	38.481	30.195	27.4
Pig Iron Production	3.054	2.109	44.8
Sponge Iron Production	19.142	14.975	27.8
Total Finished Steel (alloy/stainless + non-alloy)			
Production	53.341	39.260	35.9
Import	2.373	1.985	19.6
Export	7.754	6.544	18.5
Consumption	49.114	36.537	34.4

Source: JPC; *provisional; mt=million tonnes

Overall Production

- ***Crude Steel:*** Production at 57.159 million tonnes (mt), up by 30.0%.
- ***Hot Metal:*** Production at 38.481 mt, up by 27.4%.
- ***Pig Iron:*** Production at 3.054 mt, up by 44.8%.
- ***Sponge Iron:*** Production at 19.142 mt, up by 27.8%, led by coal-based route (76% share).
- ***Total Finished Steel:*** Production at 53.341 mt, up by 35.9%.

Contribution of Other Producers

- ***Crude Steel:*** SAIL, RINL, TSL Group, AM/NS, JSWL & JSPL together produced 35.81 mt (63% share) during this period, up by 26.0%. The rest (21.35 mt) came from the Other Producers, up by 37.3%.
- ***Hot Metal:*** SAIL, RINL, TSL Group, AM/NS, JSWL & JSPL together produced 34.278 mt (89% share) up by 25.1%. The rest (4.203 mt) came from the Other Producers, up by 50.0%.
- ***Pig Iron:*** SAIL, RINL, TSL Group, AM/NS, JSWL & JSPL together produced 0.914 mt (30% share) up by 43.1%. The rest (2.14 mt) came from the Other Producers, up by 45.5%.
- ***Total Finished Steel:*** SAIL, RINL, TSL Group, AM/NS, JSWL & JSPL together produced 31.025 mt (58% share) up by 34.3%. The rest (22.316 mt) came from the Other Producers, up by 38.1%.

Contribution of Public Sector Units (PSU)

- ***Crude Steel:*** With 81% share, the Private Sector (46.159 mt, up by 27.4%) led crude steel production compared to the 19% contribution of the PSUs.
- ***Hot Metal:*** With 69% share, the Private Sector (26.48 mt, up by 21.4%) led hot metal production, compared to the 31% contribution of the PSUs.
- ***Pig Iron:*** With 88% share, the Private Sector (2.69 mt, up by 42.2%) led pig iron production, compared to the 12% contribution of the PSUs.
- ***Total Finished Steel:*** With 84% share, the Private Sector (45.072 mt, up by 32.0%) led production of total finished steel, compared to the 16% contribution of the PSUs.

Contribution of Flat /Non-Flat in Finished Steel

- ***Production:*** Non-flat products accounted for 51% share (up by 44.5%), the rest 49% was the share of flats (up by 27.9%).
- ***Import:*** Flat products accounted for 91% share (up by 22.3%), the rest 9% was the share of non-flats (down by 2.6%).

- ***Export:*** Flat products accounted for 78% share (up by 3.2%), the rest 22% was the share of non-flats (up by 145.9%).
- Consumption: Led by Non-flat steel (55% share; up by 37.2%) while the rest 45% was the share of flat steel (up by 31.2%).

Finished Steel Production Trends

- At 53.341 mt, production of total finished steel was up by 35.9% in April-September 2021.
- Contribution of the non-alloy steel segment stood at 49.946 mt (94% share, up by 33.9%), while the rest was the contribution of the alloy steel segment (including stainless steel).
- In the non-alloy, non-flat segment, in volume terms, major contributor to production of total finished steel was Bars & Rods (21.037 mt, up by 47.4%) while growth in the non-alloy, flat segment was led by HRC (22.479 mt, up by 25.5%) during this period.

Finished Steel Export Trends

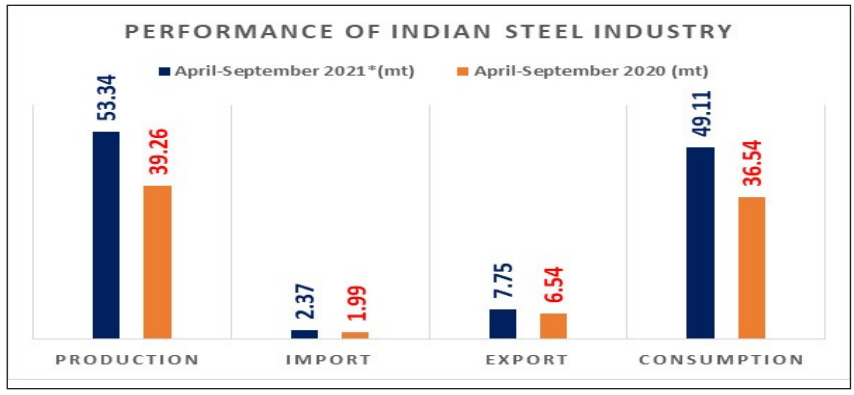
- Overall exports of total finished steel at 7.754 mt, up by 18.5%.
- Volume wise, Non-alloy HR Coil/Strip (3.434 mt, down by 23.5%) was the item most exported (48% share in total non-alloy).
- Vietnam (0.992 mt) was the largest export market for India.

Finished Steel Import Trends

- • Overall imports of total finished steel at 2.373 mt, up by 19.6%.
- India was a net exporter of total finished steel in April-September 2021.
- Volume wise, non-alloy GP/GC Sheets/Coils (0.391 mt, up by 29.3%) was the item most imported (27% share in total non-alloy).
- Korea (1.015 mt) was the largest import market for India (43% share in total)

Finished Steel Consumption Trends

- At 49.114 mt, consumption of total finished steel was up by 34.4% in April-September 2021.
- Contribution of the non-alloy steel segment stood at 45.339 mt (92% share, up by 31.9%), while the rest was the contribution of the alloy steel segment (including stainless steel).
- In the non-alloy, non-flat segment, in volume terms, major contributor to consumption of total finished steel was Bars & Rods (20.856 mt, up by 39.7%) while growth in the non-alloy, flat segment was led by HRC (18.46 mt, up by 29.6%) during this period.



INDIAN ECONOMY – HIGHLIGHTS OF PERFORMANCE

GDP: The Central Statistics Office (CSO), Ministry of Statistics and Programme Implementation has released the estimates of Gross Domestic Product (GDP) for Q1 2021-22. As per the reports, GDP at Constant (2011-12) Prices in Q1 of 2021-22 is estimated at Rs. 32.38 lakh crore, as against Rs. 26.95 lakh crore in Q1 of 2020-21, showing a growth of 20.1% as compared to contraction of 24.4% in Q1 2020-21. Quarterly GVA at Basic Price at Constant (2011-12) Prices for Q1 of 2021-22 is estimated at Rs. 30.48 lakh crore, as against Rs. 25.66 lakh crore in Q1 of 2020-21, showing a growth of 18.8%. Almost all the lead sectors reported double digit growth during this period, except Agriculture and allied sectors (4.5%), Financial, Real Estate and Professional Services (3.7%) and Public Administration, Defence and Other Sectors (5.8%).

Industrial Production: Provisional CSO data show that the overall Index of Industrial Production (IIP) for the month of April-August 2021, rose by 29% due to a significantly low base of same period of last year. Similar high levels of growth trends were noted for the various sectors/sub-sectors due to the same reason.

Infrastructure Growth: Provisional data released by the DPIIT indicate that the Index for the Eight Core Infrastructure Industries saw a growth of 16.6% during April-September 2021 with all the sectors reporting a rise except Crude Oil and Fertilisers.

Inflation: In September 2021 (prov.), the annual rate of inflation, based on monthly WPI, stood at 10.66% while the all India CPI inflation rate (combined) stood at 7.27% and compared to the previous month, the former registered a decline and the latter, a rise.

Trade: Provisional figures from DGCI&S show that during April-September 2021, in dollar terms, overall exports were up by 55.42% while overall imports were up by 79.18%, both on yoy basis. During the same period, oil imports were valued at USD 72.99 billion, 128% higher yoy while non-oil imports were valued at USD 203.03 billion, 69% higher yoy. Overall trade deficit for April-September 2021 is estimated at USD 28.63 Billion as compared to the surplus of USD 15.53 Billion in same period of last year.

Prepared by: Joint Plant Committee

Medium-Mn,high-Al duplex lightweight steels: a promising material for automotive application

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Abstract

Over the last few years, the research on third-generation advanced high strength steels (AHSS) has gained tremendous importance due to its high strength-ductility combination and weight-saving potential. There has been a shift from the first generation low-Mn TRIP steel and second-generation high-Mn TWIP steel to third-generation medium-Mn steel. To further enhance the strength-to-weight ratio of medium-Mn steel, the addition of light elements like Al to medium Mn steel has been investigated widely. This article aims to discuss the effect of Al addition in medium Mn steel. The various aspect of the effect of Al addition on retained austenite like its fraction, stacking fault energy (SFE) and its mechanical stability has been described. An overview of the annealing process, microstructure, mechanical properties, and deformation modes of Al-added medium Mn steel has been presented.

Keywords : low-density steel, medium Mn steel, duplex steel, intercritical annealing, retained austenite, TRIP, TWIP, SFE

Introduction

Steel has been the dominant material in the automotive sector because of itshigh crashworthiness, formability, recyclability, and affordability. The improved strength-ductility requirement from the automotive manufacturer has led to the industrial development of Advanced High Strength Steel (AHSS) grades that have improved energy absorptioncapability during anevent of a crash[1].Also, automobiles are one of the major sources of greenhouse gas emissions in the world because of which stern environmental guidelines to control emissions have been incorporated globally in recent years[2–4]. In order to lower the emissions and comply with the global emission standards, a weight-saving approach in the automotive vehicle has been adopted by the manufacturers. It has been reported that with every 10% reduction in vehicle weight, there is an improvement in fuel efficiency by 6-8% and a consequent decrease in emission by 5-6%[5]. To achieve the target there is a move towards the development of lightweight high strength steels for use in automotive components. In the recent past, there have been persistent efforts from the scientific community as well technological stakeholders to enhance the strength-to-weight ratio of steel. Also, the move towards the adoption of electric vehicles (EV) calls for additional weight-saving in the body-in-white (BIW) structure to compensate for the weight of batteriesand to develop high strength materials forsafety-critical components like the battery casing.

With an increase in the strength of steel, the thickness of the sheet used in the component can be reduced, thus, decreasing the overall weight of the vehicle. In this context, the recent advancement in this area is the development of third-generation advanced high strength steels (AHSS) like medium-Mn steel and Quench and partitioned (Q&P) steel that possesses excellent strength-ductility combination with strength-ductility product exceeding 30GPa%[2,6–11]. The medium Mn steel (Mn< 12wt.%) in particular has a wide range of strength and elongation properties, for various potential applications in automotive components. The further weight reduction or enhancement of strength-to-weight ratio in medium Mn steel is widely being researched recently. In this direction, Al (density: 2.7 g/cc) has emerged as the primary alloying element for density reduction in medium-Mn steel (density: 7.85 g/cc)[12–14]. It has been reported that, for every 1% addition of Al, there is a decrease in the density of steel by 1.3%, due to the combined effect of lower atomic weight and lattice dilatation[12,13,15,16]. The decrease in density of steel with Al addition has been shown in Fig. 1.[17]. However, theaddition of Al to steel affects the phase stability and microstructure. As Al is a ferrite stabilizer, with the increase in addition of Al the tendency of retention of high-temperature δ-ferrite phase increases [13,18]. So, the relative contents of Al (ferrite stabilizer) and Mn (austenite stabilizer) added to steel composition influences the phases obtained and their microstructure. Based on the relative amount of ferrite and austenite stabilizing elements, low-density steels could be single-phase ferritic or two-phase duplex steel (ferrite and austenite), or austenite based triplex steel (austenite, ferrite and k-carbide), depending on the stable phase formed at room temperature [19]. The table 1 shows the broad categorization and typical composition range of medium-Mn, Al-added, Fe-Mn-Al-C steels.In this article,we discuss about Al addedmedium-Mn duplex steel having Mn in medium Mn range (<12 wt%); The alloy design consideration and role of various factors influencing its microstructure and properties are discussed.

