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In The Issue

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GLOBAL IRON AND STEEL SCENARIO

Global Direct Reduced Iron Production

The global production of Direct Reduced Iron (DRI) in 2018 increased by over 11 Mt compared to 2017. Table 1 shows the country-wise production figures for major producer of DRI. India continues to be the largest producer in the world. However, Iran's production has been climbing steeply. USA's production is also rising, thanks to availability of Shell gas.

Table 1: Major world DRI Producers in 2017-18 (Mt)

Country	DRI Production in 2017, Mt	DRI Production in 2018, Mt
Russia	7.2	7.9
USA	2.0	3.4
Mexico	6.0	6.0
Egypt	4.7	5.8
Bahrain	1.3	1.5
Iran	19.4	25.7
Oman	1.5	1.5
Qatar	2.5	2.5
Saudi Arabia	4.8	5.0
United Arab Emirates	3.6	3.8
Middle East	33.2	40.0
India	29.5	30.4
World	**88.7**	**99.8**

Global Crude Steel Production

World crude steel production for the 64 countries reporting to worldsteel was 159.0 Mt in June 2019, a 4.6% increase compared to June 2018. For first six months of the year, the total crude steel production reached 925.1 Mt, up by 4.9% compared to the same period in 2018.

China's crude steel production for June 2019 was 87.5 Mt, an increase of 10.0% compared to June 2018. India produced 9.3 Mt of crude steel in June 2019, up 4.0% on June 2018. Japan produced 8.8 Mt of crude steel in June 2019, down 0.4% on June 2018. South Korea's crude steel production stood at 6.0 Mt, a decrease of 2.6% on June 2018. The US produced 7.3 Mt of crude steel in June 2019, a 3.1% increase on June 2018.

For the period January-June'19, worldsteel production rose, mainly due to the increased production of China, where the increase is 9.9% as compared to the same period of the last year. Vietnam and Iran are increasing their production remarkably.

Table 2: World Crude Steel production of Top 15 Countries in January-June 2019 ('000t)

Rank	Country	Crude Steel Production Jan.-June'19	Crude Steel Production Jan.-June'18	% Change y-o-y
1	China	492,169	447,825	9.9
2	India	56,959	54,230	5.0
3	Japan	51,082	52,967	-3.6
4	USA	44,345	42,059	5.4
5	S. Korea	36,445	36,060	1.1
6	Russia	35,757	36,010	-0.7
7	Germany	20,717	21,830	-5.1
8	Brazil	17,243	17,482	-1.4
8	Turkey	16,994	18,912	-10.1
9	Iran	12,788	12,110	5.6
10	Italy	12,561	12,819	-2.0
11	Taiwan, China	11,552	11,425	1.1
12	Ukraine	10,930	10,391	5.2
13	Mexico	9,650	10,430	-7.5
14	Vietnam	8,170	6,215	31.5
15	France	7,702	7,978	-3.5
	World	**925,064**	**882,005**	**4.9**

**Source-Worldsteel*

Iron Ore Price soars 5 year high

The price of iron ore has surged 60% to above $125 a tonne so far this year, aided by supply disruptions and stronger than expected demand from China's vast steel industry. That has generated a huge cash windfall for the big producers such as BHP, Rio Tinto and Fortescue Metals Group.

The extraordinary surge in the iron-ore market started in late January after a deadly dam burst at a Brazilian mine operated by Vale, the world's biggest iron ore producer. In the wake of the disaster, which killed at least 230 people, Vale was forced to close many of its mines in the southeast of Brazil. At the same time, its operations in the north of the country were hit by bad weather. Meanwhile, BHP and Rio were also experiencing weather-related problems as a cyclone ripped along the coast of northwestern Australia, damaging

operations and forcing the companies to cut their production guidance.

On the demand side, crude steel production in China has been booming, hitting record levels in April and May, fueled by strength in the domestic property market. Between January and May, China churned out a total almost 405 Mt of steel, 10% more than the same period a year earlier.

After 15 years of explosive growth while China industrialised, the iron ore market is now positioned to meet a broad flat outlook on demand. About 40 Mt could emerge from China and another 20 Mt from other countries. But it will take time for time for this swing in production to hit the market. And, it is for that reason that a further surge in prices cannot be ruled out. Port stocks of ore in China hit 116.75 Mt recently, down from 139 Mt at the start of the year. These levels are fast approaching critical levels. Steel mills have been buying at current high prices to partially replenish their depleted inventories before the market tightens even further and panicky buying sets in over the next two months. For mining executives, the big unknown in the iron ore market is not supplied, which they expect to pick up in the second half of the year when there are typically fewer weather-related incidents in Australia and Brazil, but demand. Here, the big question is whether Beijing will use additional stimulus to support its economy and improve its bargaining power in its trade spat with U.S.

Steel Industry stares at Production Disruption in 2020

Domestic steel production would be significantly affected if there is a delay in the auction of mines, which would complete 50 years of operations by March 2020. With around 60 Mt of actual production of iron ore from these mines likely to be disrupted, this would impact the integrated steel players like JSW Steel, Rashtriya Ispat Nigam Limited and merchant miners. This could also trigger an increase in imports though given the high cost of importing ore, the impact volumes may not go up substantially.

The licence of about 288 merchant mines will expire by March 2020, out of which 59 mines are under operations. A majority of, some 59 mines, are iron ore mines situated in Odisha and Karnataka with around 85 Mt of approved annual capacity. About 60 Mt of the actual production of iron ore from these mines could be disrupted.

While the largest domestic miner, NMDC Ltd. may be able to increase the volume to 4-5 Mtpa with evacuation facilities being placed at its captive mines, its 7 Mtpa Donimalai operations can restart after the settlement of a dispute between the government agencies on premium payment.

The imported iron ore is at least 150% of the domestic procurement prices. To ensure limited disruption to volumes, the government agencies may plan to extend expiry deadlines for mines along with the awarding of licenses.

Stainless Steel Scenario

Emerging Economics transform the Global Stainless Steel Market

The shape of the international stainless steel market has changed, in recent years. Burgeoning economic growth, in the developing world, particularly, in Asia, has contributed to growing global production overcapacity, relative to demand. In turn, the number of protectionist trade measures has increased.

Table 3: Performance of Indian Steel Industry: April-June'19 (Mt)

Item	April-June'19	% Change vis-à-vis last year
Crude Steel production	27.905	4.0
Hot Metal production	18.820	3.6
Pig Iron production	1.591	3.0
Sponge Iron production (April-May'19)	5716	1.0
Finished Steel gross production	26.442	7.8
Export of total Finished Steel	1.014	-27.4
Imports of total Finished Steel	1.724	-9.1
Consumption of total Finished Steel	25.19	6.9

**All figures provisional* *Source: JPC*

China's crude stainless steel output soared from 2% of the worldwide total, in 1999, to more than 50%, in every year since 2014. India's production

capability has increased rapidly in recent years, while countries such as Indonesia, Malaysia and Vietnam are now providing significant tonnages of finished steel. While, of course, the economic development of these countries leads to growing domestic consumption, the expanding stainless steel production exceeds this demand. Consequently, extra material is introduced into the international market.

Although the United States and South Korea have maintained very moderate growth rates, in the twenty-first century, the other established stainless steel producing countries have recorded shrinking output figures, since the peak year of 2006. Japan's outturn, in 2018, was 20% below that reported 12 year earlier. The European Union's annual production fell by 23%, during the same time period, while Taiwan's output was slashed by 32%.

As industries in the emerging markets grow, their major players extend their influence, internationally. Chinese producer, Tsingshan Iron and Steel, caused ripples in the global stainless steel trade, with its development of a new large-scale production unit in Indonesia. The plant's output has introduced substantial tonnages of competitively priced material into world markets.

The Indian stainless steel producers are now looking forward to an intervention by the Government to create a level playing field for Indian manufacturers. The industry needs Government support to compete with rampant dumping by FTA and other countries. To the double disadvantage of Indian manufacturers, the domestic stainless steel industry is faced with the challenge of inverted import duty structure. While imports of finished goods from FTA countries are duty-free, Indian producers have to pay a 2.5% import duty on stainless steel scrap and ferro-nickel, the two most important raw material raw materials, both of which are unavailable in the country. Further, in the absence of an effective safeguard duty structure, all trade remedial measures imposed by the Government are being circumvented through dumped, subsidised, or re-routed imports.

For the domestic stainless steel industry, FY 2018-19 was fraught with severe distortion in prices as imports rose in a big way from FTA nations like Indonesia, Korea, and Japan. This was clearly reflected in India's trade balance with Indonesia, as Indonesian imports leaped by ~14 times in FY 2018-19, as compared to the previous financial year. This surge in stainless steel imports from Indonesia became one of the biggest threats to the domestic industry during FY 2018-19.

Indian Steel Scenario

The production of steel as well as consumption has increased in April-June'19 this year compared to the same period of last year. In the case of Pig Iron, the Private Sector's share was 87%. Integrated steel producers – SAIL, Tata Steel, Essar, JSWL and JSPL together produced over 58% of finished steel.

Tata Steel's consolidated steel production rose by 9.18% to 7.61 Mt (6.97 Mt in last year's period). Tata Steel India's production was 4.37 Mt as against 3.64 Mt in the same period last year. Tata Steel BSL reported Rs. 111 crore profit in Q1. Last year's figure in the same period was Rs. 2104 crore. However, the present figure includes financial result of Bhushan Energy which was a subsidiary of BSL and hence not comparable. Essar Steel showed all round improvements. The operating profit in Q1 reached a record Rs. 1120 crore despited gloomy situation globally. Profit of JSW Steel in Q1 plunged by 57% to Rs. 1028 crore (Rs. 2366 crore in last year's Q1). JSW Steel has rolled out investment plan of Rs. 1000 crore at its Tarapur plant for manufacturing tin plate under brand name of JSW Platina. JSPL-Angul posted record hot metal production of 10,845 tonnes on a single day on 2nd July. It also restarted its 1.8 Mtpa sponge iron plant in end-March 2019.

The steel demand has recently slumped by a slowdown in major consuming sectors such as in automotive, housing and infrastructure. The trade tension between the US and China has led to diversion of exported materials to other countries including India. Export has drastically come down and imports are rising due to global slump in steel prices and diversion of steels to India.

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Expansion work at JSW Steel, Dolvi and Tata Steel's Kalinganagar unit has been progressing. NMDC's new steel plant is yet to start. Electrosteel is eyeing to expand the plant capacity to 10 Mtpa in next 5 years. KIOCL inked MoUs to sell iron ore pellets in Europe. The global increase in iron ore price has improved profitability of ore exporters and also of pellet makers.

The Essar Steel takeover tussle may reach a conclusive state after a significant judgement handed out by the National Company Law Appellate Tribunal (NCLAT). It dismissed a plea challenging ArcelorMittal's eligibility to buy Essar Steel India Ltd., clearing the way for the world's largest steelmaker to establish a meaningful presence in India after months of legal battles.

Source: Steel Tech

A Brief on Technical talk on Standardization and Quality Control Framework in Indian Steel Sector

A Technical talk was organised at our Chapter on 14.9.2019. The title of the talk was **"Standardization and Quality Control Framework in Indian Steel Sector"**. The talk was delivered by Shri A C R Das, Vice Chairman, Delhi Chapter, Iron and Steel Consultant and former Industrial Adviser, Min of Steel, Govt. of India.

At the outset Shri K. K. Mehrotra, Chairman, Delhi Chapter gave an introductory reference of Shri A C R Das. There after he requested Shri A C R Das to proceed with the presentation on the above topic.

To start with Shri Das talked about steel production across the globe and the steel production figures during 2018. It was stated by him China is the largest producer of steel in the world with over 928 MT. It was informed by him that India's steel production is on the growth path and during the financial year 2018-29 the crude steel production was 110.8 Mt. He also informed that the consumption of finished steel in India during 2018-19 was 97.5 MT which indicates an increase of 7.5% over the previous year. He also shared the data about current Indian crude steel capacity, per capita consumption of steel, Indian sponge iron production with share of coal and gas based route and share of public and private sector in India in steel production. It was stated by him that today there are more than 3500 types / grades of steel in the different physical, chemical and metallurgical property.

He mentioned that standards are key to quality and quality control. Standards are documented agreements containing technical specifications. As per International Organisation of Standardisation (ISO), standards are established by consensus and approved by recognised body. Standards once formulated are reaffirmed / amended / revised from time to time depending upon the change in technology and end use requirements. Standards exist at company, national, regional and ISO levels. Standards whether national, international are voluntary documents and conformity with standards is not necessary unless mandated under any law act or regulation. Bureau of Indian Standards (BIS) is a national standards body in India. BIS is responsible for development of standards, conformity assessment of goods and services and process and systems etc.

As regards Iron and Steel products

standardisation, metallurgical engineering division of BIS is responsible for formulation/ amendment / revision of standards. This council has published 1650 Indian Standards on various metals and metals products and related subjects. Out of these 1650 standards, about 140 to 180 standards relate to iron and steel products standards. While developing the standards the stakeholders namely industry, consumers, academia, research labs, technologists experts, government bodies and regulators are consulted while formulating the standards. Out of over 180 products standards on various steel and steel products, 66 standards / products have been notified under the mandatory quality certification marks of scheme of BIS. These constitute about 80-85% of total steel consumption on India. Manufacturers in India and abroad are required to obtain BIS licence to use Standard Mark's on notified products. BIS is the designated certification and enforcement authority.

The genesis of quality control order of steel products dates back to 2000 and from time to time more and more steel products are getting added in the mandatory standardisation list. Shri Das also spoke about the legal provisions and implications of these quality control orders. It was informed by him that the steel products where standardisation and implementation of steel control order is mandatory must conform to the relevant Indian standards and bear standard mark of BIS. These orders apply to import as well as indigenous production and producers abroad are required to obtain BIS licence to India before exporting these product. The contravention of these orders entail penalty under the relevant provisions of BIS Act.

In his concluding remarks Shri Das also touched upon issues and way forward with regard to standardisation of steel products.

There was a lively question-answer session after the conclusion of the presentation.

The event was suitably photographed. Chairman thanked Shri ACR Das for lively presentation and honoured him with a suitable memento.

The presentation was attended by about 25 participants.

The presentation concluded with lunch.

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ArcelorMittal's view on Future requirements for Steel Industry

Addressing the carbon challenge

The demand for primary steel will continue to grow: steel will be key in the transition to a lower-carbon economy. So how do we meet that demand, while bringing about the reduction in global greenhouse gas (GHG) emissions that is needed to meet the objectives of the Paris Agreement on climate change? A material at the heart of the low-carbon economy, Our modern, specialist steels are already helping to make products more carbon-efficient. Lifecycle analysis shows steel to have a lower global warming potential than many competing materials. And, because it is recyclable and recoverable, steel is well-suited to a low-carbon, circular economy. At the same time, the chemistry of primary steelmaking has, up to now, meant that it emits high levels of carbon emissions. The steel industry currently generates approximately 7% of the world's CO2 emissions. Whatever the long-term sustainability benefits of steel, we know this footprint has to be reduced. And we know we face reputational and regulatory risks if we do not make this a priority for our business. When considering what our response should be, many observers consider increasing the use of scrap as a positive emissions reduction strategy. Unfortunately, almost all scrap is already used, and stocks only make up less than 30% of today's steel

Important Statistics relating to Indian Iron and Steel Sector for the last three financial years (2016-17 to 2018-19)

Crude Steel Capacity and Production: Overall			Crude Steel Production: Share of Public vis-à-vis Private Sector				
Year	Capacity (mt)	Production (mt)	Year	Public Sector		Private Sector	
				Qty (mt)	% share	Qty (mt)	% share
2016-17	128.28	97.94	2016-17	18.46	19	79.48	81
2017-18	137.97	103.13	2017-18	19.75	19	83.38	81
2018-19	142.24	110.92	2018-19	21.50	19	89.43	81

Crude Steel Production: Process Routes				Crude Steel Production: Share of Process Routes (%)			
Year	BOF (mt)	EAF (mt)	IF (mt)	Year	BOF	EAF	IF
2016-17	42.11	29.38	26.44	2016-17	43	30	27
2017-18	47.44	26.81	28.88	2017-18	46	26	28
2018-19	49.91	27.73	33.28	2018-19	45	25	30

Sponge Iron Production: Production and Share of Coal & Gas Based				Total Finished Steel Consumption and Per Capita		
Year	Overall (mt)	% Share: Coal-Based	% Share Gas-Based	Year	Overall (mt)	Per Capita (kg)
2016-17	28.76	83	17	2016-17	84.04	64.7
2017-18	30.51	78	22	2017-18	90.71	68.9
2018-19	34.71	79	21	2018-19	98.71	74.1

Source: JPC

production, globally. Our analysis indicates that by 2050, scrap stocks will increase to around 50% of global steel demand. So, making more recycled steel from scrap will contribute a very limited amount to the overall solution. Not only that, but primary steel will continue to be needed for decades to come. The challenge for steel, therefore, must be to reform the rising to the challenge of low-emissions steelmaking over the last 150 years, the way steel has been made has frequently evolved, and the process continuously improved. Today, close to optimal energy efficiency levels have been achieved, while materials efficiency is exemplary, with almost all end of life scrap and by products both recycled and reused. We believe that the next transition – to very low-emissions steelmaking – is not only possible, but we have the potential technology to achieve it. We have identified three main technological pathways that could take us there: the use of waste sources of carbon in place of coal, together with carbon capture utilisation (CCU); electrolysis or hydrogen-based steelmaking powered by large volumes of renewable energy; and carbon capture and storage alongside the continued use of fossil fuels. Circular carbon thinking. We call the first of these the 'circular carbon pathway' – and we believe we are leading the industry in advancing it. Circular carbon enables a cycle of waste carbon – including waste biomass and plastic to be used in the blast furnace – as a valuable resource to replace fossil fuels and produce commercially viable products such as bio-oils, chemicals, plastic and bio-fuels at scale. We are pursuing this pathway in various ways. Our partnership project with LanzaTech at our €150 million industrial-scale demonstration site in Gent converts waste carbon monoxide from blast furnace gas into ethanol, which can be used in place of fossil fuel-based commodities for the production of transport fuels, plastics and chemicals. Our Torero project, also in Gent, uses bio-waste in the blast furnace in place of coal. And our IGAR technology in Dunkirk reforms waste carbon gases to use as a reductant again in the blast furnace. These technologies are all described in our forthcoming Climate Action report. Options with clean power- As well as carbon, hydrogen can also be used to reduce iron ore though very large amounts of clean energy are required to produce the hydrogen, as well as related infrastructure. We are exploring this approach at our R&D centre in Hamburg, Germany and in March 2019, we announced a €65 million demonstration project to run a DRI plant on 100% hydrogen, with an annual production of 100,000 tonnes. Iron ore can also be directly reduced by using electricity alone. With sufficient access to clean energy, this electrolysis technology could pave the way to a carbon-free steelmaking. ArcelorMittal has developed this technology at our Maizieres Global R&D centre in France, and demonstrated that steel making with electrolysis requires less power than the manufacture of hydrogen from water. It is therefore a very promising technology with the potential for deep reduction in CO2 emissions from steelmaking and could provide a more efficient alternative to hydrogen steelmaking. ArcelorMittal is the lead company of the Siderwin project. Together with 11 European

partners, and funding from the European Union's Horizen 2020 programme, Siderwin will construct an industrial scale demonstration of this technology.

