THE INDIAN INSTITUTE OF METALS - DELHI CHAPTER

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In The Issue

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VIEW OF AUDITORIUM OF DELHI CHAPTER

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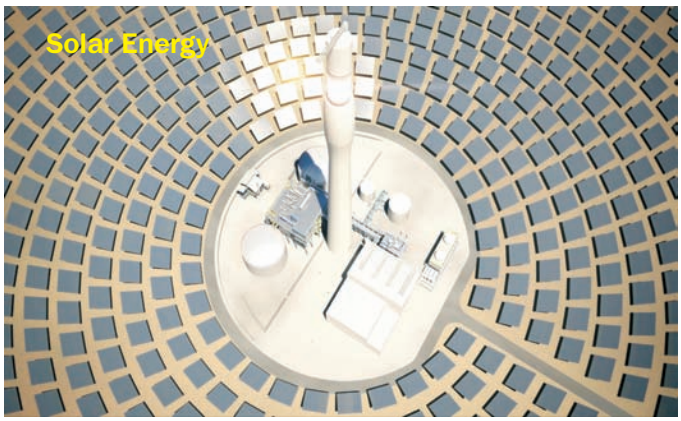

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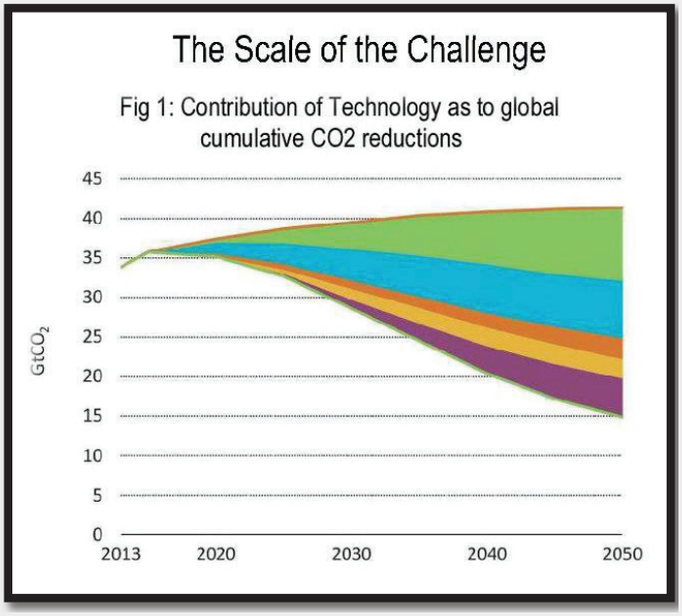
Energy Technology Perspectives for the Iron and Steel Industry

Context

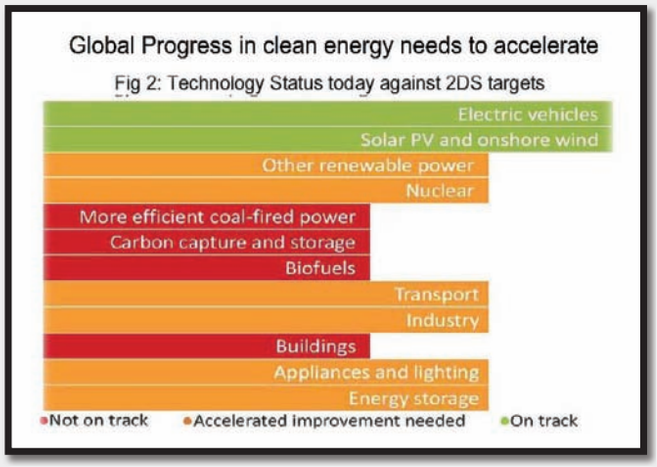
- First clear signs of decoupling of CO_2 emissions and GDP.
  - Global energy- related CO_2 emissions remained flat in 2015 for the second year in a row.