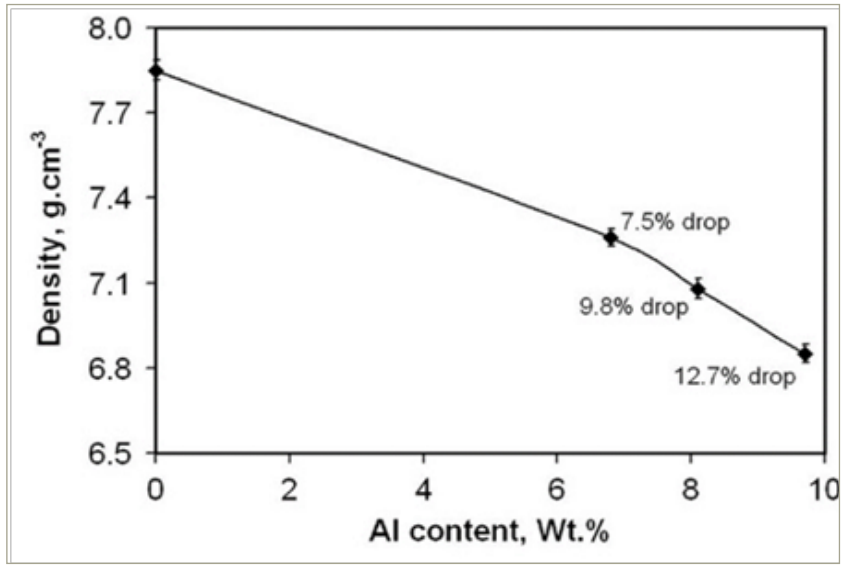


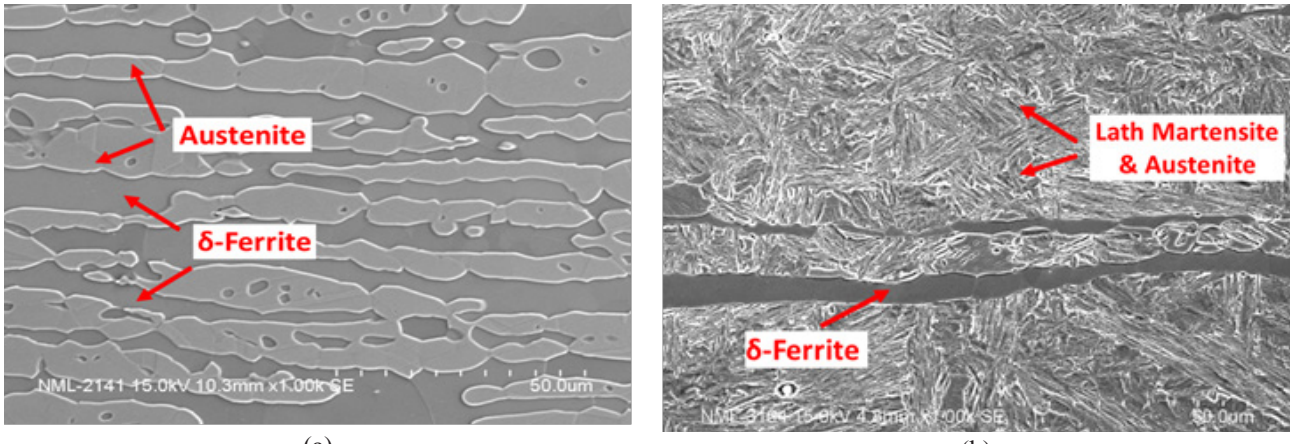
Fig 1: Change in density of steel with Al content (Adapted from ref. [12]

Table 1: Typical composition range of various category of low density steels [19]

	Ferritic	Duplex		Austenitic
		Ferrite-based duplex	Austenite-based duplex	
Typical composition range:	Al: ~5-9%	Al: ~3-7%	Al: ~5-10%	Al: ~5-12%
	Mn: < 5%	Mn: ~2-12%	Mn: ~5-30%	Mn:~12-30%
	C:< 0.05%	C: ~0.05-0.5%	C: 0.4-0.7%	C:~0.6-2.0 %

Medium Mn duplex steel and role of retained austenite

A typical microstructure of a hot rolled duplex steel is shown in Fig. 2 a and b. Figure 2a shows the hot-rolled microstructure of Fe-8Mn-8Al-0.4C duplex steel, wherein apart from austenite, δ-ferrite is present largely. In this steel, the retained δ-ferrite is quite coarse and difficult to alter during subsequent thermomechanical processing. The resulting coarse grain delta ferritemay not significantly contribute to the strengthening of the alloy. It is preferable to attain a fine-grained microstructure by suitable alloy modification. A hot-rolled microstructure of Fe-8Mn-4Al-0.25C duplex steel is shown Fig. 2b, wherein the amount of coarse δ-ferrite is relatively very less, and the primary microstructural constituent are fine lath martensite and austenite.



(a) (b)

Fig 2 : Hot rolled microstructure of duplex steel (a) Fe-8Mn-8Al-0.4C steel (b) Fe-8Mn-4Al-0.25C steel

Among the various constituents of duplex steel (δ-ferrite, α-ferrite, martensite, and austenite), the austenite phase has a greater role in influencing the overall properties and performance of the steel. The stability of the austenite phase directly affects the mechanical properties and deformation behavior of duplex medium Mn steel.The strength and ductility enhancementis achieved from the strain hardening effects like Transformation Induced Plasticity (TRIP) and Twinning Induced Plasticity (TWIP) exhibited by theaustenite during the deformation of the material. In this aspect, the retained austenite (a) volume fraction and (b) stacking fault energy (SFE) are the two crucial parameters dictating their respective roles during deformation[3,20,21].

The volume fraction of retained austenite is influenced by the processing parameters like intercritical annealing temperature and time, for a fixed steel composition. The intercritical annealing process of medium-Mn, Al-added steel is shown in Fig. 3. During the intercritical annealing, the partitioning of alloying elements takes place between intercritical ferrite and austenite. The austenite stabilizing elements like Mn, C will partition to austenite while ferrite stabilizing elements like Al and Si partition to ferrite. Due to selective partition of Mn and C to intercritical austenite, its martensite start temperature (Ms) and martensite finish temperature (Mf) decreases, such that if the Mf lies below the room temperature (RT), some amount of austenite will get retained upon quenching the steel to RT. The other parameter i.e. the SFE is primarily influenced by the chemical composition and grain size of the retained austenite, which subsequently is dependent on the intercritical annealing temperature selected for processing. Depending on the steel composition and intercritical annealing parameters, the SFE of medium Mn, Al-added steel may vary widely and for varying ranges of SFE, different deformation mechanism is exhibited. In general, the TRIP effect is observed in steel having SFE $\leq$ 20 mJ/m2[22], the deformation twinning i.e. the TWIP effect is observed in these steels with SFE in the range of 20-40 mJ/m2[23],partial and/or perfect dislocation gliding above SFE of 40 mJ/m2 and predominant microband-induced plasticity (MBIP) effect above 60 mJ/m2 and the recently reported dynamic slip band refinement (DSBR) effect above SFE of 60 mJ/m2 [24–26]. Also, recently the occurrence of combined TRIP and TWIP effect has been reported in Al-added medium Mn steel in the SFE range of 20-40 mJ/m2[27–29].From the above discussion, it is evident that the ensuing mechanical properties and deformation behavior of the medium Mn Al-added steel is influenced by the retained austenite fraction and its SFE, which in turn is directly dependent on the intercritical annealing temperature selected. Thus it becomes important to formulate a methodology to predict the retained austenite fraction and its SFE with respect to intercritical annealing temperature, so that it may be considered during the design of steel composition.

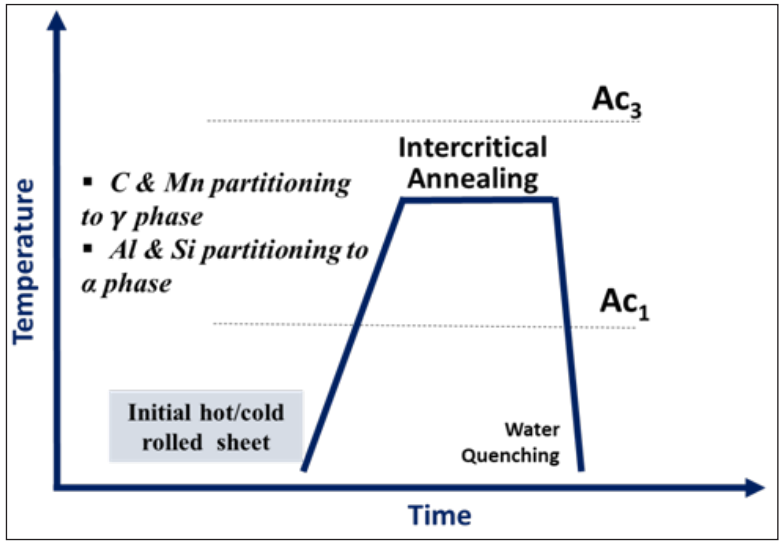


Fig. 3: Intercritical annealing schedule adopted in medium Mn, Al-added steel

Prediction of retained austenite fraction and its SFE

To illustrate the methodology for retained austenite volume and SFE prediction,two alloy composition with varying Al, Fe-8Mn-6Al-0.2C and Fe-8Mn-3Al-0.2C has been chosen.The retained austenite fraction (γ_{ret}), can be predicted using an approach given by Moor et al. [30]. The methodology is illustrated below:

(a) Prediction of the amount of intercritical austenite (between Ac1 and Ac3 temperature) as shown in (Fig. 4a),from ThermoCalcTM software[31].

(b) Prediction of Martensite start temperature (Ms) temperatureof intercritical austenite as shown in (Fig. 4b), using the equation given by Kaar et al [32].

$$M_S = 692 - 502*(C+N)^{0.5} - 37*Mn - 14*Si + 20*Al$$

where C, N, Mn, Si and Al represent the wt.% of elements in the austenite. The composition of intercritical austenite (γ_{ic}) is obtained from ThermoCalc^{TM}. The above Msrelation is specific to 3rd generation medium-Mn steel chemistries and givesa more accurate prediction of Ms temperature as compared to previously proposed equations [32].

(c) Prediction of martensite formed from intercritical austenite using the Koistinen-Marburger (KM) equation[33]:

$$f_m = 1 - e^{(-0.011(MS-QT))}$$

The final retained austenite is obtained by subtracting the fraction martensite (f_m) formed from the intercritical austenite (γ_{ic}) as shown in (Fig. 4c).

The SFE of the intercritical austenite can be predicted using the sub-regular thermodynamic model given by Zambrano et al. for Fe-Mn-Al-C steels [34].The predicted SFE of the intercritical austenite is shown in Fig. 4d.

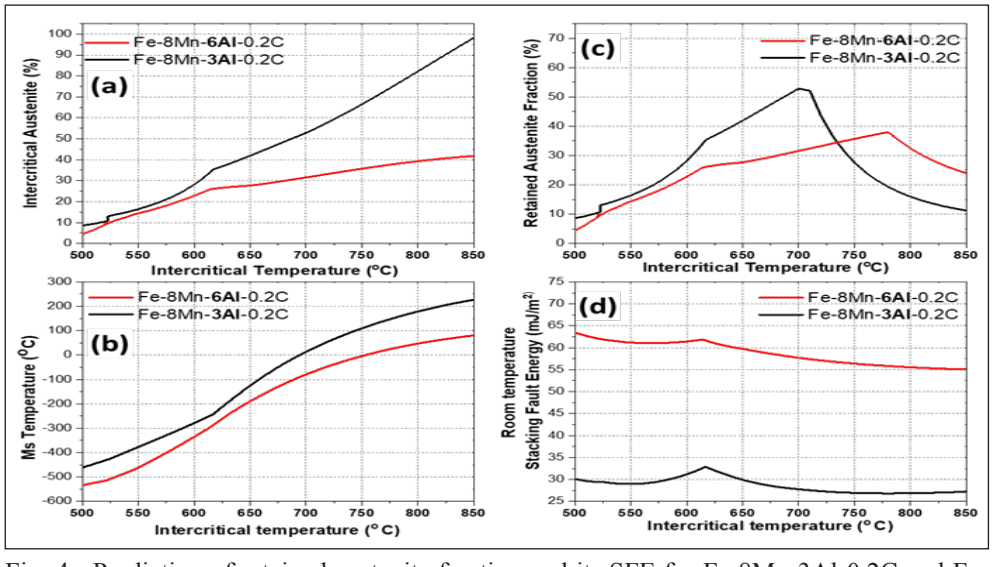
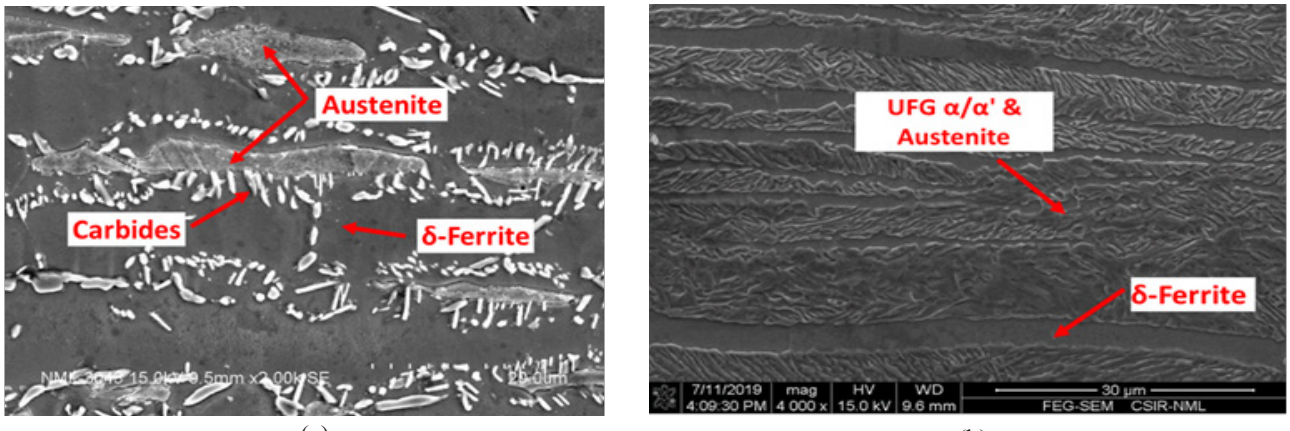