Building a business that capitalises on digital opportunities

What does it mean for our organisation and for our people to have a 'digital mindset'? What benefits is that mindset bringing us now, and what will it bring in the future? Nicolas de Abajo, our head of global R&D centres, describes ArcelorMittal's strategic focus on digitalisation.

To see the future, look around you….

If I were speaking to an engineer of the future, I would say: Look around you. The world you live in is a fascinating mix of material and digital dimensions. These are evolving very fast and in an unprecedented way. Solutions to the world's biggest challenges will be dictated by how both these dimensions interact with each other. In mining and steelmaking, digitalisation is transforming the very way in which the fabric of society is designed and made. As an organisation, we've been embracing the potential of digitalisation for several years. But, now the opportunities are expanding exponentially. Global R&D is focusing on launching digital transformation projects throughout all aspects and segments of the business. We need to digitalise our entire company as a critical part of our strategic focus on building a high-performing organisation.

Transforming manufacturing for higher yields and lower impacts

In manufacturing, we're making exciting progress, with global R&D working closely with our production sites. Our ArcelorMittal big data platform and artificial intelligence (AI) algorithms are helping us in vital areas such as defect recognition and quality assurance, which will lead to higher yields and lower environmental impacts, including CO2. Deep learning technology is also helping us detect defects to enable predictive maintenance. Combining artificial vision with analytics is enabling us to improve safety and monitor environmental impacts at our production sites. And the enormous potential of 3D printing for steel clearly relies on digital expertise. There are other transformations enabled by digital thinking. Better analytics are helping our sales teams with their forecasting. Adopting common platforms and AI are transforming our supply chain and logistics. And, while this area is still evolving, the block chain technology could well have a role to play in providing customers with reductions in transactional costs as well as supply chain assurance. Global R&D works in all these areas with a clear focus on creating platforms and tools that are rapidly scaled across the whole Group and in very different business area. This is one of the major benefits of digitalisation: replicability.

Rapid change requires a digital mindset at every level

Despite all these progresses, we know that industry is only beginning to see the opportunities of digitalisation – for instance, in the 'internet of things' – and the pace of change is going to keep accelerating. So, it is clear that a digital mindset needs to be everywhere. It is key to how we work now, and to the skills we need in the future. We're already recruiting people with profiles that would never have been seen in the steel industry even a few years ago. And each of us in the business must be a digital leader, able to identify digital opportunities for value creation and differentiation, drive the development of new capabilities and make full use of our digital capacity. We all have the potential to become 'disruptive innovators' and I am sure we have the right people and the right ideas to do it.

Source: Steel Tech

Indian Steel Plants

Ministries to make efforts to ensure Engineering Exports reach $200 billion by 2030

The Ministries of Commerce and Industry and Steel will make all efforts to ensure that engineering goods exports reach $200 billion by 2030.

The issues being faced by engineering sector were discussed in detail during a meeting which was attended by Steel Minister Dharmendra Pradhan, Commerce and Industry Minister Piyush Goyal, senior officials of both the Ministries, top steelmakers and representatives of the

engineering export sector. Steel Secretary Binoy Kumar, DGFT Alok Vardhan Chaturvedi, senior officers of both the Ministries, SAIL Chairman Anil Kumar Chaudhary, members of the Indian Steel Association, steelmakers, including JSW Steel Chairman and Managing Director Sajjan Jindal were also present at the meeting. The Challenges being faced by the steel sector and import-export trends were also discussed in the meeting.

The protectionist measures being imposed by other countries and the under-utilised capacity in steel manufacturing in India were also discussed in the meeting. Both the Ministries discussed at length the measures that both "may take to reduce unnecessary imports and boost exports".

Engineering exporters are seeking supply of steel at concessional prices so that MSME sector can compete in international markets.

Steel Authority of India Ltd (SAIL)

SAIL supplied Salem Stainless Steel for Chandrayaan 2

Steel Authority of India Ltd. (SAIL) has supplied special quality stainless steel from its Salem Steel Plant for the India's Moon Mission – Chandrayaan 2 meeting the ISRO's requirements for stringent specifications, superior surface finish and close tolerances. Earlier as well, SAIL has collaborated with ISRO to provide quality steel for the country's prestigious and indigenous space missions. For the Chandrayaan 2, SAIL's special quality sheet has been used in the Cryogenic Engine (CE20).

SAIL along with ISRO have taken a major step forward as a part of the MAKE IN INDIA initiative advanced by Hon'ble Prime Minister Shri Narendra Modi for indigenously developing the exotic Russian grade ICSS-1218-321(12X18H10T) austenitic stabilised stainless steel used in the construction of the cryogenic rocket engines that are being made at ISRO.

With this major breakthrough, SAIL is optimistic of leveraging other aerospace grades of stainless steel for the space launch vehicle components in future.

DSP-SAIL awards SMS Group order for new converters

Durgapur Steel Plant (DSP) of SAIL has awarded SMS group a turnkey contract for the supply of three new 110-tonne converters for its steelmaking plant No. 2 to replace the converters SMS group supplied 25 years ago. Moreover, SMS group will supply secondary dust collecting systems for the three converters. The new systems will be installed in the works for the first time and will more than meet the relevant environmental requirements.

The new converters will be rated for ten percent more volume. The new converters will be equipped with a bottom stirring system for combined blowing, which cuts the stirring and homogenisation time, reduces surface vibrations, and minimises refractory lining wear. The objective is to reduce the use of alloying elements previously required. Thanks to the maintenance-free lamella converter suspension system developed by SMS group, the converter vessel can be arranged in the trunnion ring without restraint. The use of the lamella suspension system, a larger air gap, and high-quality special-purpose steel grades will ensure the converters are suitably adapted to the thermal loads. This is achieved without additional cooling fluids. Sufficient cooling is ensured by the natural thermal current alone. The X-pact® electrical and automation systems for the entire converter shop will ensure cost-effective production and high steel quality.

SMS group's scope of supply comprises the turnkey installation of the equipment design and supply of the converters, the bottom stirring system, secondary dust collection systems, and X-pact® electrical and automation systems, as well as the erection and commissioning work. Commissioning of the complete plant is scheduled for September 2020.

India is in talks with Asian Steel mills for JV with SAIL

India is in talks with the Japanese and South Korean mills for a Joint Venture (JV) with SAIL as years of delays holding up a deal with the world's biggest steelmaker ArcelorMittal.

The Steel Ministry is in talks with mills, including Nippon Steel Corp., Mitsubishi Steel Manufacturing Co. and POSCO for a JV. That follows the delays in discussions with ArcelorMittal, whose plans to enter the growing

India steel market by buying the bankrupt Essar Steel India Ltd. along with partner Nippon have been held up by Court battles.

SAIL had approved a plan to build an automotive steel plant in India with ArcelorMittal in 2017, but the proposed venture has been plagued by delays as both mills fine-tune terms of the deal.

The Ministry is keen to stitch together ventures with foreign mills to make automotive steel as India is a big importer of high-grade steel. Higher output of these products will also aid several Japanese and South Korean automobile companies that manufacture in India.

Tata Steel

Tata Steel to develop High-end Products at Kalinganagar Unit

Tata Steel plans to develop 40 new product grades at its Greenfield steel project at Kalinganagar (Odisha) in this financial year. The new products are designed primarily to tap into the requirements of automobile and oil & gas industries.

Initially creating a capacity to produce 3 Mtpa, Tata Steel is now in the midst of expanding the Kalinganagar plant's capacity to 8 Mtpa, pledging a capex of Rs. 23,500 crore. The 5 Mtpa, Brownfield expansion includes 2.2 Mtpa cold rolling complex, raw material and related facilities. The ramp-up will tweak Tata Steel's product mix in favour of auto grade steel and branded products, retail & solutions.

The domestic auto industry depends on imports, chiefly from South East Asian countries for niche products where domestic steelmakers lack core competencies. Tata Steel's planned auto grade steel products will not just act as import substitutes, but offer a superior experience to its downstream consumers.

Tata Steel is one of the key suppliers of high-tensile and auto galvanised products. Also, the steel Company is the largest supplier of skin panels. Tata Steel retained its hegemony in automotive grade steel segment, boasting of 47% market share in FY'19.

The steelmaker's focus on research and innovation has been continuous and unswerving. In Q4 of FY'19, the steel monolith developed 17 products, commercialising four of them.

Tata Steel places order with SMS group for Upgrade of CSP® Continuous Caster

Tata Steel Ltd., India has placed an order with SMS group to upgrade its CSP® continuous caster at its plant in Jamshedpur. Both strands will each be equipped with an electromagnetic brake. This brake reduces the flow velocity of the liquid steel immediately when it has entered the mold, and thus steadies the mold level. As a result, the quality of the hot strip can be further improved, while maintaining a consistently throughput rate.

SMS group's scope of supply covers the engineering, delivery of the electromagnetic brakes, the implementation, and the X-Pact® electrical and automation system.

Commissioning of the first strand is scheduled for end-2019, with the upgrade of the second strand planned for end-2020.

Tata Steel uses its CSP® plant to manufacture high-quality products. Besides carbon steels, the product mix includes non-grain oriented electrical steel strip, tube grades, and dual-phase steels.

Tata Steel Kalinganagar joins the World Economic Forum's Global Lighthouse Network

Tata Steel Kalinganagar (TSK) has been included in the list of the World Economic Forum's (WEF's) Global Lighthouse Network, a community of manufacturers that are showing leadership in applying Fourth Industrial Revolution technologies to drive financial and operational impact. TSK is the first and the only Indian manufacturing plant to be included in the WEF's Lighthouse Network.

On July 3, 2019, the WEF announced the addition of 10 new factories, including TSK, to its Global Lighthouse Network. The factories join a network of 16 existing lighthouses across multiple geographies and industries. They serve as beacons to guide others to overcome challenges in upgrading systems and applying cutting-edge technologies such as artificial intelligence, big data analytics and 3D printing. The factories were selected based on their success in integrating these technologies to increase efficiency and drive innovation. Tata

Steel's IJmuiden plant in the Netherlands is already a member of this network.

Commissioned in 2016, TSK attained production levels at its rated capacity in less than two years. Spread over 3,000 acres of land, Tata Steel Kalinganagar steel plant is the largest single-location Greenfield steel project in India.

Rashtriya Ispat Nigam Ltd (RNIL)

RINL starts commissioning of Coke Oven Battery-5

Rashtriya Ispat Nigam Limited (RINL) started the commissioning of new Coke Oven Battery 5 (COB-5) Project Complex. P K Rath, CMD, RINL launched the commissioning activities of new Coke Oven Battery-5 Project Complex with the light up of the Chimney of Battery in the august presence of Directors and Senior Officials of the RINL-VSP.

RINL constructed the COB-5 to cater to the Coke requirement of the plant, which was expanded to 6.3 Mtpa Liquid Steel capacity. RINL also added one more million tonnes by modernising and revamping the existing production units, thus taking the overall capacity to 7.3 Mtpa. The COB-5 was constructed along with the existing batteries at an estimated cost of Rs 2,500 crores with a production capacity of 8.40 lakh tonnes of Blast Furnace grade Coke per year, one of the key raw material for Hot Metal production. The COB will be similar to the existing ones, 7-metre-tall and 67 Ovens each and a By-product recovery – Top charge type battery. The Coke Oven Battery-5 will generate 14 MW of power through waste heat recovery project also. RINL is presently having four Coke Oven Batteries producing 2.48 million tonnes of BF grade Coke. The Coke requirement for the Blast Furnaces (net & dry) for 6.5 Mtpa capacity has been estimated at 2.88 Mtpa with 15% ash content.

Kaniti Balancing Reservoir-2 built to increase Water Storage Capacity

Kaniti Balancing Reservoir-2 has been built to provide additional water storage facility, to cater to the enhanced levels of production. It is built by L&T under the constancy of WAPCOS. The capacity of the Reservoir is about 12.32 million cubic meters (0.5 TMC) and built at the cost of Rs 465.85 Crores. There are four pumps and capacity of each pump is 4500 CuM per hour. With this, Reservoir water storage capacity has increased to 65 days at 7.3 Mtpa liquid steel production level.

RINL-VSP enhances LPG Storage Capacity

RINL-VSP has enhanced its LPG storage capacity by constructing a mounded facility (LPG storage plant-2) at a cost of Rs. 15 crore to stock 225 metric tonnes (3X75MT bullets), in addition to the existing 115 metric tonnes capacity of LPG plant-1. The plant was built by M/s Optech, Mumbai, under the engineering and project management consultancy services of MECON Limited.

RINL Retail Outlet Inaugurated

RINL Retail Outlet is situated near BC gate at Peda Gantyada. It was developed at the cost of Rs. 4.36 Crores in an area of 5 acres with a storage capacity of 16,000 metric tonnes of steel and having a 100 MT weigh bridge.

Retail outlet facilitates delivery of materials to low volume buyers to order less & multiple products in one vehicle in customised length/ ready to use at site, finished products like cuts, bends and stirrups etc.

Retail outlet is an additional distribution channel to sustain sales in alternate market segments and facilitate delivery of material at customers doorsteps.

Other Steel Plants

JSPL posts Sales and Production growth in Q1 FY'20

Jindal Steel & Power Ltd. (JSPL) posted growth in steel & related products production at 1.57 Mt (Million tonnes) and sales at 1.51 Mt during the quarter of April – June 2019. The quarterly production and sales of steel & related products saw a robust 17% and 16% growth respectively, during the Q1 FY'20 on a year-on-year basis. The quarterly production and sales of steel & related products was 1.35 Mt and 1.30 Mt respectively in Q1 FY'19.

VR Sharma joins JSPL as MD

Renowned Steel technocrat VR Sharma, CEO of Abul Khair Group, joined Jindal Steel & Power Limited as Managing Director. He will be heading Steel and Power business of JSPL group, including Jindal Power Limited & Overseas

Ventures. This is his second term in JSPL. In his first spell, he was heading steel business of JSPL as Deputy MD cum CEO Steel business and had left 5 years back.

VR Sharma holds a degree in Mechanical Engineering in addition to Business Administration from UK and has an experience of about 40 years in the steel industry in India and overseas. He has shaped and turned around many steel mills during this period. His career in steel industry comprises of 5 years with Abul Khair Group of Bangladesh, 4+ years with Jindal Steel & Power Limited, 14 years with Bhushan Steel Group (BSL + BPSL), 4 years with Ispat Industries Ltd., 3 years with Lloyd Steel Group and 7 years of Overseas with Ministry of Heavy Industries Govt. of Libya and in Europe.

Essar Steel wins Rs. 5,000 crore order from POSCO

Essar Steel, which is under insolvency proceedings, has won Rs. 5,000 crore order from Indian subsidiary of South Korean steel major POSCO, the world's fifth largest steel producer. POSCO Maharashtra has signed a memorandum of understanding with Essar Steel for procuring one Million tonne of hot rolled products and it is the fourth contract signed between both the companies.

POSCO's partnership with Essar Steel began with a trial order of 1,000 tonnes in 2014-15. After this, a bulk order of 10,000 tonnes was placed and ended the following year with a total supply of 62,000 tonnes. Completion of these orders strengthened bond between both companies, resulting in a first agreement for the supply of 650,000 tonnes in 2015-16. The quantity was further enhanced to 850,000 tonnes and hit one Million tonne per annum from thereon.

With orders flowing in steadily, Essar Steel had developed 16 new grades of steel for auto and other special applications by POSCO Maharashtra, which has a two Million tonne unit at Mangaon. Essar Steel had been ramping production over the last few years and currently operating at capacity utilisation of about 85 percent. Last year, it produced 6.9 million tonnes of crude steel and expects to cross 7 Million tonnes in the current fiscal.

Essar Steel to supply Quenched & Tempered Grade Steel Plates to BEML

Essar Steel competes with international steelmakers to bag order to supply 2,000 tonnes of quenched & tempered grade steel plates to BEML for making dump trucks, excavators & loaders. It is now the largest supplier of indigenously manufactured high-end alloy steel plates.

Electrosteel Steels unveils Rebranded Steel Portfolio and announced Expansion Plan

Electrosteel Steels Limited (ESL), a part of globally diversified natural resources Company Vedanta Limited, launched their rebranded steel portfolio – TMT Bars, Wire Rods, Ductile Iron Pipes, Billets and Pig Irons setting new benchmarks in the steel industry.

After a year of conscientious endeavours, Electrosteel Steels, is now all set to conquer newer heights with their rebranded steel products- TMT Bars, Wire Rods and Ductile Iron Pipes.

The strong, flexible, earthquake and corrosion resistant TMT Bars are best suited for the construction of critical concrete structure, ensuring the consumers with Security and Peace of Mind. The superior quality Wire Rods lend phenomenal strength to the construction, automobiles, white goods and railway sectors with their flexibility and robustness. The low metallic & non-metallic inclusion level in Ductile Iron Pipes provides extra safety for safe and clean water to every household, thus contributing strength to the society and the nation as a whole.

