

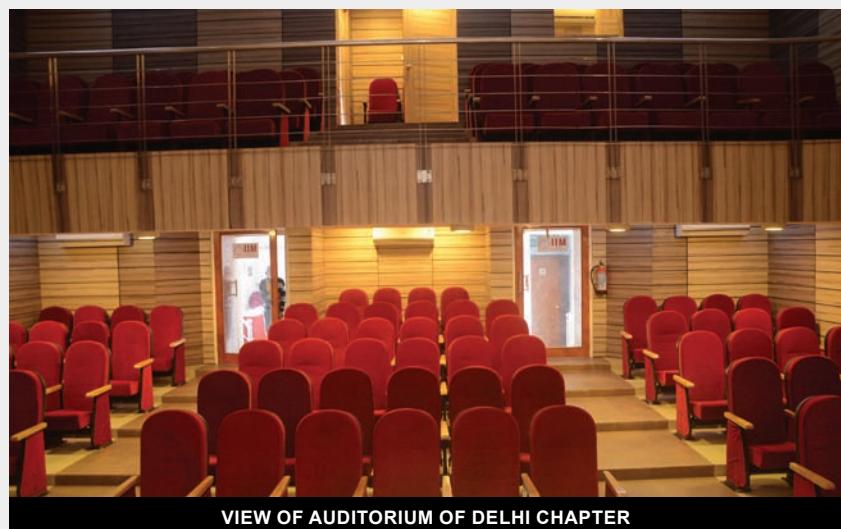


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THE INDIAN INSTITUTE OF METALS - DELHI CHAPTER



VIEW OF AUDITORIUM OF DELHI CHAPTER



Published By

The Indian Institute of Metals – Delhi Chapter

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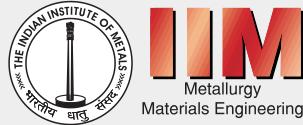
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INDIA – AN EMERGING LEADER IN STEEL

The woes of the global steel industry are one too many, and prolonged. With demand and consumption having taken a strong hit over the past couple of years and meek signs of revival, progress of steel sector in most countries in the world is impeded. These countries are forced to cut down capacities, recede operations and lower targets, including China. In the given scenario, India's big 300 million tonne steel production by 2025 target seems mighty ambitious, yet fathomable.

India's steel production is growing at an annual rate of 6% making it the only country where the future of the steel industry doesn't appear too gloomy. The good news is that even post demonetization, the grounds of growth haven't become too shaky. Certainly there is an impact on transactions and thus on demand and consumption, but the overall sentiment for the growth of Indian steel industry remains positive.

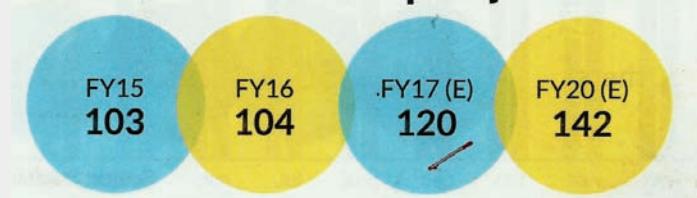
Capacity Expansions

India's aim to become the 2nd largest crude steel producer in the world is only getting stronger by the day. Following Prime Minister Narendra Modi's push on infrastructure spending and the Make in India campaign, India is set to see huge capacity additions by the major steelmakers in the coming years.

NMDC's 3 mnt pa Nagarnar Steel Plant

The largest state-run iron ore miner, as part of its expansion, value addition and forward integration plan is developing a 3 mnt pa green field steel plant in Nagarnar in Bastar region of Chhattisgarh. As reported on 1st Jan'17, a budget outlay of INR 39.64 billion, has been provided for NMDC Ltd. NMDC is expected to carry out load trials at the plant by December 2017, official sources informed.

India's Crude Steel Capacity (in million tonne)



SAIL's Massive Expansion Plans

SAIL, the largest state-run steel producer, is set to increase capacity to 15.5 mnt from the

existing 13 mnt in the fiscal starting April 1. Further, the company will boost production to 20 mnt by 2020. After this ramp up, SAIL expects to produce more of structural steel, which gives higher margin than its existing product portfolio. SAIL's sales are expected to go up 10% to 14 mnt in FY17.

On the same lines, Tata Steel's Kalinganagar steel plant, JSW Steel's expansion to 17 mnt from 12 mnt, Bhushan Steel's expansion to 5.5 mnt are major capacity additions among others to the total tally of India's steel capacity.

India's total steel production capacity in FY17 stands at 120 million tonnes. With the ongoing projects, the capacity is expected to reach up to 142 million tonnes by FY20.



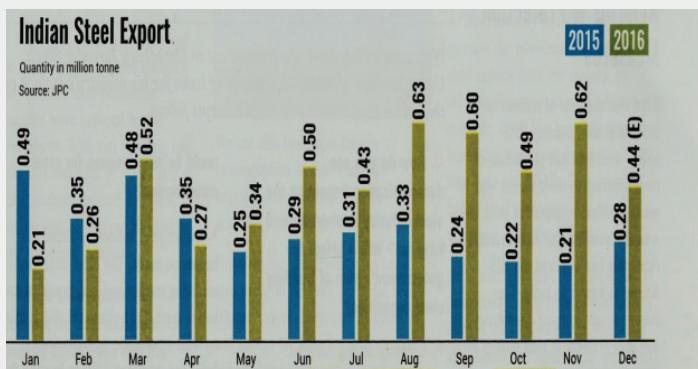
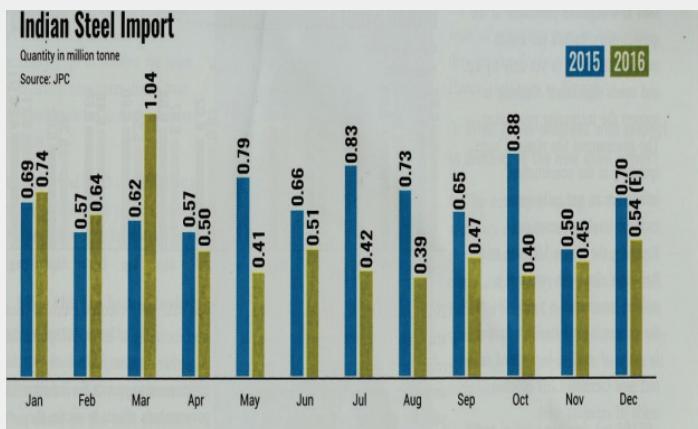
Integration

Consolidation of the industry has been on the cards for the past couple of years. 2016 saw a host of mergers and acquisitions in the Indian steel industry. Forward and backward integration has been sought after as a remedy to save margins, ease operations and to quicken expansions. Tata Steel acquiring BRPL for its pellet plant in late December last year is an example. In May 2016, JSW Energy agreed to buy out a 1000 MW power plant owned by JSPL in Chhattisgarh for INR 40 billion. Recent reports suggest ongoing discussions on JSW Energy acquiring Monnet's 1050 MW coal fired power plant in Odisha at Angul. Domestic steel major SAIL in November entered into a pact with South Korean giant Posco for technical collaboration for operational improvements. Most recently, SAIL is in preliminary discussions with Nippon Steel & Sumitomo Metal Corp and Kobe Steel on various areas of operations of steel plants.

With more high profile mergers and acquisitions expected in 2017, the Indian steel industry appears to be catching up on the idea of integration to get rid of debt laden and obsolete capacities to improve production volumes.

Imports & Export

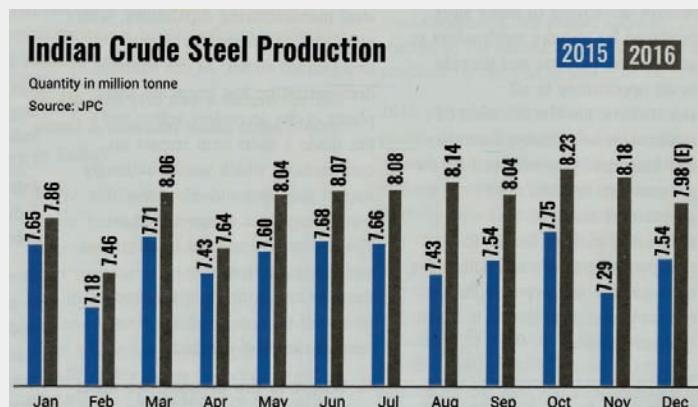
The Indian government took heed to the plight of the domestic steel producers facing the onslaught of cheap steel import from China and initiated numerous protective measures to help the industry. MIP, safeguard duty, anti-dumping duty, BIS certification helped bringing cheap steel imports in check. Import declined from 8.17 mnt in 2015 to 6.51 mnt in 2016. In FY16, total steel import stood at 8.72 mnt, which is expected to decline to 5.33 mnt by the end of FY17. Export increased from 3.8 mnt in 2015 to 5.31 mnt in 2016. In FY16, 3.47 mnt steel was exported. Total export in FY17 is expected to touch 5.82 mnt, up 6.7% from last year.



Production & Consumption

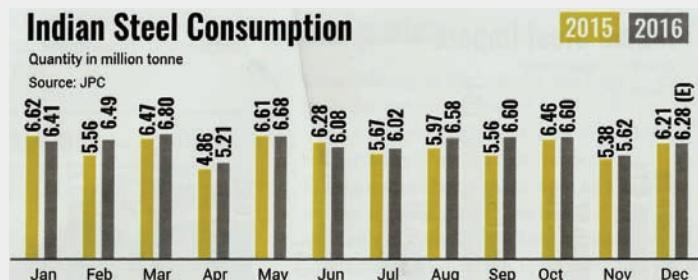
In 2016, India beat its previous year's figures of crude steel production by over 5 million tonnes. Total production in 2015 was 90.44 mnt and 95.78 mnt in 2016. Production in FY17 is expected

to reach 88.74 mnt, up 8.45% from 81.82 mnt in FY16. While production has been increasing and we are in the race to become the #2 producer in the world, India's steel consumption is seen as a negative parameter in the growth story. India's per capita steel consumption is yet only 61 kg and needs significant climbing to support the increasing production. The government has planned huge spending in the construction, infrastructure and railways to increase steel consumption. Recently, the Union Minister said – Railways alone can consume a million tonne steel a year, 10% of the country's total steel production i.e. usage of steel in high-speed rails and new German LHB coaches made of stainless steel.



Reforms & Production Measures

2016 was the year of reforms in the Indian steel industry. BIS norms were laid and production of steel adhering to those norms was made mandatory. Import of steel was also restricted



to such overseas firms that had acquired the BIS license to export to India. This reform sought to bring consistency and improvement in steel quality to compete with international standards. Further, in an attempt to remove the stigma of using steel produced by primary steelmakers in government projects and provide equal opportunity to all steelmakers, the classification

of steelmakers as primary, secondary and integrated was scrapped by the government. In May, the government removed the differential railway freight for transport of iron ore and pellets for domestic use and exports. The reform gave much-needed boost to iron ore exports.

Various protection measures were put in place by the government in 2016. Anti-dumping duties on China, US and other countries proved to be great relief from cheap imports. MIP imposed on certain steel imports in February last year for a period of 6 months was later extended and is currently in place until Feb 2017. MIP checked much of cheap steel incoming to India. Safeguard duty is another measure taken by the government to protect the industry. The government's efforts to soothe the ailing industry in 2016 were laudable.

Excerpts of interview of Steel 360 with Hon'ble Minister of Steel

With 2016 ended, steel 360 reached out to Chaudhary Birender Singh, Union Minister of Steel, Government of India for his ministry's outlook on the Indian steel industry in 2017.

Q. How do you see demonetization impacting the steel industry in short as well as long run? Will it affect the government's plan of building steel capacities?

A. Uniquely among the steel manufacturing countries, India has developed strong secondary sector steel manufacturing

capabilities, with over 50% of production in this unorganized sector. At the moment, demonetization has impacted some plants in the secondary sector and has made a short term impact on construction, which would indirectly impact steel demand. However, this would only be a temporary phase. The system is expected to adapt fast and the gains from

There is no point in carrying out research & development for the sake of it. There has to be a linkage to marketability of projects being undertaken. R&D for developing new technologies and products has to be driven by the future value of the outcomes. Till the time, the R&D in steel industry in India attains international levels; we should undertake international collaborations and adopt the best & most efficient technologies. R&D should not be limited to little tinkering here and there to improve quality and so on. Let us think big in terms of transformational technologies and new breakthroughs.

the demonetization drive in the medium term will far out-weigh the short term dip in steel demand.

Q. Where is the demand for steel expected to come from? What could be new avenues for steel consumption?

A. Indian steel industry is already in expansion mode. The older steel plants are being modernized and expanded and newer green field plants are also coming up with state-of-the-art technologies. India has overtaken USA to become the world's third largest steel producer in 2015. However, per capita steel consumption is still quite low ie 61 kg as against the world average of 208 kg. The low consumption no doubt indicates huge growth potential for Indian steel industry. In addition to this, increasing GDP and the expectedly growing urban infrastructure and manufacturing sectors indicate that demand is likely to remain robust in the years ahead.

Creation of steel demand in the country is one of the major tasks to be undertaken. To drive steel demand, the ministry has identified construction and manufacturing sectors like rural development, urban infrastructure, roads & highways, railways etc to be the key focus areas and will take necessary steps to achieve the same by diverting consumers' focus from non-steel intensive to steel intensive products. Innovation and R&D can endeavour to replace products like plastics, carbon fibre and glass with light weight and high strength steel.

Q. While MIP has been extended further for six months; the industry is seeking more protection from the government. What could be the next probable measures?

A. MIP was a temporary protection for the severely distressed domestic steel industry until permanent measures were imposed by the government. With anti-dumping and safeguard measures in place, MIP is being gradually phased out. Next move would be to focus on quality steel and demand revival.

Q. India's steel sector still accounts for 28% of banks' stressed loans. How can the ministry come over this situation and bring about a revival in the steel sector?

A. With respect to the issues related to stressed loans in steel sector, Ministry of Steel believes that the recent changes in various schemes as notified by RBI will provide suitable relief to domestic steel players. The ministry is also continuously working in association with banks and will take further measures as necessary.

In addition to this, the ministry is also working for the revival of demand in the country and is continuously exploring new avenues in discussions with various ministries.

We are also looking at the rationalization of duties/taxes to improve competitiveness of the domestic steel sector.

However, the steel industry in India also needs to be more agile and has to take initiatives to become competitive and strong. We have been telling the industry representatives to work on ways and means to strengthen the steel companies and to aim for attaining international benchmarks in production, quality and service.

Q. Do you still see a future for the small & medium scale steel plants in India?

A. Yes, definitely there is a bright future for these players as well but they have to be more transparent in their operations and have to follow the quality norms set forth by the government. Providing competitive rates within the quality specifications should be the focus of Indian small and medium scale industry that serves the basic needs to every citizen. Their scale of operations may be small but they are the closest to the end users. Hence, they have to flourish.

Q. What is the progress with respect to drafting of the new steel policy?

A. The ministry is taking all the necessary measures to address the current challenges in steel industry and is evaluating the existing National Steel Policy in terms of present context, with special focus on moving towards greener technology. It is expected to be released early next year.

Q. What is your outlook for 2017?

A. Steel industry in India can further increase the momentum of growth in steel exports from the country, by utilizing demonetization as a

blessing in disguise. There is a huge potential for benefiting from steel demand in South East Asia and Middle East, which Indian steel companies can take advantage of in the present scenario.

India with 87.5 mnt of crude steel production during January-November 2016 is the third largest in the world after China and Japan. With estimated demand growth and continued capacity expansion by private and public sector steel companies, we expect India to emerge as the second largest crude steel producer by the end of 2017.