Fig. 4 : Prediction of retained austenite fraction and its SFE for Fe-8Mn-3Al-0.2C and Fe-8Mn-6Al-0.2 C steel (a) prediction of intercritical austenite fraction from ThermoCalc (b) prediction of Ms temperature (c) prediction of retained austenite fraction (d) prediction of SFE

It can be observed from Fig. 4 that with variation in intercritical temperature, the Mstemperature, retained austenite fraction and SFE varies considerably. With variation in Al content, the maximum attainable retained austenite content and its corresponding intercritical temperature varies (38% in and Fe-8Mn-6Al-0.2C steel at 780^0C and 53 per cent in Fe-8Mn-3Al-0.2C steel at 700 oC as shown in Fig. 4c). Most notably, the SFE varies significantly with variation in Al content as shown in Fig. 4d. The predicted SFE of retained austenite for Fe-8Mn-3Al-0.2C steel was in the range of 55-63 mJ/m2 and forFe-8Mn-3Al-0.2C steel was in the range of 30-33 mJ/m^2, which implies that the austenite in the former steel composition would undergodislocation glide or MBIP while in the latter composition TRIP/TWIP effect would be dominant.

Microstructure and property of medium-Mn duplex steel.

The intercritical annealed (at 750 oC for 1 hour) microstructure of the hot-rolled Fe-8Mn-8Al-0.4C and Fe-8Mn-4Al-0.25C is shown in Fig. 5 a and brespectively. A significant variation in the microstructure is observed with Al content variation in the steels. In Fe-8Mn-8Al-0.4Csteel, the annealed microstructure comprises of very coarse δ-ferrite, austenite and inter-granular carbides (Fig. 5a); while for Fe-8Mn-4Al-0.25Csteel, δ-ferrite is relatively very lower and the majority of the microstructure is ultra-fine-grained (UFG) ferrite/martensite and austenite(Fig. 5b). Depending on the steel composition, prior deformation state (hot rolled/cold rolled/normalized) and intercritical annealing conditions the medium Mn duplex steel microstructure can be tailored to obtain a desirable combination of mechanical properties. The strength-elongation range of some low Fe-Mn-Al-C steels are shown in Fig. 6. It can be seen that the (α + γ)-duplex and (α + γ + k-carbides)-triplex steels are superior in strength-ductility combination as well in density reduction as different strength-ductility enhancement mechanisms like TRIP, TWIP, MBIP and DBSR are operative in these steels.Ferrite-based duplex steels typically exhibit ultimate tensile strength (UTS) of 600–800 MPa and total elongation (TE) of 15–40 per cent, while the austenite-based duplex steels have superior properties having UTS is in range of 600–1400 MPa and TE in range of 20–60 per cent [35].



(a) (b)

Fig. 5 : Hot rolled and intercritical annealed (at 750 oC, 1 hour) microstructure of duplex steel (a) Fe-8Mn-8Al-0.4C steel (b) Fe-8Mn-4Al-0.25C steel

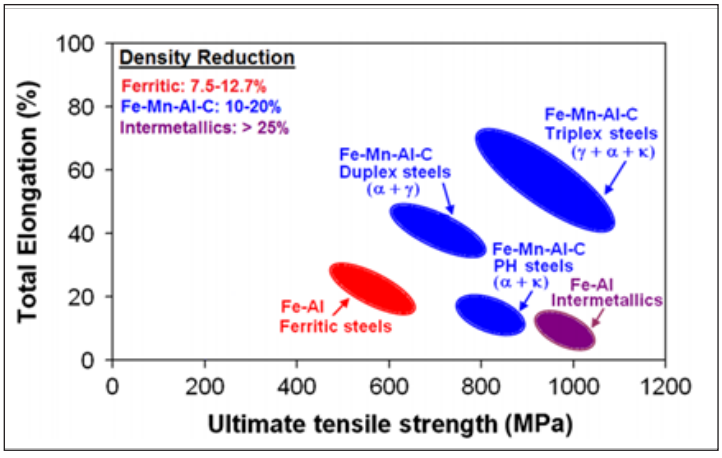


Fig. 6:Strength-elongation plot of Fe-Mn-Al-C steel (adapted from ref. [12]

Conclusion

The high-Al medium-Mn duplex steels reflect a promising weight-saving potential in automotive components. The combination of very high strength and lower density make these steels attractive choice for application in crash-resistant car body structures and structural components in cryogenic industry. With the advent of battery electric vehicles worldwide, Al-added medium Mn steels owing to their high specific strength can be used in several critical parts like battery casing, front and rear bumper for shock absorption during the event of a crash. However, several technological challenges need to be addressed for upscaling and industrial-level production of Al-added medium Mn steels. Especially, the steelmaking and casting process requires special attention. The large additions of Mn and Al in these steels are difficult to handle through the conventional steel making routes, as the formation of alumina in the liquid state can lead to nozzle clogging during continuous casting. Special inclusion engineering needs to be devised to handle inclusions arising due to the addition of Aluminium like Al-oxides. In particular, further research on optimization of alloys design, steelmaking and casting process, mechanical performance, and hydrogen embrittlement is required. These challenges make low-density Fe–Mn–Al–C steels attractive steels for further scientific and technological research.

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National News

KIOCL to expand in non-Chinese markets

KIOCL Limited (formerly Kudremukh Iron Ore Company Ltd) mulls focusing on non-Chinese markets in its efforts to expand the market for iron ore pellets, according to T Saminathan, Chairman and Managing Director.In this regard, KIOCL and Glencore International AG (GIAG) have signed a non-binding memorandum of understanding (MoU). As per the understanding, KIOCL Ltd will supply iron ore pellets to GIAG for further sale by GIAG in South Korean, European and non-Chinese markets. The MoU shall be valid for one year. Saminathan, who was in Mangaluru recently has said that market in China was dull not much is expected it. Thus, KIOCL is trying to concentrate on other markets for supply of iron ore pellets.

Indian Metals and Ferro Alloys to commence work on greenfield project in 2022

Odisha-based ferro chrome manufacturer, Indian Metals & Ferro Alloys limited (IMFA) is hopeful of getting land allocation for its proposed Rs. 550 crore greenfield expansion project at Kalinganagar in Odisha by next month. It plans to commence work on the project in 2022. According to Subhrakant Panda, Managing Director, IMFA, the company had received the State Government's approval for its one lakh tonne expansion project in 2019. But, the plan was put on hold owing to the Covid-19 induced pandemic. IMFA, which has manufacturing complexes in Therubali & Choudwar in Odisha, has a total capacity of 2,84,000 tonnes.They were however, waiting for land allocation from government which expectly will the allowed by next month. Work would commence on the project Bokaro admin plans to set up an industrial cluster on 1,000 acres

Bokaro admin plans to set up an industrial cluster on 1,000 acres

Bokaro will soon have an industrial cluster on 1,000 acres as part of the Union government's Amritsar-Kolkata industrial corridor. The cluster will come up on land owned by the Steel Authority of India Limited (SAIL). Sources in the district administration has expressed that the Jharkhand government has recently constituted a six-member committee to prepare a master plan for the project. SAIL subsidiary, Bokaro Steel Limited (BSL) will hand over 1,000 acres to the industries department for developing the cluster. Kolkata industrial corridor development project will encompass states like Gujarat, Haryana, Madhya Pradesh, Maharashtra, Rajasthan and Uttar Pradesh besides Jharkhand before the end of calendar year 2022.

Visakhapatnam Steel Plant relay hunger strike completes 255 days

The Central government's policy of the sale of PSUs to corporate groups, has extended to all sectors like aviation, railways and coal mines, and has thrown several workers out of their jobs, VisakhaUkkuParirakshanaPorata Committee leaders Mantri Rajasekhar and D. Adinarayana have said.They were addressing the workers, who are on a relay hunger strike, for the 255th day, demanding that the Centre revoke its decision on strategic sale of Visakhapatnam Steel Plant (VSP) at Kurmannapalem. They said that the government has put up for sale 400 railway stations, 90 passenger trains, 1,400 km of railway tracks and 265 goods sheds in the country, and deplored the Centre's decision to sell 120 coal mines in the next four years. Already some States are facing electricity shortages. The BJP government has also failed to implement any of the assurances given to Andhra Pradesh in the AP Reorganisation Act, 2014, they said.

Climate change: Tata Steel wants roadmap to make industry greener

Tata Steel says it needs a route map from the UK government before it decides how it would make steel in the future. There are fears that steel industry, as the biggest single emitter of CO_2 in the UK, might not fit into a new greener economy and thousands of jobs could be lost.That would damage communities in Port Talbot, Newport, Llanelli and Shotton. The UK government said it was supporting the steel industry. Tata Steel has already reduced its emissions and said it wants to go much further but has not yet worked out how. It said the industry alone could not solve the emissions problem and there had to be a partnership with government.

JSW Steel plans to levy surcharge on steel products as input cost mounts

To offset the rising input cost, domestic steel giant, JSW Steel is planning to levy a surcharge on sale of its steel products to its long-term OEM (original equipment manufacturer) customers, according to a top company official. JSW Steel will be the first company to introduce the concept of surcharge to the domestic steel market. There is a huge pressure on the cost of production. Cost of per tonne steel production went up by 19 per cent or Rs 6,600 per tonne quarter-on-quarter in July-September 2021, Seshagiri Rao, Joint Managing Director and Group CFO, JSW Steel, said.

JSW plans to set up modern colour coated steel manufacturing facility in Pulvama

JSW Steel plans to set up a modern colour-coated steel manufacturing facility of 120,000 tonne per annum along with special lines to produce 'steel sandwich panels' and 'steel doors' for Jammu and Kashmir market with investment of Rs.150 crore. Union Home Minister Amit Shah presented the papers allocating land at Pulvama to Sajjan Jindal, Chairman and Managing Director, JSW Group.Sajjan Jindal, Chairman JSW Group said this facility will provide immense benefits to local businesses and society in a meaningful way besides providing employment opportunities to the local youth and rejuvenating the Jammu and Kashmir economy.

JSW Steel plans to set up a modern colour-coated steel manufacturing facility of 120,000 tonne per annum along with special lines to produce 'steel sandwich panels' and 'steel doors' for Jammu and Kashmir market with investment of Rs.150 crore.

Arcelor-Nippon to invest –1 trillion in India over 10 years

ArcelorMittal and Nippon Steel Corp.'s joint venture steel company in India plans to invest about –1 trillion over 10 years to expand its operations in the country, a senior executive said.ArcelorMittal Nippon Steel India Ltd (AMNS India) is owned 60 per cent by the world's biggest steelmaker and the rest by Japan's Nippon Steel. ArcelorMittal acquired Essar Steel India Ltd in December 2019 for Rs.42,000 crore in one of the largest stressed-asset deals in the country. It then tied up with Nippon Steel, the world's third-largest steel producer. An integrated flat steel producer, AMNS India is the top steel producer in western India, with its main facility at Hazira, Gujarat.