Neelachal Ispat to launch TMT bars soon

Neelachal Ispat Nigam Ltd. (NINL) is all set to launch its own brand of thermos-mechanically treated (TMT) bars, a value-added product, which is expected to improve the Company's earnings. The aim is to initially produce about 10,000 tonnes of TMT bars a month from billets. This should help NINL improve top line and bottom line by about 30%. In due course of time, the quantity of value-added products will increase when NINL gets its own TMT bar-cum-rod mill.

The MMTC and Odisha government-promoted steel public sector undertaking is the country's largest producer of pig iron. it has only been producing 'semis' so far, 'NINL SMART TMT' will

be NINL's first finished product and will mark a milestone in the turnaround journey of this loss-making Company.

The latest milestone takes NINL from a producer of semis into a full-fledged steelmaker. Prices of pig iron and billets have been among the worst affected in recent months. NINL's value-added products like TMT bars will considerably ease the pressure on margin.

In April, NINL had announced its highest-ever net sales turnover. By expanding into higher-value products, it is hoping to report positive profits in the final quarter of March 2020.

NINL to enhance Capacity to 5 Million tonnes

Neelachal Ispat Nigam Ltd. (NINL) plans to enhance its plant capacity at Kalinganagar in Dubri area of Jajpur district., to 5 Mtpa from the present 1.1 Mtpa with an investment Rs. 5,600 crore.

The expansion will be done in two phases. In the first phase, NINL's capacity will be doubled to 2.2 Mtpa and in the second phase, the capacity would be raised up to 5 Mtpa.

About 30 percent of Rs. 5,600 crore required for expansion work would be raised through equity and 70 percent through debt. MMTC would pump in about Rs. 400-Rs. 500 crore for the purpose.

The first phase expansion would be completed around 2020 and the second phase by 2024-25.

Source: Steel Tech

Global steelmaking capacity to rise in 2019-21: OECD

After a marginal drop in 2018, global steel capacities is likely to rise by 4-5 percent if all of the current ongoing projects are completed, Organisation for Economic Co-operation and Development has said in its latest report.

Data available with OECD suggest global steelmaking capacity in nominal crude terms declined marginally in 2018 to 2,233.7 million tons (mt) from 2,240.1 mt in 2017 as some investment projects were postponed.

However, many investment projects continue to take place around the world and others are in the planning stages. Should these projects be realized, global steelmaking capacity could increase by approximately 4-5 percent between 2019 and 2021 in the absence of closures amounting to additional capacity ranging from 88 to 110 million tons during this period, the report said.

"Globally, 87.8 mt of gross capacity additions are currently underway and could come on stream during the three-year period of 2019-21. An additional 22.4 mt of capacity additions are currently in the planning stages for possible start-up during the same time period," it said.

Asia is expected to experience a considerable increase in steelmaking capacity with over 53.4 mt of gross capacity additions currently underway and 10 mt in the planning stages for 2019-21.

Several capacity investments are also taking place in the Middle East region, where investment projects amounting to 25.1 mt of capacity are currently underway, and due for completion in the next three years.

Some investments are also underway in Africa and Europe, a total of 2.9 mt and 4.1 mt of capacity that could come on stream during the period, respectively.

The CIS, Latin America and NAFTA regions could also see an increase in capacity, with 1.8 mt, 0.2 mt and 0.3 mt of gross additions currently underway in each region, respectively.

"The decline in global steelmaking capacity in 2018 follows a deceleration in capacity growth since 2013 and results from both capacity reductions and slower capacity growth in some parts of the world," the report points out.

Capacity Utilisation

The gap between global capacity and production is likely to have narrowed in 2018 in view of the slight reduction in global crude steelmaking capacity (-0.3 percent), while global steel production increased by 4.6 percent in 2018.

"In view of these developments, the gap between capacity and production is expected to have declined to 425.1 mt in 2018. As a result, global production of steel as a percent of capacity may have increased from 77.2 percent in 2017 to 81 percent in 2018.

India capacity

Capacity in India has been expending at a fast rate in recent years and further growth is expected over the short-to medium-term due to increasing demand, notably from infrastructure investments, the report states.

Among recent additions, the report talks of Steel Authority of India completing 3 mt expansion of BOF facilities at the Bhilai Steel Plant. In August 2018, India's Mono Steel launched new facilities in its Kutch plant with a capacity of 0.25 mt.

Iran capacity to jump 71%

Iran is likely to be the largest contributor to the steelmaking capacity expansion in the region. A total of 2.9 mt started operations in 2018. These investments included Chadormalu Steel with a capacity of 0.3 mt, Ardestan Steel Complex with a capacity of 0.5 mt, Sarmad Iron and Steel Company with a capacity of 0.6 mt, Bistoun Steel with a capacity of 0.4 mt, Bardsir Sponge Iron and Steel Plant with a capacity of 1.0 mt and Shahrood Steel with a capacity of 0.1 mt.

During 2019-21, if all other projects that are currently underway are completed as scheduled, Iran's nominal crude steelmaking capacity would reach 57.5 mt by 2021, an increase of 71 percent when compared to the capacity level of 33.6 mt at the end of 2018.

Iran is committed to attracting foreign investment for its steelmaking capacity projects. However, the plan by Iranian Mines and Mining Industries Development and Renovation Organization (IMIDRO) to install a new steelmaking plant with a capacity of 1.6 mt in Iran was cancelled in 2018.

This was a joint-venture project that had been planned with Korea's Posco Engineering. The Chinese Metallurgical Corporation of China (MCC) had agreed with IMIDRO to finance some of the steelmaking capacity projects some years ago, but there is no additional information on the latest status of these projects.

OECD considered National Mineral Development Corporations' delayed greenfield steelworks in with capacity of 3 mt Shree Uttam Steel and Power Ltd's greenfield capacity of 1.55 mt in Maharashtra. All these are expected to be operational in 2019.

In addition, JSW Steel has started an expansion project at Dolvi in Maharashtra, raising capacity by 5 mt by 2020. JSW Steel also announced a plan to increase capacity of its Vijayanagar Works by 3 mt, which is likely to be completed by 2020. "As a result of investment projects that are underway, steelmaking capacity in India could reach 137.6 mt by 2021, in the absence of closures. If this materialises, India could become the world's second largest steel economy in terms of steelmaking capacity," the report says.

World Steel production up 4.6% in June

World crude steel production for the 64 countries reporting to the World Steel Association (Worldsteel) was 159.0 million tons (mt) in June, a 4.6 percent increase compared to June 2018.

World crude steel production was 925.1 mt in the first six months of 2019, up by 4.9 percent. Asia produced 660.2 mt of crude steel, an increase of 7.4 percent over the first half of 2018. The EU produced 84.7 mt of crude steel in the first half, down by 2.5 percent compared to the same period of 2018. North America's crude steel production in the first six months of 2019 was 60.1 mt, an increase of 1.4 percent compared to the first half of 2018.

The CIS region produced 50.5 mt of crude steel in the first six months of 2019, the same as in the first six months of 2018. China's crude steel production for June was 87.5 mt, an increase of 10 percent compared to June of 2018.

Japan produced 8.8 mt of crude in June, down 0.4 percent on June 2018. South Korea's crude steel production was 6 mt in June 2019, a decrease of 2.6 percent from June 2018.

In the EU, Germany produced 3.4 mt of crude steel, down by 5.8 percent from June 2018. The US produced 7.3 mt of steel in June 2019, an increase of 3.1 percent compared to June 2018.

Asean uptick

Crude steelmaking capacity has expanded rapidly in the Association of South East Asian Nations (ASEAN) region over the past decade and could continue to increase from 54.1 mt in 2017 to 64.8 mt by 2021 (a growth of 21.2 percent).

In the Philippines, Steel Asia Manufacturing started the construction of a new 0.8 mt EAF plant at Compostela Works in Cebu which is expected to begin operation in 2020.

Vietnam Japan Steel commissioned capacity of 0.35 mt in April 2018 while Vietnam's Hoa Phat

Group is constructing a new integrated steel plant with BOF capacity of 2 mt in the Dung Quat Economic Zone in Quang Ngai, which is expected to be complete in 2019.

In addition, Hoa Phat Group has a plan to add more 2 mt BOF in the same plant.

"Solid steel demand growth has attracted many foreign investors to the ASEAN regions and there are several new investment projects supported by Chinese companies," the report said.

Alliance Steel, a joint venture between China's Guangxi Beibu Gulf Port International Group and China's Guangxi Shenlong Metallurgical Company, has started the operation of 3.5 mt BOF facilities in Kuantan Industrial Park, Malaysia in June 2018.

Gunung Gahapi Sakti is installing a new EAF plant that has a 0.5 mt capacity, as part of a joint venture with China's Nanjing Iron and Steel at Medan in north Sumatra, Indonesia, which is expected to start operation in 2019.

Dexin Steel Indonesia, a joint venture between China's Delong Holdings, China's Shanghai Decent Investment Group and Indonesia's PT Indonesia Morawali Industrial Park, has started the construction of a new 3.5 mt BOF steel mill in Morawali Industrial Park, Central Sulawesi province, with the start of production scheduled for 2019.

In December 2018, China's HBIS Group, Huili Investment Fund Management, the Philippine's Steel Asia Manufacturing Corporation and PHIVIDEC Industrial Authority signed a memorandum to jointly develop a new integrated steel mill in Misamis Oriental, Philippines, with a steelmaking capacity of 0.6 mt to be installed during the first phase of the project, and it during would eventually reach 8.0 mt.

Elsewhere in Asia, Bangladesh's Kabir Group has commissioned a new induction furnace (IF) facility with a capacity of 0.5 mt in August 2018 in Chittagong.

Bangladesh Steel Re-Rolling Mills and GPH Ispat are also constructing new steelmaking facilities, namely 0.9 mt IF and 0.815 mt EAF equipment, respectively, that are expected to become operational in 2019. In Pakistan, Amreli Steels and Faizan Steel Mills are expanding their steelmaking capacity by 0.2 mt and 0.08 mt, respectively, which are also expected to be completed in 2019. Pakistan's Agha Steel Industries and Naveena Steel also have plans of installing new steelmaking facilities, respectively with capacities of 0.6 mt and 0.27 mt within 2019.

In September 2018, Druk Holding and Investments, with Indian partner Dilip Kumar Goenka, started a greenfield steel plant with a capacity of 0.2 mt (IF) in the Motanga Industrial Park of Bhutan.

This project is scheduled to be completed by 2020 and could be the first-ever steelmaking plant established in Bhutan.

CIS marginal growth

In CIS region, Russian steelmaker Tulachermet is installing a 1.8 mt BOF, which is expected to become operational in 2019.

In addition, the modernisation of steel manufacturing facilities continue to take place in the region, with outdated Open Hearth Furnaces (OHF) being shut down. Russia's OMK closed its two OHF facilities at Vyksa works in March 2018, which had a total of 0.46 mt of capacity.

In Ukraine, Zaporizhstal Iron and Steel Works has a plan to replace its OHF that has a capacity of around 4 mt with new BOF with a capacity of 3.2 mt.

In addition, Uzbekistan's Uzmetkombinat has announced a plan to expand EAF capacities by 1 mt by 2020.

Taking only projects that are underway into account, the CIS region's steelmaking capacity could increase marginally from 142.4 mt in 2018 to 144.2 mt by 2021 in the absence of any further closures.

Europe to see flat growth

Steelmaking capacity remained stable at around 274 mt between 2017 and 2018. However, in the absence of additional closures, steelmaking capacity in the region could increase again to 278.7 mt in 2019-21.

There are several investments underway in Turkey: Kardemir has announced a steelmaking capacity expansion at its BOF plant in Karabuk

to 0.7 mt to become operational in 2019.

Mescier Iron and Steel is constructing new EAF facilities with a capacity of 0.9 mt in northern Turkey, aiming to start production in June 2019.

Tosyali Holding is proceeding with the construction of a new EAF plant with the capacity to produce 2.5 mt of crude steel in the Iskenderun Bay, Which is expected to start operation in 2020.

Van Merksteijn International has announced a plan to install an EAF plant with a capacity of 1 mt at the seaport of Eemshaven in north Netherlands, which could start production by 2020.

In May 2018, India's JSW group, the new owner of Italy's Aferpi, announced plans to resume steelmaking production at the Piombino site by installing two new EAFs by 2020.

Latin America capacity to rise 0.3%

In Latin America, Ecuador's Adelca and Paraguay's Vemarcorp SA have commissioned new steelmaking facilities with a capacity of 0.4 mt (EAF) and 0.15 mt (IF) in 2018.

On the other hand, in July 2018, Vallourec Tubos do Brasil closed its 0.6 mt BOF facilities in Belo Horizonte, Brazil.

For the region as a whole, Latin America's steelmaking capacity remained stable at around 74.7 mt between 2017 and 2018. There is only one capacity investment underway in the region that will become operational during the 2019-21 period.

Bolivia's Las Lomas has started the construction of the country's first steelmaking plant with a capacity of 0.2 mt in Buena Vista, Santa Cruz province. The project started in November 2017 and operations are expected to begin in 2019.

Peru's Aceros Arequipa has a plan to replace a current 0.85 mt EAF with a new 1.25 mt EAF by 2020.

Venezuela's Siderurgica Nacional had suspended construction of an integrated steel plant including EAF with a capacity of 1.55 mt in Ciudad Piar, Bolivar.

At this stage, there is no further information on whether this project is still going forward. Overall, steelmaking capacity in Latin America could slightly increase by 0.3 percent to 74.9 mt by 2021.

Middle East growth seen at 37.3%

Steelmaking capacity has increased rapidly over the past decade in the Middle East, from 27.8 mt in 2008 to 64.4 mt in 2017, growth of over 131 percent. Capacity increased by 2.9 mt between 2017 and 2018.

Rapid growth is expected to continue over the next few years and steelmaking capacity could increase to 92.4 mt by 2021 (or 37.3 percent) if all the projects that are underway come on stream and in the absence of closures.

Elsewhere in the region, Oman's Moon Iron and Steel is building a new 1.2 mt EAF plant, which is expected to be operational in 2019.

Iraq's United Brothers Holding has a plan to install a new EAF facility with a capacity of 0.5 mt, in the industrial area near Basra by 2019.

NAFTA

In the NAFTA region, crude steelmaking capacity increased slightly by 0.4 percent to 154.4 mt in 2018.

Mexico's Industries CH, Grupo Simec, started operation of a new EAF with a capacity of 0.6 mt in February 2018.

In the United States, Nucor Corporation is installing a new EAF mill with a capacity to produce 0.3 mt in Sedalia, Missouri, with a view to starting operation in 2019.

Nucor Corporation also announced a plan to build a second new EAF mill with a capacity of 0.3 mt in Frostproof, Florida, with a view to start operations in 2020.

In addition, Big River Steel, Steel Dynamics and Australia's BlueScope Steel also announced plans to install new EAF facilities, respectively.

Taking only projects that are underway into account, steelmaking capacity in the NAFTA region could increase by 0.3 mt (0.2 percent) to 154.7 mt by 2021.

Cross-border investments

Asia is the largest investment destination, accounting for six cross-border and six joint venture investments between domestic and foreign investors.

Africa attracts one cross-border investment and one JV. Latin America has one JV while

Europe and NAFTA have two cross-border investments respectively. The CIS, Middle East and Oceania regions currently have no cross-border investments nor JV investments.

Domestic and cross-border investments in new steelmaking capacity

Region	Domestic Investments		Cross-border Investments		Joint Ventures	
	Number	Capacity	Number	*Capacity	Number	*Capacity
Africa	4	2.9	1	2.3	1	2
Asia	30	94.2	6	22.5	6	15.2
CIS	3	6	0	0	0	0
Europe	4	5.1	2	0	0	0
Latin America	5	3.6	0	0	1	0.2
Middle East	37	33.2	0	0	0	0
NAFTA	5	5.5	2	0.6	0	0
Oceania	0	0	0	0	0	0
World Total	88	150.4	11	25.4	8	17.4

* Capacity in Million tons

In total, there are 107 new steelmaking capacity projects around the world, classified as underway or planned, that are scheduled to become operational in 2018 or later – this includes projects that have started operation in 2018, as well as projects for which the start date is not available.

Of these projects, domestic steelmakers are the investors in 88 (82 percent) of the cases.

Of the remaining steelmaking capacity projects, 10 percent entail cross-border investments, representing on investment that is based wholly on one or on several foreign investors/ owners, and 7 percent are structured as joint ventures between domestic and foreign investors or owners.

Chinese companies account for two cross-border investments and participate in five JV investments abroad.

ASEAN is the most attractive region for Chinese companies, who are also investing in Latin America.

Malaysia is the location for two cross-border Chinese investments, while Indonesia is the location for two JV investments by Chinese companies.

In the Philippines, there are two JV investments with Chinese companies. Regarding the other investments, two Chinese Taipei companies and a Japanese company are jointly investing in two cross- border projects in Viet Nam.

An Indian company has two cross-border investments in Italy and one cross-border investment in the United States. A company from the UAE has two cross-border investments in Pakistan.

Investors from Turkey and Australia have once cross-border investment each, respectively in Algeria and the United States. Investors from Korea and Qatar have one joint venture project each, respectively with companies in Indonesia and Algeria.

Source: Steel Insights

Steel sector margins to shrink in FY20: Crisil

With the Indian economy caught in crosswinds, rating agency CRISIL expects gross domestic product (GDP) to grow 6.9 percent this fiscal, or 20 basis points lower than what the agency had envisaged earlier.

"The revision factors in a triangulation of downside risks: inadequate monsoon, slowing global growth, and sluggish high-frequency data for the first quarter," CRISIL said in its India Outlook 2019 report. And that's bad news for the steel sector which would see its margins contract during the year, the report has predicted.

"In fiscal 2020 revenue is expected to grow much slower, at 7.5-8 percent on-year. This is largely because of a moderation in sales volume in key consumption sectors such as automotive, softening of commodity prices affecting the metals sector, and a lack of fillip to export-linked sectors from the currency," the report says. Profit, though, is expected to outpace revenue growth in fiscal 2020, rising 10 percent on-year, compared with 9 percent growth in 2019, riding on improving profitability in consumer discretionary sectors such of airlines and telecom, which saw sharp contractions last year the report predicts.