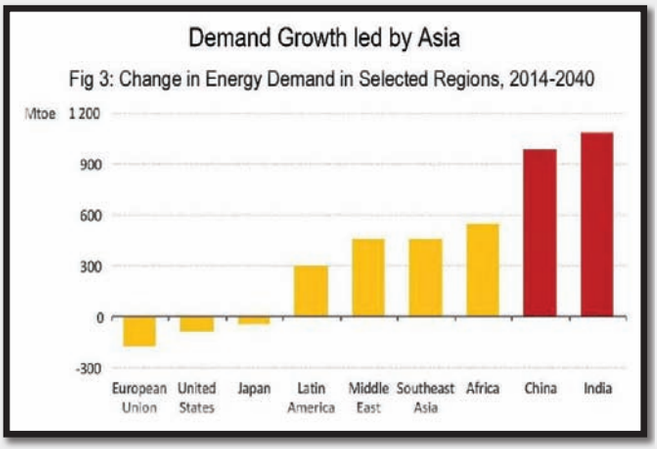


- Unprecedented cuts in upstream oil and gas investments, and shifts to investments in low carbon and energy efficiency.
  - Renewable power capacity at record high with over 150 GW installed in 2015.
  - Rapid decreases in the costs of solar PV and wind.
- Paris Agreement provided a historic push for clean energy.
  - New goals put forward to limit long-term global temperature rise to "well below 2 degrees Celsius"
  - Growing recognition that greater innovation is essential to meet ambitious climate goals.

Global Progress in clean energy needs to accelerate

Global clean energy deployment is still overall behind what is required to meet the 20C goal, but recent progress on electric vehicles, solar PV and wind is promising.



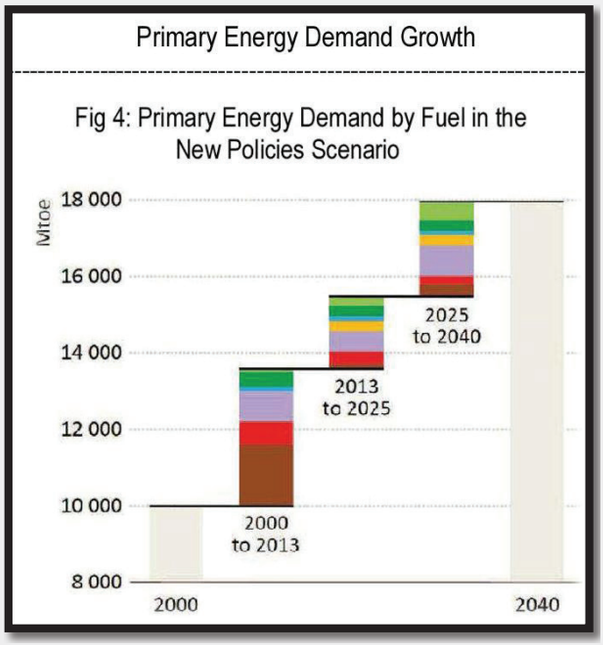


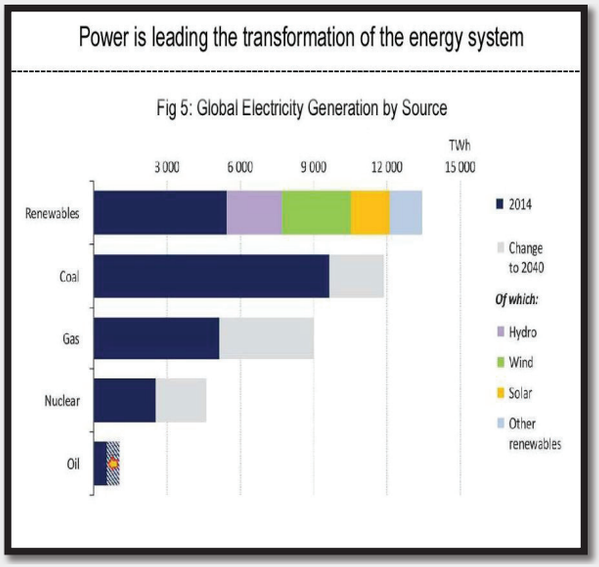
Mission Innovation

- Leaders of 20 countries representing:
  - 67% of global greenhouse gas emissions
  - 70% of global GDP
  - 80% of global clean energy R&D investments
- Each doubling its clean energy R&D investments over next 5 years.
- Complemented by the private sector Breakthrough Energy Coalition.

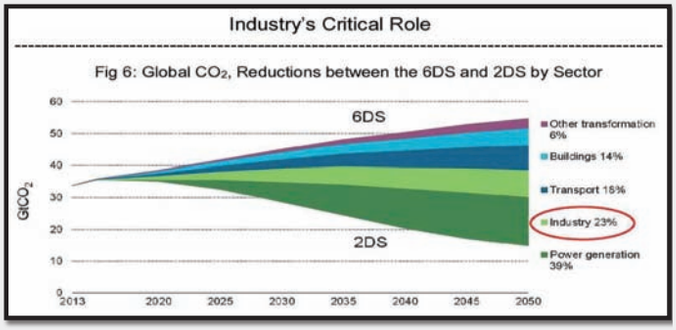
World Energy Investment: a new annual report that measures energy investment and implications