2016 played havoc with raw material prices, demand and was full of reports on anti-dumping duties being slapped on various countries. We saw major capacity cuts in steel production and low capacity utilization. Also, 2016 was the year when demonetization trumped any other global news. 2017 has just begun and is already offering much to look forward to. With consolidations in the line and results of demonetization awaited in the year, the steel industry is bracing itself to withstand a lot more.

Source: Steel 360

THE CHALLENGES FOR MAKE IN INDIA AND ROLE OF SCIENTISTS

This article discusses some of the major challenges that the Make in India campaign is likely to face. There is more focus on the 'soft' non-technical issues that often play greater roles in making any such initiative becoming a reality. Make in India will need innovations in which scientists need to play their part. The article also discusses the difference between invention and innovation and measures that make technology transfer to make innovations possible. Finally some recommendations are summarized which need attention for making a new India through this campaign.

Introduction

The phrase 'Make in India' is now a widely discussed subject. The slogan, which sounds incomplete, initially invited different interpretations. However, now it is well accepted that the buzzwords emphasize the need to manufacture goods in India, notably

using imported technologies but also by designing and developing in India to deliver goods to the country as well as elsewhere. The idea is to generate employment and attract capital investment from within the country and also from abroad. It is imperative that during manufacturing due respect will be paid to concerns of quality and environment.

If manufacturing gets a boost then the GDP will grow along with employment opportunities. In this article we examine the challenges that may impede the realization of the dream of a big take-off and what roles the scientists can play to help achieve success.

‘Hard and ‘Soft’ problems

Challenges for doing anything worthwhile arise from ‘hard’ and ‘soft’ problems. A ‘hard’ problem is not necessarily a difficult problem. The word implies that the problem is well defined, like the contours of a solid object, and that there is a clear method for finding a unique solution. On the other hand, a ‘soft’ problem is characterized by an unclear definition of the problem, no clear method of solution and, finally, a solution that is never unique. The problem of finding the volume of a solid is a ‘hard’ problem but that of finding the surface area is not. The latter will depend on the degree of surface undulations that are taken into account. Similarly, while the area of the landmass of India can be ascertained with a good degree of reliability, the coastal length cannot. What length on estimated from a map is not what the coastal animals, familiar with all the nooks, crevices and corners cover. Finding a suitable job or a life’s partner is a ‘soft’ problem because the definition of the problem itself, its method of solution and the final answer – all three – are fuzzy. The final result would depend on circumstances and luck.

It is said that there is a Causality Law which states that while for achieving anything there are some necessary conditions, it is very difficult, if not impossible, to define conditions that will prove sufficient for the achievement. Necessary conditions do not guarantee success which needs something additional. Thus not wonder that many individuals with excellent and even more than necessary credentials fail to secure a proper placement and even the most

handsome/beautiful, wealthy and supremely gifted individuals end up staying single for being unable to find a suitable and willing partner. A laboratory may develop a wonderful technology that passes all criteria of techno-economic feasibility, return on investment, environmental compatibility etc. but it may fail to be commercialized. A manufacturer needs many others supportive factors such as availability of land and assurance for continued supply of labour, water, power, support of stakeholders, politicians and the Government etc., policy stability and many more for ‘sufficiency’.

The Boston Consultancy Company and CII have produced a valuable document during the 13th Manufacturing Summit in 2014 which is about the challenges for manufacturing. The report, available in the internet, lists the main challenges which are essentially concerned with ‘soft’ problems. To make ‘Make in India’ a reality the following have been identified as the essential area of reforms (the figures within brackets represent relative weightage in importance).

1. State of art infrastructure to support manufacturing (18%).

This implies available of power, land, roads, water resources etc. These are better in some states in the South, West and North West of India than in the Eastern region.

2. Labour reforms (15%).

We know that Rajasthan has initiated some reforms. They will be difficult in many other states because the goals of political leaders are short term and their subjective horizon is very limited.

3. Changes in manufacturing policies, incentives and support to industry (12%).

This is self-explanatory.

4. Political stability (9%).

There is a strange situation in India now. Political stability implies clear cut majority of a political party so that policies can be formulated, decisions taken and implemented in a stable environment. Unfortunately, even though there are governments with clear majority of a ruling party at the Centre and several States the political environment is not conducive for progressive policy decisions

and implementation.

5. Aggressive marketing and rebranding of Indian manufacturing image (9%).

Traditionally, not many Indian manufacturers have been able to create a brand image internationally as many foreign companies have. Strangely, there were exceptions even forty years ago. Gadore Company which produces tools and Gajra Gears have enjoyed an international reputation for decades for their products. So have Indian tea, textiles and some other goods. Now an increasing number of Companies are creating new brand images.

6. Deeper linkage between the Centre and State Governments (9%).

As is well known this remains a serious problem. Even the Government of the Union Territory of Delhi does not enjoy a harmonious relationship with the Central Government in Delhi.

7. Incentives for high tech imports and R & D investment (8%).

The investment in R & D, discussed later in this article, continues to be low. This has to increase not only to absorb the high tech imports but also to innovate for gradual substitution of indigenous efforts.

8. Reduction in burden of compliance (8%).

At present every manufacturer needs to comply with multiple rules and regulations of several departments and the so-called talk of 'one window clearance' remains only a dream. What makes matters worse is that often the compliance requirements change with time and there have been some strange cases of retrospective laws.

9. Concerted help to Small Scale Sector (SSS) (6%).

As is well known the SSS accounts for the largest share of employment. It also badly needs to be upgraded through innovations. This subject is discussed in some detail subsequently.

There are some other factors such as incentives.

Nature of Manufacturing

Remes of McKinsey Global Institute, USA, says that while manufacturing continues for promoting GDP growth and employment, the nature and role are changing with global landscape, policy makers, outputs from R &

D laboratories and universities, new product designs and production processes, new business models and regulation and, of course, market needs. He says that worldwide manufacturing's share of total employment follows an inverted U-shape pattern as an economy becomes prosperous. However, for developing countries like India increasing employment for quite some time.

Remes classifies manufacturing in five following groups:

- a. Global innovations for local markets: Chemicals, auto and transport equipment, machinery and appliances.
- b. Regional processing: Fabricated metals, food and beverages, printing, rubber and plastics.
- c. Energy and resource intensive commodities: Wood, paper and pulp, basic metals, petroleum, coke and mineral products.
- d. Global technologies/innovations: Semiconductors, computers and other electronic goods, medical and optical equipment.
- e. Labour intensive tradables: Textiles and apparel, furniture, toys etc.

In the US, manufacturing employment in the industry during 1980-2013 decreased from b to e. However, in India this will be different. In all sectors the manufacturing skill needs constant upgradation and, therefore, there has to be emphasis on skill development.

Parbat, a former President of the Indian Institute of Metals and a former Director and COO of Indian Aluminium Co. Ltd., believes that many emerging economies in Asia, Africa, South America and Eastern Europe are eagerly waiting to see the success of Indian experiment with rapid economic growth. He, however, says that among others, the following barriers need to be removed for success of 'Make in India' mission:

- Legal and institutional hurdles.
- Colonial mindset at bureaucratic levels.
- Ministerial interference.
- Poor commitment by politicians.
- Environment and forest clearance regulations that are cumbersome.
- Difficulties in acquisition of land for industrial and infrastructure projects, access to mines

and potable water.

- Lack of awareness about waste recycling and reuse for zero discharge to environment.
- Non-availability of adequately qualified personnel.
- Undue dependence on foreign technology and supply of foreign equipment.
- Lack of focus on innovations in the academia.
- Lack of confidence of Indian entrepreneurs in Indian economy etc.

Models of economic growth necessarily change with times and countries. A few decades ago the US was a leading producer of steel but then they have shifted away from metal processing to cleaner technologies. Collen of UI Labs, USA says that the US economy is being transformed by advanced manufacturing enterprises; intelligent machines advanced analysis, cyber physical security etc. UI Lab partners a range of companies, universities and world class industry leaders.

Collens also says that basic research has to go through several well-known levels of Technological Readiness before it leads to innovation. Government and Universities can go only half the way before the private sector takes care of commercialization of the technology. However, there is often a gap that needs to be bridged.

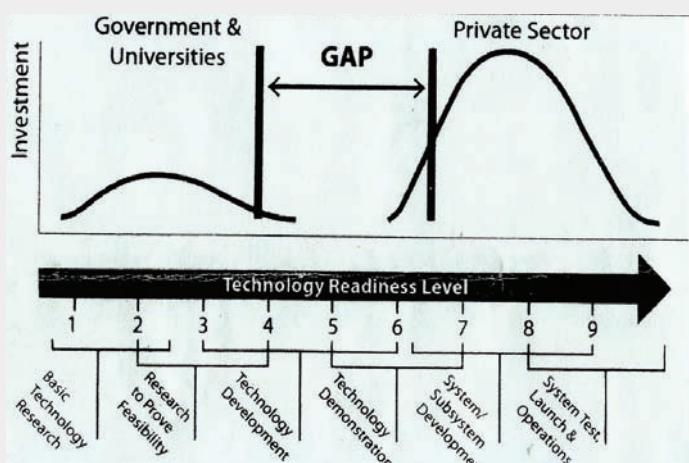


Fig. 1. Bridging university-industry innovation gap.

The Role of Scientists

So far scientists in India have made little impact on the industry. Industrial production based on indigenous R & D may be only 5% of the total.

It is sometimes claimed that India has the third or fourth largest scientific manpower. However, this is not true. A majority of science degree holders are not doing anything that relates to science. Then again, many so called scientists in scientific laboratories and departments are simply administrators with science or engineering degrees. According to the previously mentioned Boston Consultancy Company report, full time researchers in the industry, laboratories and academia in some countries per million population is given in Table 1.

India's share of high technology exports in the total manufacturing sector is on the decline, from 9.1% in 2009 to 6.6% in 2012.

Table 1: India's position in terms of number of scientists and R&D spending in percent GDP in comparison to some countries.

Country	No. of Full time researchers per million population	R&D spending (% GDP)
Japan	5151	3.4
Germany	3950	2.19
USA	3838	2.8
China	890	1.8
Brazil	710	1.2
India	160	0.9

The Government and the Public Sector continues to support Indian R & D to the extent of more than 60% and the Private sector is less prominent. In other countries it is the other way around. For example the figures for public sector support (%) for some countries are: US-64, Germany-67, UK-62, China-70. For Make in India to succeed indigenous R & D will have to play an important role because scientists make inventions which have the seeds of Innovation.

Innovation

There is some confusion about the word innovation, specially in the universities. Although the word is derived from the Latin word 'nova' which means something new not all novel technologies are innovations. To become an innovation an invention needs the support of enterprise. It is now accepted that to become an innovation there has to be real impact on the society and the industry. High science or advanced technology is not a necessary requirement. The Government has declared this

decade to be a decade of innovation which has been defined by a Government document as follows – Innovation is an S & T led solution that is successfully deployed in the economy or the society.

Thus scientific research needs to convert money into knowledge and innovation converts knowledge into wealth. A real innovation is one that brings real benefit for many. Thus not only the laptops, smart phones, Xerox machines, missiles, GSLV's GPs, agricultural and food processing marvels etc. are great innovations but so also are polymer chappals, cello tapes, 3M pads, safety pins sanitary towels and babies huggies etc. not all of which use high science. The special non-sticking glue of 3M pads and the super absorbers of napkins and towels do use high science though.

Though Indians are very creative most often they have excelled in Jugad technologies which provide local solutions to local problems. In spite of spectacular achievements of Indian scientists in agriculture, aerospace, nuclear energy and some other sectors India is not an innovative society. In fact, according to the Global Innovative Index the country is gradually falling behind in innovation compared to other countries. There are several sites in the internet that discuss this subject and the criteria for evaluating the Index. It is generally agreed that while countries like Singapore, South Korea, USA Japan, Sweden and Germany are near the top in 2014, India is perhaps at 76 amongst 143 countries considered by the world Intellectual Property Organization (WIPO). Essentially the Index is based on the number of inventions generated as well the environment, policies and support to take them forward for commercialization. There may be as many as 80 factors to be considered for evaluation of the index.

Research in the Universities and R & D Labs

The industry looks for improvement in existing products and processes, newer products and process, background knowledge for absorbing new technology, reduction in production costs and innovation lag, changes in design and market etc. However, generally there is a mismatch of goals and visions of the academia and the industry. Many believe that eventually

the market is going to be the main arbiter of issues and the economy as well as R & D. Unless the scientists are provided with a proper environment where he can flourish enjoining financial support and a new orientation, technologies developed by R & D laboratories will simply lie like 'sleeping beauties' for the prince of industry to come and kiss to life. Thus numerous technologies listed as 'ready for transfer' by IITs have found no takers. CSIR Laboratories are only marginally better. Gupta believes that glamour of high technology industries has encouraged a belief that more technology push means more innovation and that R & D is the fountainhead. In reality, R & D, technology and innovation may often be separate items with a complex relationship. Prathi et.al in their critical study on problems of management of scientific research, have opined that there is a high degree of dissatisfaction and frustration amongst Indian scientists about their own output as well as that of others. A majority gradually become cynical and moralistic.

So far scientists in Indian universities have primarily focused on academic research because their career growth depends on publications. There is no awareness of IPR issues and few universities have Patent cells. Not many attempt to create inventions that can become innovations. Such efforts are risky because in India nobody rewards failures. Contrast this with the Motto of the 3M Company which says, 'those who do not fail deserve to be fired'.

R & D organizations such as Council of Scientific and Industrial Research (CSIR) do make efforts directed at innovations but the success rate is very limited. Technology transfer is never easy not only in India but elsewhere too. Norling, in one UK based study says some 3000 raw ideas may result in 300 submitted ideas based on which around 125 projects may be initiated,. Then there may be 9 large developments and less than 2 commercial launches. Eventually only one may see commercial success. The problem of Technology Transfer (T2) is discussed later.

There are many hurdleless scientists and laboratories face in their research work specially if the work is directed at inventions meant for technology

transfer, some of these are as follows:

- Unfair competition with imported technologies.
- Absence of mission mode in R & D and dedicated research teams.
- Absence of a shared vision.
- Poor scientists-hours available due to innumerable leaves and interruptions in work.
- Fear of failure and inadequate recognition of sincere efforts if there is failure.
- Poor interaction amongst different units in a laboratory and with other laboratories etc.
- An indifferent bureaucracy which does not share visions of scientists etc.

Technology Transfer

The main difficulties in Technology Transfer, often called T2, are the following:

- People and organizations are naturally resistant to change.
- T2 requires some expensive steps, as discussed later.
- There is inadequate publicity of technologies available.
- Acceptance of new technologies take time.

To be fully developed a technology needs to go through some distinct levels called Technology Readiness Levels (TRL). These levels indicate the stages of maturity of a product to deliver its function. Actual manufacturing, however, needs to consider many additional criteria. When TRL reaches 2 and, there is promise of a technology with potential, the consideration of actual manufacturing is initiated. This also goes through many stages in parallel, called Manufacturing Readiness Levels (MRL). Generally the steps are as follows:

- Assessment of manufacturing opportunities.
- Identification of basic manufacturing implications material requirements etc.
- Basic concepts and feasibility of manufacturing processes, design etc.
- Development of proof of concept, validation of laboratory studies, hardwares and softwares characterization fixation of supply chain.
- Establishment of ability to produce prototype,

production requirements and risks.

- Identification of production capability of prototype components, materials, tooling, test equipment personnel skill etc.
- Establishment of production capability, cost calculation, supply chain, supplier and quality assessment.
- Initiation of manufacturing
- Demonstration of full volume production
- Finally, ensuring that all materials supply, processes, procedure, test equipment etc are in place and quality levels assured.