Vardhman Special Steels Q2 Profit at Rs 24.29cr, increase of 172% yoy; Stock up 1%

Vardhman Special Steels Limited, amongst India's leading producers of special steels catering to diverse sectors of automotive, engineering, tractor, bearing and allied industries, has announced its unaudited financial results for the second quarter and half-year ended September 30, 2021, in the Board meeting held on October 25, 2021.The volumes for the quarter stood at 43,283 tonnes as against 43,986 tonnes in Q2FY21. Revenue from Operations stood at Rs335.65 crore in Q2 FY22, as against Rs247.09 crore in Q2FY21, a growth of 35.84 per cent mainly on account of higher sales realizations. Q2FY22 Profit stood at Rs24.29cr as against a profit of Rs8.94cr in Q2FY21, an increase of 171.72 per cent.EBITDA (including other income) for the quarter was Rs48.55 crore as against Rs26.67cr in Q2FY21, increase of 82.00 per cent, mainly due to increase in sales prices and cost saving initiatives. EBITDA per tonnes for the quarter was Rs11,216 as against Rs6,064 in Q2FY21.

ArcelorMittal and Nippon Steel Corp.'s joint venture steel company in India plans to invest about –1 trillion over 10 years to expand its operations in the country

Jindal Stainless second quarter net profit grows 5-fold to Rs 412 cr

Jindal Stainless Limited (JSL) posted a five-fold jump in consolidated net profit at Rs 411.62 crore for the September quarter, mainly on account of higher income. The company had clocked a net profit of Rs 80.64 crore during the July-September period of the 2020-21 financial year, JSL said in a regulatory filing. During the quarter under review, the company's total income rose to Rs 5,041.26 crore from Rs 3,324.15 crore a year ago.

Kadapa Steel Plant gets PCB go- ahead

The Andhra Pradesh Pollution Control Board (APPCB) has issued Consent for Establishment (CoE) to the Kadapa steel plant at Sunnapurallapalli and Peddadandluru villages of Jammalamadugumandal in Kadapa district. APPCB Chairman A.K. Parida said that the environmental clearance had been received on March 9, 2021, and the total project cost was Rs. 16,986 crore.The land area is 3,591 acres and the project will have 84.7 MW captive power generation.

Steel producers report strong growth in profit despite COVID-19

Despite disruptions caused by the fourth wave of the COVID-19 pandemic, steel producers still reported extraordinary profits.In its third-quarter financial report,

HoàPhát Group (HPG) posted a rise of 56 per cent year-on-year in revenue to VNĐ38.9 trillion (US$1.7 billion), resulting in record profit after tax of VNĐ10.35 trillion, 2.7 times higher compared to last year. As of September 30, the leading steel producer recorded revenue of over VNĐ105.8 trillion, up more than 60 per cent. Its profit after tax jumped 200 per cent over last year to VNĐ27.1 trillion, which exceeded 45 per cent of the year`s plan.

Shortage of containers, rising fuel costs are affecting engineering exports: EEPC chairman

Pending Merchandise Exports from India Scheme (MEIS) dues worth Rs. 35,000 crore pertaining to FY20 and nine months of 2020 (April to December) have impacted the working capital flow of many players, says Mahesh Desai, Chairman, EEPC India.The EEPC has also taken up issues like availability of containers and low awareness of FTAs as areas of concerns and has approached the Centre to address them. Desai talks about the outlook for FY22, MEIS dues, and the RoDTEP (remissions of duties and taxes on exported products) scheme, among others.

Steel companies see hot market extending into 2022

U.S. steelmakers said demand for steel will remain strong deep into next year, keeping prices high for customers such as auto and appliance makers and stoking continued investments in new mills.The extended boom in the $180 billion U.S. steel industry that began last year following the Covid-19-related shutdowns of mills is giving steelmakers more time to bring new plants into service and renew customer contracts at higher prices, executives said. Steel inventories remain tight as mill outages and transportation bottlenecks have crimped shipments, keeping some steel buyers on edge about acquiring enough supply in the coming months.

Steel ministry likely to seek applications from interested parties to take part in PLI scheme

The Union steel ministry is likely to seek applications soon from interested parties to take part in the Rs.6,322 crore production-linked incentive (PLI) scheme that seeks to promote production of speciality steel within the country from the middle of the next month.The ministry hopes the scheme, notified recently, to attract around Rs 45,000-crore investment during the five-year scheme period and it will enhance India’s manufacturing capacity of such grades to 42 million tonnes per annum from round 18 million tonnes per annum. Overall, India produced 102 million tonnes steel last year.Apart from substituting annual imports of speciality steel for use in automobile and power sectors among others, worth around Rs 33,000 crore a year with domestically manufactured product, the scheme will also help in augmenting India’s capacity of exporting of such products in the overseas markets. It will also promote India’s self-reliance in the steel sector.

EGS to address stakeholders' concern on PLI scheme for specialty steel: Minister

A meeting of empowered group of secretaries (EGS) will be called to address the issues of the companies looking to invest under the PLI scheme for specialty steel, The

Hon'ble Union Minister, said. Singh made the remarks while speaking at a seminar on 'PLI Scheme for Specialty Steel' organised by industry body FICCI here. The applications from companies looking to avail benefits of the scheme will be invited from second week of November, he said. If a stakeholder has any concern, it will be taken up at the meeting of the EGS, Hon'ble Union Minister said, without giving any timeline for the meeting. On July 22, the Union Cabinet chaired by Prime Minister Narendra Modi had approved a Rs 6,322-crore PLI scheme to boost production of specialty steel in India, attract additional investment of about Rs 40,000 crore and generate fresh 5.25 lakh job opportunities. The Ministry of Steel issued guidelines of the PLI scheme for specialty steel.

PLI Scheme would be a game changer on imports for specialty steel: SAILChairman

Hon'ble Union Minister, organised Seminar on Performance Linked Incentive (PLI) Scheme for Specialty Steel which was inaugurated by the Hon'ble Union Minister of Steel in presence of Shri Faggan Singh Kulaste, Hon'ble Union Minister of State for Steel.The seminar provides a platform to the stakeholders for brainstorming key features of the PLI scheme. The daylong seminar was organised along with MECON Ltd, FICCI, and Invest India. Soma Mondal, Chairman of Steel Authority of India Limited was also present at the seminar along with Pradip Kumar Tripathi, Secretary (Steel), Rasika Chaube, Additional Secretary (Steel), Salil Kumar, CMD MECON Limited, Dilipn Oommen, CEO Arcelor Mittal Nippon Steel India, Subhrakant Panda, VP, Federation of Indian Chambers of Commerce & Industry (FICCI), Deepak Bagla, MD and CEO Invest India. Speaking on the event Soma Mondal, expressed that the PLI Scheme would be a game-changer in reducing the dependency on the imports for Specialty Steel.

Aluminium industry flags coal crisis to PMO, warns of risk to a million jobs

Curtailment of coal supply to the industry has put at risk over one million livelihood and about 5,000 SMEs. The aluminium industry focesing on this fact has sought the intervention of the Prime Minister's Office (PMO) to resume regular fuel supply and provide adequate railway rakes.In a letter addressed to the principal secretary to the Prime Minister, the Aluminium Association of India stated that the industry has been receiving only 50 per cent of its required coal quantity since August 21, and currently the supply has been reduced drastically to 10 per cent. The industry is struggling to sustain operations with alarmingly depleted coal stocks of only 1.5-3 days and is on the verge of running out of the fuel. With the government taking several steps to address the issue of coal shortage at numerous power plants across the country, other industries — which run captive electricity generation units to supply electricity to its factories — have been complaining about the fuel crisis brewing in the sector.

WTO members to quiz India on ' trade distorting measures'

India will face questions from anxious World Trade Organisation (WTO) members at the Council for Trade in Goods meeting to be held recently on many of its "trade distorting measures" in recent months, including curbs on import of pneumatic tyres

and air conditioners.While Japan will raise the matter of mandatory certification for steel products and import restriction on air conditioners, Indonesia will raise questions about quality control orders and import restriction in the automotive sector for items such as wheel rims, safety glass and helmets as well as quality control order for plain copier paper. European Union and other countries will raise the matter of import policy on pneumatic tyres and restriction on import of certain pulses, while the US will question India on the order related to the requirement for GM-free certification accompanied with imported food consignments. Japan is “highly concerned" that the restriction on import of air-conditioners unfairly pressured companies to reconstruct their supply chains, and is inconsistent with GATT rules and TRIMS agreement.

International News

Chinese steel giant Baosteel reports stellar quarter despite high coal prices

Chinese listed steel producer, Baoshan Iron & Steel Co Ltd has said that its third-quarter net profit rose 68.6 per cent on an annual basis, defying intensified pressure from production curbs and higher raw material prices.The steel giant, known as Baosteel, pocketed 6.5 billion yuan ($1.02 billion) during the July-September quarter, it said in a filing to the Shanghai Stock Exchange. This was down from 9.7 billion yuan it earned in the second quarter but still well above profits the company made in the same period of 2020. Baosteel has expressed that during the third quarter, downstream demand like vehicles, home appliances and engineering machineries have been relatively weak and growth in overseas demand has slowed. Meanwhile, China's steel production and energy consumption controls also weighed on the company's profitability together with rising coal prices, according to the company. Prices for coking coal futures, a key steelmaking ingredient, on the Dalian Commodity Exchange, surged more than 80 per cent in the third quarter triggered by a coal supply crunch, crippling the impact of falling iron ore prices, which were down 32 per cent. Baosteel said it had managed to overcome the difficulty by adjusting production strategy and cutting costs.In the first three quarters, the steelmaker's net profit stood at 21.59 billion yuan, surging 174.5 per cent from the Jan-Sept period in 2020, it said.The company made 33.13 million tonnes of iron and 37.05 million tonnes of steel this year as of end-September, according to the filing.

German steel duo invests in XXL production

German steel company, Dillinger has agreed a new investment with its Steelwind Nordenham subsidiary to expand production for XXL monopiles.The €56.5m investment will allow for the production of super heavy steel sheets to enable the production of monopiles with less welding seams, the company said.Dillinger is, therefore,modernising its blast furnace at the Dillingen mill.SteelwindNordenham will also be able to significantly increase manufacturing capacities and productivity by expanding the bearing surfaces and optimising the shell casing to produce a larger number of monopile segments at higher bulk weights, it added.

Production restarts at Yorkshire Liberty Steel

Liberty Steel UK has relaunched production at its Greensteel Rotherham electric arc furnace, with restart and operation at night to maximise efficiency and mitigate high energy costs.Operations at Rotherham are scheduled to run between 11p.m. and 6 a.m. when energy costs will be lower. The site produces sustainably produced steel

for growth markets such as infrastructure and high value engineering and is among the UK's most electro-intensive industrial sites.Liberty's speciality steel division in nearby Stocksbridge, which produces steel components for demanding aerospace and energy applications, is also restarting production campaigns for key customers.

Gerdau expects 4-6% Brazilian steel demand growth in 2022

Long and flat-rolled steel producer, Gerdau expects demand to continue to grow in 2022, after a rapid recovery of the local market this year from the lows of 2020 that were caused by the Covid-19 pandemic, the Brazil-based company has said.Brazilian steel consumption was likely to rise by 4-6 per cent next year from 2021 levels, chief executive officer Gustavo Werneck said.Data from steelmakers' association Instituto AçoBrasil showed that apparent steel consumption in the country increased by 37.25 per cent year-on-year in the first nine months of 2021 to 20.96 million tonnes, compared with 15.27 million tonnes.The construction sector and some industrial sectors, such as capital goods, were estimated to have led that increase, while demand from long steel, retail and the automotive industry were more on the downside, he added.

Based on preliminary Census Bureau data, the American Iron and Steel Institute (AISI) has reported that the U.S. imported a total of 3,237,000 net tonnes of steel in September 2021, including 2,469,000 net tonnes of finished steel (up 16.7 per cent and 17.1 per cent, respectively, vs. August final data).