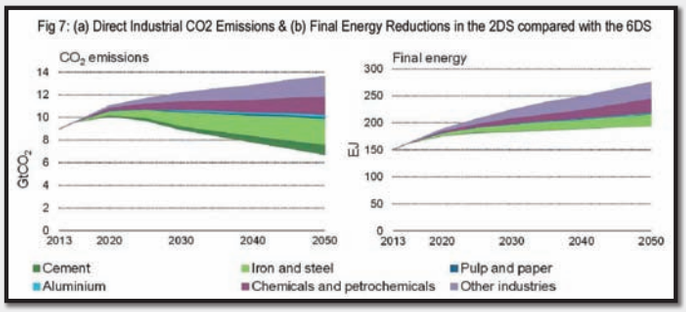
Total global energy investment in 2015 – 1.8 trillion USD which is 8% lower as compared to 2014, mostly because of cuts in upstream oil and gas spending as well as declining costs across the energy sector. Oil and gas sector still is number 1 despite investment drop.





- USD 221 billion in energy efficiency
- USD 313 billion in all renewable energy sources
- USD 21 billion in new nuclear plants.





A major shift in investment is towards low carbon sources of energy.

By 2040, India's energy demand closes in on that of the United States, even though demand per capita remains 40% below the world average.

Driven by continued policy support, renewables account for half of additional global generation, overtaking coal around 2030 to become the largest power source.

Iron and steel associated with the largest reduction in direct emissions, but CO_2 emissions and energy use must be decoupled.

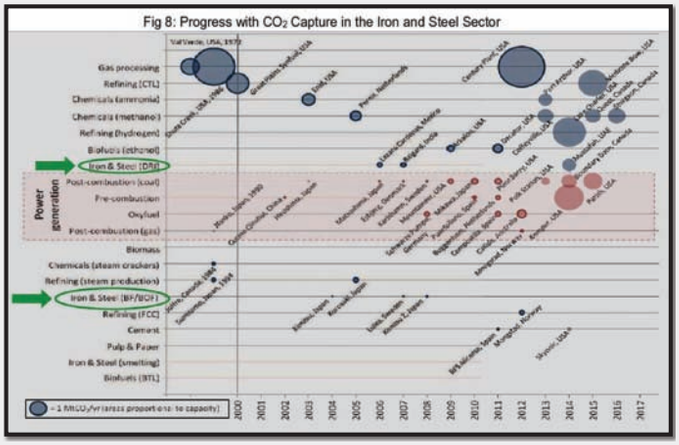
Main Innovative Options for Low-Carbon Steel

- **Upgraded smelting reduction (SR):**
  Maximises the CO_2 content of the off-gases through pure oxygen operation, making CO_2 capture more straight forward. A 90-day pilot plant trial is planned for 2016. Avoids the need for coke or sinter.
- **Oxy blast furnace and top gas recycle:**
  The CO_2 content of the top gas is raised by replacing the air in the blast furnace with oxygen and recycling the top gas. Lowers coke requirements.
- **Coke oven gas (COG) reforming:**
  Increasing the hydrogen concentration of COG through reforming tar to reduce net energy consumption. Through integration with oxy blast furnace, CO_2 capture can be added.
- **An upgraded DRI process:**
  An upgraded DRI process that reuses off-gases from the shaft as a reducing agent after CO_2 capture. Avoids the need for coke or sinter.
- **CO_2 capture:**

It applied to on-site utilities and general combustion equipment. Addition of a post-combustion CO_2 capture unit to: hot stoves, steam generation plant, coke oven batteries and lime kiln.

Each of these options requires CCS for low-carbon production.

- Plus in a longer-term, molten oxide electrolysis relying on renewable electricity.

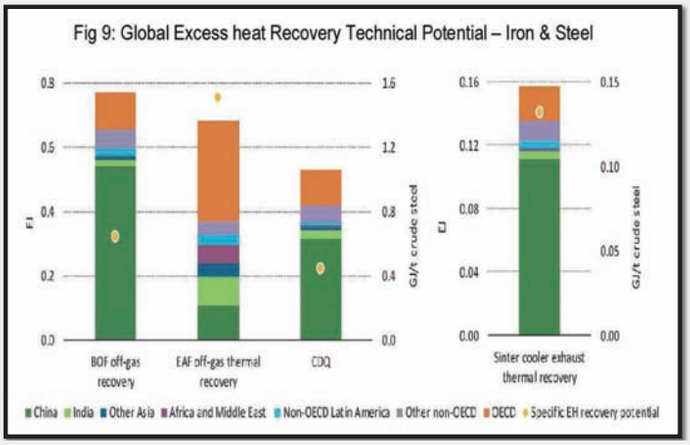


Globally, 6% of the final energy use in iron & steel making could be technically recovered.