In both TRL and MRL 2 to 3 years are required in each stage and 15-20 years in all. One requires much higher levels of funding and greater number of people at MRLs.

Generally, most R & D laboratories are not mandated or even capable of going upto pilot plant level. They cannot reach the demonstration level and the industry avoids this because of risks involved. This creates a gap.

Any laboratories not only put undue emphasis on non-productive academic research but also on high technology glamorous areas. The Make in India campaign cannot neglect the Small Scale Sector (SSS) which deserves more R & D support because it provides large scale employment. It accounts for leather goods, garments, food processing, building materials, ceramics, assembly of electrical and electronics equipment, medicinal and aromatic plants, drinking water, bio-energy etc. overall R & D allocations and jobs must be shared by this sector also. This will motivate rural resources of capital and skill and decentralization of capital flow and decision making. The output/employment ratio, which is some measure of productivity is low in this sector but the potential for employment generation is very high.

In small and medium scale sectors innovations stir start-ups for which the Central Government has recently declared some new dispensations which have been well received by entrepreneurs.

Making a New India

Slogans such as Make in India, Swachcha Bharat etc. express dreams. We need them because in dreams begin the possibilities.

Many institutions express this in their Mottos on Vision and Mission statements. IIT Kanpur aims at maintaining a judicious balance amongst the following:

- To acquire knowledge through research.
- To transmit knowledge through teaching.
- To apply knowledge through public service.

The Council of Scientific and Industrial Research (CSIR) had adopted a Vision 2000 document which envisaged the organization to be

- A model of scientific industrial research.
- A global R & D platform and provider of competitive R & D services worldwide.
- A lead player in India in major societal missions and which combine technology with human face, and
- A path breaker in shifting paradigm of self-financing.

While such organizations have achieved a lot they have not made the desired mark as regards societal missions.

For all R & D institutions there should be some clear cut mandates and autonomy to achieve these. Till some thirty years Canada and Australia had organizations similar to CSIR and they too were heavily dependent on Government. Then these were disbanded and every individual laboratory was turned into autonomous profit centres with clear mandates in certain areas of R & D. These Centres have thrived scene.

In India ISRO, DAE etc. have well defined mandates but CSIR Laboratories do not. During a recent meeting of the Directors with the Central Cabinet Minister a set of goals have been enunciated. This is called the Dehradun Declaration.

Dehradun Declaration for CSIR Laboratories for the Year 2015-16

Team CSIR (CSIR Directors and through them all employees of all CSIR Institutions) today at Dehradun resolve:

To develop technologies for National missions like Swachcha Bharat, Swasthya Bharat, Skill India, Smart Cities, Digital India, Namami Ganga.

We resolve to:

- Be a catalytic agent to evolve India into

Samarth Bharat – Sashakt Bharat;

- Achieve global standards;
- Develop at least 12 game changing technologies per year;
- Cater to aspirations of common man and develop technologies beneficial to the poor;
- Focus on developing technologies for improving quality of life.
- Develop one technology for the strategic sector;
- Bring confidence to society about relevance of lab in terms of social impact;
- Conduct Mid-term review of 2015-16 activity plan with clear milestones achieved;
- Make preparation for Platinum Jubilee Celebrations beginning September 2016;
- Attempt for self-financing of all laboratories in next 2-3 years;
- Develop a Revenue model in business-like manner with clear cost Benefit analysis; and
- Develop Entrepreneurship in Small, Medium and Big industry.

However, while the goals are laudable the declaration focuses on what to achieve and how. Now some laboratories have initiated the necessary restructuring. This will not be easy because the bureaucracy – Administration and Finance – resist change. They are generally concerned with mundane rules and procedures.

It has been said that we Indians argue far too much to achieve things. It is good that there are conflicting opinions because as Walter Lippmen says, when all think alike nobody thinks much. Yet we need to evolve a consensus culture or a command structure so that clear cut decisions are arrived at after debates.

Weinberg and Ray wrote about different kinds of utopias that one can dream off. In the Free market utopia the Government loses most of the functions, serving only the punish crime, enforce contracts, provide essential services and national define. There is no constraint of free enterprise and industrialization. The US has similar goals and in this scientists play a major role. The religious utopia, now aimed at by some fanatics, imagines a religious revival. This will sweep the world with accompanying bloodshed and loss

of secularism. No scientific community can be enthusiastic about this. There are some idealists who would like the world to turn away from industrialization so as to return to a simpler way of life in self-dependent communities. We know that it is too late for this Green utopia to emerge and if it does most scientists will face hostility. The Technology utopia based on modern information technology, robotics, fibre optics, synthetic smart materials nanotechnology etc is a popular subject for science fiction. In such a set up societal productivity increases so much that distribution of wealth becomes irrelevant and borders amongst countries disappear. Scientists certainly will have a decisive role in such a utopia but they will be dehumanized.

The best utopia would be a set up where the public affairs are put in the hands of an intelligent and educated class of leaders. Scientists would not have much of a role because they would rather do their teaching and research. However, they should remain as watch dogs and never be marginalized. Scientists should stay out of governance because they may well prove to be miserable failures. In this set up power is diffused amongst many conflicting Government and Private Institutions. Here ethics and morality will have a strong role, there will be civilized administration corruption free bureaucracy and courts, free thing and cultured population.

Indiresan has described India as Paradox Paradise. Here rockets fly but buses crawl, scientists and technologies put into or bit Mangalyan but do not produce guns ammunitions, the brightest minds go in the Government Sector but Private Sector is way ahead in efficiency and profitability. Here the rich and powerful eat in subsidized can teens, those who sell soaps and toothpaste make far more money than scientists, engineers and doctors, petty actors and sports persons are mobbed everywhere but a scientist with nation's highest honours go unnoticed except among fellow members of his scientific community. Here a scientist of international reputation may have to report to some administrator who may be essentially a graduate and then again this administrator may have to take orders from a school or college drop out.

Here certainly there are problems but many people still think that because of several favourable factors India may be the right place for a utopia to emerge.

Remedial Measures

Research Industry interaction is a much discussed subject. If R & D can generate innovations and business then profits can be ploughed back into business. Unfortunately, this interaction is like a marriage in which nobody, not even the bride and groom is much interested. In India R & D and business move parallelly and there is no intimacy. The Government stands to gain in many ways if there is more allocation for R & D through taxes on salaries, taxes on purchases, direct benefit from taxes on products and processes and then, of course, from multipliers.

The paper has earlier referred to technologies of R & D laboratories lying as 'sleeping beauties' that needs rediscovery by the industry. This is true for science too. Indiana University Bloomington researchers recently combed through 22 million scientific papers published over the post centenary and found to their surprise that many studies remained unnoticed as 'sleeping beauties' for years. When suddenly noticed, the top finds were the ones that languished in obscurity for the longest they gave fresh insights to present day science. It may be worthwhile to revisit technologies developed by various R & D laboratories in the last few decades but not commercialized.

Various hurdles impeding efforts of scientists and laboratories have been discussed earlier. Accordingly, the some major remedial measures can be suggested.

- Fix priorities of R & D and focus in mission mode and define action plans and milestones.
- Orient capabilities towards needs of the industry.
- Close wasteful programmes and laboratories.
- Ensure a shared vision amongst all scientists and supporting staff.
- Integrate technology development with techno economic analysis.
- Ensure fair assessment schemes that not only reward successes but even failures if there are honest efforts.

- Create pilot plant facilities, if necessary with collaboration from the industry.
- Initiate projects in collaboration with the industry preferably with some financial stake from the later.
- Create rapport with the media.
- Empower of the laboratory authority to reward successes and honest efforts and formulate disincentives for the nonperformers.
- Establish a carrier chain for investments to become innovations.
- Create special cells for marketing, IPR and legal issues, financial aspects, project monitoring, evaluation, periodic analysis etc.
- Revisit earlier R & D results from time to time.
- Revamp the outdated bureaucracy etc.

Conclusion

The main conclusions of this write up are the following:

- Most obstacles to be faced by the make in India campaign are likely to be nontechnical and they can only be removed by major support from the Government.
- Innovations will have a role in this campaign and, therefore, R & D scientists need to be made aware as to how an invention does not become an innovation automatically.
- R & D results needs to be carried forward through several levels of Technology Readiness Levels (TRL) before some manufacturer steps in to take things forward. Unfortunately, generally there remains a gap in this interaction.
- A manufacturing technology has to develop a through Manufacturing Readiness Levels (MRL) which run in parallel to TRL. Generally 2-3 years are needed at each step and in all 15-20 years may be required for success.
- R & D scientists face innumerable problems in doing their research aimed at technology transfer and Make in India campaign cannot succeed unless these are addressed.
- Make in India is one part of the dream of Make a New India and this dream may well become a reality one day.

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CULTURE bulletin October 2016 (Extracted from Science and Culture Bulletin).

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SHINING YEARS AHEAD FOR INDIAN STEEL INDUSTRY

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As we all know steel is an important part of our lives and a good indicator of country prosperity. Of its many benefits, one that stand out is its longevity. Skyscrapers, bridges, railway tracks, pipeline that uses steel can be last many decades even a century. That also means that steel is prone to decades long "super cycle, ten to fifteen years of accelerating demand followed by a long period of stagnation or declines.

Over the past century we have seen three massive surges in global steel consumption, the first after the second world war when most of the western world rebuilt their infrastructure, the second from late 1960's driven mainly by Japan & the third more recently when Chinese demand took off in the last decade and a half. Between each global steel demand growth cycle, the industry slowed down to catch breath. The cycle became worst when many decades of infrastructure construction are squeezed into one. The statistics shows that China consumed as much cement in 4 years as the US did in whole 20th century. Even adjusting for larger population, it indicates an excessive pace. Not only does the pace of steel consumption in that decade far exceeded the normal pace necessitating the setting up of steelmaking capacity that is far more than sustainable.

Presently the steel industry as perceived by the expert entered into a period of pause. How long this pause will last essentially depends on the future advancement of another developing region of sufficient size and strength to produce another major growth cycle. Accepted logic today suggests this can only come when India, or Sub-Saharan Africa, starts growing rapidly but experts feel India stands a better chance over Africa due to accelerated economic growth.

So a shining years lying ahead for Indian Steel Sector & when experts say they have reasons for this prediction.

- 1 India is the world third largest producer of crude steel about 95.6 Mt in 2016 (up from 8th in 2003) after China 808 Mt & Japan 104.8 Mt & is expected to become second largest producer in near future. The growth in Indian steel sector has been driven by domestic availability of raw material such as iron ore & cost effective labour. Considering quality of workforce, Indian steel industry has low unit labour cost, commensurate with skill. This gets reflected in the lower production cost of steel in India compared to many advanced countries
- 2 The Indian steel industry is very modern with state of art facilities. It has always strived for continuous modernization & up-gradation of older plants and higher energy efficiency levels. The steel sector in India contributes nearly 2% of country GDP & employ about 600,000 people. India steel consumption for FY 2015-16 is estimated to increase by 7% higher than 2% growth last year due to improving economic activity.
- 3 Currently, the steel consumption in India is second only to China. However, with the steel consumption in China expected to moderate at around 3%, India is likely to emerge as the growing steel consuming nation. Further, India's current per capita finished steel consumption at 60 kg is well below the world average of 203 kg. With rising income levels expected to make steel increasingly affordable, there is vast scope for increasing per capita consumption of steel. Being a core sector, steel industry tracks the overall economic growth in the long term.
Also, steel demand, being derived from other sectors like automobiles, consumer durables and infrastructure, its fortune is dependent on the growth of these user industries which are on the growing path due to reform/initiative taken by present Government.
- 4 Automotive sector
Despite threats from other materials, steel still accounts for nearly 65% of the material used in passenger car. The automotive sector

accounts for 7.1% of country GDP. Production of automobile increased at CAGR of 9.4% over Financial Year 2005-06 to Financial Year 2015-16. Passenger vehicle segment witnessed growth at 10.1% during 05-06 to 15-16 producing 3.4 million units in 2015-16. Today Indian automobile sector is US \$ 74 billion industry & it is expected that by 2026, it will achieve a turnover of US \$ 300 billion clocking a CAGR of 15%. So there will be huge demand for steel and ample opportunity for steel maker to capture market share by producing value added products.

5 Consumer Durables

Consumer durable is another segment which consume sizable quantity of steel. Revenue from this segment in the country was US\$ 12.5 billion in 2015-16. Revenue from urban population accounts for 65% & balance from rural population. Increase in urban population, growing awareness, easier access & changing life style have been the key growth drivers. Implementation of 7th Pay Commission recommendation by Government of India and expected pay revision for Public Sector staff likely to boost consumer durable and automotive demand in coming years. It is expected that the sector will grow at CAGR of 13% from 2015-16 to 2019-20 to touch the revenue of US\$ 20.6 billion.

6 Infrastructure & Construction

Urbanisation and growing middle class continue to keep steel demand on rise in India for next 15-20 years thus driving steel demand in construction and real estate. Increasing investment in construction and infrastructure will lead to 8-9 % y-o-y domestic demand for long products.

Country need Rs 31 trillion (US\$ 454 billion) to be spent on infrastructure development over next 5 years with 70% fund needed for power, road & urban infrastructure segment. Government announced investment of Rs 25 trillion (US \$ 376) in infrastructure over a period of 3 years. Development of 100 smart cities announced by Government of India will further boost steel demand. With surge in construction activities both in housing & infrastructure, Indian construction equipment industry is expected

to grow to US \$ 5 billion by FY 20 from current level of US \$ 2.8 billion.

- 6 Availability of raw material & skilled work force India has rich mineral resources. It has abundance of iron ore, non-coking coal and many other raw materials required for steel production. Country has fourth largest iron ore reserves after Russia, Brazil & Australia. India is also having one of the pool of technical manpower next to USA & Russia capable of understanding & assimilating new technologies.

7 Unexplored Rural Market

The Indian rural sector remains fairly unexposed to their multi-faceted use of steel. The current per capita consumption in rural segment is only 16-17 kg. Enhancing applications in rural areas assumes a much greater significance now for increasing per capital consumption of steel. The usage of steel in cost effective manner is possible in the area of housing, fencing, structures and other possible applications where steel can substitute other materials which not only could bring about advantages to users but is also desirable for conservation of forest resources.

8 China Factor

Steel output in China, the world largest producer posted the first annual decline in 2015 in last 25 years as local demand dropped, prices sank and producers struggled with overcapacity. Chinese Government has laid out a reform plan to overcome the excess capacity issue by shutting down the junk companies. In addition major Chinese players have increased prices of finished products during 2016. China is targeting to cut 150 Mt capacity by 2020.

Excess supply in China was finding its way to Indian Market creating pricing pressure on domestic steel producers. Reduction in Chinese capacity & increase in-house consumption will reduce export to India benefitting domestic steel producers.

9 Export Market Penetration & import substitution

It is estimated that world steel consumption will double in next 25-30 years. India's current export of steel products is meager 5-6 % of its total production in last two financial

years against the global export trade of steel products to 29%. Quality improvement of Indian steel combined with its low cost advantages will definitely help in substantial gain in export market in years to come.

India imported 13.3 Mt steel in 2015 against China imported only 13.2 Mt. Most import into India is from South Korea, Japan & China in flat steel segment. Domestic steel producers should focus their expansion for production of value added products / import substitution to earn save foreign exchange and reduce dependence on foreign suppliers.

Short comings of Indian Steel Industry

To become more competitive in global steel market, Indian steel industry has to overcome the following shortcomings.