Steel imports up 34.9 per cent year-to-date through September

Based on preliminary Census Bureau data, the American Iron and Steel Institute (AISI) has reported that the U.S. imported a total of 3,237,000 net tonnes of steel in September 2021, including 2,469,000 net tonnes of finished steel (up 16.7 per cent and 17.1 per cent, respectively, vs. August final data). Through the first nine months of 2021, total and finished steel imports are 23,806,000 and 16,684,000 net tonnes, both up 34.9 per cent, vs. the same period in 2020. Annualised total and finished steel imports in 2021 would be 31.7 and 22.2 million net tonnes, up 44.2 per cent and 37.8 per cent, respectively, vs. 2020. Finished steel import market share was an estimated 25 per cent in September and is estimated at 21 per cent over the first nine months of 2021. Key finished steel products with a significant increase in imports in September compared to August are line pipe (up 111%), oil country goods (up 104%), reinforcing bars (up 70%), cut lengths plates (up 44%), wire rods (up 33%), tin plate (up 27%), plates in coils (up 22%), standard pipe (up 18%), cold rolled sheets (up 17%) and hot rolled sheets (up 16%). Products with a significant year-to-date (YTD) increase vs. the same period in 2020 were hot rolled sheets (up 106%), plates in coils (up 81%), wire rods (up 56%), sheets and strip all other metallic coatings (up 53%), cut lengths plates (up 52%), oil country goods (up 37%), heavy structural shapes (up 29%), cold rolled sheets (up 28%), hot rolled bars (up 26%), wire drawn (up 24%), sheets and strip hot dipped galvanized (up 20%), tin plate (up 17%) and reinforcing bars (up 13%).

Iran's H1 steel exports soar amid drop in domestic use

Iran's exports of steel increased significantly halfway through the calendar year starting March as steelmakers earmarked lower supplies to the domestic market, shows a report.The report by the ISNA news agency showed that steel shipments supplied to foreign buyers in the six months to September 22 had increased across the board for various products.The report cited figures by the Iranian Steel Producers

Association (ISPA) showing that the steel output supplied to the domestic market had dropped by 16 per cent compared to March-September 2020.The domestic supply of steel ingot dropped by 24 per cent to just over 9.5 million metric tonnes over the same period while the amount of sponge iron, or what is technically known as DRI, supplied to the domestic buyers had dropped by 8 per cent to 14.11 million tonnes, showed the ISPA figures.Exports of steel ingots from Iran had risen by 36 per cent in the six months to late September while overseas shipments of bars and sheet metals had increased by 71 per cent and 62 per cent, respectively, said the report. It added that Iran's DRI supply to foreign customers had surged by 287 per cent half way through the calendar year.The report said that Iranian steelmakers seemed to have prioritized exports in the second quarter of the current calendar year to compensate for losses suffered over the summer because of forced power cuts in their plants. The Iranian government imposed brief outages on steel and cement manufacturers starting July to prevent recurrent power cuts in large cities.However, the measure caused a major decline in steel output in several large plants across the country while causing prices hikes for certain products in the domestic market.

US Steel considering Fairfield plant for $3 billion expansion

Jefferson County Commissioners working on competitive incentive package to make U.S. Steel consider Fairfield, county. U.S. Steel has a lot of plants across the country, which gives the company a lot of options. There are certain things it is looking for that the Fairfield plant has. If the expansion takes please or Fairfield is chosen, city leaders hope that would bring in more jobs.

POSCO reports highest ever quarterly profit in Q3

South Korean steelmaker, POSCO reported its highest-ever quarterly operating profit in the third quarter, as a surge in steel prices was fanned by reduced supply from China. POSCO, the world's sixth-largest steelmaker, has said that its consolidated operating profit for the July-September quarter was 3.1 trillion won ($2.63 billion), matching its forecast earlier this month. It reported 667 billion won in operating profit a year earlier. Revenue rose 45 per cent to 20.6 trillion won in the third quarter. POSCO has revised its consolidated 2021 revenue target to 74.1 trillion won from 66.4 trillion won previously, as it expected tight steel supply to continue for the rest of the year. China, the world's top steel producer, saw September daily crude steel output fall to its lowest since December 2018, due to environmental curbs to reduce smog and carbon emissions as well as a power crunch in many areas. POSCO shares rose 1.3 per cent after the earnings results were published, while the wider market (KS11) was down 0.1 per cent.

South Korean steelmaker, POSCO reported its highest-ever quarterly operating profit in the third quarter, as a surge in steel prices was fanned by reduced supply from China.

Mexico's steel exports set record

Compared with the period before the Covid-19 pandemic, steel exports in the first seven months of this year had an advance of 26.8 percent.Among the largest manufacturers of this metal in Mexico are: Ternium, Grupo Villacero, AHMSA, DeAcero, Industrias CH, ArcelorMittal, Grupo Simec, Grupo Collado, Molymex and Hydro Aluminum México.Before, in the periods from January to July, Mexico's steel exports were $ 4.754 million in 2017 and $ 5.831 million in 2018.

Nucor plans $2.78 steel plant: its largest construction project ever

Nucor Corphas is contemplating to setup a $2.7 billion sheet steel plant, targeting low-carbon production for automotive steel to serve car manufacturers in the South and Midwest. Nucor is considering sites in Ohio, Pennsylvania and West Virginia. The Charlotte steelmaker plans to start construction next year on the plant, which will have an anticipated capacity of 3 million tonnes, and put it into operation in 2024. It would be the largest construction project in Nucor's history. The move comes among rising fears of excess capacity in the U.S. industry. Many major steel producers, including Nucor, have recently seenstock prices fall as U.S. Steel Corp. announced its own plans for a 3 million-tonne sheet mill plant. Nucor CEO, Leon Topalian attempted to address that issue head on in his conference call about the plan, even before analysts asked. He said that they expected that many would be thinking about the project and what it meant to the broader industry landscape of North America. According to him the market needed a steelmaking facility of the caliber, built and operated by the industry leader, and they believed that there were several million more tonnes that were vulnerable and might become obsolete in the coming years due to cost position and carbon intensity.

Vietnam steel exports surge 127 pc

Steel exports increased by 43.4 per cent year-on-year in the first eight months to 8.54 million tonnes, and were worth US$7.1 billion, a 127 per cent rise.In August, for a second month in a row, the billion-dollar mark was breached, with the value of shipments increasing 2.5-fold to nearly $1.5 billion.The main export markets were Southeast Asia, which bought 2.7 million tonnes and China (1.8 million tons). Exports to the E.U. and U.S. skyrocketed 7.5-fold and four-fold from 12 months earlier as demand there continued to soar.Exports to Europe also benefited from the EU-Vietnam Free Trade Agreement, with many companies taking advantage of lower tariffs.According to the Vietnam Steel Association, the country's production capacity is around 24 million tonnes a year. Output this year is expected to reach 21.2 million tonnes, enough to meet domestic and export needs.

Bangladesh steel scrap: Major mills avoid container after recent bulk buys

The largest steelmakers in Bangladesh were largely out of the market for containers of steel scrap following recent deep-sea cargo bookings, market participants have expressed. In recent deals, two deep-sea cargoes were booked to a mill in Bangladesh from the United States West Coast at $530 per tonne cfr for shredded, while a second mill booked deep-sea material from Australia and New Zealand at $515 per tonne cfr for HMS 1&2 (80:20), sources said.This latest round of buying was done at prices lower than sales from the US West Coast in early August, in which deals were done around $540-542 per tonne cfr Bangladesh for HMS 1&2 (80:20), sources said.

US Steel plans to build $3 billion mini mill

U.S. Steel has said, that it had begun looking for a site in the U.S. to build a state-of-the art mini mill at an estimated cost of $3 billion.The Pittsburgh-based steelmaker

said the investment would be a significant step toward, achieving the company's goal of reducing its global greenhouse gas emissions and would help meet its target of net zero carbon emissions by 2050. The planned mini mill will combine two electric arc furnaces with differentiated steelmaking and finishing technology. Electric arc furnaces are cleaner and more flexible than the company's legacy fleet of blast furnaces.U.S. Steel operates electric arc furnaces at its Fairfield Works in Alabama and its Big River Steel mini mill in Arkansas. Potential sites for the new mini mill include Alabama and Arkansas, as well as greenfield sites, the company said.

Brazil crude steel production up by 15.3% in September

In September 2021, The Brazilian production of crude steel rose by 15.3 per cent during September 2021 to 3.1 million tonnes, compared to the same month in 2020, according to data from the local steel institute AçoBrasil.Rolled steel production was 2.1 million tonnes, 8.5 per cent more than that in September, 2020. The production of semi-finished goods for sales was 695,000 metric tonnes, an increase of 52.3 per cent compared to the same month in 2020. Domestic sales increased 1.2 per cent compared to September, 2020, reaching 1.9 million tonnes. Apparent consumption of steel products was 2.2 million metric tonnes, 8.5 per cent higher than that of the same period of the previous year. Exports for September were 949 thousand tonnes, or US$942 million, which resulted in an increase of 26.6 per cent and 150.1 per cent, respectively, compared to the same month in 2020. September 2021 imports were 358 thousand tons and US$414 million, up 151.1 per cent in quantum and 139.4 per cent in value when compared to that recorded in September 2020.In the accumulated from January to September 2021, the Brazilian production of crude steel was 27.2 million tonnes which is an increase of 20.2 per cent compared to the same period of the previous year. The production of rolled products in the same period was 20.1 million tonnes, an increase of 28.7 per cent compared to the same period in 2020. The production of semi-finished products for sales totaled 6.2 million tonnes from January through September 2021, an increase of 6.3 per cent on the same basis of comparison. Domestic sales were 17.9 million tonnes from January through September 2021, a 29.7 per cent increase when compared to the same period of the previous year.The national apparent consumption of steel products was 21.0 million tonnes in the year to September 2021. This result represents a 37.3 per cent increase compared to the same period in 2020.Imports reached 3.9 million tonnes in the accumulated to September, 2021, an increase of 162.7 per cent compared to the same period of the previous year. In value, imports reached US$ 3.6 billion and advanced 126.7 per cent in the same comparison period.

Asia steel billet importers fear more volatility in the coming months

Expectations of further volatility in the steel markets for the remainder of 2021 were reportedly influencing buying habits among some importers of steel billet in Asia. China's absence from buying on the import steel billet market continued in mid-September, with consumers able to pay a maximum of $700-710 per tonne cfr for 3sp billet. But prices in Southeast Asia have moved above this level in the recent past.

There was more volatility ahead, the more was a real risk premium on later shipment dates for billet now, it has been reported. He added that booking a December-shipment cargo would be riskier because he had no idea what the price in the finished steel markets might be by the time the material arrived. However, if 5sp billet were available for shipment within a few weeks' time, he said, he would take a cargo at $720-730 per tonnecfr Indonesia.

Bluescope rides robust steel demand in the US and Australia

Australia's biggest steelmaker, BlueScope has lifted its profit forecast by almost 17 per cent for the December half as it benefits from strong steel prices and booming demand in both the United States and Australia.The company in August reported its highest annual profit in 19 years and the buoyant conditions are continuing, although some investors believe the golden days in this cycle have already been factored in. BlueScope shares were up 0.8 per cent to $20.30 but have faded from above $25 in mid-August.

Excerpts are from leading Indian dailies Metal Bulletin, Steel Guru, SEASI steel letter and other important Journals and websites.