"Softening metal and coal prices will support margin expansion in these sectors. Margins of the construction and steel sectors, though, are expected to shrink," the India Outlook report states.

Attributes of slowing revenue growth in FY20

- Significant slowdown in construction commodities, as steel prices weaken in FY20 from the peak of 2019
- Consumption-linked sectors, especially high-ticket purchases, to moderate in FY20
- Export-linked sectors return to real growth led by rupee stabilization.

Cement

Despite a sharp slowdown in sales volume growth, from 12 percent on-year in FY19 to 6-7 percent on-year in FY20, revenue and profit are expected to expand at a healthy pace on improving realisation (5-6 percent) and lower power and fuel cost.

Construction

Margins are expected to deteriorate because of change in the revenue mix; revenue will be driven by less profitable sectors such as roads, power transmission and distribution (T&D), water supply and irrigation.

Steel

Lower on-year realisation because of weak global cues and rising iron ore cost are expected to weigh on the sector's revenue and profitability in FY20.

Commercial vehicles

Moderation in volume growth, especially of the medium and heavy commercial vehicle (MHCV) segment, will weigh on growth in FY20. The axle norms created 20 percent additional capacity in this sector, leading to volume decline, more so in the MHCV segment. Further, rail BTKM (billion tons km) also shows a moderating trend, led by a slowing Index of Industrial Production that aggravated the problem for transporters and, hence, commercial vehicle (CV) sales. Passenger vehicles and two-wheelers: Despite flat growth in passenger vehicle sales volume, revenue is projected to grow 5 percent this fiscal on rising vehicle prices and inter-segmental shift. Revenue growth of two-wheelers is expected to moderate significantly to 3 percent from 13 percent on-year in FY19, primarily because of sales growth slowdown. Meanwhile, lower raw material prices will support the sector's profit this fiscal.

Consumer durables

The sector will be supported by healthy growth of the air-conditioning and washing machine segments amid lower raw material cost.

Why is private fixed investment not back?

- Listless domestic consumption and export demand, amid already low capacity utilisation, has reduced manufacturers' appetite to invest. Business expectations remain muted, while consumer expectations, which saw a mild bump-up in the interim, have flopped back
- Among infrastructure segments, high leverage – despite some easing lately – continued to constrain investment plans
- Capital expenditure suffered led by lower investments in steel, cement, and non-ferrous sectors. The first half of fiscal 2019 did see some capacity additions in select sectors, as utilisation rates increased, but rates were below optimum level seen prior to FY10. Further, large companies, especially in steel and cement, have focused on asset acquisition in the past three fiscals, weighing on fresh investments
- Foreign investment (measured by net foreign direct investment or FDI) weakened in recent years
- Credit offtake by industry is still sluggish. Micro, small and medium enterprises (MSME) offtake had fallen, mirroring the impact of slowing exports and adverse effects of demonetisation and GST implementation. Sectors such as mining, textiles, leather products, rubber and plastic, basic metals and products, and iron and steel saw credit offtake slowing down significantly in the second half of FY19

Also, corporate revenue is set to grow at a slower 7.5-8 percent this fiscal, reversing the trend of double-digit growth in the past two fiscals.

A trifecta – of spurt in cost of compliance because of changes in regulation, tightening liquidity, and moderating income growth – is expected to impact sales volume in the automobiles sector. And how farm incomes pan out will weigh on rural demand-driven segments. In other words, most consumption segments will pull revenue growth into single

digit this fiscal. And weak prices of commodities such as steel and crude oil would exacerbate the pain.

As for industrial capex, it would remain moderate given the weak demand.

Over the past few years, infrastructure investments (including public and private) have driven capex. But over the next three years, lower spending, such as on roads, is expected to drag growth in infrastructure investments to 6 percent compound annual growth rate (CAGR) over the next three fiscals compared with 10 percent in the last three fiscals.

Sectoral capital investment trends for key sectors

Oil and gas

While upstream oil and gas capex will be healthy, weaker downstream capex in the natural gas sector will weigh on growth in FY20. Also, capex by standalone refiners is expected to be muted.

Steel

Brownfield capacity expansions by JSW Steel and Tata Steel will aid a healthy revival in the sector's capex in FY20. However, in the medium term, CRISIL expect no major capex push, as more assets get acquired and large players expand their existing and acquired units.

Cement

Lower utilisation (below 70 percent in the past three fiscals) and a slew of capacity acquisitions weighed on the investment cycle in the sector. Around 49 million tons of capacity changed hands in the past four fiscals. In the near term, capacity expansion will be driven by large players adding capacity. In the medium term, the rising proportion of clinker expansion plans will infuse investments.

Automotive and auto components

Weak automotive demand amid increasing cost of ownership across vehicle segments and new supply by two new players will limit capital investment in the near term.

Non-ferrous metals

Greenfield capital investment by Nalco and capacity expansion by other private players on the alumina front will drive investments in the sector.

"The re-elected NDA government's resolve to push growth up is evident. And with a softer monetary policy stance, investments are likely to increase in the future. But if savings do not rise commensurately, India's current account deficit could come under stress. Clearly, it is time to reignite the virtuous cycle of high savings, investment, and growth, if the economy has to be pulled out of its current downswing and restored on the high growth trajectory," the report says.

Source: Steel Insights

Steel Min for ways to raise quality output

The Steel Ministry has asked stakeholders to provide suggestions on ways to increase production of quality steel in India.

Hailing that India is now the second largest producer of crude steel in the world, Minister of State for Steel Faggan Singh Kulaste said the country can also become a leader in quality steel.

"I invite suggestions/ ways from industry players, stakeholders to increase the output of quality steel in India and curb the use of low-standard material," Kulaste said at India Steel Quality Standards Conference.

At the conference, attended by over 200 hundred industry players, the issue of surge in imports was also discussed.

JSW Steel Executive Vice President (Sales and Marketing) Sanjay Jayaram said in India steel-consuming sectors are infrastructure, railways, construction machinery etc are growing and these all require quality steel. At a time when country is heading towards its target of 300 MTPA capacity the imports of low sub-standard steel is also posing a challenge for the local industry, JSPL Joint Managing Director N A Anasari said.

Yatinder Suri, MD and Country Head of stainless steel maker Outokumpu India said there is a need to ban the production of non-standard stainless in the country, which is being used by the down-stream users to manufacturer consumer-wares.

This will ensure that people with low income can

also buy quality products at affordable prices, he said.

Kulaste also informed that 53 steel products have been brought under the ambit of quality control order (QCO).

In June 2018, sixteen additional steel products have been brought under the ambit of quality control order, a move that have brought around 90 percent of the steel and steel products consumed in the country under QCO.

Steel Secretary Binoy Kumar had earlier said the Centre is committed to bringing in all steel products under the quality regime.

"Government has put in a set of enablers to help steel industry realise its potential. Ministry of Steel is committed to achieve 100 percent quality regime in steel products.

"This will help in restricting the production and import of inferior grade products that are consumed in various important end-use segments such as power distribution, human health and safety of infrastructure and construction," the secretary had said.

Anti-dumping duty likely on imports from Brazil, China, Germany

The government may impose an anti-dumping duty of up to $3,263 per ton on imports of a certain type of steel from Brazil, China and Germany for five years, according to a government notification.

The commerce ministry's investigation arm DGTR has recommended the duty after concluding its probe on alleged dumping of 'High Speed Steel of Non Cobalt Grade' being imported from these three countries.

This steel is used for making high-speed steel-cutting tools.

It has concluded that the product has been exported to India from these nations below its normal value, which was resulting in dumping of the product.

The domestic industry has suffered material injury due to the dumping, the Directorate General of Trade Remedies (DGTR) has said in a notification.

"The authority (DGTR) considers it necessary to recommend imposition of anti-dumping duty on imports" of the goods from these countries "for a period of five years," it said.

The anti-dumping probe was conducted following a complaint from Graphite India Ltd. It had asked for imposition of the duty on the imports.

The recommended duty ranges between $1,902.34 and $3,263.68 per ton.

The final decision to impose the duty will be taken by the finance ministry.

A country conducts anti-dumping investigation on the basis of applications filed by the domestic industry with prima facie evidence of dumping of dumping of goods in the country.

The probe is a quasi-judicial process and is allowed under the World Trade Organisation (WTO) rules. India is a member of the WTO, which has been framing laws for global exports and imports since 1995.

During April 2018 to March 2019, DGTR initiated 24 anti-dumping (both fresh and review) investigations, and issued final findings in 50 such cases.

Anti-dumping duties are levied to provide a level-playing field to local industry by guarding against cheap imports.

All the three countries are members of the WTO.

Govt. for duty on China, Vietnam imports

The government is likely to put countervailing duty on some varieties of steel pipes and tubes from China and Vietnam for five years, new agency PTI has said.

Commerce ministry's investigation arm Directorate General of Trade Remedies (DGTR) has recommended imposition of duty on 'Welded Stainless Steel Pipes and Tubes' following conclusion of a probe in response to a complaint from Stainless Steel Pipe and Tubes Manufacturer Association; South India Stainless Steel Pipe and Tubes Manufacturer Association; and Haryana Stainless Steel Pipe and Tube Manufacturer Association.

The directorate, in its findings, concluded that the product has been exported to India from these two countries at subsidised value.

The domestic industry has suffered material injury due to subsidisation of the product, the DGTR has said in a notification. "The definitive

countervailing duty is recommended to be imposed from the date of notification to be issued in this regard by the central government" on all imports of these goods from China and Vietnam, it added.

The recommended duty was in the range of 29.88 percent and 10.33 percent. While the DGTR recommends duty, finance ministry takes the final call to impose it. The purpose of imposition of countervailing duty, in general, is to eliminate injury caused to the domestic industry by unfair trade practices of subsidisation so as to re-establish a situation of open and fair competition in the Indian market.

Source: Steel Insights

Auto industry slowdown has impacted steel sector: Tata Steel CEO

The prolonged slump in the domestic automobile industry has impacted the steel sector, Tata Steel CEO and MD T V Narendran said. The demand for steel in India has to pick up and that depends a lot on the construction and automobile sectors, he added.

Narendran, also the Vice-President of CII, was speaking to media persons after representatives of various industry bodies held a meeting with Finance Minister Nirmala Sitharaman. "I think, steel touches all parts of the economy… It is 20% of the steel that gets consumed in auto and that has an impact. That is certainly something that has played out over the last three months," said Narendran. While the auto industry has its own challenges, the government can do a lot in the construction and infrastructure segments, but the rest depends on private capital and residential demand, he added.

"They (the automobile industry) had a separate sitting with the (finance) minister. So as far as the international market is concerned, things are a bit soft. The problem is less about international steel flows and more about domestic demand," Narendran said.

Source: Steel 360

Govt's SAIL Move Likely to Cheer Steel Makers

The Centre has allowed SAIL to sell a quarter of its captive annual iron-ore output, a move that will increase input-supplies security for domestic steel makers as the state-run company is the country's second-biggest miner of the key raw material.

The ministry of mines order, valid for two years, will allow SAIL to offload 7 million tonnes of iron ore (60-65% iron content) produced at its different mines – Jharkhand, Odisha and Chhattisgarh – to be sold in the domestic market after getting the necessary clearances from the respective state governments. "The government of India has taken a decisive step in assuring the supply of iron ore for India's steel sector by allowing SAIL to sell 25% of its total mineral production in a year. We thank the @MinesMinIndia for this initiative," the ministry of steel said in a Twitter.

While this development is positive for the steel industry, it may not mean much for SAIL investors. This offers near-term relief, as the company's core business could slide into losses from the current quarter. Besides, sale of captive ore may not be as easy due to evacuation issues.

According to the SAIL annual report, it had iron-ore fines inventory of 41.5 million tonnes in the end of FY19, and its production was 28.4 million tonnes.

A quarter of this would mean that SAIL would be able to sell nearly 7 million tonnes a year. Assuming EBITDA of $20 per tonne, the company is estimated to make Rs 1,000 crore annually. However, estimated fall in EBITDA for the September quarter alone is Rs 525 crore.

SAIL sold 3.5 million tonnes of steel in the previous September quarter and steel prices are down since June end, meaning Rs 525 crore less profit over the preceding quarter. It logged EBITDA of Rs 1,590 crore in the June quarter, and its interest and depreciation amounted to Rs 1,660 crore. SAIL has net debt of Rs 47,000 crore.

Separately, the company can now also sell 70 million tonnes of low-grade iron fines and ores (including slime), lying dumped across its different captive mines with necessary permission from the three states.

"Ensuring raw material security for the Indian steel industry is our top priority. Our government has taken several steps toward this and the order passed by the ministry of mines is an important step in this direction," Dharmendra Pradhan, minster of petroleum, natural gas and steel, said in a statement.

The move comes at a time when 31 working mining leases that make for 30% of the country's iron ore output are set to expire by March next year. If the auctions for these mines get delayed, it will cause a 60 MT shortfall in the market, negatively affecting primary and secondary steel makers dependent on ore sourced from merchant miners.

With the dam collapse at Vale's mining site in Brazil in January this year and shutting of NMDC's Donimalai mine back home, supply of ore has anyway been disrupted this year, pushing prices to $100 per tonne.

Source: The Economics Times

DEVELOPMENT OF PHYSICAL SIMULATION TECHNOLOGY IN MATERIALS RESEARCH

- **The Indian Institute of Metals-Delhi Chapter** along with **IIT Delhi, Material Science & Engineering Department** organised a one day program on **Development of Physical Simulation Using Gleeble System and its Application In Steel Processing on September 28, 2019 at IIT Delhi Campus.**

- Welcome address was given by Dr. Jayant Jain, Associate Professor, Dept of Material Science Engineering, IIT Delhi. He welcomed the IIM Members and Chairman IIM Delhi

Mr K K Mehrotra and expressed his desire to conduct such interactions between IIM and IIT Delhi which will be beneficial for both the organisations.

- Opening Remarks were given by Shri K. K. Mehrotra, Chairman, IIM Delhi Chapter. He highlighted the activities being conducted by IIM Delhi Chapter and invited the faculty and students of IIT Delhi to the Chapter and continue such interactions
- Brief address was given by Dr Rajesh Prasad, Professor, IIT Delhi and he also emphasised the need for closer interaction between the two organisations.
- A presentation was given by Dr. Wayne Chen,
- Managing Director, Asia Pacific Operations, Dynamic Systems Inc of USA. They are the pioneer in Gleeble Simulation technology and its application in metal processing. The system is widely used for fundamental studies such as phase transformation ,dilatometry, weldability, recovery and recrystallization along with simulation of industrial processing such as continuous casting, multi-pass hot rolling, heat treatment, continuous annealing and product development.

  Dynamic Systems Inc. (DSI) designs and manufactures equipment for dynamic thermal-mechanical testing of materials and physical simulation of processes.

  Samples of material are heated and mechanically worked while various performance parameters of interest are measured and recorded for analysis. After the simulation or test is done, the microstructure of the material may also be examined.

The most widely known machine produced by DSI for physical simulation is the Gleeble® System. The Gleeble System is produced in a number of different sizes and configurations . These machines typically have a high speed heating system, a servo hydraulic system and a computer control and data acquisition system. DSI have supplied 13 such systems in India.

A visit to various facilities of Material Science & Engineering Dept., IIT Delhi was undertaken before the lecture session.

The program was attended by Ph.D. and M.Tech students of IIT Delhi along with faculty members of Material Science & Engineering Department. Some members of Executive Committee of our Chapter also attended the program.

The programme concluded with lunch.

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Energy Optimization of Electric Arc Furnaces at Essar Steel India Ltd

Abstract

Production cost in steel industry is a critical parameter and optimisation of energy is of vital importance. This paper describes the work and technological changes adapted by Essar Steel

India Limited during the optimisation process of Electric Arc Furnaces. In particular, it has been found that different feed mix pattern can help to achieve optimum energy. To sustain the optimum energy consumption different technological process and equipment changes were adapted in 25 years of EAF technology like adaption of HDRI, Hot Metal, Oxygen jet lances. The main goal of the optimisation task usually is to find balance point of the needed trade-offs to maximise the benefits in every heat, and to have a system with the flexibility to adapt the operation when the conditions change.

Introduction

Electric Arc Furnace technology for steelmaking was first demonstrated by Sir William Siemens in 1879, with the first commercial plant being installed in 1907 in USA. Over the years, the technology has improved considerably. The process has been adapted to take care of the raw material variation like using % hot direct reduced iron, refined combustion practices like BSE (Badische Stahl Engineering) manual oxygen lance system to Co-jet oxygen system, improved version of OFF gas technological adaptation.

Modern Electric Arc Furnaces (EAF) has become flexible in terms of raw material charge selection. Several innovations like charging preheated scrap into the furnaces or charging of 100% sponge iron has significantly improved the efficiency, economics and flexibility. Currently, most of the technological developments for EAF are aimed at the development of methods of solid charge melting.

Essar Steel Ltd. is a 10 million tonnes per annum (Mtpa) integrated steel facility located at Hazira, Gujarat. It operates six gas-based sponge iron plant with a combined production capacity of 6.5 Mtpa, One Blast Furnace of 1.75 Mtpa and two Corex with combined capacity of 1.75 Mtpa. Hazira Facility has two Steelmaking units. Steelmaking unit #1 houses 4 DC Electric Arc Furnaces with secondary refining facility, three continuous slab casting machines, vacuum degassing facilities, RH Degasser, Lime Plant and oxygen plants. The steel plant was commissioned in 1994 and has adopted several innovative practices in the past 24 years. The paper highlights the chronological developments at the melt shop, which has resulted in overall increase in productivity and energy optimisation.

DC Electric Arc Furnace Melting

Conventional DC Electric Arc Furnaces (EAF) melting use predominantly Directly Reduced Iron (DRI) in the form of pellets with a combination of scrap. Since scrap is easily available in most of the European countries and well-developed Asian countries, the EAF's in those places have adopted a charge combination of scrap and DRI. However, since India does not produce adequate quantity of scrap, it has to be imported from outside, which makes the input cost higher. To sustain the business, a different strategy needs to be adopted.