- **Low labour productivity:** At comparable capacity labour productivity of SAIL/ TISCO is 350 & 425 t/man/year (JSW : 740t/man/year) against 980 & 1345 t/man/year for NIPPON & PASCO
- **High specific energy consumption:** Ranging from 5.7 to 6.6 Gcal/ tcs against 4.6-5.0 Gcal/ tcs in plants in developed nations.
- **Low expenditure in R&D:** Meagre 0.06 – 0.07 % of turnover against 4-5% in developed world. Country is dependent on import for several high performance and value added steel products like electrical steel, automotive grade steel & steel for specialized use in defence, space, power & nuclear applications. Technology in such high value products is closely held by the companies in US, Germany, Japan& Korea who do not part with such technologies easily. Not only high R&D investment to develop such technologies are needed but efforts are also required for technological collaborations with such companies for acquiring high end technologies possessed by them.
- Delay in absorption of technology & ramping up production capacity
- Value Added Products : Past couple of years, demand for value added steel with superior quality to meet stringent demand norms for various market segment like power, oil & gas, nuclear and defence has been growing. Presently major steel producers like SAIL & Tata Steel are making about 45-50 % value added

steel, JSW about 65% as compare to 80-90 % by Nippon in Japan and PASCO in Korea. Indian steel companies should focus on adding capacity to value added steel for specific end users market as crude steel will continue to face oversupply pressure. Domestic steel producers can replicate Korean / Japanese model where steelmakers worked closely with automobile/ consumer appliances manufacturers to add capacity and have a ready market.

Government Initiatives

- Government of India is aiming to scale up steel production in the country to 300 Mt /yr by 2030 from present 95.6 Mt/yr
- The PSU / private steel companies have announced to enhanced their crude steel production further beyond their ongoing expansion plan.
- Ministry of Steel has set up an industry driven Steel Research & Technology Mission of India (SRTMI) in association with public & private sector steel company to spearhead R& D activities in Iron & Steel Industry with initial corpus fund of Rs 200 crores.
- Formation of SPV to set up plant with capacity 3 to 6 Mt/yr
- Constitution of Project Monitoring Group to fast track various clearances / resolutions of issues related to investment of Rs 1000 crores or more.
- Imposition of safe guard duty & anti-dumping duty on import of certain steel products to protect domestic steel producers.
- Imposition of Minimum Import Price (MIP) on certain steel products.
- Issued quality control order for steel / stainless steel products under mandatory BIS certification
- Government is planning to come up with a policy under which it will be mandatory to use locally manufactured steel for all infrastructure and construction projects of the Government.
- Government is working on new steel policy that ensure not only steel but related sectors such as iron ore to grow.
- Special concession for MSME in steel sector & change in classification of MSME's based

on their turnover than Number of people employed

In the recently held DAVOS Economic Forum on 18th January, 2017 Mr K.V.Kamath BRICS Nation National Development Bank Chief said the world is going through very uncertain times but that will not have much impact on India & India continue to grow on the back of its consumption driven economy. In the same Forum, Mr T.V. Narendran, MD, Tata Steel said 2017 will be better year for Indian Steel Industry than 2016 on the back of increase in Government expenditure on infrastructure. India will be net exporter soon because India has raw material & efficient producers.

The above facts and figures therefore predict that with a slightly stronger outlook for 2016 compared with 2014 & 15 and the promise of further progress in 2017 and beyond the steel sector is focusing ahead to start taking the opportunities available to them and stand up not only to meet domestic demand but cater to global requirement in future . This changes will not be immediate and take time. Nevertheless the steel sector is expected to gradually gain momentum in near future.

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GLOBAL STEEL MARKET

The paper describes the global trend in the following areas.

Global Steel Scenario

The year 2016 started with depressed steel prices and demand glut. In order to restrict cheap imports from China almost all countries imposed trade measures by way of safeguard duties, Minimum Import Prices, etc. This helped in increasing domestic prices. Meanwhile China's domestic demand increased resulting in lesser availability of Chinese steel. International steel prices have increased by more than USD 100 a tonne. Europe's demand has picked up and so also prices. North America had been doing well. So, overall, prices are now steady.

China's Ministry of Industry and Information Technology said that China will achieve major progress in the steel sector's structural overhaul

by 2020 and fundamentally bail out the industry. According to the ministry's 2016-20 plan on upgrading the industry, China plans to reduce crude steel output by 100 to 150 Mt by 2020 including 45 Mt this year and ease the uneven supply demand situation in the sector.

The plan said "The whole sector will be modernized and its energy consumption and emissions will be within the national standards by 2020." This year's coal target was 250 Mt. The local governments have been asked to give financial support to create jobs for workers made redundant by the cuts. In May, the Ministry of Finance announced 100 billion yuan (14.5 billion US dollars) of aid for steel and coal companies to resettle laid-off workers.

China's steel plants if run at full steam can produce 1.3 billion tonnes of metal a year. As China's output of crude steel is about 800 Mt a year, it means about 500 Mt of production facilities remains idle and so shutting down 45 Mt of capacity makes little difference to China's actual steel production.

Indian Steel Scenario

Indian government has taken several steps to support the domestic steel industry, some of which are:

- To ensure that only quality steel is produced and imported, Government has notified Steel and Steel Products (Quality Control) Orders dated 12.03.12 and 04.12.15.
- Govt. has notified MMDR, Amendment Act, 2015 to streamline grant of Mining Leases in order to maintain sufficient availability of raw materials for various sectors including steel sector.
- To provide level playing field to the domestic steel producers, Govt. has imposed Minimum Import Price (MIP) on 66 steel products.
- Government has imposed in June, 2015, an Anti-Dumping Duty on imports of certain variety of hot-rolled flat products of stainless steel from China (\$309 per tonne), Korea (\$180 per tonne) and Malaysia (\$316 per tonne).
- Hiked import duty on ingots & billets, alloy

steel (flat & long), stainless steel (long) and non-alloy long products from 5% to 7.5% and non-alloy and other alloy flat products from 7.5% to 10%. This was further revised in August, 2015 on flat steel from 10% to 12.5%, long steel from 7.5% to 10% and semi-finished steel from 7.5% to 10%.

These have helped the domestic steel producers to raise steel prices and restrict cheap imports, not only from China but also from Japan, Korea, etc.

Cost-push due to three-fold rise in coking coal price and also iron ore price increase, has elevated prices in the international market. Domestic steel producers are taking steps to boost export for higher realisation backed by weak rupee. This also helps in lesser availability of steel in the domestic market, thus enabling to keep prices at higher level. India is likely to turn a net exporter of steel this year. During April-November, exports increased 53% over the same period last year to 4.24 Mt. Imports, on the other hand, dropped 39% to 4.73 Mt. Given that there is still a quarter to go, the sector is expecting exports to surpass imports.

Source: Steel Tech

MAKE IN INDIA

How Technology will Destroy Low-wage and Middle Class Jobs the World Over

It's likely that machines will be smarter than before the end of the Century – not just at chess or trivia questions but at just about everything, from mathematics and engineering to science and medicine." - Gary Marcus, professor at New York University. There is an ongoing crisis of jobs in India and many parts of the world. The Labour Bureau revealed this year that India added only 135,000 jobs in 2015, compared to 419,000 in 2013 and 900,000 in 2011. That is vastly inadequate considering that 12 million people reportedly enter India's workforce each year. The news is grim elsewhere too. The jobs situation in the US propelled Donald Trump's presidential campaign leading to his historic win. Youth unemployment in Europe is rife. South Korea's shipbuilding industry eliminated 20,000 jobs this year. Australia has one low-skilled job

advertised for every six people looking for work. The situation is usually attributed to the 2008 financial crisis and the slowdown of China's demand for raw materials and manufactured goods. But there is also a recognition that advancing technology is displacing jobs, exacerbating the effects of globalisation which has created an unequal world of winners and losers. The World Bank president Jim Yong Kim has pointed out that automation technology threatens 69% of jobs in India and 77% in China. Keeping in step with changes in technology and their effects on society is not easy given the pace of change. A fascinating, indispensable book to understand where technology is headed, how it will affect the world and what policy choices governments will confront in the future is Martin Ford's *Rise of the Robots: Technology and the Threat of a Jobless Future*. Ford's book, which won the FT and McKinsey business book of the year award in 2015, largely deals with the US but it is relevant for middle classes worldwide which tend to see their own future as interwoven with that of the West and the developed world.

These are some of Ford's key arguments:

The great displacement

Advances in automation technology will threaten a lot of blue-collar jobs. The "visual perception, spatial computation and dexterity" of robots, for instance, is improving rapidly and their use is in industries increasing. Tesla, the electric car company, for example, uses 160 robots to assemble 400 cars per week. Foxconn, a manufacturer of Apple devices, plans to introduce a million robotics in its factories. Robotics are a focal point of China's "Made in China 2025" plan; it "has set national goals of producing 100,000 industrial robots a year and having 150 robots in operation for every 10,000 employees by 2020." There are now machines to make sushi, pick almonds and strawberries in farms and arrange merchandise in warehouses. Momentum Machines has a device that makes burgers from start to finish. The company wants to target restaurants, convenience stores and food trucks and its co-founder has candidly conveyed that his device "isn't meant to make employee more efficient." It's meant to completely obviate them."

The advent of artificial intelligence (AI) means that computers are now capable of doing (certain) white collar jobs as well. For instance, software can perform statistical analysis of baseball games, pick out notable events and generate sports stories for readers that can pass off as one written by regular journalists. A powerful AI engine called "Quill" is now used by media outlets, including Forbes, to produce automated articles in fields including, sports, business and politics. One entrepreneur predicts that in 15 years 90% of news articles will be written algorithmically. Quill is designed to be a "general purpose analytical and narrative-writing engine"; it is able to generate business reports drawing on a variety of sources, including databases, "financial and sales reporting systems, websites and even social media."

The Quill engine is just one of the many new software applications capable of doing the knowledge work that has been the preserve of humans. We are in the age of machine learning, defined as a form of artificial intelligence which gives the computers the ability to learn without being explicitly programmed or, as Ford puts it, "a technique in which a computer churns through data and in effect, writes its own program based on statistical relationships it discovers." IBM's Watson technology thus was able to absorb around 200 million pages of information to beat champions of the unpredictable quiz show *Jeopardy!* in 2011. Watson's technology is now used in medicine; it processes information from medical textbooks, journals and clinical studies to act as a diagnostic tool and improve treatment plans at major medical centres in the US. IBM has announced that it is working on making online shopping sites replicate the personalised service in a retail store. Ford says once these are implemented in the sphere of customer service, "huge numbers of offshore call centre jobs are poised to be vaporised."

Such technologies are set to be applied in other fields. The IBM announced in 2013 that it was moving the Watson artificial intelligence system to the cloud so that developers can link to the system directly and incorporate the cognitive computing technology into their software applications and apps. Google also

offers developers a cloud-based machine learning application and a "large-scale compute engine that lets developers solve huge, computationally intensive problems by running programs on massive supercomputer-like networks of servers."

Technology alone not to blame

Advances in automation (and the 2008 recession) exacerbate these trends and we now have a situation where middle class jobs are under threat in a range of fields including customer service, retail, catering, administration and even driving (owing to the advent of self-driving cars and trucks). There is increasing incidence of job market polarisation in the developed world where jobs previously done by the middle class are disappearing and the labour market is divided between low-wage service jobs and highly paid skilled professional jobs. Economists have observed that middle class jobs tend to permanently disappear in recessions and the jobs that are likely to be created during recoveries are in low-wage sectors. The assumption that education and reskilling on the job will lead to new opportunities does not pan out in reality. Many graduates work in low-wage temporary jobs with weak benefits. The one serious impact of all this is that a majority of population across the world does not have enough money to spend on goods and services.

Martin Ford writes in the *Rise of the Robots: Technology and the Threat of a Jobless Future* that around 47% of total employment in the US, around 64 million jobs, have the potential to be automated perhaps within a decade or two. Europe is already facing a crisis of jobs. Youth unemployment in Italy stands around 36% while it is nearly 44% in Spain. Thanks to offshoring and automation, we are seeing a polarisation in the labour market that is split between low-wage service jobs and highly-paid top end with middle class jobs disappearing everywhere. India has a mass of low-paying jobs (which masks the problem); its pace of job creation pales in comparison with the millions entering the workforce each year and, according to the World Bank, 69% of jobs in India are threatened by automation. Education and skill training no longer guarantee jobs as the tech landscape is

changing and making jobs scarce.

Governments need to wise up to the political implications of the lack of opportunities in their economies. One way of managing social tensions, he argues, is for governments to implement a guaranteed minimum income for all citizens. Also known as a universal basic income (UBI) or a guaranteed basic income, the idea of an income for all has been around for years – it was backed by the Left and even libertarian thinkers like Milton Friedman and Friedrich Hayek and is beginning to gain traction again among economists. Proponents like Ford feel that a cash boost via a universal basic income mitigates the political problem of creating jobs and it provides disposable income that can be used to pay for goods and services, which companies depend on. The idea appeals to some conservatives because (a) it boosts the economy, (b) it is easier to administer and (c) it can potentially downsize the bureaucracy which currently manages a range of welfare programmes.

Universal basic income has been criticised and reckoned as unfeasible on two grounds. One is that it reduces beneficiaries' incentive to work and encourages delinquency and, two that it would be too expensive to implement in mass societies. These discussions in the developed world seem far removed from India as the costs seem prohibitive and as the country grapples with more foundational issues like ease of doing business, addressing education and skill deficits and kick-starting investments while banks are stuck with bad loans. But given high poverty levels and the anger among youth that will inevitably rise following failure to find rewarding jobs, policymakers will need to seriously consider basic income, or at least some form of it. Ideas such as universal basic income are yet to be mainstreamed in India. But as developed countries increasingly warm to the idea (Finland is set to implement its version in 2017), policymakers may find it difficult to avoid discussing guaranteed minimum income.

Source: Steel Tech

SOLAR PANEL AND LIFT INSTALLED AT IIM DELHI CHAPTER



NEWS LETTER

ISSUE NO. 108/2017

VOL. CVIII "MONTHLY"

JANUARY 2017



INDIAN STEEL PLANTS- DEVELOPMENTS STORY

Steel Minister Highlights Importance of Marketability for R&D Projects

India's Union Steel Minister Mr. Chaudhary Birender Singh said that "There is no point in doing Research and Development just for the sake of doing it. There has to be a linkage to marketability of projects being undertaken. R&D for developing new technologies and products has to be driven by the future value of the outcomes. Till the time, the R&D in steel industry in India attains international levels, we should go in for international collaborations and adopt the best and most efficient technologies. Let us not limit R&D to little tinkering here and there to improve quality and so on. Let us think big in terms of transformational technologies and new breakthroughs. The PM was mentioning the other day that to compete in a globalized world, we need to aggressively push for path-breaking innovations and get them patented."

Mr. Birender Singh was reviewing the progress of Steel Research and Technology Mission of India which has been registered as an institution to lead the research and development in steel in the country. He advised that the institution should grow as a single umbrella body for all steel-related research and development in India. It should set up a body for promoting higher education in steel making and related disciplines. Steel Minister also shared that the Ministry has proposed to consider expenditure on R&D as a part of CSR expenditure, which if implemented would encourage companies to do research on cost effective, environment-friendly and energy efficient technologies and processes.

Strategies to face Challenges for the Steel Industry: Steel Minister

Minister of Steel, Chaudhary Birender Singh at the inaugural function of the Ministry of Steel Pavilion at the 36th India International Trade Fair, on November 14, 2016 in New Delhi said "The entire industry will have to come up with joint strategies to take on the challenges being faced by the industry. My desire is that public, private sector and ministry will have to prepare

themselves to jointly face the challenges coming from abroad. The Government of India is focused on manufacturing sector and is implementing aggressive Research and Development projects in diverse realms of Iron & Steel Technology under various categories such as Plant Performance Improvement (PPI), Product Development (PD), Scientific Investigation and Development (SID), Basic Research (BR) and Technical Services (TS). The major efforts are directed towards cost reduction and improvement in quality of Indian steel, in order to develop and deliver high quality steel products that add value to the customer's business, across the value chain."