Upcoming Events/October 2021

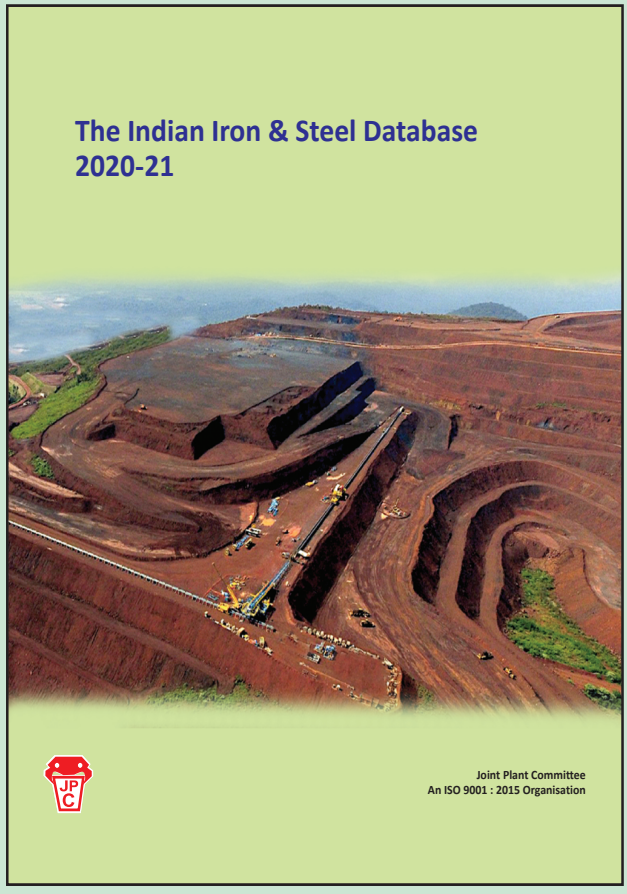
International Conference on Ferrous Metallurgy; Date: Thu, 18 Nov 2021; Venue: map London, United Kingdom; Organiser: World Academy of Science; Contact: https://waset.org/

International Conference on Ferrous Metallurgy: Date: November 18, 2021; Venue: London, United Kingdom; Organiser:World Academy of Science Contact: https://waset.org/

Asia Steel 2021: Date: December 05, 2021; Venue: South Korea; Organiser:The Korean Institute of Metals and Materials; Contact: secretary@asiasteel2021.org

NASCC: The Steel Conference 2022; Date: 23 Mar 2022; Venue: map Colorado Convention Center, Denver, Colorado, USA; Organiser: American Institute of Steel Construction; Contact: nascc@aisc.org

5th International High Manganese Steel Conference 2022; Date: 23 May 2022; Venue: map Voestalpine Stahlwelt Linz, Austria; Organiser: Austrian Society for Metallurgy and Materials; Contact: asmet@asmet.at



The Indian Iron and Steel Database, 2020-21

The vast, heterogenous and complex nature of the spread of the modern day domestic iron and steel industry has necessitated an enumeration – a State/UT-wise listing of the iron and steel units. Accordingly, with dissemination of information as one of its core activity, Joint Plant Committee (JPC) has come up with its latest offering, the ***"The Indian Iron and Steel Database"*** – a first of its kind publication which provides a detailed listing of the units present in the country in 2020-21, segment-wise, category-wise and most importantly - and which is the cornerstone of the publication - State/UT-wise.

Price: Rs. 15000/-

To purchase, Contact:

Joint Plant Committee

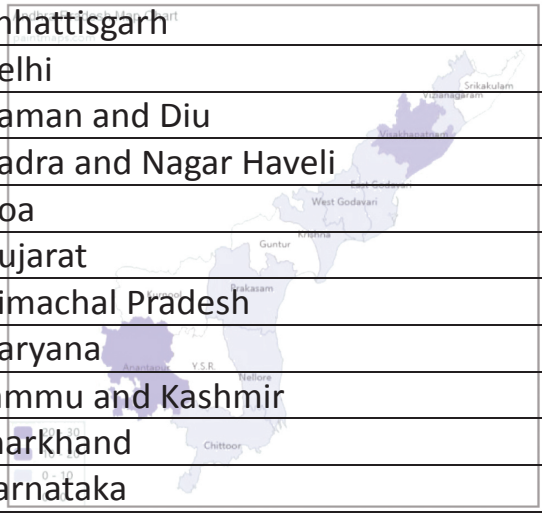
Ispat Niketan, 52/1A, Ballygune Circular Road, Kolkata – 700019

Tel: (033) 2461 4055 ;Email: jpc.kolkata@gmail.com

Content

ANDHRA PRADESH

District Wise Distribution



DISTRICT	NO. OF UNITS
ANANTAPUR	
CHITTOOR	
EAST-GODAVARI	
KRISHNA	
NELLORE	
PRAKASAM	
VISAKHAPATNAM	
VIZIANAGARAM	
WEST-GODAVARI	
TOTAL	

Segment Wise Distribution

	Segment		No. of Units	Capacity('000 tonnes)
I	**Pellets**			
II	**Sponge Iron**			
III	**Blast Furnace**			
IV	**Crude Steel**			
	1	BOF		
	2	Induction Furance		
	Total Crude Steel (1-2)			
	3	Re-rolling		
	4	Colour Coated		
	5	Pipes		
V	**Finished Steel (3-5)**			

Performance of the Indian Iron & Steel Industry: A Statistical Summary April - September 2021 (prov.)

Trends in Production, Export, Import and Consumption

Overall Production

- **Crude Steel:** Production at 57.159 million tonnes (mt), up by 30.0%.
- **Hot Metal:** Production at 38.481 mt, up by 27.4%.
- **Pig Iron:** Production at 3.054 mt, up by 44.8%.
- **Sponge Iron:** Production at 19.142 mt, up by 27.8%, led by coal-based route (76% share).

Total Finished Steel

- At 53.341 mt, production of total finished steel was up by 35.9% in April-September 2021. Contribution of the non-alloy steel segment stood at 49.946 mt (94% share, up by 33.9%), while the rest was the contribution of the alloy steel segment (including stainless steel).
- Overall exports of total finished steel at 7.754 mt, up by 18.5%.
- Overall imports of total finished steel at 2.373 mt, up by 19.6%.
- India was a net exporter of total finished steel in April-September 2021.
- At 49.114 mt, consumption of total finished steel was up by 34.4% in April-September 2021. Contribution of the non-alloy steel segment stood at 45.339 mt (92% share, up by 31.9%), while the rest was the contribution of the alloy steel segment (including stainless steel).

Note: All growth figures as compared to same period of last year; All data are provisional
Source: JPC

CRUDE STEEL PRODUCTION

(In '000 tonnes)

	Producers	APRIL - SEPTEMBER 2021 - 22 (Prov.)	2020 - 21 (Final)	% Variation
A	SAIL	8238	6291	31.0
B	TSL GROUP	9369	7816	19.9
C	RINL	2762	1425	93.8
D	AM / NS (ESSAR) GROUP	3722	2985	24.7
E	JSPL	3644	3262	11.7
F	JSWL	8075	6631	21.8
G	OTHER	21350	15550	37.3
TOTAL PRODUCTION		**57159**	**43960**	**30.0**

Category-wise Production of Finished Steel
APRIL - SEPTEMBER 2021 (2021 - 22)

('000 tonnes)

	Category	SAIL, RINL, TSL Group, AM/NS, JSWL & JSPL		Other Producers		Production	
		2021-22 (Prov)	2020-21	2021-22 (Prov)	2020-21	2021-22 (Prov)	2020-21
I.	Pig Iron	914	639	2,140	1,470	3,054	2,109
II.	Sponge Iron	5,773	4,315	13,369	10,660	19,142	14,975
III.	Semis	35,810	28,410	21,350	15,550	57,159	43,960
IV.	**Finished Steel Equivalent (Non - Alloy)**						
	Bars & Rods	7,244	4,183	13,793	10,085	21,037	14,268
	Structurals	998	606	2,276	2,064	3,273	2,670
	Rails & Rly. Materials	658	735	6	11	664	746
	PM Plates	2,442	1,668	51	26	2,493	1,695
	HR coils/skelps/strips	19,042	15,456	3,438	2,462	22,479	17,919
	TOTAL (Non - Alloy)	**30,384**	**22,648**	**19,563**	**14,649**	**49,946**	**37,298**
V.	**Finished Steel Equivalent (Alloy)**						
	Non - Flat	511	247	1,402	689	1,913	936
	Flat	40	125	91	52	131	177
	TOTAL (Finished Steel Alloy)	**551**	**372**	**1,493**	**741**	**2,044**	**1,113**
VI.	**Finished Steel Equivalent (Stainless)**						
	Non - Flat	0	0	349	232	349	232
	Flat	91	75	912	543	1,002	617
	TOTAL (Stainless)	**91**	**75**	**1,261**	**775**	**1,351**	**849**
	TOTAL (Finished Steel Equivalent)	**31,025**	**23,095**	**22,316**	**16,165**	**53,341**	**39,260**

CRUDE STEEL TO FINISHED STEEL EQUIVALENT (Prov.)
APRIL 2021 - SEPTEMBER 2021 (2021 - 2022)

('000 tonnes)

CATEGORY	PRODUCTION							
	SAIL	TSL GROUP	RINL	AM/NS (ESSAR)	JSPL	JSWL	OTHERS	TOTAL
SEMIS	8238	9369	2762	3722	3644	8075	21350	**57159**
FINISHED STEEL (NON - ALLOY)								
BARS & RODS	1375	1669	1591	0	980	1629	13793	**21037**
STRUCTURALS	466	0	181	0	350	0	2276	**3273**
RLY. MATERIALS	582	0	0	0	76	0	6	**664**
TOTAL(NON-FLAT)	**2423**	**1669**	**1772**	**0**	**1406**	**1629**	**16074**	**24974**
PM PLATES	1522	0	0	371	550	0	51	**2493**
HR COIL/STRIP	2458	7206	0	3304	405	5668	3438	**22479**
TOTAL(FLAT)	3980	7206	0	3675	955	5668	3489	**24972**
TOTAL(Non-Alloy)	6403	8875	1772	3675	2361	7297	19563	**49946**
FINISHED STEEL (ALLOY)								
NON-FLAT	3	200	0	0	56	252	1402	**1913**
FLAT	0	0	0	0	2	38	91	**131**
TOTAL(Alloy)	3	200	0	0	58	290	**1493**	**2044**
FINISHED STEEL (Stainless)								
NON-FLAT	0	0	0	0	0	0	349	**349**
FLAT	91	0	0	0	0	0	912	**1002**
TOTAL(Stainless)	91	0	0	0	0	0	**1261**	**1351**
FINISHED STEEL (Non-Alloy +Alloy+ Stainless)								
TOTAL(NON-FLAT)	**2427**	**1869**	**1772**	**0**	**1462**	**1881**	**17825**	**27236**
TOTAL(FLAT)	**4070**	**7206**	**0**	**3675**	**957**	**5706**	**4491**	**26105**
TOTAL Finished Steel	**6497**	**9075**	**1772**	**3675**	**2419**	**7587**	**22316**	**53341**

PRODUCTION, IMPORT, EXPORT & CONSUMPTION OF IRON & STEEL (Prov.)
APRIL 2021 - SEPTEMBER 2021 (2021 - 2022)

('000 tonnes)

CATAEGORY	PRODUCTION	IMPORTS	EXPORT	AVAILABILITY	Stock			CONSUMPTION		Consumption Variation Over Last Year(%)
					As on 01-APR-2021	As On 30-SEP-2021	Variation in Stock	Current Year	Last Year	
SEMIS	**57159**	**85**	**2989**	**54255**	**679**	**820**	**141**	**54114**	**39558**	**36.80**
FINISHED STEEL (Non - Alloy)										
BARS & RODS	21037	43	1264	19816	4365	3325	-1040	20856	14930	39.69
STRUCTURALS	3273	8	109	3172	247	247	0	3171	2732	16.09
RLY. MATERIALS	664	38	0	701	180	173	-6	708	771	-8.2
TOTAL(NON-FLAT)	**24974**	**89**	**1374**	**23689**	**4791**	**3745**	**-1046**	**24735**	**18433**	**34.19**
PM PLATES	2493	126	442	2178	470	508	38	2139	1709	25.18
HR COIL/STRIP & Equivalent	22479	1284	5366	18397	3583	3516	-67	18465	14242	29.65
TOTAL(FLAT)	24972	1411	5808	20575	4052	4024	-29	20604	15951	29.17
TOTAL(Non-Alloy)	49946	1499	7182	44264	8843	7769	-1075	45339	34384	31.86
FINISHED STEEL (Alloy)										
NON-FLAT	1913	110	259	1764	83	32	-51	1815	953	90.45
FLAT	131	344	54	421	7	4	-3	424	353	20.19
TOTAL(Alloy)	**2044**	**454**	**313**	**2185**	**90**	**36**	**-54**	**2239**	**1306**	**71.47**
FINISHED STEEL (Stainless)										
NON-FLAT	349	16	90	275	15	6	-10	285	171	66.5
FLAT	1002	403	169	1236	19	3	-15	1251	677	84.95
TOTAL(Stainless)	**1351**	**419**	**260**	**1511**	**34**	**9**	**-25**	**1536**	**848**	**81.23**
FINISHED STEEL (Non-Alloy +Alloy+ Stainless)										
TOTAL(NON-FLAT)	**27236**	**215**	**1723**	**25728**	**4889**	**3783**	**-1106**	**26834**	**19557**	**37.21**
TOTAL(FLAT)	**26105**	**2158**	**6031**	**22232**	**4078**	**4031**	**-47**	**22279**	**16980**	**31.21**
TOTAL Finished Steel	**53341**	**2373**	**7754**	**47960**	**8967**	**7813**	**-1154**	**49114**	**36537**	**34.4**