The power requirement in EAF is a function of quality and quantity and temperature of various inputs to EAF. It also depends upon the operating parameters like amount of additional carbon & oxygen injected, arc time, arc current and delays. It also depends on the heat loss through outgoing gases.

Melting of 100% Sponge Iron

The original design of the furnace at Steelmaking Unit #1 was with 80% sponge iron and 20% scrap combination. However, due to limited availability of scrap, focus was shifted on the possibility of melting 100% sponge iron in the form of Hot Briquetted Iron (HBI). It is generally held that 100% HBI melting is difficult and more power consuming. After repeated trials, satisfactory results were found and the concept of melting 100% HBI evolved and was implemented for the first time at Essar Steel Ltd., India in the Year 1998-99. This whole concept has been fully developed in-house without any capital investment. The steel plant is the first of its kind in the world to adopt 100% HBI melting practice successfully.

Hot DRI (HDRI) Feeding

After the successful implementation of 100% HBI feeding concept, technological development shifted towards bringing down the specific power consumption in EAF. The possibility of feeding DRI in hot condition was explored. At Essar, the steel melt unit #1 is approximately 1 km away from the DRI plant. Special 10 Mt refractory lined vessels was designed, which could be mounted on a trailer and transported

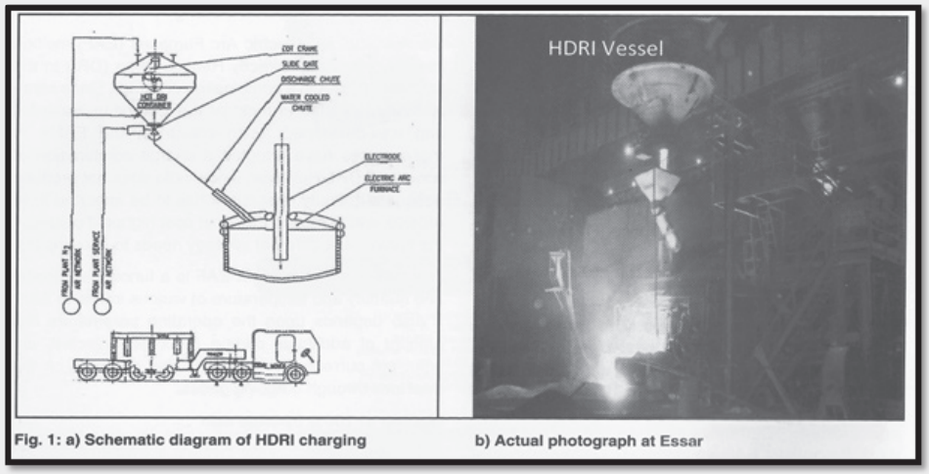


Fig. 1: a) Schematic diagram of HDRI charging b) Actual photograph at Essar

from the HBI plant to the steel melt shop. These containers are lifted with the help of EOT overhead cranes and positioned above the furnace roof. DRI is discharged into the furnace at approx. 620-630 Deg C. Trial run of feeding Hot DRI from this container proved successful and from June 1999, 45 Mt vessels were put in uses which were slowly replaced with 90 Mt and 100 Mt vessels.

The design, engineering and fabrication of the Hot DRI vessels have been done in-house. The key challenges included prevention of re-oxidation during transit, design of feeding systems to EAF etc. Essar has a patent for design and manufacturing these vessels. The Project has brought about an overall improvement in power consumption and productivity. Over the years, many incremental vessel design modifications were done to sustain this energy efficient technology. These included modification of bottom slide gate diameter of HDRI vessels, introduction of leak proof designed slide gate system etc.

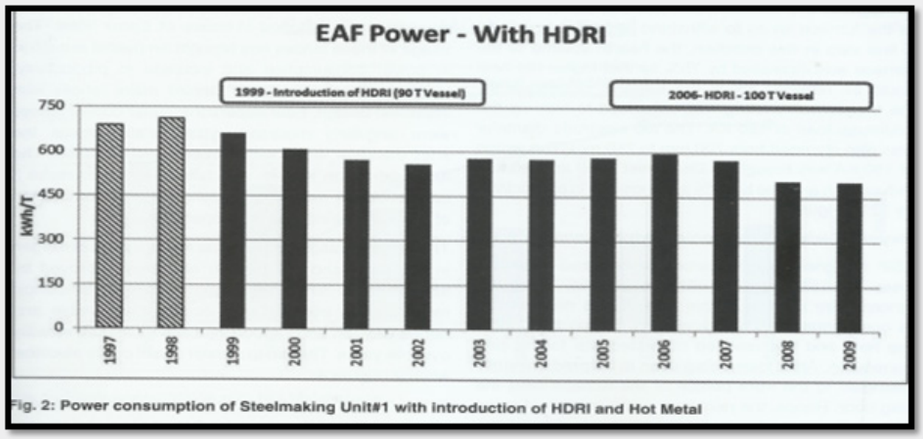


Fig. 2: Power consumption of Steelmaking Unit#1 with introduction of HDRI and Hot Metal

In the year 2015, further brainstorming was done to increase the HDRI% in a day. HDRI vessels were further modified to 150 t capacities to enhance the productivity rate. To facilitate the project, various design modification are going on in the plant like charging crane capacity modification, vessel transportation system, etc.

The sensible energy of Hot DRI (HDRI) is utilised in increasing the bath enthalpy, thereby reducing the heat making cycle time, and overall heat load. Approximate energy savings accrued by using HDRI was 150-180 KWh per MT of LS with approximately 66% HDRI in charge mix.

Transformer Upgradation

For increasing productivity, higher rate of power input is essential. The voltage input is restricted by the foamy slag height at a given instance. In contrast, current levels can be maximised to make the heats faster. Higher current results in more stirring of the bath due to eddy current effect and higher turbulence. However, this needs to be carefully done, as the increase in bath turbulence would potentially result into severe erosion of the bottom refractory and the bottom electrodes if hot heel is not sufficient.

M/s Clecim designed furnaces in Essar Steel Ltd. were designed to take up 120 KA maximum secondary current. To increase the productivity, it was decided to upgrade the transformers and the bottom hearth of the furnace so as to withstand 150 KA current. As a first step in this direction, the hearth volume of the furnace was increased by 75% so that higher hot heel could be retained inside the furnace. Subsequently, the transformer cooling was enhanced to take up the additional load of 150 KA. The top electrode diameter was also changed from 700 mm to 750 mm. The usage of 150 KA was brought in December 2000 and led to a reduction in arc

time by 37% and increase in productivity by 32% (Figure 3).

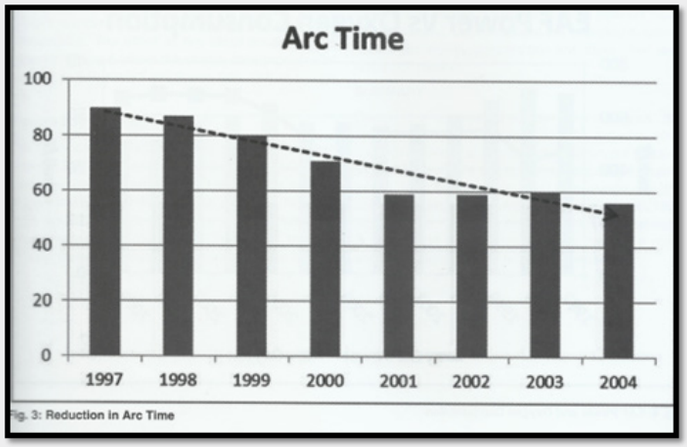


Fig. 3: Reduction in Arc Time

Oxygen Carbon Supersonic Modular Lances

BSE designed oxygen carbon lances and assembly were originally installed with the furnace. Since the lances were of consumable type, it was not possible to continuously lance oxygen and carbon throughout the heat and this resulted in inadequate foamy slag generation. Also, foamy slag used to be predominantly restricted to the front portion of the furnace near the slag door. Hence, the refractory wear and risk of panel leakage used to be more on the back side of the furnace, i.e. the EBT side due to arc flaring.

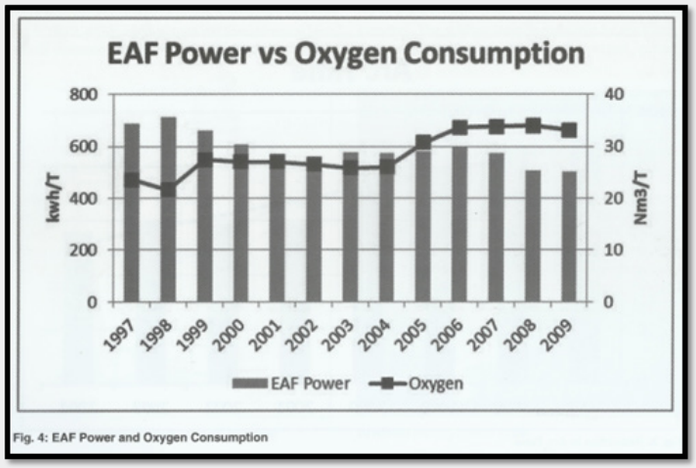


Fig. 4: EAF Power and Oxygen Consumption

To achieve uniformity of foamy slag generation, supersonic modular lances were introduced for EAF in 2002. These lances were mounted on the shell. These lances were developed in-house at Essar Steel. The usage of these lances has brought an overall reduction in power consumption and increase in productivity. In 2006, Essar introduced Danieli make lances with improved design. Four supersonic water cooled lances were angularly mounted symmetrically across the shell diameter along with carbon injection lance. The fume extraction system was fully re-jigged to make it compatible for matching efficiency of post combustion of CO with sealed slag door operation.

These modifications led to better impingement of oxygen in the bath, and the oxygen efficiency improved by approximately 30%. With increasing oxygen efficiency, more oxygen injection was economically viable and hence Oxygen and Carbon injection increased steadily over the years. This led to a lower use of costly electrical energy (Figure 4).

From 2008 onwards, furnaces were modified with copper chill panel, oxygen/carbon lances and copper cooling blocks at lower shell by M/s Miwenti. This improved the refractory consumption significantly and marginally reduced arc time.

Hot Metal Feeding

With new changes in lance system and Miwenti Copper Panel shell, Essar took trial of Hot Metal Pouring in DC Electric Arc Furnace. From Nov. -2010, SMP-1 started taking Hot Metal from Blast Furnace to sustain the energy and production process. Hot metal and HDRI & CDRI combination was taken to optimise the power consumption. The effect of Hot Metal on process is shown with 38% DRI in charge mix.

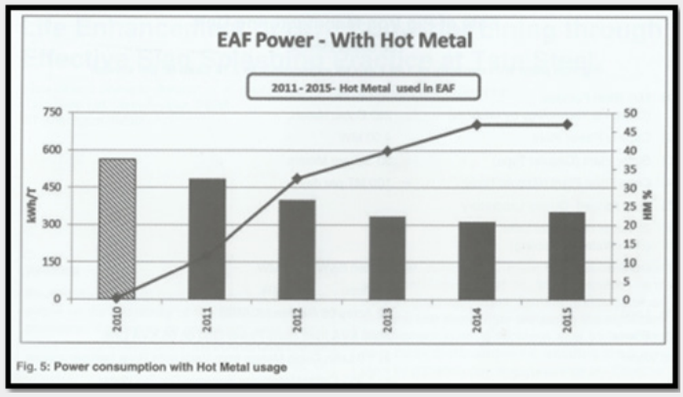


Fig. 5: Power consumption with Hot Metal usage

Present Day Challenges

The technical innovations made over the last two decades had been partially offset by ever deteriorating quality of iron ore available in market. The gangue content in HBI/DRI has

increased by 11.5% between 2005 and 2019. This has had a negative effect of approximately 20 KWh/T of LS. In addition, there is an ever increasing societal pressure to reduce fugitive emissions from steel plant. Increasing Hot Metal in charge or blowing more Oxygen tends to increase the fumes from the furnace and there is an increased load on fume extraction systems. To offset these, efforts are underway to debottleneck the shop floor operations. Essar has also modified the Fume extraction system to take care of excess fumes arising from different types of raw material. Such initiatives are expected to further reduce the energy consumption and make steel melt unit much cleaner.

Summary

Due to the impressive number of innovations, the cycle time of heat shortened by 35% between 1998 and 2019. Electrical energy consumption got reduced by 15-20% with DRI as input material during the same period. With hot metal up to 47% in charge mix, the actual consumption was reduced by 45-50% with 1998 as base year. The steel melt unit of Essar Steel India is well poised to take up challenges towards a more energy-efficient and eco-friendly steelmaking.

Source: Steel Tech

Chromium in BOF Slag: Identification of its Source and Strategies to Recycle as Soil Conditioner

Abstract

The target of the current metallurgical industry is zero waste discharge and steelmakers are trying to recycle & utilise all their by-products for sustainable production loop. Slags are the most important wastes and by-products of metallurgical industry, which are treated, recycled and used worldwide for road construction, cement manufacturing and in agriculture as fertiliser etc. The slags should be recycled, modified and processed in a proper way keeping in view its impact on surrounding environment. The main by-products resulting by iron making and steelmaking are slags (that represent 90% of the total by-product), dusts and sludge. On an average about 200 and 400 Kg of by –products per tonne of steel results from the steel production through the electric arc furnace and BF/BOF routes respectively are produced. The main concern of BOF slag recycling as soil amendment and fertiliser that poses a serious environmental problem is due to the leachable heavy metals and contamination of the soil environs, surface and ground water. Chromium (Cr) is one of those heavy metals contained in BOF slag and its presence is mainly due to the use of any input material that contains high Cr content. Chromium content in BOF slag is limited up to 150 ppm for use in agriculture soil, but some of Indian integrated steel plants are facing the chronic problem of high chromium content in BOF slag ranging 500-600 ppm. Thus, it restricts the use of BOF slag in the agriculture industry so attention must be paid to identify the possible source of chromium and if possible, control strategy for its use as soil conditioner.

Introduction

Slags are the main by-products generated during iron and crude steel production with high potential of recycling. Over the past decades, the steel production has increased and consequently the higher volumes of by-products and residues generated have driven to the reuse of these materials in an increasingly efficient way. In recent years new technologies have been evolved and some of them are still under developing in order to improve the recovery rates of slags. Steelmaking slag deriving from BOF process comes from the hot metal refining process, which converts molten hot metal and steel scraps into high quality steel. Most slags from steel plant derive from this process, with an average of 100-150 kg of slag generated per tonne of steel produced. X-ray diffraction studies have shown that the major phases present in LD slag are dicalcium ferrite, calcium alluminate and wustite, but it contains also some reactive mineral phases, such as 2CaO.SiO2, 3CaO.SiO2 and free CaO and MgO. Recently, due to a better understanding of the slag formation mechanisms and of the overall BOF process, a large number of different slags has been designed, and it is also currently possible to control, optimise and minimise slags production. BOF slag can be used in

different fields of application such as fertiliser, soil conditioners and recovery of metal values, etc. Because of its hard characteristics, it is also used as aggregates for road construction and for hydraulic engineering structures. The main concern of BOF slag recycling as soil amendment and fertiliser that poses a serious environmental problem is due to the leachable heavy metals and contamination of the soil environs, surface and ground water. Chromium (Cr) is one of those heavy metals contained in BOF slag and its presence is mainly due to the use of any input material that contains high Cr content.

Current technologies status

According to environmental policy, the targets concern the environment preservation, protection & its quality improvement, and the efficient use of natural resources by adopting measures for handling environmental issues on global and local level. The use of slags has a crucial significance as regard the environmental aspects. The main problem concerning the utilising of steel slags in agriculture consists of the possible leaching of heavy metals. Heavy metals are broadly distributed in the Earth's crust and some of their chemical forms can be a potential risk to biosphere in particular to the water life because of their solubility. Heavy metal-contaminated land is an important environmental health issue in India, attributed to both industrial as well as mining activities. Chromium is present in various forms in soil. Out of the six oxidation states of chromium, +3 and +6 oxidation states are the most stable forms found in nature. Hexavalent form of chromium (Cr+6) is highly toxic, carcinogenic and harmful to both the plants and animals in comparison to trivalent forms (Cr+3) as reported by several workers. Chromium (Cr) is used in different industrial field of applications such as steel industry, wood preservatives, electroplating, metal finishing, leather tanning, textiles and chemical manufacture and it is a frequent contaminant of both surface and ground waters. In oxidising conditions, it is highly soluble and forms Cr (VI) anions, such as chromates or dichromates. Under reducing conditions, through a process involving a chemical reduction and a precipitation, Cr (VI) converts to Cr (III) that is insoluble. Both forms are stable in the environment. The roots of plants can absorb both forms Cr+3 and cro2-4, but according to literature the Cr (III) forms stable compounds (e.g. hydroxides, oxides and sulphates). Therefore, it is less soluble and consequently less bio available. Although Cr is an essential element for animal and human health, hexavalent Cr salts have toxic and carcinogenic effects. The plant mechanism of toxic effect of Cr is due to the reaction between Cr-complexes and hydrogen peroxide that produces hydroxyl radicals. The increasing interest concerning the slags use for soil conditioning has focused the attention on the heavy metal concentrations in these materials. Due to heavy metals content and the environmental problems resulting to their release to earth, LD slag is often subjected to treatments aiming to extract these harmful, but also precious elements from it. Several investigations carried out in Finland have shown that the concentration of some elements such as Cr and Zn is low because of the high temperatures of the processes. On the other hand, long-term experiments in Germany have shown that the application of steel slag as a liming material does not increase the content of mobile chromium into the soil and after using steelmaking slags as fertiliser. Nevertheless, it is important to carry out further investigations focused on the heavy metals behaviour on the soil in order to better understand the effects of long-term use of steelmaking slags in agriculture. Results on soil analysis have shown that the highest values for Cr have been detected during the 50-years test conducted in St. Peter site (Black Forest) after using of basic slag where Cr has increased of 40-50 mg Cr/kg of aqua regia soluble and total Cr. It has been shown that Cr even has increased in the top soil, it is stable and immobile in the soil. In addition, after more than 50-years tests, they did not move into the deeper soil and therefore they cannot adversely affect the ground water and consequently the human and animal health. Plant analysis conducted in pot experiments has shown no significant differences for Cr uptake, but in different crops they have shown different results for Cr. In particular, the Cr concentrations in rice and winter wheat were about lower of the detection limit (< 0.035 mg). Furthermore, it has been pointed out that the metals uptake by the plants is affected by the soil properties.