He added "India is the 3rd largest manufacturer of steel in the world, and we are constantly working towards innovative and cost-effective R&D solutions, developing and commercializing improved processes and products, continually enhancing the capability with the aim of becoming a global hub of centre of excellences."

Dr. Aruna Sharma Secretary Steel said "In-line with PM Narendra Modi's vision and Government of India's flagship programme – Digital India, the Indian steel industry has taken a very proactive approach and enabled seamless integration of digital technologies across processes, such as operations research, product development, robotics & mechanical engineering, mining, pelletization, raw material handling, coke oven, sinter plant, blast furnace, long product mill, continuous casting, SMS/BOF, flat product mill, supply chain management, procurement, retail and online sale of steel. The Digital Revolution holds many promises, for the steel sector in India, it has already embedded transparency, efficiency, enhanced quality of Indian steel and most importantly improved safety standards, leading to a digitally empowered society and knowledge economy".

Steel Research & Technology Mission of India

India's Minister of State in the Ministry of Steel Mr. Vishnu Deo Sai and that Ministry of Steel is facilitating an Industry driven institutional mechanism namely Steel Research & Technology Mission of India, to facilitate joint collaborative research projects in the iron & steel sector in India.

The salient features of SRTMI are as under:

- SRTMI is an industry driven initiative which has been setup as a Registered Society wherein Ministry of Steel is a facilitator.
- SRTMI will be governed and administered by a Governing Body comprising the steel CEOs Domain Experts and a representative of Ministry of Steel.
- The executive functioning of SRTMI will be carried out by the Director, SRTMI, who will be assisted by a suitable/appropriate supporting structure.
- Initial corpus for setting up of SRTMI is Rs. 200 crore of which 50% is to be provided by Ministry of Steel and the balance by the participating steel companies.
- Thereafter, the centre will run on yearly contributions from the steel companies based on their turnover of the previous year.

The R&D investment of the leading steel companies in India in terms of percentage of their turnover ranges from 0.05 to 0.5% vis-à-vis upto 1% in leading steel companies internationally. Some of the steel companies have also formulated their R&D masterplans to increase their R&D expenditure to 1% of their turnover. SRTMI is likely to enhance the R&D investments in the industry to international levels.

RBI Directs to Help Debt Burden Steel Producers

India's Steel Secretary Ms. Aruna Sharma said that the steel ministry has already had discussions with Chairmen of all banks and the Finance Minister on the direction of RBI (Reserve Bank of India). Accordingly, the Central bank issued directions where a combination of SDR (strategic debt restructuring), S4A (Scheme for Sustainable Structuring of Stressed Assets) and 5/25 scheme features can be used jointly to find a solution to heavy balance sheets. We are currently studying the amendments by RBI and have identified top six steel companies in trouble.

She added that there isn't one solution that would fit all but a combination of features. So in some cases, a longer repayment tenure has been given; in others, banks are taking a haircut; and in certain cases there is longer moratorium

period. So, it's different for every case. Since the domestic steel industry continues to be EBITDA (earnings before interest, taxes, depreciation and amortisation) positive despite weak business climate, it means the problem is outside the industry. This is one sector which, with some support from banks, can easily pay back and so the steel ministry is working to help debt-burden producers.

On the matter of recent rise in coking coal price, she said "We're looking for a government-to-government agreement with major coking coal producing countries such as Australia, China and Canada from where this raw material can be brought. We're looking for a long-term arrangement in pricing, which can protect the industry. Currently, the domestic steel industry imports 70 percent of its coking coal requirement."

Ministry Pushes for India-Made Steel Only for Govt. Infra Projects

Concerned over the anemic growth in steel consumption, steel minister Birender Singh urged all concerned ministries to use India-made steel only for infrastructure and construction projects of the government. He also wants a modification in the general financial rules to include life cycle cost analysis in design and planning stage of public projects.

At a recent consultative committee meeting, he also said the ministry is exploring new avenues for usage of steel like steel bridges, containers, water tanks and crash barriers. "We have spoken to different central and state governments to enhance usage of steel," the minister said.

Singh said the ministry has constituted four committees with representatives from INSDAG, steel producers, consultants, architects, users and government authorities to promote steel usage with the mandate of formulating codes and standards, life cycle cost analysis and sustainability, development of designs of various utility structures and skill development in the steel sector.

"Similarly, four task forces have been constituted for increasing steel usage in railways, urban development, road transport and highways and shipbuilding sectors," he said.

Hoping demands to come from the

government's rural housing project plan, the steel ministry has approached concerned authorities to elaborate on the advantages of steel houses like less erection time, more durability, better flexibility and eco-friendliness. Presentations with prototype designs have been made to key officials of the rural development ministry.

Singh said the road ministry's plan to reconstruction of 1,500 road bridges, 208 over bridges and the chardham highway project provide huge opportunity for enhancing steel usage. Ministry and PSUs are working on these opportunities as also in sectors like railways, defence and other manufacturing industries, he said.

Steel Authority of India Ltd (SAIL)

SAIL achieved Impressive Growth in Sales during April-December'16

Steel Authority of India Ltd (SAIL) has posted a solid sales growth of 16% during the April-December'16 period over the corresponding period last year. The improved domestic sales as well as expanding exports, with the latter recording a remarkable rise of around more than double during this period, contributed to the improved sales numbers. The Company's exports rise is in keeping pace with the SAIL's focus to expand its global foot prints.

At the production front, SAIL produced 10.18 Mt of saleable steel during Apr-Dec'16 period, of which 1.18 Mt alone came in December'16, registering a 15% growth in saleable steel production over Apr-Dec'15.

With enhanced performance from the modernized units, the techno-economic parameters also exhibited improvement during the first nine months of FY 16-17 (BF productivity: 7% and Coke Rate: 3% improvement). This is conforming to the company's constant endeavours to attain most effective utilization of all resources as SAIL recognizes that its business activities have direct and indirect impact on the society.

The Company realizes that water is a vital resource and should be judiciously utilized. In this endeavor, SAIL is observing January 2017 as 'Water Conservation Month' across all its

Plants and Units with a target to reduce water consumption by 25%.

SAIL signs MoU with POSCO for Operational Improvements and HR Development

A memorandum of Understanding was signed on November 7th 2016 between POSCO and Steel Authority of India Ltd on technical collaboration for operational improvements and Human Resource Development.

Speaking on the occasion Chairman, SAIL said that "This MOU signing is an important milestone in SAIL-POSCO's long standing relationship and in future the companies would be collaborating in many more areas. It would be SAIL's endeavour to work together with POSCO for the mutual benefit of both the companies."

Dr. Kwon expressed happiness at the collaboration with SAIL and said he hopes both companies will work together to make it a success.

Environment-friendly and Energy-efficient Steel Plant from SMS group for the production of Quality Steel at IISCO Steel Plant

IISCO Steel Plant and SMS group have successfully commissioned an X-Melt ® converter shop for the production of quality steel grades at its Burnpur plant, West Bengal. The new steelworks is rated for an annual production of 2.6 Mt of liquid steel. The steelworks comprises three converters each with a tapping weight of 150 tons, three stirring stations, two ladle furnaces, an RH-TOP vacuum circulation degassing plant, primary and secondary gas cleaning systems and a converter off-gas recovery system.

The SMS group scope of supply comprised the complete basic and detailed engineering of the mechanical core components and the complete X-Pact ® electrical and automation systems. Delivery, erection, commissioning, commissioning supervision as well as training of the operating personnel were also part of the contract.

The BOF converters are equipped with the maintenance-free lamella suspension system developed by SMS group, with bottom-stirring systems for combined blowing and with the tilt drive systems manufactured in SMS group's own workshop in Hilchenbach, Germany.

The supply scope further includes the oxygen blowing lance system, the additives handling system, ladle lining repair facilities and the rail bound ladle transfer vehicles.

The RH-TOP vacuum degasser is of a rocker-type design, using a hydraulic counterweight system for lowering the vessel into the ladle for treatment. The unit features an SMS Mevac multifunction TOP lance combining oxygen blowing and an oxygen fuel burner for vessel heating.

The degasser is complete with an extensive alloy addition system. The scope of supply for SMS Mevac comprised all the technological equipment, including the vacuum pump and TOP lance system, and the complete supply of the first fill of the main refractory materials.

For primary gas collection, use is made of the proven SMS group adjustable skirts for the recovery of the energy-containing CO gas. SMS group also supplied the off-gas cooling system, the wet-type scrubbers, the gas change-over and export stations, and a gas tank with a volumetric capacity of 50,000 Nm³ converter off-gas. With the aid of this technology, every year a volume of 200 million Nm³ converter off-gas can be used to replace other fossil fuels for energy production. Not only the energy costs but also the output of CO₂ can thus be considerably reduced.

Secondary gas cleaning is performed by means of easy-to-maintain electrostatic precipitators (ESP), rated for a capacity of more than 1,870,000 Nm³ per hour. The X-Pact ® electrical and automation system has been specifically adapted to the mechanical components of the plant and, in addition to the technological control systems (level 1), it includes the metallurgical process models (level 2), ensuring economical production and a high steel quality. Secondary gas cleaning is performed by means of easy-to-maintain electrostatic precipitators (ESP), rated for a capacity of more than 1,870,000 Nm³ per hour.

The X-Pact ® electrical and automation system has been specifically adapted to the mechanical components of the plant and, in addition to the technological control systems (level 1), it includes the metallurgical

process models (level 2), ensuring economical production and a high steel quality.

SAIL wants to Double Production at Durgapur and Burnpur Plants

Steel Authority of India Ltd wants to more than double production at its Durgapur and Burnpur plants, taking the total output in Bengal to 15 Mt. A SAIL official said that "We can take Durgapur's capacity to 10 Mt and increase IISCO's to 5 Mt.

Following the latest round of modernisation, Durgapur is expected to produce 2.2 Mt saleable steel once its newly installed bloom caster and structural mill start functioning. IISCO, which saw its old steel mill replaced by a brand new one with Asia's largest blast furnace, produces about 2.8 Mt of steel. The capacity expansion plan is likely to involve investments of over Rs 35,000 crore, besides investment in ancillary downstream and upstream units, whose total value can be over INR 50,000 crore.

However, top officials said the plan would be contingent on the development of a deep water port and the improvement of infrastructure by the State Government, either by fast-tracking the Sagar port or by increasing the draft at Haldia to allow larger ships.

Tata Steel

Kalinganagar Steel Plant to be a Global Benchmark – Mr. Narendran, MD Tata Steel

Mr. T V Narendran, MD, Tata Steel India & South East Asia on the eve of its first anniversary of dedication as saying that Tata Steel Kalinganagar, the Tata group's greenfield steel plant in Odisha, should become the benchmark steel plant in the world. On the occasion, Tata Steel had organized a number of programmes in the premises of the steel plant. It had also organised an exhibition to showcase milestones achieved by various operating departments of the plant in the last one year. Mr. Anand Sen, President of TQM & Steel Business stated that Tata Steel Kalinganagar has the best in class equipment which should be leveraged to achieve world class benchmarks in operating performance.

The state-of-the-art plant located in Odisha's Jajpur district has achieved several milestones

across areas of operation. These include integrated commissioning of various facilities. In particular, the plant achieved production of one million tonne of hot metal in Blast Furnace, one million tonne of gross coke and one million tonne of net sinter production within five months of its commissioning. Tata Steel has also started exports of Hot Rolled Coils (HRC) and Tata Ferro-shots from its Kalinganagar plant and the products have been received well in the market.

Tata Steel inaugurates Phase II of CRM Bara Unit

Tata Steel inaugurated the second phase of CRM Bara plant at Jamshedpur. It said "The company has installed the upgradation of facilities in Phase II such as the reversing mill to meet the full hard cold rolled (FHCR) requirement of Tata Blue Scope Ltd at CRM, Bara, which is of 0.25 Mtpa capacity." It added "In the current ramp-up of TBSL, the unutilized capacity of the reversing mill is being used to produce hot rolled skin passed pickled and oiled (HRSPO). To meet the increased demand of HRSPO coils in automotive sector, a 0.3 Mtpa hot rolled skin passing facility has also been installed."

After the implementation of Phase-II expansion Project, part of the picked coils will be input to the hot skin pass mill, which is also being installed as a part of the project. In order to cater to the input requirement of the new hot skin pass mill for hot rolled coils, the production capacity of the existing pickling line has been increased to 0.68 Mtpa from the designed capacity of 0.5 Mtpa. The final product from the plant after augmentation shall now be full hard cold rolled, hot rolled pickled and oiled coils and hot rolled pickled, skin passed oiled coils.

Mr. T V Narendran, MD, Tata Steel, India said "During the inception of CRM BARA Phase we faced few challenges. I am very happy to see that the learning and experience from Phase I has been implemented in Phase II." We faced few challenges. I am very happy to see that the learning and experience from Phase I has been implemented in Phase II."

Tata Steel India's Improved Performance in Production and Sales

Items	Q3	Q2	Q3	YTD	
	FY16	FY17	FY17	Apr-Dec FY17	Apr-Dec FY17
Hot Metal	2,689	3,128	3,407	7,941	9,550
Crude Steel	2,546	2,812	3,150	7,400	8,485
Saleable Steel	2,512	2,719	3,162	7,152	8,219
Sales	2,349	2,624	2,994	6,825	7,764

Tata Steel to Acquire Pellet Maker – BRPL for Rs 900 crore

Tata Steel will acquire 100 percent equity in Odisha-based Brahmani River Pellets (BRPL) for an enterprise value of Rs 900 crore in a bid to secure raw material and reduce costs at its Kalinganagar steel unit in Odisha. The deal, which will be financed through the company's internal cash flows, will also help Tata Steel to ramp up its capacity at Kalinganagar. The steelmaker will buy out existing shareholders Aryan Mining and Trading Corporation Private Ltd. and Moorgate Industries Group in an all-cash deal, and hopes to complete the transaction in four months. BRPL was earlier owned by UK trading major Stemcor Corp, before it was demerged last year under a global restructuring exercise initiated by the UK Company. BRPL had revenue of Rs 452 crore in the last financial year, and owns two iron ore plants. The Company plans to reduce its freight cost by using BRPL's slurry pipeline to transfer iron ore from its captive mine in the Joda and Khondbond region. The pellet plant is located inside the Kalinganagar Industrial Area, which also houses one of Tata Steel's two integrated steel plants in India.

Tata Steel Ferrochrome and Saraf Titanium units at Gopalpur Inaugurated

Odisha Chief Minister Naveen Patnaik inaugurated two major industrial projects near Gopalpur. The projects are a ferrochrome plant of Tata Steel built at a cost of INR 542 crore and a high-titanium slag making unit of Saraf Agency set up with an investment of INR 350 crore. The 55,000 TPA ferrochrome plant is claimed to be the first greenfield ferrochrome project of Tata Steel in the country. It has come up in the Gopalpur industrial park, for which Tata Steel is the anchor developer.

Mr. T V Narendran, MD, Tata Steel (India and South East Asia), said "With the commissioning of

the ferrochrome plant, the Gopalpur industrial park should see lot more investors coming forward to set up industries here, adding to the industrial progress of the region." Mr Arun Misra, Vice President, Project Gopalpur & Managing Director, Tata Steel Special Economic Zone Ltd, said "The ferrochrome plant at Gopalpur uses state-of-the-art pollution control equipment and technology. It has 100 percent water harvesting facility that caters to most of the water needs of the plant. Also, it is the first plant in India to use briquetting method of chrome ore fines agglomeration."