Note:For Import,Export,Availability,Stock Variation & Consumption, all items across the value chain have been taken

DOWNSTREAM PRODUCTION / VALUE ADDED PRODUCTION (PROV.)
APRIL 2021 - SEPTEMBER 2021 (2021 - 2022)

'000 tonnes

CATEGORY	PRODUCTION							
	SAIL	TSL GROUP	RINL	AM/NS (ESSAR)	JSPL	JSWL	OTHERS	TOTAL
FINISHED STEEL (Non-Alloy)								
HSM PLATES	0	0	0	159	61	18	0	238
HR SHEETS	58	62	0	866	0	156	0	1141
CR COIL/SHEETS	594	1745	0	812	0	3974	2411	9535
GP/GC SHEETS/COIL	78	626	0	496	0	1389	1354	3942
COLOR COATED COILS/SHEET	0	98	0	190	0	416	423	1127
ELECTRICAL COILS/SHEETS	28	0	0	0	0	85	94	207
TIN PLATES (incl ww)	0	0	0	0	0	87	183	270
PIPES (LARGE DIA.)	27	142	0	136	0	0	1254	1559
TMBP	0	0	0	0	0	0	4	4
TIN FREE STEEL	0	0	0	0	0	0	3	3
FINISHED STEEL (Alloy)								
FLAT	0	0	0	0	0	0	194	**194**
FINISHED STEEL (Stainless)								
FLAT	25	0	0	0	0	0	299	**324**

DOWNSTREAM / VALUE ADDED PRODUCTION, IMPORT,EXPORT & CONSUMPTION (PROVISIONAL)
APRIL 2021 - SEPTEMBER 2021 (2021 - 2022)

('000 tonnes)

CATAEGORY	PRODUCTION	Consumed For DownStream Processing	IMPORT	EXPORT	AVAILABILITY	Stock			CONSUMPTION		Consumption Variation Over Last Year(%)
						As on 01-APR-2021	As On 30-SEP-2021	Variation in Stock	Current Year	Last Year	
HR Coils/Strips		**13554**									
FINISHED STEEL (Non - Alloy)											
HR PLATES	238	0	0	0	238	0	0	0	238	182	30.75
HR SHEETS	1141	0	0	2	1139	314	332	18	1122	835	34.31
CR COIL/SHEETS	9535	4297	144	681	4702	1462	1396	-66	4768	2691	77.15
GP&GC/GALVALUME	3942	1127	345	1005	2155	192	214	22	2133	1989	7.21
COLOR COATED COILS/ SHEET	1127	0	46	148	1025	47	65	18	1007	936	7.58
ELECTRICAL COILS/ SHEETS	207	0	226	17	416	11	14	2	413	304	36.07
TIN PLATES (incl ww)	270	0	50	22	298	13	24	11	287	225	27.32
PIPES (LARGE DIA.)	1559	0	71	55	1575	193	117	-76	1651	1498	10.2
TMBP	4	0	0	0	4	0	0	0	4	3	69.83
TIN FREE STEEL	3	0	11	1	13	0	0	0	13	23	-43.72
FINISHED STEEL (Alloy)											
FLAT	194	0	166	16	344	0	0	0	344	75	359.85
FINISHED STEEL (Stainless)											
FLAT	324	0	323	94	552	3	2	0	552	299	84.85

CRUDE STEEL TO FINISHED STEEL EQUIVALENT
APRIL 2020 - SEPTEMBER 2020 (2020 - 2021)

('000 tonnes)

CATEGORY	PRODUCTION							
	SAIL	TSL GROUP	RINL	AM/NS (ESSAR)	JSPL	JSWL	OTHERS	TOTAL
SEMIS	6291	7816	1425	2985	3262	6631	15550	**43960**
FINISHED STEEL (NON - ALLOY)								
BARS & RODS	742	1058	657	0	645	1081	10085	**14268**
STRUCTURALS	292	0	44	0	269	0	2064	**2670**
RLY. MATERIALS	683	0	0	0	52	0	11	**746**
TOTAL(NON-FLAT)	**1717**	**1058**	**702**	**0**	**966**	**1081**	**12161**	**17685**
PM PLATES	977	0	0	328	364	0	26	**1695**
HR COIL/STRIP & Equivalent	1631	6068	0	2649	329	4779	2462	**17919**
TOTAL(FLAT)	2608	6068	0	2978	692	4779	2489	**19613**
TOTAL(Non-Alloy)	4325	7125	702	2978	1658	5860	14649	**37298**
FINISHED STEEL (ALLOY)								
NON-FLAT	0	93	0	0	32	123	689	**936**
FLAT	0	0	0	0	0	125	52	**177**
TOTAL(Alloy)	0	93	0	0	32	247	**741**	**1113**
FINISHED STEEL (Stainless)								
NON-FLAT	0	0	0	0	0	0	232	**232**
FLAT	75	0	0	0	0	0	543	**617**
TOTAL(Stainless)	75	0	0	0	0	0	**775**	**849**
FINISHED STEEL (Non-Alloy +Alloy+ Stainless)								
TOTAL(NON-FLAT)	**1717**	**1150**	**702**	**0**	**998**	**1204**	**13082**	**18853**
TOTAL(FLAT)	**2682**	**6068**	**0**	**2978**	**692**	**4904**	**3083**	**20407**
TOTAL Finished Steel	**4399**	**7218**	**702**	**2978**	**1690**	**6108**	**16165**	**39260**

PRODUCTION,IMPORT, EXPORT & CONSUMPTION OF IRON & STEEL
APRIL 2020 - SEPTEMBER 2020 (2020 - 2021)

('000 tonnes)

CATAEGORY	PRODUCTION	IMPORTS	EXPORT	AVAILABILITY	Stock			CONSUMPTION		Consumption Variation Over Last Year(%)
					As on 01-APR-2020	As On 30-SEP-2020	Variation in Stock	Current Year	Last Year	
SEMIS	**43960**	**128**	**4439**	**39649**	**613**	**704**	**91**	**39558**	**53750**	**-26.40**
FINISHED STEEL (Non - Alloy)										
BARS & RODS	14268	42	510	13800	7704	6574	-1131	14930	20378	-26.73
STRUCTURALS	2670	14	47	2637	400	305	-95	2732	3396	-19.55
RLY. MATERIALS	746	29	7	768	188	185	-3	771	830	-7.13
TOTAL(NON-FLAT)	**17685**	**84**	**564**	**17205**	**8292**	**7064**	**-1228**	**18433**	**24604**	**-25.08**
PM PLATES	1695	205	271	1629	624	544	-80	1709	2328	-26.58
HR COIL/STRIP & Equivalent	17919	1040	5304	13654	4693	4106	-587	14242	20403	-30.19
TOTAL(FLAT)	**19613**	**1245**	**5575**	**15284**	**5317**	**4650**	**-667**	**15951**	**22731**	**-29.82**
TOTAL(Non-Alloy)	**37298**	**1329**	**6139**	**32488**	**13609**	**11714**	**-1896**	**34384**	**47335**	**-27.36**
FINISHED STEEL (Alloy)										
NON-FLAT	936	123	78	982	49	78	29	953	1654	-42.39
FLAT	177	312	150	339	18	4	-14	353	530	-33.5
TOTAL(Alloy)	**1113**	**436**	**228**	**1320**	**68**	**83**	**15**	**1306**	**2185**	**-40.23**
FINISHED STEEL (Stainless)										
NON-FLAT	232	13	59	186	3	18	15	171	241	-28.97
FLAT	617	207	119	705	6	35	28	677	1228	-44.91
TOTAL(Stainless)	**849**	**220**	**178**	**891**	**9**	**53**	**44**	**848**	**1469**	**-42.3**
FINISHED STEEL (Non-Alloy +Alloy+ Stainless)										
TOTAL(NON-FLAT)	**18853**	**221**	**701**	**18373**	**8344**	**7160**	**-1184**	**19557**	**26500**	**-26.19**
TOTAL(FLAT)	**20407**	**1764**	**5844**	**16327**	**5342**	**4689**	**-653**	**16980**	**24489**	**-30.66**
TOTAL Finished Steel	**39260**	**1985**	**6544**	**34700**	**13686**	**11849**	**-1837**	**36537**	**50989**	**-28.34**

Note:For Import,Export,Availability,Stock Variation & Consumption, all items across the value chain have been taken

DOWNSTREAM PRODUCTION / VALUE ADDED PRODUCTION
APRIL 2020 - SEPTEMBER 2020 (2020 - 2021)

('000 tonnes)

CATEGORY	PRODUCTION							
	SAIL	TSL GROUP	RINL	AM/NS (ESSAR)	JSPL	JSWL	OTHERS	TOTAL
FINISHED STEEL (Non-Alloy)								
HSM PLATES	0	0	0	118	56	9	0	182
HR SHEETS	43	15	0	638	0	137	0	833
CR COIL/SHEETS	295	1086	0	614	0	2423	1522	5940
GP/GC SHEETS/COIL	55	528	0	394	0	829	1214	3020
COLOR COATED COILS/SHEET	0	78	0	159	0	290	417	943
ELECTRICAL COILS/SHEETS	15	0	0	0	0	55	56	126
TIN PLATES (incl ww)	0	0	0	0	0	85	109	194
PIPES (LARGE DIA.)	22	101	0	81	0	0	1283	1486
TMBP	0	0	0	0	0	0	3	3
TIN FREE STEEL	0	0	0	0	0	0	0	0
FINISHED STEEL (Alloy)								
FLAT	0	0	0	0	0	0	147	**147**
FINISHED STEEL (Stainless)								
FLAT	15	0	0	0	0	0	203	**217**

DOWNSTREAM / VALUE ADDED PRODUCTION, IMPORT,EXPORT & CONSUMPTION
APRIL 2020 - SEPTEMBER 2020 (2020 - 2021)

('000 tonnes)

CATAEGORY	PRODUCTION	Consumed For DownStream Processing	IMPORT	EXPORT	AVAILABILITY	Stock			CONSUMPTION		Consumption Variation Over Last Year(%)
						As on 01-APR-2020	As On 30-SEP-2020	Variation in Stock	Current Year	Last Year	
HR Coils/Strips		**9138**									
FINISHED STEEL (Non - Alloy)											
HR PLATES	182	0	0	0	182	0	0	0	182	298	-38.85
HR SHEETS	833	0	1	9	825	334	324	-10	835	1244	-32.86
CR COIL/SHEETS	5940	3278	84	300	2446	1944	1699	-246	2691	3652	-26.30
GP&GC/GALVALUME	3020	943	253	372	1957	316	284	-32	1989	2925	-32.00
COLOR COATED COILS/ SHEET	943	0	50	51	942	61	67	6	936	1144	-18.17
ELECTRICAL COILS/ SHEETS	126	0	180	17	289	46	32	-15	304	524	-42
TIN PLATES (incl ww)	194	0	49	8	235	0	10	10	225	319	-29.23
PIPES (LARGE DIA.)	1486	0	70	56	1500	129	131	3	1498	1833	-18.27
TMBP	3	0	0	0	3	0	0	0	3	2	18.42
TIN FREE STEEL	0	0	24	1	23	0	0	0	23	43	-46.91
FINISHED STEEL (Alloy)											
128	147	0	54	126	75	0	0	0	75	85	-12.02
FINISHED STEEL (Stainless)											
FLAT	217	0	151	59	309	1	11	10	299	995	-69.98

JOINT PLANT COMMITTEE

IMPORT OF IRON & STEEL THROUGH MAJOR INDIAN PORTS

CATEGORYWISE IMPORT REPORT FOR PERIOD 01-Apr-21 To 30-Sep-21(PROV.)