For example, the Cr contents into potatoes are reduced in soils with higher content of organic matter and with a heavy texture. In addition, the uptake of Cr by potatoes is favoured by low pH.

Experimental

Data used in this work has reference of a plant with vessel size of 300 t, which charges almost 280 t of hot metal with other input materials such as Calcined lime, Calcined Dolomite, scrap and LD slag. The slag formed is the result of a complex series of physical and chemical reactions between the non-metallic charge (Calcined lime, Calcined Dolomite and fluxes), the energy sources (coke, oxygen, etc) refractory bricks and Ferro alloys if added any in the converter. Because of the high temperatures (about 1600oC) during their generation, slags do not contain any organic substances. The slag's protected the metal bath from oxygen and maintains temperature through a kind of lid formation. Due to the fact that slags are lighter than the liquid metal, they float and may be easily removed. The current steelmaking process is based on the Basic Oxygen Steelmaking process, where a basic slag is produced in the Linz-Donawitz converter. Nevertheless, the LD slag contains high levels of lime (CaO) and MgO) that make it a potential liming agent and may improve soil pH hence can be used as plant nutrients. Particularly free lime, which is one of the main slag constituents can partially dissolve by reacting with water to produce calcium hydroxide, Ca (OH)2' as shown in Eq. (1):

$$CaO + H2O \rightarrow Ca(OH)2 \quad (1)$$

The calcium hydroxide dissolves into Ca2+ and OH-, resulting in a pH increase. All these factors characterising this material, can allow to recycle an industrial residue to improve the fertility of acid soils. Furthermore, the behaviour of trace elements, such as Ca, Mg, P, Cr, V, Zn and Pb, in soils and plants should also been investigated, in particular, the behaviour of heavy metals, especially of Cr, its mobility and its bonds in the soil.

Source of Chromium in Slag

The compositional analysis of different raw materials was done by X-ray fluorescence (XRF) and Optical Emission Spectrometer (OES) and shown in Table 1.

Table 1: Chemical analysis of Hot Metal

	C,%	Mn, %	P, %	S, %	Si, %	Cr, PPM
Sample 1	4.28	0.09	0.17	0.031	0.82	110
Sample 2	4.04	0.12	0.192	0.047	0.75	83
Sample 3	4.16	0.1	0.176	0.028	0.91	150
Average	**4.16**	**0.10**	**0.18**	**0.04**	**0.83**	**114.33**

Elemental Mass Balance

Elemental mass balance has been done by applying Eq. (2) on each constituent. The calculated value of WM (bal) should be zero, but if it was negative this means that this value should be added to the furnace.

WM (bal) =WM (h) + WM (add) – WM (ST) – WM (SL) – WM (off) **(2)**

Calculations based on static mass balance equations are carried out on steelmaking processes as a first step to estimate the chromium content in slag. Thereafter, it was validated using calculating Cr content from input material to down line. A complete mass balance for chromium is done for an integrated steel industry. The first source of chromium as input material is iron ore. Then, as process follows chromium accumulated and partitioned between products and by-products as per stability in thermodynamic condition. The chromium flow can be divided in three major

Table 2: Chemical analysis of other input and output materials

	Al_2O_3	P_2O_5	CaO	MgO	SiO_2	Fe_2O_3	Cr, ppm	MnO	LOI
Cal Dolo	1.29	0.07	44.9	37.47	5.59	1.33	-	0.08	8.49
Cal Lime	0.59	0.009	81.59	3.51	2.04	0.72	-	0.04	11.37
I/O Fines	6.14	0.15	0.24	0.21	5.41	78.66	--	0.04	8.91
I/O Lump	1.18	0.19	0.08	0.12	5.5	87.04	55.00	0.02	5.78
Sinter	2.94	0.31	11.07	3.38	6.63	74.43	274.00	0.63	
BOF Slag	1.52	2.68	47.22	10.89	16.80	18.06	478.95	1.14	
FSNL Slag	1.33	2.32	43.17	7.36	15.83	27.32	616.00	1.20	
Dumped Slag	1.72	2.29	41.91	7.50	16.42	27.49	411.00	1.16	

parts for an integrated iron and steel industry. These are as follow:

1. Chromium flow in iron ore sinter plant
2. Chromium flow in Blast furnace
3. Chromium flow in Basic oxygen furnace

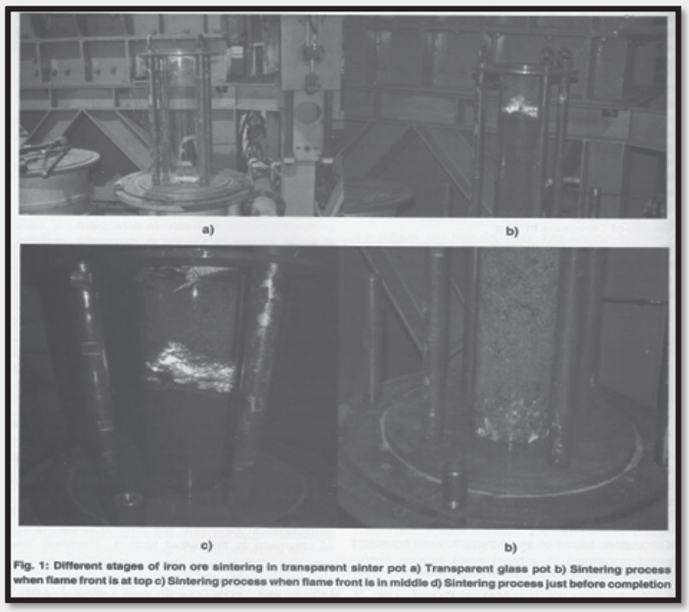


Fig. 1: Different stages of iron ore sintering in transparent sinter pot a) Transparent glass pot b) Sintering process when flame front is at top c) Sintering process when flame front is in middle d) Sintering process just before completion

Mass Balance of Chromium in Iron Ore Sinter Plant

With the recent growth of interest in the effect of trace elements on the environment and health, the inclusion of certain emission limits for few elements has been increasingly observed. From the viewpoint of environmental impacts, 14 elements are considered to have potentially higher impact: arsenic, cadmium, chlorine, copper, chromium, manganese, mercury, lead, nickel, vanadium, zinc, polonium, uranium and thorium. These elements are associated with the main inputs of the steel industry and when present in the sinter can affect (positively or negatively) the steel chain and final product. In the present work, chemical characterisation of chromium in various sintering inputs was performed, and the intake of these elements in a sintering process was then analysed. The mass balance was then considered to determine the theoretical partitioning of chromium in the output product. Therefore, this study aims the better understanding the behaviour of chromium in the sintering process to eventually support interventions to modify the output in the product.

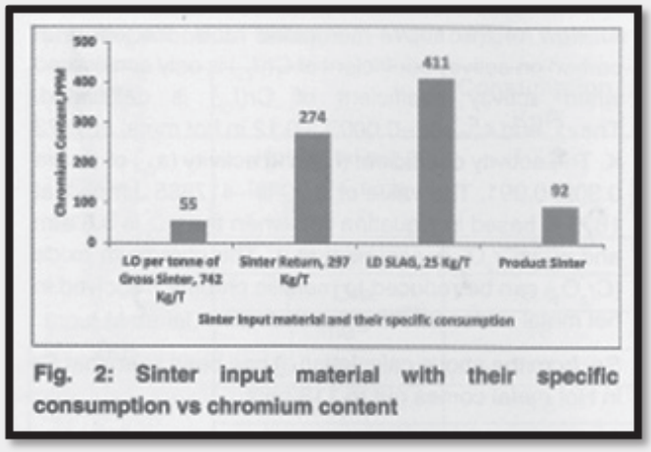


Fig. 2: Sinter input material with their specific consumption vs chromium content

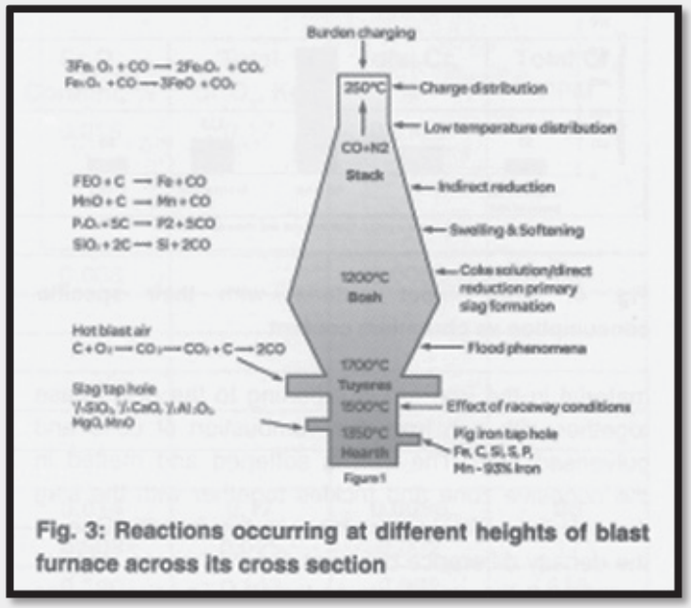


Fig. 3: Reactions occurring at different heights of blast furnace across its cross section

In the sintering process, a mixture of raw materials composed of fine iron ore (sinter feed), solid fuel (coke), flux, returned fines and steelmaking residues are arranged on a conveyor belt and then heated to temperatures close to 1300oC to achieve reductive oxidising semi fusion. The product of this process is a mass called sinter which is then crushed; its particle size is adjusted through screening to meet the requirements of the next stages of steel production, and the thin material is reused in the process.

Elements in sinter were analysed by XRF method at lab for different sinter input material. The concentration of chromium and their specific consumption is shown in Figure 1. It was seen that a chromium presence in fluxes and reducing agents were below detection limit.

As per above calculation, it has been observed that there was 55 ppm chromium content in iron

ore, which resulted 92 ppm chromium in sinter.

Chromium Balance in Blast Furnace

An illustration of the blast furnace is presented in Figure 2. The raw material used in the process is coke, iron ore agglomerates of pellets or sinter and slag formers. Other materials that can be used are cold bonded briquettes of residues, basic oxygen furnace slag and scrap. Alternating layers of coke, iron burden and slag formers are charged at the top. The material descends due to gravity when the coke is continuously burned at the tuyere level and the slag and pig iron is tapped from the hearth.

Table 3: Chromium balance in sintering process

		Consumption, Kg/T#	Cr_2O_3 Content, %	Total Cr_2O_3, Kg	Total Cr, %	Total Cr, PPM
Input Material, Kg	I.O per tonne of Gross Sinter	742	0.008	0.059	0.0055	55
	Lime Stone	92	-	-	-	-
	Dolomite	85	-	-	-	-
	Coke Breeze	57	-	-	-	-
	Mill scale	12	-	-	-	-
	Sinter Return	297	0.020	0.059	0.0137	137
	Flue Dust	7	-	-	-	-
	Lime Dust	1	-	-	-	-
	LD SLAG	25	0.06	0.015	0.0411	411
	Total	**1318**	**0.010**	**0.134**	**0.0069**	**69**
Output	**Sinter**	**1000**	**0.013**	**0.134**	**0.0092**	**92**

#Consumption figure has been taken from Annual Statistics Report (FY 2017-18)

In the tuyeres hot blast, i.e. preheated air, is introduced together with pulverised coal. The blast adds to the thermal balance of the blast furnace. Also, the reaction between the blast and the pulverised coal and the coke generates carbon monoxide. As the carbon monoxide ascends throughout the furnace the iron ore consisting mainly of hematite (Fe_2O_3) is reduced.

When the iron oxide is reduced to metallic iron throughout the descent in the furnace, the gangue material in the iron ore is reporting to the slag phase together with ash from the combustion of coke and pulverised coal. The iron is softened and melted in the cohesive zone and trickles together with the slag through the coke layers down to the hearth. Due to the density difference between the slag phase and hot metal (HM) the slag floats on the HM. The two phases can thus be separated when tapping the furnace.

In spite of the burden containing small amounts of chromium oxide (Cr2O3), most of chromium oxide was reduced into hot metal and the rest passed to slag. The reduction equation of chromium oxide is shown in Equations below.

$$Cr_2O_3 + 3C(s) = 2[Cr] + 3CO\,(g)$$

$$\Delta G^{\theta}_{Cr} = 839491 - 618.72T\,(J.mol^{-1})$$

$$\Delta G_{Cr} = \Delta G^{\theta}_{Cr} + RT\ln\frac{a^2_{[cr]}\left(\frac{p_{CO}}{p^{\theta}}\right)3}{a_{Cr2O3}a^3_C} \qquad (3)$$

In view of the above-mentioned facts, the effect of carbon on activity coefficient of Cr (f_{Cr}) is only considered when activity coefficient of Cr (f_{cr}) is only considered when activity coefficient of Cr(f_{cr}) is calculated. The e^{cr}_{cr} and e^{c}_{cr} are -0.0003, -0.12 in hot metal at 1873 K. The activity coefficient (f_{cr}) and activity (a_{cr}) of Cr are 0.305, 0.091. The value of ΔG_{cr} is -417885 J.mol-1 at 1873 K based in Equation (3), when the pco is 0.6 atm and ac, aCr_2O_3 is assumed to 1. The chromium oxide (Cr_2O_3) can be reduced to metallic chrome dissolved in hot metal under smelting conditions.

So, from the above calculation, it has been seen that Cr in Hot metal comes out to 113 ppm.

Chromium Balance in Basic Oxygen Furnace

Chromium is dissolved as divalent and trivalent chromium in the slag phase. Increasing temperature, decreasing oxygen potential and decreasing slag basicity results in an increase of the ratio between Cr2+ and Cr3+. Since the BOF process is operated under high slag basicity and high oxygen potential so Cr3+ predominates in the slag phase.

Table 4: Chromium balance in blast furnace

		Consumption, Kg/T	Cr_2O_3 Content,%	Total Cr_2O_3,Kg	Total Cr, %	Total Cr, PPM
Input Material, Kg	I.O.(Lump) per tonne of HM	516	0.008	0.04	0.0055	55
	Sinter	1142	0.013	0.15	0.0092	92
	Coke(dry)	470	-	0.00	-	-
	Nut Coke	39	-	0.00	-	-
	CDI (Dry)	50	-	0.00	-	-
	Pellet		-	-	0.00	-
	Quartzite	0.4	-	0.00	-	-
	Mn. Ore	-	-	0.00	-	-
	LD SLAG	0.01	0.060	0.00	0.0411	411
	Scrap	9.40		0.00		
	Total	**2226.81**	**0.009**	**0.19**	**0.0060**	**60**
Output	**Hot Metal**	**1000**	**0.016**	**0.16**	**0.0113**	**113**
	Slag	**400**	**0.007**	**0.03**	**0.0050**	**50**

*~85% of chromium goes to hot metal and rest in slag

Result and Discussion

A detailed study has been carried out to identify the possible source of chromium in BOF slag. Chromium content in BOF slag came around 800 ppm, which is on higher side for use in agricultural process. So, possible source and strategies for its reuse was looked through this project. Samples were collected from an integrated Steel Plant and it was found the main source which contributed to such high value of chromium was iron ore. Cr content in iron ore was 55 ppm, which amounts to 92 ppm in sinter. When this sinter is used in blast furnaces, Cr content in hot metal goes up to 113 ppm and finally end with 818 ppm in slag. Literature study revealed that Cr containing BOF slag is being used as soil conditioner after grinding it. Cr has been limited to 150 ppm and Cr in BOF slag was found around 800 ppm. So, the effect of the use of BOF slag in proportionate quantity for agricultural use should also be investigated.

Conclusion

In the preliminary investigation, based on the origin of heavy metals in the BF-BOF route has led to the result that Cr is originated from iron ore.

Table 5: Chromium balance in basic oxygen furnace

		Consumption, Kg/T	Cr_2O_3 Content, %	Total Cr_2O_3, Kg	Total Cr, %	Total Cr, PPM
Input Material, Kg	Hot Metal per tonne of Crude Steel (T)	1023	0.016	0.17	0.0113	113
	Scrap	102	-	-	-	-
	Iron Ore	0.6	0.008	-	0.0055	55
	Lime	78	-	-	-	-
	Limestone	1.1	-	-	-	-
	Fe-Mn	3.8	-	-	-	-
	Fe-Si	0.3	-	-	-	-
	Coke/Pet Coke	0.3	-	-	-	-
	Total	1209.1	0.014	0.17	0.0096	96
Output	**Crude Steel**	1000	0.003	0.025	0.002	17
	BOF Slag	120	0.120	0.143	0.082	818
*~85% of chromium goes to Steel slag and rest to steel bath						

Few plants are using Cr containing BOF slag as soil conditioner after grinding it up to very fine size.

Effect of use of BOF slag in proportionate quantity for agricultural use can be another method which can be explored.

Source: Steel Tech

Electric Vehicles adoption to drive copper demand HCL head

Greater trust by the government on popularising Electric Vehicles through incentives and evolving regulatory measures would boost demand for copper, chairman cum managing director of Hindustan Copper Santosh Sharma said at the annual general meeting of the company.

"The evolving market will have a substantial impact on Copper demand. The market for electric vehicles (EV) is expected to witness growth in coming years as government incentives continue around the world including India by reducing GST. It is projected that the demand for Copper due to electric vehicles is expected to increase by 1,700 kilotons by 2027," Sharma told shareholders.

Indian scenario

In FY19, the copper ore production in India was 4.12 million tons (mt) 12 percent higher compared to FY18.

Refined copper production in FY19 was about 4.57 lakh tons (1kt), as compared to 7.65 1kt in FY18.

During FY19 demand of refined copper products was around 7 1kt and is expected to grow at 9-10 percent in tandem with economic growth in the country.