Besides the new unit at Gopalpur, Tata Steel has two other ferrochrome plants in the state – a 65,000 TPA plant at Bamnipal in Keonjhar district and the other at Athagarh in Cuttack district of 55,000 TPA capacity under the management of its subsidiary T S Alloys. Both the units were acquired by the steel behemoth earlier. Similarly, the high-titanium slag plant of 36,000 tonne per annum is established in the Titanium dioxide park near Takiria Berhampur by Saraf Agency. The Kolkata based firm is developing a Special Economic Zone on 260 acres of land there. The titanium slag, made from ilmenite, a rare earth product, would be exported to countries like Japan, China, UK etc. The plant will also produce 20,000 tonne per annum pig iron as its bye-product. The company has plans to add titanium dioxide, Titanium ferroalloys and scandium plants in the next two years with an investment of Rs 2000-crore.

Tata Steel conferred the IEI Industry Excellence Awards, 2016

Tata Steel was conferred the IEI Industry Excellence Award 2016 under the category "Manufacturing & Processing" for demonstrating highest order of Business Excellence at the 31st Indian Engineering Congress of the Institution of Engineers (India). The event was organised on 16th December, 2016 at Kolkata. The event was attended by the Honourable Governor of West Bengal, Shri Keshari Nath Tripathi, Sri Sovandeb Chatterjee, Minister for Power and Non-conventional Energy and Sri H C S Berry, President, Institution of Engineers (India). The award was received by Mr. Uttam Singh, Chief Blast Furnaces, Tata Steel and Mr. Mukesh Prasad, Head, TQM, Tata Steel on behalf of the

company.

Rashtriya Ispat Nigam Limited (RINL)

Cost Cutting Crucial at Present – Mr. Madhusudan, CMD Vizag Steel

Mr. P Madhusudan, CMD of the Visakhapatnam Steel Plant noted that the steel industry in the country, in a crisis at present, should make all efforts to cut costs and then only can it stay in the market. According to him, it is all the more important now as the industry is facing the challenge of cheap steel imports from China and other countries.

Mr. Madhusudan inaugurating the blast furnace and sinter plant operating committee meeting in the steel plant in Ukkunagaram said that good operating practices, improvement in techno-economic parameters, low energy consumption, optimisation of raw materials and technological discipline would largely contribute in reduction of cost of production. He said the RINL had introduced pulverized coal injection technology in its blast furnaces to reduce coke consumption and also for achieving higher productivity and competing with other major steel makers. He expressed the hope that the steel industry would soon come out of the crisis and contribute to nation-building.

Vizag Steel Promotes Brand Image through Indian Railways

Steel is a key component for a country's progress and Indian Railways being the most cost-effective medium to promote a product, Vizag Steel has chosen to promote its brand image through Samta Express, said Chaudhary Birender Singh, Union Minister of Steel while flagging off the train along with Shri Suresh Prabhu, Minister of Railways. Mr. Suresh Prabhu, Minister of Railways and Chaudhary Birender Singh, Minister of Steel flagged off the daily Hazrat Nizamuddin – Visakhapatnam, Samta Express, now renamed as Vizag Steel Samta Express at Nizamuddin station. The Vizag Steel Samta Express has been emblazoned with eye-catching Vizag Steel promotional visuals across its entire length.

Commending Vizag Steel for taking proactive steps to counter the downturn in the

prevailing scenario by effectively channelling its marketing efforts with a structured brand promotion activity, Shri Singh informed that undertaking such initiatives would not only help Vizag Steel extend its market reach to both urban and rural markets, but would also go a long way in increasing the nation's per capita steel consumption from 61 kg to the global level of 208 kg, as envisaged by the Steel Ministry.

Steel Secretary, Dr. Aruna Sharma Inaugurates 5 MW Solar Power Plant

Dr. Aruna Sharma, Secretary to GOI, Ministry of Steel has inaugurated the 5 MW Solar Plant installed by RINL at a cost of Rs 33 crores in the presence of Sri P Madhusudan, CMD, RINL, Smt. Urvilla Khati, Joint Secretary, Ministry of Steel and Directors of RINL. RINL has joined other major corporates in harnessing solar power with this 5 MW Ground Waste Solar Power Plant in its premises. Dr. Aruna Sharma commended RINL management for foraying into Solar Energy in tune with the government thrust to tap renewable energy sources, she said that the role of renewable energy has been assuming increasing significance in recent times with the growing concern for the country's energy security.

Other Steel Plants

JSW Steel Plans to Restart Coking Coal Mining in US

JSW Steel plans to restart coking coal mining in the US following sharp rise in prices during the last few months. JSW Steel owns nine coking coal mines with cumulative resources of 123 Mt at West Virginia in the US. Mr Seshagiri Rao, Joint Managing Director, JSW Steel, said though the increase in coking coal and iron ore prices are eating into the company's margins it has thrown a great opportunity to restart iron ore and coking coal mines in Chile and the US. He said "We will restart coking coal mines in the US by March next year and then take up iron ore mining in Chile. We will not bring the coal to India but it will act as a financial hedge as we are largely dependent on imported coal to operate our plants in India." These mines

which were acquired from a string of US-based companies in 2010, could not be developed due to fall in coal prices following global financial crisis and the subsequent economic slowdown.

Source: Steel Tech

INDIAN STEEL PLANTS SPREAD WINGS

JSW Steel Joining Consortium to Buy Ilva Steel Plant

Mr. Sajjan Jindal, the Chairman of the metals to cement conglomerate JSW Group confirmed that JSW Steel is in a consortium looking to buy the beleaguered Ilva steel plant in Italy. Mr. Jindal said "We are working on it. It will not need much investment."

JSW Steel, the flagship steel company of the group, has been eyeing the loss-making Ilva steel plant for several months. JSW Steel had signed an agreement with Italian lender CDP, businessman Leonardo del Vecchio's holding company and steelmaker Arvedi to make the bid. The bid is expected to be made by a consortium called Acciaitalia, which means Steel is Italy. JSW will hold 35 percent, Arvedi 10 percent and the remaining stake will be distributed among two more players, said a source who declined to be named.

Tata Steel will invest 1 billion pounds in UK plant

Tata Steel has reached a deal with the agitating trade unions of Tata Steel UK plant to invest 1 billion pounds in the loss making Port Talbot steel plant over the next 10 years, and also to avoid any compulsory job redundancies. Tata Steel will also secure the future of the downstream sites. Besides, the company started a process to close the expensive British Pension Scheme replace it by defined contribution scheme, which will lower uncertainty in payouts. The new scheme will have a maximum contributions of 10% from the company and 6% from employees. Tata Steel said the Port Talbot plant will continue the existing blast furnace configuration in Port Talbot until 2021. Future

investments will continue based on financial performance in the next 5 years.

Tata Steel's UK operations have been saddled with a huge pension liability of 15 billion pounds for its 1.4 lakh employees including current and retailed employees. Tata Steel said it also offered an employment pact until 2021 which supports employees through future changes by investing in their skills to support further plant upgrades, automation and other digital initiatives. Tata Steel's new strategy is to continue to invest in UK.

Tata Sons interim Chairman Ratan Tata was hailed as the saviour of the UK steel industry after the Tata Group announced a 10-year commitment of one billion pounds investment to save thousands of jobs for its embattled steelworks in the country. In a special feature titled 'Man of Steel', the Sunday Times attributed the thousands of jobs saved in the industry largely to the sacking of Cyrus Mistry and Ratan Tata stepping in as interim Chairman.

Source: Steel Tech

INTERNATIONAL STEEL

World's largest HBI plant from Primetals Technologies and Midrex begins Operations at Voestalpine in Texas

On October 26, the direct reduction HBI plant built by Primetals Technologies and consortium partner Midrex Technologies, Inc. was officially started-up after an effective construction phase of about two years. The Midrex direct reduction plant, located near the city of Corpus Christi, Texas, USA on the Gulf of Mexico. It is designed to produce 2 Mt of hot briquetted iron (HBI) per year, making it the largest single module of this type worldwide. The three digit million euro range order was awarded to Primetals Technologies and Midrex Technologies Inc. in July 2013. The consortium of Primetals Technologies and Midrex were responsible for engineering, supply of mechanical and electrical equipment and advisory services for the direct reduction

plant. At the site near Corpus Christi in San Patricio County, Voestalpine invested a three-digit million euro amount. This also included comprehensive infrastructure improvements for the project location, particularly the necessary port facilities. The Midrex facility will produce high-quality HBI from iron ore pellets, which is comparable to the highest quality scrap or pig iron. Being charged to electric arc furnace, converters or blast furnaces, HBI allows for the production of highest-quality steel grades. In contrast to the coal-based blast furnaces route, direct reduction only uses natural gas as the reducing agent, which is much more environmentally friendly. This improves the carbon footprint of the Voestalpine Group and is an important step in the achievement of the Group's energy efficiency and climate protection objectives. MIDREX is a registered trade mark of Kobe Steel, Ltd.

Successful Modernization of the Electric Arc Furnace at Georgsmarienhutte by SMS group

Georgsmarienhutte GmbH, Germany, had awarded SMS group the order to revamp the direct-current electric arc furnace (DC EAF) supplied by SMS in 1994 and modified in 2005, also by SMS. On the basis of a study performed by SMS group, modifications were made to the arrangement of the secondary conductor of the EAF's pin-type bottom electrode. This measure had the purpose to shift and thereby weaken the effect of the hotspot, which typically occurs in DC furnaces. The new arrangement extends the lifetime of the furnace's refractory lining, increases productivity and lowers the operating costs. The SMS group supply scope comprised the engineering, manufacture and installation of the equipment as well as monitoring of commissioning. The electric arc furnace has a tapping weight of 140 tons, an installed power of 130 MVA and is equipped with the pin-type bottom electrode patented by SMS group. The revamp took place during the shutdown in summer 2016.

Source: Steel Tech

GLOBAL IRON AND STEEL SCENARIO

Global DRI Production

to the World Steel Association was 4.512 Mt in November 2016, up compared to 4.212 Mt in November 2015. The cumulative global DRI production during January-November 2016 was 48.932 Mt, which is much lower compared to about 54 Mt in the same period last year. Sponge production in India continues to decline and lower by about 2 Mt compared to the last year in Jan-Nov'16. Iran is now the largest DRI producer.

Table 1: Global DRI production ('000t')

Direct Reduced Iron	Nov'16	Total Jan-Nov'16	Total Jan-Dec'15
Canada	60e	1243	1502
Mexico	420e	4858	5499
Trinidad and Tobago	0	120	2520
Argentina	95e	684	1252
Peru	0	11	72
Venezuela	60e	535	1356
Egypt	227	2358	2451
Libya	64	604	449
South Africa	63e	633	1125
Iran	1430e	14848	14546
Qatar	218	2320	2631
Saudi Arabia (4)	396	4629	5800
United Arab Emirates	325	3128	3190
India	1155e	12953	16228
Total D.R.I (5)	4512	48932	58622

World Crude Steel Production

World crude steel production for the 66 countries reporting to the World Steel Association was 132.4 Mt in November 2016, 5.0% up on November 2015. The global crude steel production in Jan-Nov'16 was 1468.52 Mt as compared to 1461.63 Mt in the corresponding period of last year. China's crude steel production for November 2016 was 66.3 Mt, an increase of 5.0% compared to November 2015. Elsewhere in Asia, Japan produced 8.6 Mt of crude steel in November 2016, a decrease of -1.4% compared to November 2015. India's production growth continues to remain robust at 10.7% compared to last Nov'15.

In the EU, Germany produced 3.3 Mt of crude steel in November 2016, a decrease of -4.2% compared to November 2015. Italy produced 2.1 Mt of crude steel, up by 11.2% on November 2015. France produced 1.3 Mt of crude steel in November 2016, up by 11.8% year-on-year. Turkey's crude steel production for November 2016 was 2.9 Mt, up by 10.4% on November 2015. In November 2016, Russia produced 6.0 Mt of crude steel, up by 5.0% on November 2015. Ukraine produced 2.0 Mt of crude steel, up by 3.1% compared to the same month in 2015. The United States produced 6.2 Mt of crude steel in November 2016, an increase of 6.8% compared to November 2015. The crude steel capacity utilisation ratio of the 66 countries in November 2016 was 69.6%. It was 67.1% in November 2015. PMI reading above 50 indicates an overall improvement in manufacturing conditions and below 50 an overall decrease.

Commenting on the Indian Manufacturing PMI survey data, Pollyanna De Lima, Economist at IHS Markit and author of the report, said "Having held its ground in November following the unexpected withdrawal of 500 and 1,000 bank notes from circulation, India's manufacturing industry slid into contraction at the end of 2016. Shortages of money in the economy steered output and new orders in the wrong direction, thereby interrupting a continuous sequence of growth that had been seen throughout 2016. Cash flow issues among firms also led to reductions in purchasing activity and employment. As the survey showed only a mild decline in manufacturing production in the last month of the year, the average reading for the Oct-Dec quarter remained in growth terrain, thereby suggesting a positive contribution from the sector to overall GDP in Q3 FY16/17. With the window for exchanging notes having closed at the end of December, January data will be key in showing whether the sector will see a quick rebound."

Table 2 (a): Global crude steel production for Top 25 Nations ('000t')

Rank	Country	Nov'15	Nov'16	YoY	J-N'15	J-N'16	YoY
1	China	63133	66290	5.0%	729984	739463	1.3%
2	Japan	8740	8618	-1.4%	96550	96059	-0.5%
3	India	7234	8010	10.7%	81721	87531	7.1%
4	United States	5832	6226	6.8%	72881	72041	-1.2%

5	Russia	5690	5975	5.0%	65147	64623	-0.8%
6	South Korea	5847	5770	-1.3%	63800	62779	-1.6%
7	Germany	3481	3335	-4.2%	39691	38852	-2.1%
8	Turkey	2637	2912	10.4%	28846	30325	5.1%
9	Brazil	2548	2426	-4.8%	30794	28064	-8.9%
10	Ukraine	1891	1950	3.1%	21040	22211	5.6%
11	Italy	1868	2076	11.2%	20535	21546	4.9%
12	Taiwan, China	1515	1765	16.5%	19751	19745	0.0%
13	Mexico	1364	1635	19.9%	16851	17281	2.6%
14	Iran	1255	1585	26.3%	14810	16435	11.0%
15	France	1180	1319	11.8%	14007	13268	-5.3%
16	Spain	1213	1113	-8.2%	13903	12750	-8.3%
17	Canada	963	930	-3.4%	11403	11576	1.5%
18	Poland	624	780	24.9%	8546	8124	-4.9%
19	United Kingdom	663	598	-9.8%	10232	7094	-30.7%
20	Belgium	545	600	10.0%	6632	7030	6.0%
21	Austria	648	637	-1.7%	7031	6792	-3.4%
22	Netherlands	552	578	4.5%	6479	6392	-1.3%
23	South Africa	483	498	3.1%	5991	5723	-4.5%
24	Saudi Arabia	82	496	502.1%	4949	5016	1.3%
25	Czech Republic	404	437	8.3%	4870	4874	0.1%

Table 2 (b): Estimated crude steel production in 2016 for six largest steel producers and PMI

Rank	Country	Crude Steel 2016E, Mt	YoY	Share	Dec PMI	Comment on PMI
1	China	806	+0.2%	50.3%	51.9	Production expanded at the fastest pace in nearly six years
2	Japan	105	-0.5%	6.5%	52.4	12-month high
3	India	96	+6.8%	6.0%	49.6	Down from 52.3 in Nov
4	US	78	-0.7%	4.9%	54.3	21-month high
5	Russia	71	-0.4%	4.4%	53.7	Q4 (53.2) was the strongest for over five-and half year
6	South Korea	69	-1.6%	4.3%	49.4	Highest since July

China Steel Exports likely to touch 110 Mt in 2016

China's exports of finished steel products slightly rose to 8.12 Mt in November 2016, up by 5.45% from 7.7 Mt in October 2016 but down by 15.5% YoY. During Jan-Nov'16, Chinese steel exports totaled at 100.68 Mt down by 1% YoY ie monthly average of 9.152 Mt and almost 110 Mt on annualized basis.