Quantity : '000 tonnes
Value : Rs. Crores

SL No	CATEGORY	Carbon Steel (Prime)		Carbon Steel (Seconds/ Defective)		Alloy/Stainless Steel		Total		
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value (Rs Crs)	Value (USD million)
I	**STEEL**									
	A.SEMIS									
	.....Billets,Slabs,etc.	8.4	41.2	0.0	0.0	20.8	326.4	29.2	367.6	49.7
	.....Re-rollable Scrap	56.0	192.1	0.0	0.0	0.0	1.0	56.0	193.0	26.1
	B.FINISHED STEEL									
	1. Non-Flat Products									
	BARS & RODS	42.9	267.2	0.1	0.4	124.7	1879.6	167.8	2147.2	290.5
	STRUCTURALS	7.5	52.3	0.0	0.0	1.5	17.2	9.0	69.5	9.4
	RLY. MATERIALS	38.1	305.1	0.0	0.0	0.0	0.0	38.1	305.1	41.3
	TOTAL (1) Non-Flat Products	**88.6**	**624.6**	**0.1**	**0.4**	**126.2**	**1896.8**	**214.9**	**2521.8**	**341.2**
	2. Flat Products									
	PLATES	126.4	965.9	0.0	0.1	41.6	515.6	168.0	1481.5	200.5
	HR SHEETS	0.0	0.0	0.0	0.0	4.6	43.7	4.6	43.7	5.9
	HR COIL/STRIP	389.7	2467.5	0.0	0.0	216.7	2198.1	606.4	4665.7	631.3
	CR COIL/SHEETS	139.9	894.6	4.6	25.5	426.9	4343.6	571.4	5263.6	712.2
	GP/GC SHEETS/COIL	336.4	2762.1	55.0	272.9	0.0	0.0	391.3	3035.0	410.6
	ELECT. SHEETS	226.1	2258.8	0.0	0.0	0.0	0.0	226.1	2258.8	305.6
	TMBP	0.0	0.0	0.1	0.5	0.0	0.0	0.1	0.5	0.1
	TIN PLATES	10.4	71.1	39.8	200.9	0.0	0.0	50.2	272.0	36.8
	TIN FREE STEEL	2.7	20.5	8.4	44.1	0.0	0.0	11.1	64.6	8.7
	PIPES	46.3	374.7	24.9	95.9	57.2	1149.4	128.5	1619.9	219.2
	TOTAL (2) Flat Products	**1278.0**	**9815.1**	**132.8**	**639.9**	**747.0**	**8250.4**	**2157.7**	**18705.5**	**2530.8**
	TOTAL Finished Steel(1+2)	**1366.6**	**10439.7**	**132.9**	**640.3**	**873.2**	**10147.3**	**2372.7**	**21227.3**	**2872.0**
	TOTAL Steel=(A+B)	**1431.0**	**10673.0**	**132.9**	**640.3**	**894.0**	**10474.6**	**2457.9**	**21787.9**	**2947.9**
II	**Other Steel Items**									
	FITTINGS							67.5	868.9	117.6
	MISC. STEEL iTEMS							155.2	1687.4	228.3
	SCRAP							2380.5	12968.7	1754.7
III	**Iron**									
	PIG IRON							6.4	25.1	3.4
	SPONGE IRON							22.9	62.4	8.4
IV	**Ferro-Allloys**							**274.2**	**4165.4**	**563.6**
	GRAND TOTAL							**5364.5**	**41565.8**	**5623.8**

CRUDE STEEL TO FINISHED STEEL EQUIVALENT PRODUCTION, IMPORTS, EXPORTS, AVAILABILITY, STOCK & CONSUMPTION (PROVISIONAL)
APRIL 2021 - SEPTEMBER 2021

(In '000 tonnes)

PRODUCERS	FINISHED STEEL								
	Non-Alloy Steel			Alloy / Stainless Steel			Total		
	2021 - 22 (Prov.)	2020 - 21 (Final)	% Variation	2021 - 22 (Prov.)	2020 - 21 (Final)	% Variation	2021 - 22 (Prov.)	2020 - 21 (Final)	% Variation
a) Production									
SAIL	6403	4325	48.1	94	75	25.9	6497	4399	47.7
TSL GROUP	8875	7125	24.6	200	93	115.3	9075	7218	25.7
RINL	1772	702	152.5	0	0		1772	702	152.5
AM / NS (ESSAR) GROUP	13333	10496	27.0	348	279	24.7	13681	10775	27.0
JSPL	19563	14650	33.5	2754	1516	81.7	22316	16165	38.1
JSWL	49946	37298	34	3395	1962	73	53341	39260	36
OTHER	1499	1329	12.8	873	655	33.3	2373	1985	19.6
Total Production	7182	6139	17.0	572	406	41.1	7754	6544	18.5
b) Imports	44264	32488	36	3696	2212	67	47960	34700	38
c) Exports	8843	13609		124	77		8967	13686	
d) Availability (a + b - c)	7769	11714		45	135		7813	11849	
Opening Stock	-1075	-1896		-79	58		-1154	-1837	
Closing Stock	45339	34384	32	3775	2153	75	49114	36537	34.4
e) Variation in Stock	63	-471		-132	3		-69	-468	
f) ASU (Consumption)	7433	7937	-6.3	723	523	38.3	8156	8459	-3.6

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and delve into the statistical detail of the Indian iron & steel industry over the last five-year period, 2016-17 to 2020-21

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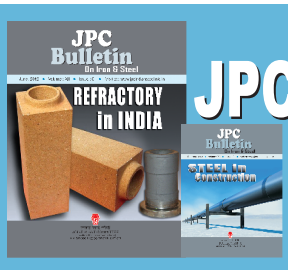

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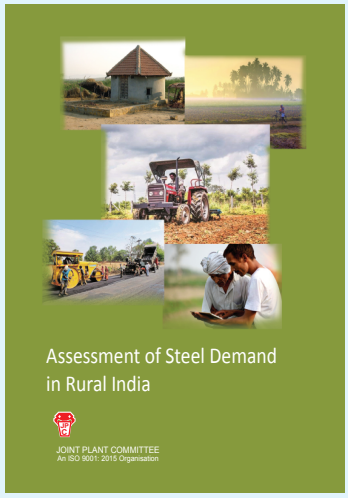

Assessment of Steel Demand in Rural India : A JPC Report

A detailed insight into the status, trends and potential of steel consumption in the Indian rural market, based on an all-India field survey conducted by Joint Plant Committee (JPC) covering 300 districts, 1499 villages, 23,472 rural households, 760 rural manufacturers, over 3000 channel partners and nearly 2400 rural institutiuons

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- Overview of the steel consumption scenario in the Indian rural market including trends in per capita consumption
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Ispat Niketan, 52/1A, Ballygunge Circular Road, Kolkata – 700019

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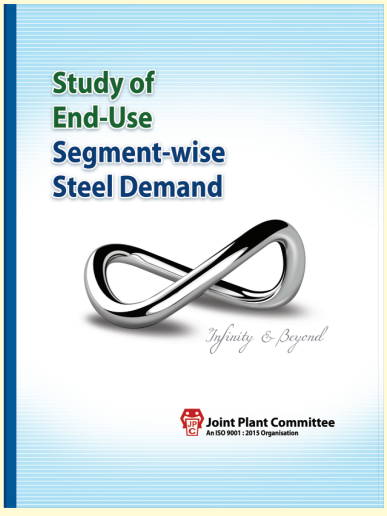

Joint Plant Committee or JPC,
the official organization authorised by the Ministry of Steel, Government of India for collection and reporting of data on iron and steel, has recently completed the first-ever official work on a Study on the pattern, level and nature of steel consumed in the various prominent end-use segments in modern-day India.

HIGHLIGHTS:

- Based on an extensive **Pan-India Primary Data Survey**
- Over 1000-plus sample size encompassing **All Stakeholders** - producers, associations, traders, consultants, concerned departments/Ministries of Government of India, industry bodies/chambers etc.
- Covers **All Major Steel Consuming Segments**: Building & Construction, Infrastructure, Automobile, Engineering & Packaging, Consumer Durables and Defence
- Unveils **First-Ever Official Statistics** on current and emerging trends in steel consumption in the country: overall, end-use segment-wise, grade-wise, steel category / item-wise
- Steel consumption trends in **Mega-Infrastructure Projects** of the Government of India
- Understand the future of steel consumption through **Detailed Year-Wise Projections** on annual steel demand till 2030-31
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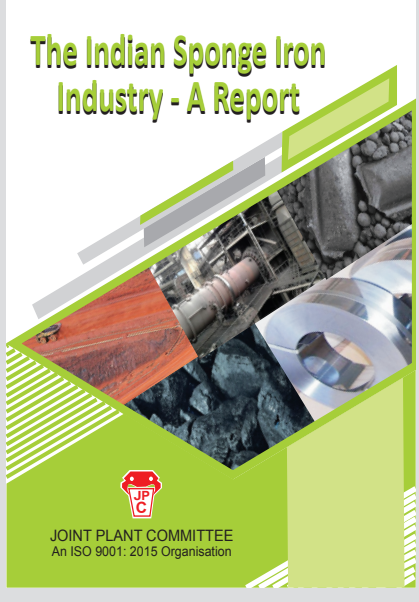

The Indian Sponge Iron Industry: A Report

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- Detailed analysis of the status and performance of the industry
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A Joint Plant Committee Publication

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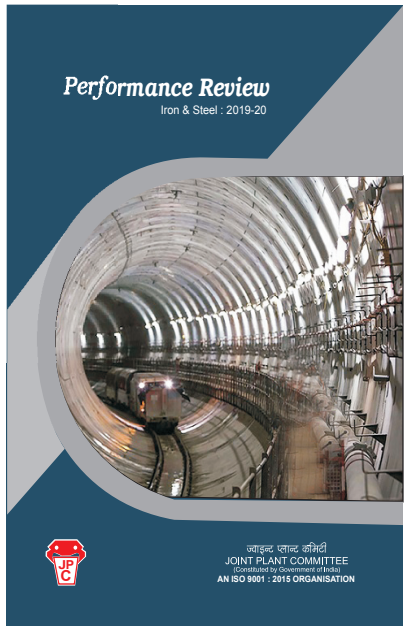

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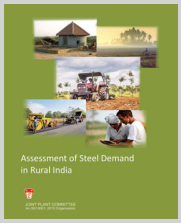

A detailed insight into the status, trends and potential of steel consumption in the Indian rural market, based on an all-India field survey conducted by JPC

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An exhaustive coverage of iron and steel trade including grade-wise import and monthly trends

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A detailed statistical representation of the performance of the domestic iron and steel industry covering all core parameters

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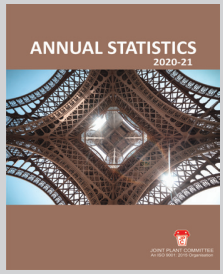
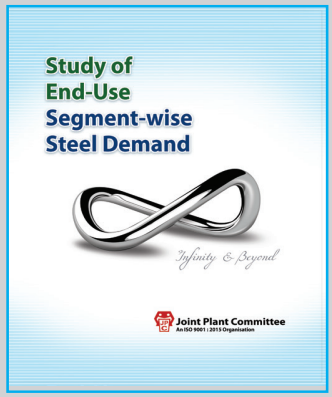


Includes statistical profile of five-yearly database on various segments of the Indian steel industry

Study of End-Use Segment -wise Steel Demand



A first time report on trends in domestic steel consumption in major end-use segments in the country analysed item-wise, grade-wise, with detailed reports on individual segments, forecasts till 2030, review of potential steel demand and recommendations for enhancing future growth

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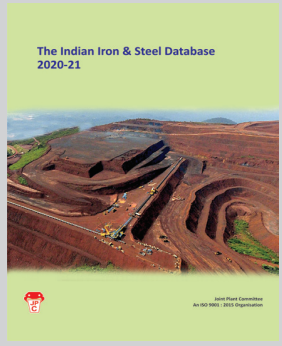
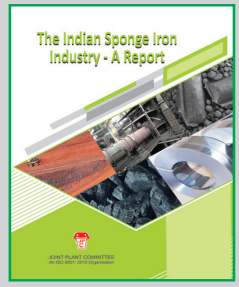
Fortnightly statement on trends in retail prices of key items of iron and steel in the four metro markets

The Indian Iron and Steel Database



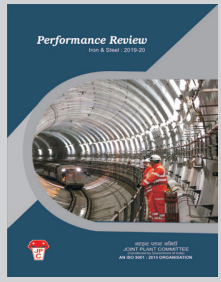
The first of its kind publication- Provides a detailed listing of iron and steel units present in the country in 2020-21, segment-wise, category-wise and State/ UT-wise

The Indian Sponge Iron Industry - A Report



The Report contains account of development in varied aspects of the Indian Sponge Iron Industry.

Performance Review Iron & Steel



Encapsulates an exhaustive account of development in varied aspects of the Indian Iron and steel industry during a fiscal year

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