"Infrastructure will remain a strong pivot to the demand growth of refined copper in the country," Sharma said.

Thrust on increasing urbanisation, development of industrial corridors, smart city project, housing for all Indians by 2022, National highway development project, new Indian Railways projects, defense production policy to encourage indigenous manufacture are some of the steps to fuel demand, he said.

"Per capita copper consumption in India is expected to increase from the current level of 0.5 Kg to 1Kg by 2025," he said.

Global Perspective

During 2018, world mine production increased by about 2.3 percent to the level of 20.56

mt in metal terms and is forecast to remain unchanged in 2019 and then to grow by 1.9 percent in 2020.

"Global mining companies have taken up capacity enhancement projects and world copper mining capacity is estimated to reach 25.9 mt in 2021, with 20 percent being from solvent extraction process," the HCL head said.

World refined Copper production has increased by about 1.98 percent during 2018 and reached to a level of 24.02 mt.

"In 2018, World growth was constrained by an unusually high frequency of smelter disruptions and temporary shutdowns for technical upgrades and modernisations. The main contributor to growth in world refined production was China due to its continued expansion of capacity.

Overall growth was partially offset by 34 percent decline in India's output due to shutdown of some of the smelters and declines in Germany, Philippines and Poland as a consequence of maintenance shutdowns and operational issues.

"A rise of 2.8 percent is expected in 2019, but refined copper production is likely to be constrained in 2020 due to tightness in the availability of concentrates resulting in a limited increase of around 1.2 percent in world refined production," he said.

In 2018, world consumption of refined Copper was 24.41 mt registering a growth of 2.86 percent.

World refined copper usage is expected to increase by around 2 percent in 2019 and 1.5 percent in 2020.

International Copper Study Group has projected a deficit of about 190,000 tons in 2019, for 2020, a higher deficit of about 250,000 tons is foreseen as growth in refined production is expected to lag behind that of usage.

"Infrastructure development in major countries such as China and India and the global trend towards cleaner energy will continue to support copper demand. China, consuming half of global refined copper, is about to start its second phase of economic expansion and its economy is set to regain its growth momentum in coming years following some needed reforms undertaken," Sharma said.

Company performance

Copper ore production of 41.22 1kt during FY19 is the highest in last 21 years. Ore production of 25.42 1kt at Malanjkhand Copper Project (MCP) during the year is the best since inception.

Metal-in-Concentrate production of 32,439 tons during FY19 is the highest in last 17 years. Total copper sales of 38,273 tons during FY19 is the best in last 9 years.

Major overhauling of flash furnace with technical upgradation in the slag cleaning furnace at ICC, Ghatsila was completed during the year.

In FY19, net turnover was the highest since inception at Rs 1753.29 crore as against Rs 1599.26 crore during FY18 registering an increase of 9.63 percent.

EBITDA during FY19 was Rs 538.70 crore as against Rs 307.98 crore last year. EBITDA margin improved significantly to 29.66 percent compared to 18.44 percent year ago, registering a growth of 60.84 percent.

Capex during FY19 was Rs 602.46 crore and in the current year capex will be around the same level.

Expansion Projects

In view of the vast gap between supply and demand of Copper metal in the country, the Board of HCL approved enhancement in mine production plan of the company from present projection of 12.4 mt to 20.2 mt a year in next 5 years at an estimated capex of Rs 5,500 crore.

"Work is under progress since August 2015 to develop an underground mine at Malanjkhand below the existing open cast mine of capacity 5 mtpa.

During FY19, sinking of Service Shaft 665 meters and production shaft 693.6 meters was completed. Malanjkhand underground mine is now ready to start ore production through decline route.

Letter of Intent has also issued during July 2019 to the successful bidders for undertaking production activities for five years while the development of the lower level of the mine and other construction activities will be continued.

Hindustan Copper plans to award EPC contracts for Chapri-Sidheswar, Surda and Khetri mine expansion projects and the mine operations.

Extension of mining lease period of the existing mining leases beyond March 2020 is under active consideration by the respective state governments. The State Government of M.P. has extended the mining lease of Malanjkhand up to August 2023.

With regard to exploration activity, to establish the depth continuity of mineralization exploration, drilling from surface has been undertaken at Surda and Rakha Mining Leases at ICC, Ghatsila Belt.

Waste to Wealth

Hindustan Copper is in the advanced stage of erection of Copper Ore Tailing recovery facility of capacity 3.3 mtpa to recover the valuable metals and minerals from the tailing and reduce the mass in the existing tailing storage facility so as to extend active life of TSF and unlock the value in the waste/ tailing at Malanjkhand Copper Project.

The project besides generating additional revenue to the company will also help mitigate the risk to the environment. It is expected that the plant will be commissioned during FY20.

Joint Venture with Nalco, MECL

Hindustan Copper signed a Joint Venture Agreement on August 1 with National Aluminium Company Ltd (NALCO) and Mineral Exploration Company Ltd (MECL) – CPSEs under Ministry of Mines – for constituting a JV company namely Khanij Bidesh India Ltd (KABIL).

The equity participation among NALCO, HCL and MECL is in the ratio of 40:30:30 while the authorized capital of the JV is Rs100 crore.

"The objective of the JV company is to secure the strategic mineral interests of the country. At present, there are strategic minerals like Tin, Cobalt, Lithium, Germanium, Gallium, Indium, Beryllium, Niobium, Tantalum, Tungsten, Bismuth, Selenium that are either not available in the country or not available in the desired quantity. The company is set up for identification, acquisition, exploration, development, mining and processing of strategic minerals overseas for commercial use and meeting country's requirement for these minerals," Hindustan Copper said in a release following the signing of the JV agreement.

The JV will help in building partnerships with other mineral rich countries like Australia and those in Africa and South America, where Indian expertise in exploration and mineral processing will be mutually beneficial and bring new economic opportunities. The three CPSEs will also be benefited from the JV and will make a mark at the global stage, release said.

Source: Steel Insights

Recent Trends in Applications of Aluminium Alloys

Introduction

Aluminium is a very important metal due to its typical characteristics such as light weight, corrosion resistance, attractive appearance, good thermal and electrical conductivity and so on. It has high strength to weight ratio; hence it is an ideal metal for replacement of heavy metals like iron and copper. It also has good recycling potential. Aluminium alloys are second only to steels in use as structural metals.

Due to these characteristics it is extensively used for castings, extrusions and also in the form of sheets. The highly formable 5000 series alloys are used for inner panel applications whereas 6000 series alloys which are heat treatable are used for outer panel applications. Among the most common applications of Aluminium and its alloy are in automobiles, railway coaches, aircrafts and aerospace, electrical wires and cables, utensils and host of others.

Light weight, coupled with the high strength of some aluminium alloys (exceeding that of structural steel), permits design and construction of strong, light weight structures that are particularly advantageous for anything that moves – space vehicles and aircraft as well as all types of land – and water-borne vehicles.

(a) Aluminium for automobile applications

The use of this metal has grown by more than 80% in the last 5 years. About 110 kgs of Al per vehicle was used in 1996, which increased by more than 250 or 340 kgs with or without body panel and structure applications in next 5 years' time.

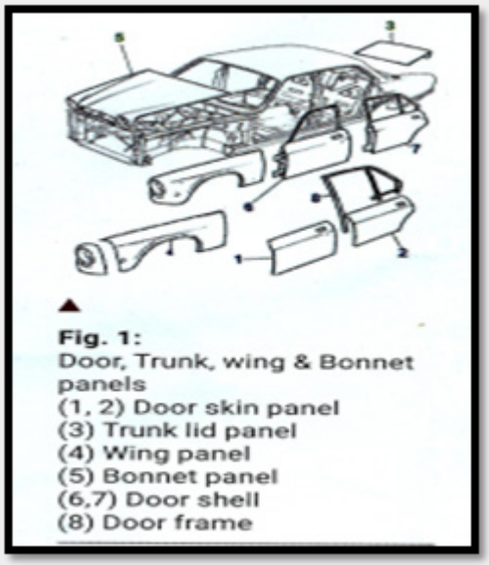


Fig. 1:
Door, Trunk, wing & Bonnet panels
(1, 2) Door skin panel
(3) Trunk lid panel
(4) Wing panel
(5) Bonnet panel
(6,7) Door shell
(8) Door frame

Hood, trunk lid and doors made from Aluminium can replace steel parts.

Aluminium castings are replacing engine blocks which were traditionally made of cast iron. Pistons (100%), cylinder heads (75%) and intake manifolds (85%) are now replaced by Aluminium. Recent trends include power trains, chassis, body structure and air conditioning also. Forged Aluminium wheels are also being developed. Aluminium alloys find extensive applications for radiators which were made from copper.

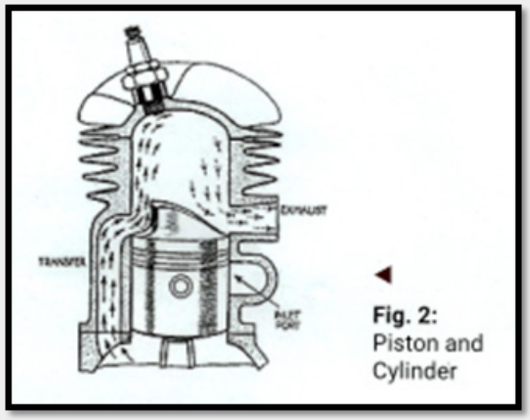


Fig. 2:
Piston and Cylinder

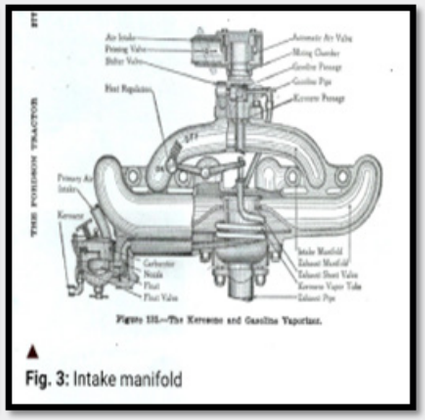


Fig. 3: Intake manifold

Wrought Aluminium is finding uses in bumper reinforcements, side impact panels, seat frames, sumps etc.

Latest developments show that, the body in white (BIW) offers greatest opportunity for weight reduction of 50% by using large amount of Al. This can result in overall 20-30% reduction in weight.

Demands to improve fuel economy and reduce emissions necessitate modifications in the materials and design of engine blocks. Wear resistance and low friction coefficient are the major characteristics required for engine block materials.

Excellent thermal conductivity and lower density make Al-Si alloys a suitable alternative for cast iron in the fabrication of engine components. The increase in the maximum operation temperature and pressure of engines necessitates improving thermo mechanical fatigue performance of Al-Si alloys.

(a) Aluminium alloys for aircraft industries

Future of Aluminium alloys in aerospace – Industry experts are positive about the future of Aluminium alloys in aerospace.

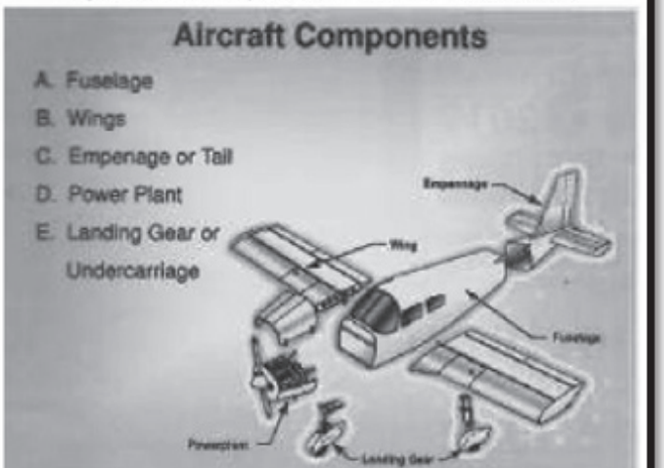
Fig. 4:
AUDI AL2 with an all Aluminium Body structure

It is projected that demand for Aluminium will double over the next decade. By 2025, there will be a global demand of 80 million tons. For this reason, the aerospace industry is increasingly looking to recycled alloys to satisfy their high demand. There is also a push for innovation in the materials used, as well as the design structure of aircraft.

For instance, aluminium-lithium alloys have been developed for the aerospace industry to reduce the weight of aircraft and therefore improve performance of the aircraft. Al-Lithium alloys are advanced materials because of their low density, high specific modulus, and excellent fatigue and cryogenic toughness properties.

Selected applications of wrought Aluminium alloys are as under –

Fig: 4 main Components of Aircraft Structure



1. 2024-T3 grade alloy has tensile strength of 62000 psi and used in the sheet form for fuselage, aircraft structure, wing skins and cowls.
2. 6061-T6 alloy has strength level comparable to mild steel and used for aircraft landing mats, structural components and truck bodies as well as frames.
3. 5052-H32 alloy has excellent corrosion resistance and hence suitable for marine applications. It is suitable for making fuel tanks.
4. 7075 – grade alloy contains 1.6% Copper, 2.5% Magnesium, 5.6% Zinc and has high strength and suitable for strengthening aircraft structures.

Common aluminium alloys used as casting are as under –

Table: 3

Material	Application	Remarks
Ti-6Al-4V	Cockpit window frame, Wing box, Fastener	Figure 5
Ti-3Al-2.5V	Hydraulic pipe	
Ti-10V-2Fe-3Al	Landing gear, Track beam	Figure 4
Ti-6Al-2Sn-4Zr-2Mo	Exhaust, Tail cone	Figure 6
Ti-15V-3Cr-3Sn-3Al	Duct	

Applications of some of the Titanium and Aluminium alloys are highlighted in Table 3 below

Table 1 & Table 2

Alloy No.	Representative Application
100.0	Electrical rotors larger than 152 mm (6 in.) in diameter
201.0	Structural members; cylinder heads and pistons; gear, pump, and aerospace housings
332.0	Automotive and heavy-duty pistons; pulleys, sheaves
354.0	Premium-strength castings for the aerospace industry
390.0	Internal combustion engine pistons, blocks, manifolds, and cylinder heads
518.0	Architectural and ornamental castings; conveyor parts; aircraft and marine castings
520.0	Aircraft fittings; railway passenger care frames; truck andbus frame sections

Nominal compositions of alloys referred to in Table 1 are shown in Table 2 below.

Alloy No.	Product	%Cu	%Mg	%Mn	%Si	Others
201.0	Sand Casting	4.6	0.35	0.35	---	0.7 Ag, 0.25 Ti
354.0	Permanent mold casting	1.8	0.50	---	9.0	------
390.0	Die casting	4.5	0.6	---	17.0	1.3 Zn max.
518.0	Die casting	--	8.0	---	---	---
520.0	Sand casting	--	10.0	---	---	---

(b) Applications in aerospace industry

▲
Fig. 5:
Coke pit window frame

▲
Fig. 6:
Tail cone of an aircraft

A rocket must withstand the strong forces during launch and be as light as possible. For the main frame most rockets use aerospace grade aluminium or titanium since both metals are very strong but lightweight. Future rocket designs are even looking into using carbon composite structures. Aluminium for spaceships – A rocket must withstand the strong forces during launch and be as light as possible. For the main frame most rockets use aerospace grade aluminium or titanium since both metals are very strong but light weight. Future rocket designs are even looking into using carbon composite structures.

Space ships need to be solid for safety, but they

also need to be light so that they have a better chance of escaping earth's gravitational pull with less fuel or propellant, which is heavy and expensive on its own. This is why Aluminium and aluminium composite materials are used on spacecraft. Aluminium is light but also very sturdy. Using titanium alloys can also strengthen the body of the ship.

Conclusion:

Thus it is clear that Aluminium and its alloys have a promising future. They have vast applications in Automobiles, Aircrafts, Space vehicles, Railway coaches, Marine applications, electrical wires and cables and host of others.

Though, alternatives to Aluminium like composite materials are also being used, there seems to be no immediate or near future threat to demand for aluminium coming down.

Source: Metal World

Domestic scrap market remain volatile

Indian melting scrap prices fluctuated slightly in specified regions and price range move down by Rs 300-1000 per ton in major scrap consuming regions like western and southern India, sources said.

Domestic melting scrap price might remain supported or remain range bound considering limited supply in western region, which is known as major scrap consumer like Gujarat as well as Maharashtra.

Further in southern India – scrap prices in Chennai remained near to range bound with minor fluctuation amid average supply. Prices varied in the range of Rs200-300 per ton depending upon the quality and quantity of the material.

Imported scrap (HMS 1) viability seems limited in India as fresh offers are hovering at $290-300 per ton cfr for Dubai origin HMS 1, which landed cost to western India base plants will be close to Rs 22,700 per ton. This includes Rs 2,300 per ton logistic, customs clearance and import duty. However, the domestic scrap prices hovered at Rs 22,000-22,100 per ton in Gujarat market.

Scrap prices in Chennai market stood at Rs 20,200 per ton and landed cost of imported scrap calculated at Rs 21,300 per ton considering $280 per ton from West Africa.

However, few participants shared that they have booked West Africa scrap (HMS 80:20) at $270 per ton which ultimately cost Rs 20,600 per ton equivalent to domestic scrap prices.

Owing to limited supply and demand in domestic market, scrap prices are less likely to see a major change in near term.

According to industry sources, domestic prices were marginally down because of the weakness in the steel market, cash crunch and low movement of material.

India's overall ferrous scrap usage is estimated to be around 25-30 million tons. In FY19, India imported around 6.55 million tons of scrap, up 38 percent over 4.74 million tons imported in FY18. In FY19, India imported around 417,000 tons of re-rollable scrap, down 2 percent over 424,000 tons imported in FY18. In the April-June period of FY20, scrap imports stood at 1.92 mt and re-rollable scrap imports stood at 84,000 tons.

India imposed a 2.5 percent duty on imported ferrous scrap. The government decided not to eliminate this tariff in the budget for the current financial year.

The National Steel Plan for India, released by the country's Ministry of Steel, states ambitions to increase steelmaking capacity to 300 million tons per year by the 2030-31 financial year. This shall increase requirement of steel scrap from present level of around 25 million tons to more than 50 million tons by 2030.