Table 3: Import and export of finished steel products for China (Mt)

Description	Nov'16	Jan-Nov'16	Jan-Nov'15	YoY
Imports	1.11	12.02	11.60	3.6%
Export	8.12	100.68	101.74	-1.0%

STAINLESS STEEL SCENARIO

Global stainless steel production in 9M increases by 7% YoY

The International Stainless Steel Forum has released figures for the first nine months of 2016 showing that stainless steel melt shop production increased by 7.0% YoY to 33.6 Mt. Production increased in all regions except Central and Eastern Europe.

Table 4: Stainless and heat-resisting melt shop steel production ('000t')

Region	Q1'16	Q2'16	Q3'16	QoQ	9M'15	9M'16	YoY
Western Europe/ Africa	1995	2047	1761	-14.0%	5738	5762	0.4%
Central/ Eastern Europe	65	61	63	3.3%	198	189	-4.5%
The Americas	642	722	815	12.9%	2146	2178	1.5%
Asia (W/o China)	2395	2447	2531	3.4%	2077	7372	254.9%
China	5213	6551	6319	-3.5%	16238	18083	11.4%
Total	10270	11827	11488	-2.9%	31397	33585	7.0%

Demand for stainless steel recovered after the global economic downturn

It has been a difficult few years for chromite and ferrochrome producers. Demand for stainless steel recovered after the global economic downturn, and so too did prices in 2010, 2011 and 2012. Thereafter, falling production costs coupled with, at times, oversupply and relatively sluggish demand caused prices to stagnate and then fall. By Q1 2016, prices were at six year lows. The depressed market had major implications for South African ferrochrome producers. While, on average, costs declined, ore and reductant costs fell substantially while electricity and labour costs dropped much more modestly. Market conditions brought about the closure of several ferrochrome operations, many of which also struggled without a stable supply of ore – forcing them to buy feedstock on the spot market. By mid-2016, four out of 14 South African smelters were idle, and two were partly idle. Of the eight producing companies in South Africa, four were not producing any ferrochrome (Assmang, ASA, IFM and Tata Steel KZN). Three of these, IFM, Tata Steel KZN and ASA Metals, had entered business rescue

the previous year.

In H2 2016, there was a dramatic recovery. By Q3, chrome ore prices had recovered to their highest levels since the global economic downturn. UG2 chrome ore (42%) prices increased from US\$85/t in January to US\$210/t at the end of September, and have since risen to over US\$380/t. South African 44% concentrate was up to US\$410/t in November. This was mostly driven by Chinese demand for South African ore for ferrochrome production, which improved considerably as the year progressed owing to stimulus-linked demand and dwindling inventory levels in China.

Price recovery, and a series of takeovers, started to consolidate and revive the South African sector as bigger producers acquired the assets of smaller, struggling operations. Traxys acquired Tata Steel KZN's ferrochrome plant in Q2. ASA Metals accepted an offer from Tubatse Ferrochrome, a joint venture between Samancor Chrome and Sinosteel, in Q3. In Q4, Samancor Chrome restarted production at the plant formerly owned by IFM, after acquiring the operation earlier in the year. Further, Afarak announced that it was converting silico-manganese furnaces at its Mogale Alloys plant to ferrochrome, to reduce its exposure to high manganese ore prices. More consolidation could occur over the coming months. Several market participants have suggested that Glencore is considering the purchase of Hernic's operations. In 2017, it is likely that ferrochrome prices will remain strong in Q1 and possibly Q2. Thereafter, with higher prices incentivising more and more ferrochrome production from currently unutilised capacity in China, Kazakhstan, India and idled capacity in South Africa, the market may find itself in oversupply, which will eventually drive prices down. This will relieve demand for chrome ore and subsequently lead to lower chrome ore prices.

INDIAN STEEL SCENARIO

India's Minister of State in the Ministry of Steel Shri Vishnu Deo Sai has provided the latest status regarding total capacity of production of steel, its import, demand and supply in the country.

Table 5 (a): Total Finished Steel (non-alloy + alloy) – 2015-16 (Mt)

Crude steel capacity	Production for sale	Import		Demand	
		11.71	80.45	121.97	90.98

Table 5 (b): Producer-wise details of Production Capacity and Production ('000t')

Producer	Cap' 13-14	Prod' 13-14	Cap' 14-15	Prod' 14-15	Cap' 15-16	Prod' 15-16
SAIL	13019	13575	17519	13909	17519	14279
RINL	2910	3202	2910	3296	6300	3641
Tata Steel	9600	9155	9600	9331	9600	9960
Essar Steel	8540	3245	8540	2854	10000	3685
JSW Steel	14600	12227	14600	13136	16600	12679
JSPL	2400	2836	4000	3557	4850	3177
Other EAF/ Corex-BF/ MBF-EOF	14697	9874	15888	14613	18802	15574
IF Units	36494	27579	36794	28283	38300	26796

Indian steel production and consumption in April-December, 2016

Crude Steel

During April-December 2016-17, crude steel production was 72.166 Mt, a growth of 8.5% over same period of last year. SAIL, RINL, TSL, Essar, JSW & JSPL together produced 40.193 Mt during April-December 2016-17, which was a growth of 15% compared to same period last year. The rest i.e. 31.973 Mt came from the Other Producers, which was a growth of 1.1% compared to last year. Overall crude steel production in December 2016 (8.214 Mt) was up by 12.5% over December 2015 and by 6.7% over November 2016.

Total Finished Steel – Production for sale

Production for sale of total finished steel at 73.771 Mt, registered a growth of 10.5% during April-December 2016-17 over same period of last year. SAIL, RINL, TSL, Essar, JSW & JSPL together produced 41.251 Mt during April-December 2016-17, which was a growth of 17.3% compared to same period of last year while production for the Other Producers was down by 1.3%. Overall finished steel production for sale in December 2016 (8.416 Mt) was up by 12.4% over December 2015 and by 11% over November 2016.

Exports

Export of total finished steel was up by 57.8% in April-December 2016-17 (4.977 Mt) over same period of last year. Exports in December 2016 (0.748 Mt) was up by 92% over December 2015

and was up by 13% over November 2016.

Imports

Imports of total finished steel at 5.495 Mt in April-December 2016-17 declined by 37.4% over same period of last year. Imports in December 2016 (0.761 Mt) was down by 23.2% over December 2015 but was up by 26.4% over November 2016.

Consumption

India's consumption of total finished steel saw a growth of 3.3% in April-December 2016-17 (61.517 Mt) over same period of last year. Consumption in December 2016 (7.225 Mt) was up by 5.2% over December 2015 and by 17.1% over November 2016.

Table 6: Indian steel scenario: April-December 2016-17 (Provisional)

Total finished steel	April-Dec'16, Mt	YoY, %
Production for sale	73.771	10.5
Import	5.495	-37.4
Export	4.977	57.8
Consumption	61.517	3.3
Crude Steel Production	72.166	8.5

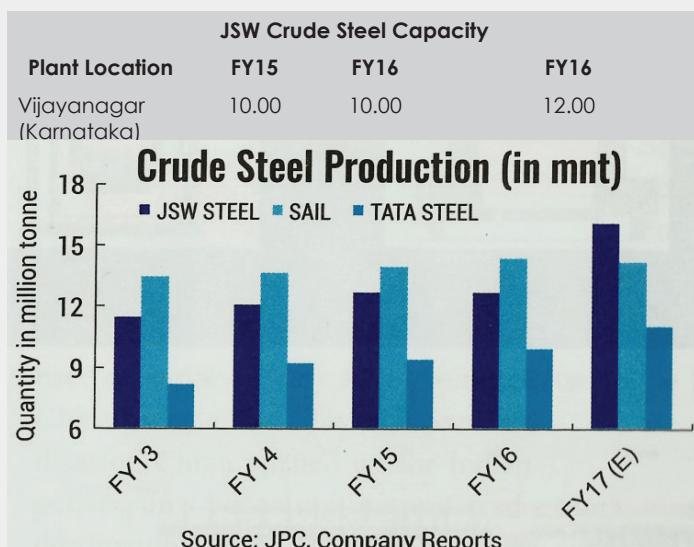
India is the third largest steel producer globally and is likely to be the second largest steel producer in a few years. The sector contributes about 2 percent to the country's GDP and employs over 6 lakh people. Over the last few years, the steel sector has been adversely impacted by the global steel glut which resulted in predatory pricing and a surge in steel imports into the country. To provide level playing field to the domestic steel producers, Government has extended Minimum Import Price on 19 steel products till February 4, 2017. Government has also imposed provisional Anti-Dumping duty on import of flat products (Hot Rolled & Cold Rolled) and on Wire Rods from China, Japan, Korea, Russia, Brazil, Indonesia & Ukraine. Such measures have aided in decline in steel imports by 37.4 percent between April-December, 2016 while exports have increased by 57.8 percent during the same period.

Source: Steel Tech

JSW STEEL – NOW INDIA'S LARGEST STEEL PRODUCER

JSW Steel is now the largest steel maker in India

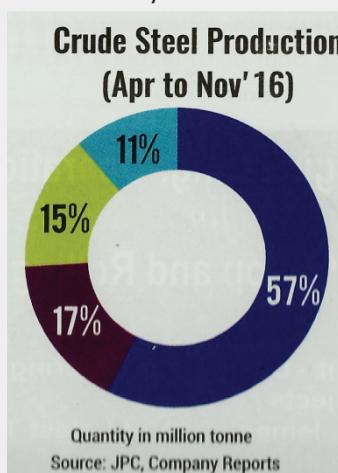
with an installed capacity of 18 million tonnes (mnt), ahead of long time market leader Steel Authority of India Ltd (SAIL). The company produced a total of 10.7 mnt crude steel during Apr-Nov'16 (8 months) overtaking SAIL's 9.46 mnt and Tata Steel's 7.29 mnt in the same period of FY17. With its plants at 6 strategic locations in South and West India, the company has been steadily raising its production capacity in the home market through brown field expansions and strategic acquisitions. Based on 8-month production figures, it is estimated that JSW Steel's crude steel production will touch ~16 mnt by the end of current fiscal ahead of its domestic peers; SAIL (~14 mnt) and Tata Steel (~11 mnt).



As shown in the table above, JSW's crude steel capacity grew to 18 mnt in the current year from 14.3 mnt in FY16. This was owing to capacity expansions at two of the upstream steel making locations of the company.

In FY17 (from April'16 to Nov'16), out of the total domestic crude steel production of 64.46 mnt, JSW turned out to be the single largest producer with 10.7 mnt share. SAIL and Tata Steel produced 9.46 mnt and 7.29 mnt crude steel respectively.

"We will continue to focus on volumes; we have given a 15 million tonne sales guidance



for FY17, and we stick to that guidance. So we will be doing 15 million tonne of sales in this fiscal year but as regards to EBITDA, there is pressure in this quarter and we expect some recovery in

World Crude Steel Production 2015 vs 2016		
Country	2015	2016
US	67.0	66.0
Germany	36.2	35.5
Russia	59.5	58.6
India	74.5	79.5
China	666.9	673.0
South Korea	58.0	57.0
Japan	87.8	87.5

Source: Steel 360

SAIL also plans to raise its capacity to 21.4 mnt pa by 2020. Among other steps taken to give a boost to the steel industry, SAIL has undertaken modernization and expansion of its integrated steel plants at Bhilai, Bokaro, Rourkela, Durgapur and Burnpur. At the same time, working towards its aim of growing capacity to 300 million tonnes of crude steel by 2025-26, the Ministry of Steel has evolved a concept of developing Ultra Mega Steel Plants (UMSPs) and SAIL is participating for setting up of a UMSP of capacity (3 + 3) or (4 + 2) million tonnes per annum in Bastar, Chhattisgarh.

Source: Steel 360

INDIA MAY SURPASS JAPAN TO BE NO. 2 IN STEEL OUTPUT BY 2017

The Institute for Steel Development and Growth (INSDAG) is a research unit promoted by the Ministry of Steel, India. INSDAG feels that the domestic steel market is ready to go to the next growth trajectory riding on demand from the infrastructure and machinery sectors. The Indian steel market is expected to grow at 7-8 percent per annum while other two steel manufacturing countries in Asia – Japan and China – are going to face negative growth. Even though demonetisation adversely impacts the steel market, in the long run, it will benefit the industry, Sushim Banerjee, Director General, INSDAG, tells Diptoshree Sengupta. Excerpts from an interview.

Q. Currently, the Indian steel market is going

through a challenging phase. What kind of growth are you expecting in the next couple of years?

- A. The Indian steel market can experience a big jump in 2017, depending on infrastructure and industrial growth. Here we are not only talking about carbon steel but all varieties of iron and steel such as stainless steel, which is being used in domestic areas as well.

Even though the first and second quarters did not do well for the steel market, the situation will change for the better in 2017. The domestic steel market is expected to grow at a 7-8 percent CAGR next year. This is quite a significant growth while a number of countries are running into negative zone.

Recently, credit rating agency Moody's released a report saying that India is the only area of strength in the subdued Asian steel market aided by rising demand and government measures to curb imports like MIP and anti-dumping duties. However, the agency kept the outlook for the Asian steel market negative mainly because of decline in production and lower profitability.

Another two steel giants – China and Japan – may register a decline in steel growth. As a result, by 2017, India may surpass Japan and become the second-largest steel producer in the world. Currently, the difference between Indian and Japanese steel production is 15-20 million tons (mt). The difference can be covered by the end of next year. Moreover, the Japanese steel market is mostly export-based while in India domestic demand leads the way of steel production.

Q. Which sectors will drive growth for steel consumption?

- A. The growth of the steel industry is directly related to the overall economic growth (GDP) of the country. The infrastructure sector consumes 60-62 percent of the total steel production in India. Currently, construction and developmental activities are taking place in a number of states, which is expected to boost steel demand. Initiatives like construction of bridges, flyovers, industrial corridors, ports, etc also indirectly propel steel demand. Development works also boosts two important steel consuming sectors – machineries and logistics.

Machinery and engineering contribute 22-

23 percent of the total steel demand. If the infrastructure sector grows, the demand for heavy machinery is also expected to grow. It is a fact that the automobile and logistics sectors can only grow if they are bolstered by good roads and a strong transportation network. The automobile sector contributes 10 percent of the total steel demand in India while the logistics sector, including railways, shipbuilding and aircraft, contributes 5-6 percent of the steel demand.

The Central government has evolved a target of laying 20 km of roads every day and the government is on the right track in achieving this target. TMT bars are used in concrete roads and in many cases steel mesh is also used. Even though road construction alone does not consume steel in a big way, steel railing is used in dividers and peripheries. We have asked the government to mandate these railing in each and every road for better security and it is being considered seriously in the ministry.

On the other hand, construction of railway freight corridors will also be another reason for steel growth. Currently, India has received some investments for freight corridors from the World Bank, Asian Development Bank and Japanese banks. Currently, India is using 0.8-0.9 mt steel per annum for making wagons and coaches, which is expected to improve to 1.2-1.5 mt once all the projects are implemented.

The remaining 2 percent steel is being used in the packaging sector, mainly as tinplate. Once the overall economy grows, the packaging sector automatically follows in the same direction.

Apart from that, the oil and gas sector also uses steel in a big way for making pipelines. The water supply system also uses steel pipelines for its network development.