The basic-oxygen furnace (BOF) method will see the biggest rise, so scrap consumption will be boosted primarily by the higher intake at Indian integrated mills.

Notably, the plan suggests that demand will rise for both scrap and metallics, despite announced plans to depart from iron-based steelmaking in favor of more environmentally friendly scrap-based processes.

While the Indian steel industry offers ample potential for growth, there are significant downside risks arising from its limited access to raw materials, including a tight gas supply, and the lack of investor-friendly downstream projects.

Requirements for direct-reduced iron (DRI), also known as sponge iron in India, will be close

to 52.50 million tons per year by 2030, which exceeds the country's current capacity of 46 million tons per year.

As long as capacity expansion plans are achieved, demand for both metallics and scrap will benefit from the rising steel output. And this means that import scrap volumes are also likely to increase, at least over the next five years, despite the launch of local shredding capacities. Over the longer term, India's potential to become self-sufficient in shredded scrap depends on ELV stock availability, as well as on car-scrappage legislation and investment in shredding operations.

India's domestic steel scrap shortage

The supply shortage of domestic steel scrap in India is set to expand and this may lead to more imports of the commodity. India's shortage of domestic scrap supply in FY19 was at 6.55 million tons, which will increase to 9.11 million tons in 2021-22, India's steel ministry told parliament.

Scrap Import to India's (in '000 tons)

Product	Non-alloy (Prime + defective) April-June FY20	Non-alloy (Prime + defective) April-June FY19	Growth %
Re-rollable Scrap	84	113	-75
Scrap	1921	1502	28

Prices of scrap in various markets during the past six months (Rs/ton)
(Prices are basic, exclusive of taxes)

Name of the market	Price Rs/Ton as on 1 August 2019	Price Rs/Ton as on 31 July 2019	Price Rs/Ton as on 24 July 2019	Price Rs/Ton as on 1 July 2019	Price Rs/Ton as on 1 February 2019
Mandi Gobindgarh	20,500	20,200	20,900	22,300	24,700
Kolkata	22,900	23,100	23,900	25,100	26,600
Alang Scrap Yard	22,100	22,000	22,000	23,900	25,500
Ludhiana	24,300	24,200	24,800	25,900	28,000
Mumbai	20,900	20,900	21,200	22,400	25,000
Durgapur	22,400	22,600	23,400	24,600	26,100

Major scrap suppliers to India are the UAE, the US, UK and South Africa. Total scrap demand in FY2020 is expected at 29-31 million tons, while domestic supply is expected to reach 27-28 million tons.

Source: Steel Insights

India still dependent on Imported Scrap

Dhawal Shah is the Managing Director of Metco Marketing India Pvt. Ltd., which is one of India's leading indenting houses for secondary metals, Ferrous/ Non-Ferrous scraps & Ferro-alloys. He has been with the company for over 23 years, and during this period, has made Metco expand its global footprint, and also its product line.

A commerce graduate from Mumbai, he strongly believes in thought leadership, and likes to remain realistically optimist. Besides managing Metco, Shah currently is also serving as Senior Vice President of the BIR Non-Ferrous Board, and is Vice President of Metal Recycling Association of India (MRAI), which is India's apex association dedicated to metal recycling.

He is also on Advisory Committee of Multi Commodity Exchange (MCX), India's leading electronic exchange for commodities. Recycling is very close to his heart, and over the last 7 years has dedicated a lot of his time on growth & development of metals recycling industry in India.

Speaking to Sanjay Singh, Assistant Editor of Metalworld, Shah commenting on the source of scrap says it is only a myth that it is mostly originating, or sourced from the unorganized sector. Excerpts

Q. Can you give on overall view of recycled Aluminium industry in the country?

A. The Indian aluminium (including primary and recycled industry is estimated to have grown at about 6-7% CAGR during FY13-18 period and reached 3.7 million tonnes by March 2018. Of the total volumes growth, the demand for primary aluminium is estimated to have grown by 5% y-o-y and reached 2.5 million tonnes by end of the FY 2018.

This growth was largely attributed to a modest growth in key end-use segment power (cables and transmission lines). On the other hand, the demand for recycled aluminium is estimated to have grown at a relatively faster pace of 10% CAGR during FY13-18 period reaching 1.2 million tonnes by the end of FY March 2018, primarily led by healthy demand scenario for non-ferrous castings from auto sector.

As a result, the share of recycled aluminium has gradually risen to an estimated 32% in FY18 from 28% in FY13.

The growth in overall aluminium demand was also supported by replacement of other non-ferrous or ferrous metals with aluminium in key end-use industries in the domestic market owing to better technical properties such as optimum strength to weight ratio, low melting point, corrosion resistance, better electrical and thermal conductivity, better recyclability etc., amongst others.

Q. What is the demand for recycled Aluminium in India?

A. During FY13-17 period, the demand for recycled aluminium (ingot equivalent) is estimated to have grown by 9% CAGR and reached 1.05 million tonnes by FY17. This was primarily supported by rising application of non-ferrous Casting in auto sector coupled with higher usage in B&C segment.

Further, in FY18, the demand for recycled aluminium gained further steam and rose at 17% y-o-y and reached 1.2 million tonnes. This increased growth was primarily led by a sharp rebound in sales volumes of the automotive industry (which includes 2 wheelers, 3 wheelers, cars & UV, CVs etc.), which is estimated to have grown at 14% y-o-y during the year, as against 7% CAGR during FY13-FY18 period.

The packaging segment too witnessed a faster growth (for recycled) during the year largely as a result of a healthy growth in key underlying industries such as food products, beverages and pharmaceuticals.

Of the total estimated demand for recycled aluminium of 1.2 million tonnes in FY18, majority of the demand (to the tune of 40-45%) is concentrated in the northern region, followed by southern and western region. This is primarily on the back of key auto hubs/ clusters in the NCR belt with key OEMs like Maruti Suzuki, Hero Motocorp, Bajaj Auto, Tata Motors etc. being situated there.

Auto clusters in Chennai, Coimbatore and Pune etc. coupled with significant presence of extruders in West and South aids significant share of secondary aluminium in the region at 20-25% each. Eastern region, however, with no major auto component belt has the lowest share of about 10-15% in FY18. De-ox and utensils are key end-users in the Eastern belt.

Q. Can you give a brief profile of Metco India and its activities?

A. Metco is India's leading indenting house for secondary metals & non-ferrous scraps. It is a crucial interface between suppliers and consumers, providing cutting edge solutions in global raw materials trade. For last 33 years, it has developed a unique mix of product knowledge, market dynamics, and logistical network – to deliver service based packages.

Headquartered in Mumbai, Metco India has a large talent pool, comprising of highly qualified traders, shipping & IT personnel, accountants etc.. who relentlessly work together, making it a leader in this segment.

Q. To which industry you supply your products and who are your clients?

A. Metco India works across secondary non-ferrous consumers, who in turn cater to larger segments. Some of the biggest industries where such secondary metals are consumed in larger units are – Automotive, Building & Construction, Steel, Packaging, Heavy & Light engineering.

Our clients are typically secondary smelters, who make inter mediate, as well as down stream products in aluminium, stainless, copper alloys (Brass, Bronze, etc.), & lead. Our clientele spreads across the Indian

sub continent, Far East, Europe and also Americas.

Q. How do you source your scrap requirement and how much it is imported?

A. India's secondary sector is still largely dependent on imported scraps to feed its production. Over the last 3 decades, we have penetrated across global supply chains, and created a strong data base of suppliers who can consistently deliver quality products, at competitive pricing. As such, we do a large part of our scrap sourcing from these supply partners. On average, we handle around 6500 mt per month of all non-ferrous scraps (including stainless), and nearly 95% is through imports.

Q. Since scrap is mostly sourced from the unorganised sector, do you think there is a need that the industry needs to be more organised?

A. I think it is only a myth that scarp is mostly originating, or sourced from the unorganised sector. Take the case of aluminium, India produces about 1.2 million tons of secondary aluminium. About 85% of the raw material needs are met through imports.

About 65% of the output is being then sold to automotive industry. The remaining gets divided between other large organized sectors like building & construction, packaging, steel, utensils, transport & power.

The supply chains required for such businesses need strong compliances, and traceability. There could be a minuscule percentage of the unorganised sector existing – however, post GST, there is tremendous pressure for them to merge with the organized sector. Associations like MRAI have championed this cause, and have extensively worked with NITI Aayog to create a draft for National Materials Recycling policy (NMRP), which allows the unorganized sector to transform, and get an opportunity to become part of the formal supply network.

Source: Metal World

India proposes recycling policy to make high-quality scrap

India's current fiscal year Union Budget aimed to make the economy to reach USD 5 trillion by 2025. In order to achieve India's high growth oriented economic target, the Ministry of Environment, Forest and Climate Change (MoEFCC) has released the draft National Resource Efficiency Policy to implement resource efficiency across all relevant resources including metals, minerals, fossil fuels, biomass, air, water, land, forests and across all life cycle stages including raw material extraction, material processing, production, ue, end-of-life management.

The policy has proposed regulatory instruments, market based incentives and disincentives and public procurement to achieve material resource efficiency and promote circular economy.

By 2025, India will have more than 2.1 crore vehicles that have reached the end of their useful life, according to an estimate by the Central Pollution Control Board (CPCB). More than 87 lakh vehicles had reached the end-of-life vehicle status in 2015. At present, these vehicles usually end up at the unorganised dismantling centres for extracting functioning spare parts.

In a new draft policy, India's environment ministry has proposed a higher focus on recycling in the automobile sector, among other sectors, with a target of 75 percent to 90 percent recycling rate for vehicles, depending on the year of manufacture. The draft also seeks the establishment of 20 official vehicle dismantlers across major urban centres by 2020.

With India's resource extraction (withdrawing material from the natural environment) reported to be more than three times the world average, the Ministry of Environment, Forest and Climate Change (MoEFCC) has proposed a National Resource Efficiency Policy (NREP) 2019 to increase the focus on recycling and reuse for resource efficiency.

The draft also proposes a three-year action plan and implementation strategy across seven

major sectors- automotive, plastic packaging, building and construction, electrical and electronic equipment, solar photovoltaic, steel and aluminium – which together contribute to one-fourth of India's income. The ministry has sought views and suggestions on the draft of the policy.

India extracts natural resources, primarily for use in its various industries, at the rate of 1,580 tonnes per acre. This is significantly higher than the world average of 450 tonnes per acre, according to the draft NREP policy.

Thus the draft policy aims to implement efficiency in the use of all relevant resources including metals, minerals, fossil fuels, biomass, air, water, land, forests and across all life cycle stages starting from raw material extraction to end-of-life management.

Among the proposed measures in the policy, the draft said that "over time, it will be extremely important to move towards zero landfill" and for that, it will be important to disincentivise landfilling by "imposing landfill taxes" and "high tipping fees especially for bulk generators of waste". It stressed that this would encourage the optimal use of the material and better waste management.

The need for such a policy is important as India's fast-growing economy is unsustainably consuming its resources, with the policy noting that India has increased its material consumption to six times, from 1.18 billion tonnes in 1970 to seven billion tonnes in 2015 and projected to be more than double of this by 2030, but that this "economic growth has been coupled with inherent cost on the natural environment."

The draft policy stressed that India has low material productivity compared to the global average and a much lower recycling rate at 20-25 percent compared to rates as high as 70 percent in regions like Europe.

Material productivity means the ratio of output achieved compared to the inputs (resources) used and low material productivity indicates that resources are not being used efficiently.

India also withdraws the highest amount of water for agriculture, globally. Additionally, 30 percent of its land is undergoing degradation and there is a high import dependency of many critical raw materials.

"The projected pace of economic development is going to put pressure on already stressed and limited resources and limited resources and may lead to serious resource depletion and environmental degradation affecting the economy, livelihoods and quality of life. Further, material use is also closely associated with the problem of increasing waste," said the draft policy.

The policy said it wants to reduce "primary resource consumption to sustainable levels" in line with United Nations Sustainable Development Goals, create higher value with less material through resource-efficient and circular approaches and minimise waste creation.

Focus on recycling and reuse

The draft policy includes the first three-year action plan (2019-2022) for the seven sectors that are heavily dependent on imports of raw materials, which can be brought down by efficient use of resources. For instance, for electronics sector, the import dependency of raw materials like silver is 75 percent, rare earth material (100 percent), gold (90 percent), platinum (95 percent) and copper (50-60 percent).

The action plan observed that key materials used in solar panel manufacturing include silicon, glass, silver, aluminium and copper and the demand for these would increase with the growth in the sector. "Under an ambitious solar energy deployment scenario of nearly 170 gigawatts by 2030, the total estimated demand for materials will increase from almost 7 lakh tonnes to 1.2 crore tonnes between 2015 and 2030. Under this scenario demand for glass, aluminium, silver will reach 70 lakh tonnes, 17 lakh tonnes and 38 lakh tonnes by 2030, as compared to 4 lakh tonnes of glass, 1 lakh tonnes aluminium and 2 lakh tonnes of silver consumed in 2015 by the sector.

In the plan for the steel sector, an "imposition of import duty for scrap imports beyond certain limits to promote utilisation of domestic scrap" was proposed. It proposed a goal of zero import of steel scrap for recycled steel production by 2030. Similarly, for the aluminium sector, the action plan stressed that there is heavy dependence on imported scrap and

"increased availability of domestic scrap can be achieved through various economic instruments including export taxes, export quotas, and even export bans or punitive tax rate if recycler resorts to trade in scrap without processing or adding value."

For this, it recommended goals of domestic scrap fulfilling to be 50 percent of the total aluminium scrap requirement by 2030 and increasing the recycling rate to 50 percent by 2025 and 90 percent by 2030.

In addition to the above, the Ministry of Steel has come out with draft steel scrap policy, which is aimed at curtailing import dependency and make India self-sufficient by producing high-quality ferrous scrap. The policy envisages to set up environmentally sound management system for ferrous scrap which can encourage processing and recycling of ferrous scraps through organised and scientific metal scrapping centres across India to minimise dependency on import of scrap and make India self-sufficient in scrap availability," said the draft steel scrap policy.

Source: Metal World

Vedanta to expand capacity

Vedanta is prioritizing controlling costs as it embarks on expanding capacity, according to the Chief Executive Officer Srinivasan Venkatakrishnan.

According to a report, Venkatakrishnan, who was the CEO of Johannesburg-based AngloGold Ashanti Ltd for five years before taking the helm at Vedanta in 2018, said that "Any expansion plans, we will do it with the strictest capital discipline and balance sheet focus. We will control the purse strings quite tightly.

He further said that Vedanta plans to double alumina capacity at its refinery in the eastern state of Odisha to 4 million tonnes over the next 2.5 years and raise aluminium smelter production capability by 30% to 3 million tonnes "at an all-in cost of less than USD 1,500 a tonne.

He further said that "Every business has to earn its right to spend the capital before we spend the capital. Hence, we said let's first drive the cost down before we actually go ahead with the expansion.

Owned by billionaire Anil Agarwal, Vedanta plans to spend USD 7.8 billion to boost output across its businesses as it seeks to tap into the demand created by India's ambitions of upgrading its infrastructure. Capital expenditure for the aluminium unit is estimated at $100 million in the year ending March, Venkatakrishnan said.

The company has been able to bring aluminium production expenses from USD 2,200 a tonne last year to about USD 1,764 largely due to lower alumina prices and higher coal supply security, he said.

He added that "We are targeting coal security of around 90% of our requirement from around 72% now and that would see our cost come down."

Source: Metal World

Exide & Leclanche JV for Lithium-Ion Battery

Exide Industries is planning to start production of lithium-ion batteries from its joint venture plant in Gujarat by end of this calendar year. Aiming at entering India's electric vehicle market and grid-based applications, Exide had formed a 75:25 joint venture with Switzerland-based Leclanche SA, one of the world's leading energy storage solution companies, in June last year. The JV company's production plant in Gujarat is the first such indigenous facility in the country for manufacturing lithium-ion batteries and provide energy storage systems for the EV market, with the government's push towards promoting electric mobility. The JV company, which is planning three different assembly lines for three different types of products, will specifically target e-transport and fleet vehicles, including e-buses, e-wheelers and e-rickshaws.

Exide Industries MD & CEO Gautam Chatterjee told that "It is inevitable that electric vehicles will come into India. Whether it will be three years or five years or ten years down the line, that can be debated. But we, as a company, want to be fully prepared to address this opportunity." He added that "The Gujarat plant is going on full stream. It will start operation by end of this calendar year. Around INR 100 crore has

already been invested. Another INR 100 crore will be pumped in within March next year."

Source: Metal World

India's Copper consumption May Rise

India's per capita copper consumption is expected to increase from the present level of 0.5 Kg to 1 Kg by 2025. While infrastructure will spur demand growth of refined copper in the country other key drivers would include thrust on increasing urbanization, development of industrial corridors, smart city projects, housing for all Indians by 2022.

According to a news report, National highway development project, Rail projects and Defence production policy to encourage indigenous manufacture, Hindustan Copper Chairman Santosh Sharma said in his address during the company's 52nd AGM.

In addition to this, the evolving market will have a substantial impact on copper demand. The market for electric vehicles is expected to witness growth in coming years as government incentives continue around the world including India by reducing GST.

It is projected that the demand for copper due to electric vehicles is expected to increase by 1,700 kilotons by 2027. Another driver would be India's energy plan 2022-100GW solar, 32GW wind, 260GW thermal & nuclear, 62GW hydro and plan for green energy corridor for transmission of renewable energy.

He said that during the fiscal 2018-19 the demand of refined copper products in the country was around 7 lakh tonnes and is expected to grow at 9-10% in tandem with economic growth in the country.

World mine production is expected to grow by 1.9% in 2020. While it increased by about 2.3% to 20.56 million tonnes in 2018, it is forecast to remain unchanged in 2019. Global mining companies have taken up capacity enhancement projects and world copper mining capacity is estimated to reach 25.9 million tonnes in 2021, with 20% being from solvent extraction process.

Refined copper production is expected to rise by 2.8% in 2019, but is likely to be constrained in 2020 due to tightness in availability of concentrates with growth being restrained to around 1.2% in 2020 technical upgrades/ modernisations.

Source: Metal World