Government initiatives like 'Make in India' are a boon for the manufacturing sector, including steel. Now many manufacturing contracts are being offered to the domestic companies, especially in the MSME space, which was not a priority earlier.

Now a number of Defence equipment, which require high volumes of steel, are being manufactured domestically. Now military boots are up for contracts and a number of MSMEs are capable of and interested in delivering the same. They will be awarded the contract if the

standard and quality criteria are fulfilled.

Not only Indian companies, some foreign automobile companies like General Motors and Toyota are also setting their export-based manufacturing facilities in India, which is also a good source of steel consumption.

These foreign companies find the Indian socio-political structure favourable compared to other countries for setting up facilities. However, strong domestic demand is also there for high-end automobiles such as sports cars.

Q. The prices of raw materials of steel, such as iron ore and coking coal, have increased in the last year. What kind of a price rise do you expect in the coming days?

A. Prices of steel have already increased 16-20 percent from December last year. Because of the raw material price hike, the prices of finished goods are likely to go up further. However, for the last 3-4 days, the prices of coking coal have stabilised and we can hope for some stability in the future. On the other hand, the price movement of iron ore is mostly dominated by China, which alone is an importer of 1 billion tons of iron ore per year. But a downturn in the Chinese steel market may also restrict the price rise of this steel-making raw material.

But the price increase process must be a slow and continues one. If the steel manufacturers suddenly announce a big price jump then the consumers may postpone the purchase plan, which will not benefit a manufacturer in the long-run.

Q. How has demonetisation impacted the steel sector especially the secondary steel market?

A. The cash crunch in the market is temporary but, in the long run, the move is going to impact positively. After demonetisation, the unused funds will be deposited with banks which will increase the liquidity of the banks significantly. As a result, banks will find avenues to invest the funds. Chances are there that the infrastructure sector will receive investment and indirectly the steel sector will be benefitted.

More ecommerce in the steel sector is also a welcome move as it will bring more transparency. If other countries can buy and sell steel products through online platforms why not India?

Source: Steel Insights

TATA STEEL EXPLORING NEW FRONTIERS

Looks at opportunities in materials such as silicon as an alternative to steel to introduce a second product line.

Tata Steel is exploring opportunities in materials alternative to steel with the idea of introducing another product line beyond the existing one. "It is a joint company effort and it's very early. But, our eyes are now beginning to set on alternative materials. The application for these materials can be in sectors like pharmaceuticals, electronics or anything related to the automotive sector. It would be a completely different area that can give us a natural hedge against the cyclicity of the steel business," said Peeyush Gupta, vice-president (steel & marketing) of Tata Steel.

It may be early days, but Tata Steel is on a search to find the next 'silicon'. Elemental silicon has an immense impact as most computers, cell phones, and modern technology depend on it.

One area that Tata Steel is working on is graphene, believed to be the world's first two-dimensional material. It is ultra-light, 200 times stronger than steel, yet incredibly flexible. It is a superb conductor and can act as a perfect barrier, and is also transparent. Graphene research is focused on applications in energy, membranes, composites and coatings, biomedical, sensors and electronics.

Gupta admitted that graphene was one area for Tata Steel, but did not want to elaborate. He, however, said that globally, the material space is witnessing immense research and development (R&D).

In Tata Steel, some cases are in the R&D stage, in some cases, there are applications being looked at and in some cases, there are manufacturing processes being studied so that it can go into pilot. "We can work with our European counterparts," said Gupta.

In August, Tata Steel signed a memorandum of understanding with the Indian Institute of Technology, Madras to set up a research centre in the IIT Madras Research Park as part of its long-term strategic roadmap in the area of advanced materials. The idea is to come up with new materials, which will include graphene.

Tata Steel UK signed a collaboration agreement with Talga Resources to explore opportunities in graphene supply, processing and applications. As part of the agreement, Talga would supply graphene and graphitic carbon materials for use across applications in various Tata research programmes including, but not limited to, anti-corrosion pigments and conductive, formable, barrier and thermal coatings.

This is not Tata Steel's first initiation into new materials. Tata Steel had once explored opportunities in titanium. In 2003, Tata Steel had signed an agreement with Outokumpu Finland's physical separation division based in the US, Outokumpu-Lurgi, Germany, Pincock Allen Holt (an international resource and mining consulting company), US, and Larsen & Toubro, for setting a titanium dioxide project in Tuticorin district of Tamil Nadu.

The first phase involved mining and separation or ilmenite and some other minerals, and its subsequent upgradation into synthetic rutile or titanium dioxide slag, and the second phase entailed titanium dioxide pigment. Titanium dioxide is widely used in the paints industry as it increases the opacity of the paint film. However, land issues derailed the project. Tata Steel had applied for prospecting licence over an area of 5,100 hectares in north Kerala.

Gupta said the project was closed. "Titanium is an attractive element, but profitable extraction on a commercial basis is difficult."

Source: Business Standard

STEEL SECTOR REVIVAL LIKELY AFTER APRIL...

Iron ore prices are retreating, coking coal has come off its highs and international steel prices are elevated, the future looks bright for the steel industry, but the good times are likely only in the next financial year.

Spot prices of premium hard coking coal, one of the key inputs for steel, have come off a high of \$310 in November to \$222 a tonne. But contract prices for the fourth quarter are still high at \$285 a tonne.

Experts tracking iron ore are forecasting a slide in 2017 to around \$52 a tonne. At present, global prices are \$80 a tonne, down by about nine percent.

Together, coking coal and iron ore account for 75 percent of the input cost for steel.

"It all depends on the spot versus contract mix of companies importing coking coal. But most of the impact of higher coking coal is likely to kick in during the fourth quarter. Companies with captive raw material will stand to benefit from higher steel prices on their entire output," explained Jayanta Roy, senior vice president, ICRA.

SAIL and Tata Steel are the major producers with captive raw material.

An ICRA report in December said due to doubling of contract coking coal prices, the cost of steel production for domestic blast furnace players would increase in the fourth quarter of 2016-17.

Around 40 percent of India's 90 million tonne steel production uses the blast furnace technology. That includes all major players, Tata Steel, SAIL, JSW Steel, Bhushan Steel and Essar Steel.

Over December and January, however, companies have been able to pass on a total increase of Rs 5,000 a tonne to customers.

The third quarter of 2016-17 is expected to be flat for producers while the fourth quarter could be worse for those on contract coking coal. But the industry is looking beyond the fourth quarter. The focus is on the consumption pattern.

Sunil Srivastava, deputy managing director, State Bank of India, said the overall reduction in raw material prices was favourable for the industry.

"As soon as the investment cycle starts, the demand for steel is going to go up and prices will climb," he said.

Globally, hot rolled coil prices have increased from \$475 a tonne to \$530-550 a tonne since October. Essar Steel's executive director of strategy and business development, Vikram Amin, said, "Prices in China are up and there is no propensity to export. There is a firmness in demand and the road ahead is clear."

But for the debt-stressed sector, this could still translate into little.

"Although some recovery is possible, we cannot say everything will be alright soon. Steel companies are not out of the woods yet," said R K Takkar, managing director and chief executive officer of UCO Bank.

Source: Business Standard

JSW BIDS RS 25,000 CRORE FOR BHUSHAN STEEL

The Sajjan Jindal-led JSW Steel has submitted a bid of Rs 25,000 crore to banks for the debt-laden Bhushan Steel.

Sources close to the development indicated the deal would include taking over the debts of Bhushan Steel, which were Rs 44,477.90 crore in 2015-16, at a substantial discount. However, the Bhushan Steel management is not on board with the deal and JSW Steel is dealing with the lenders directly.

Bhushan Steel's market capitalisation was Rs 1,202.79 crore at the close of trade a few days back. An e-mail to JSW Steel went unanswered. Text messages and calls to Bhushan Steel also did not draw any response. JSW Steel informed stock exchanges recently in response to reports that the company had bid for Bhushan Steel. JSW Steel wants to double its steel-making capacity to 40 million tonnes in the next decade and it will use organic and inorganic growth to achieve this target.

Bhushan Steel, on the other hand, told exchanges it had not called for any bids from JSW Steel or any other buyer.

A forensic audit of Bhushan Steel is now complete and a techno-economic viability study is under way. Banks may decide on invoking strategic debt restructuring or sustainable structuring of stressed assets in the Bhushan Steel case.

Bhushan Steel ran up big debts to speed up its growth. It commissioned 0.3 million tonnes in 2008-09, two million tonnes in 2009-10 and 5.2 million tonnes in 2014.

In 2013, the Odisha State Pollution Control Board directed Bhushan Steel to shut its blast furnace after an explosion during the trial run killed two workers and injured 16 others. Bhushan Steel's debt mounted from Rs 39,078.70 crore in 2014-15 to Rs 44,477.90 crore in 2015-16. Losses widened from Rs 1,256.80 crore to Rs 2,911.40 crore over the same period.

Sources said JSW Steel was looking at a change of management in Bhushan Steel. JSW Steel is also a front runner for buying Monnet Ispat Energy.

Source: Business Standard

If You Have a Desire, Distance Doesn't Matter

The starting point of all accomplishment is desire. Keep this in mind: feeble desires bring feeble results just as a small amount of fire makes a small amount of heat. Be passionate about your life. Act from your passions. The more energy you apply to any task, the more you will have to apply to the next task. Desire is like the planting of a seed. It causes something to begin and grow. Deep desire creates not only its own opportunities, but its own talents. Attitudes alter abilities.

It's passion that persuades. "A strong passion for any object will ensure success, for the desire of the end will point out the means".

The trouble with many educated men is that learning goes to their heads and not to their hearts. Does the path you're traveling capture your hearts? You have been sent into this world to do something into which you can pour your heart.

You will only be remembered in life for your passions. Find something that consumes you. A belief is not just an idea a person possesses; it is an idea that possesses a person. Learn to be comfortable with being enthusiastic.

Every time zeal and passion are discussed someone brings up balance. Balance is a tremendous virtue, but the immediate neighbours of balance are apathy and weakness. If the truth were known, being balanced is usually an excuse for being lukewarm, indifferent or neutral. Indifference, lukewarmness, and neutrality are always attached to failure.

Enthusiasm can achieve in one day what it takes centuries to achieve by reason. "Above all else, guard your affections. For they influence everything else in your life". "Perhaps the greatest discovery of this century is that if you change your attitude, you can change your life." Put a smile on what you do. It adds to your face value. When your enthusiasm increases, stress and fear in your life diminish. Passion is powerful.

"Believing is seeing. It's much more effective than the old notion that seeing is believing". Love the thing you do, and you will keep doing better and bigger things.

This is the twenty-ninth of series of "Nuggets of truth" which are our sound food for soul. Get ready to blow the lid off our limited Thinking & create your recipe for happiness & success.

Compiled by Shri K L Mehrotra

Chairman – IIM-DC & Former, CMD – MOIL

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NEWER IITs SEE CORE SECTOR COMEBACK

The newer Indian Institutes of Technology (IITs) have seen core manufacturing sector making a comeback at campuses this year. After IT, the core sector, represented largely by public sector units (PSUs) and government organisations, formed the second largest recruiter at newer IITs.

With the All IITs Placement Committee (AIPC) deciding on restricting certain start-ups from participating in campus placements, coupled with a loss of interest among start-ups in recruitments, the trend shifted in favour of core manufacturing.

"The trend here has been that of IT followed by the core sector leading the recruitments. Last year, many start-ups had participated but this year several stayed away. This year we decided that we would focus on PSUs and the core sector, rather than inviting start-ups. This has led to a rise in the share of the core sector in recruitments," said Samar Agnihotri, faculty advisor, training and placements, IIT-Mandi.

Seconding Agnihotri was B Venkatesham, in charge of the placement cell at IIT-Visakhapatnam. He said the core sector had made a comeback as the second leading recruiter after IT this year.

According to sources at the newer IITs, the shares of offers made by the manufacturing sector and IT were between 25 percent and 35 percent each.

What also worked in favour of the core sector was the IITs' move to shift start-ups to later dates and push PSUs to the front in the first phase. "Instead of inviting start-ups on the first two days, we shifted them to later dates. This year the response from start-ups was not good. Many start-ups did not approach the IITs," said Agnihotri.

The newer IITs have also seen average salaries rise this year, thanks to several of them bagging international offers for the first time. At IIT Indore, as against an average salary of Rs 11 lakh last year, the institute reportedly posted the highest offer of Rs 14.5 lakh.

Source: Business Standard

GOVT. TO FUND UP TO 60% R&D COST FOR E-VEHICLES

Move in line with thrust on 'green' transport & to boost 'Make in India'

The government has, for the first time, decided to fund up to 60% of the research and development indigenous low-cost electric technology that will help power two-three-wheelers and commercial vehicles operating in public spaces, a move aimed at reducing pollution.

The government, which considers electric mobility as an alternative to cut pollution and boost its 'Make in India' initiative, expects low-cost electric technology to help replace petrol and diesel-run vehicles, which are currently used as public transport.

"The intent is to make the hybrid and electric vehicle market in India self-sustaining by increasing domestic capacities for product and technology development. We are inviting proposals in five areas, which will be undertaken as consortia projects involving multiple companies and academic institutions. The government has agreed to provide up to 60% of R&D costs involved in eligible projects," a senior government representative associated with the Technology Platform for Electric Mobility (TPEM), said. TPEM is a joint initiative of the departments of heavy industry (DHI) and science and technology (DST).

- TPEM is creating a collaborative platform for developers, suppliers, automakers to work together in five areas – lithium battery technology, motors and drives, charging infrastructure, drive cycle and traffic pattern, light-weighting of XEVs – and developing affordable electric technology, which will be open for use by all in manufacturing two-wheelers, three-wheelers and commercial vehicles used for public transport.
- The consortia projects in these areas will be eligible for grant-in-aid funding generally up

- to 60% with user-industry partners (vehicle and component manufacturers) expected to contribute the rest in terms of resources, manpower, equipment and facilities.
- The consortia project will be funded by the government from the corpus of 14,000 crore set aside under the National Electric Mobility Mission Plan (NEMMP).
 - "We do not want to fund any individual company but want them to work together to create common standards and devices. This will help build scale and bring down costs," said the official.
 - At present, all critical components such as battery, motor and motor controllers, used in electric vehicles are imported, making costs often prohibitive and creating hurdles for the government programme towards Faster Adoption and Manufacturing of Hybrid and Electric Vehicles in India (FAME). One of the priority projects for the 30-member committee (comprising automobile industry executive, experts and government officials) monitoring TPEM is to determine a battery module.
 - Globally, major auto makers design battery modules in-house for use across their range of green vehicles. With demand for electric vehicles being minuscule in India, it has become necessary to design a common module which can be utilised by several manufacturers to generate scale and make viable economics of manufacturing and selling electric vehicles.
- A lot of research is being done at the basic level in India. Indian engineers also work on developing finished products for global companies. However, there is a gap which exists today for progressing from the prototype to testing and validation phase indigenously," said an executive from a leading component manufacturing company.
- "The attempt is to bridge this and (locally) make battery modules, motor, motor controllers and power electronics."
- Also underway is a study to evaluate driving patterns on roads to fine-tune the technology. "Since electric vehicles run on battery, the use of air-conditioning and driving uphill may draw out excessive energy. The technology has to factor in these conditions. Light weighting is important to address range anxiety," said a second government official in know of the project.

Source: The Economic Times



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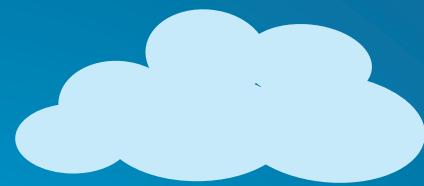
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