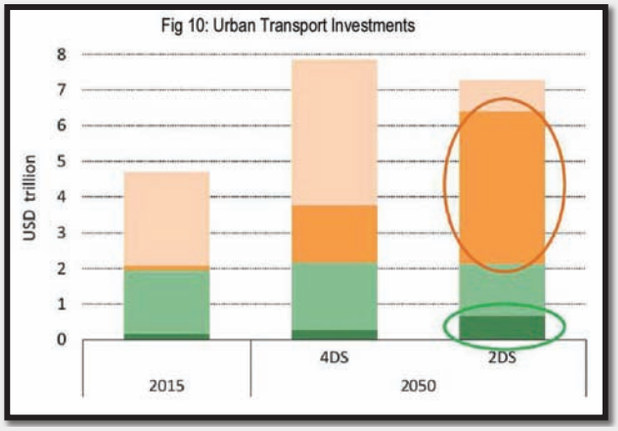
In the 2DS, by 2050 one billion cars are electric vehicles while public transport travel activity more than doubles.

Overview of IEA Roadmap Process

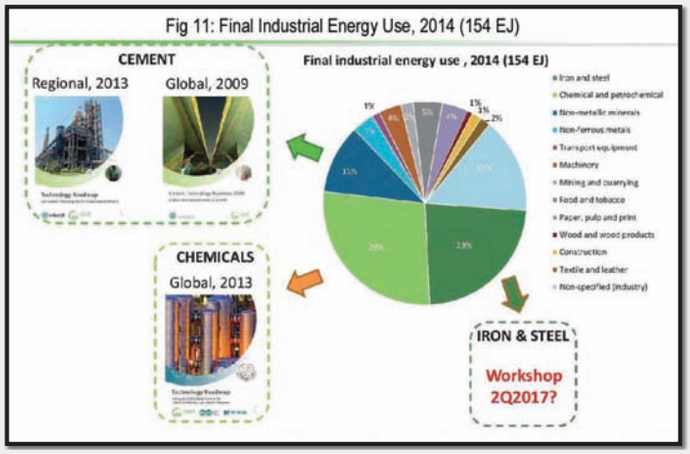
Engage cross-section of stakeholders:



1. **Identify a baseline:** Where is technology today?



2. **Establish a vision:**
   What is the deployment path needed to achieve 2050 goals?
3. **Identify technical, regulatory, policy, financial, public acceptance barriers:**
   What are the near term action items?
4. Develop implementation action items for stakeholders.



Conclusion

- The steel industry has reduced its energy consumption substantially and continues to do, but the marginal gains in existing processes are diminishing.
- The close link between the steel industry and coal, makes integrated steel mills (and steel demand?) vulnerable to climate policy and pro-climate action (shareholders, investors etc.)
- The steel industry is not under immediate pressure to reduce emissions and innovative processes are under development.

- Downside: They are over a decade from widespread adoption and they require integration of CO_2 capture (which probably requires a CO_2 storage business)
- Way forward (a roadmap for steel in a low carbon future):
  - Identify the benefits of innovative processes for environment and export reasons.
  - Promote technology development projects to improve novel processes, e.g. more pilots
  - Collaborate on other relevant R&D/ projects: Oxygen production, hydrogen production, CO_2 storage, enhanced oil recovery.

Source: Steel Tech

Steel turns dearer as coking coal price surges

Major flat-steel producers have increased prices by Rs 1,500 a tonne on the back of a surge in coking coal prices. Since July, spot coking coal prices have increased from $90 a tonne to $279 a tonne. Coking coal contracts for the fourth quarter of 2016 have been sealed at $200 a tonne, an increase of 116% over the third quarter. Coking coal accounts for 30-50% of the cost of production for steel makers that use the blast furnace technology. Around 44% of India's steel production of 90 million tonnes uses the blast furnace technology, an industry representative said. This would include major players such as Tata Steel, SAIL, JSW Steel, Bhushan Steel and Essar Steel. ICRA has estimated that domestic blast furnace players dependent on imported coking coal would see a cost increase of Rs 5,750 a tonne of steel produced. This works out to 17% the price of hot rolled coil (HRC), a benchmark product for flat steel used by the automobiles and white goods sectors. Around 60-70% of India's coking coal requirements are imported. Steel turns dearer as coking coal price surges The primary reason for the increase in coking coal prices was a curb in domestic production by China, which has prompted it to import coal. The Chinese government has set a target of reducing capacity by 500 million tonnes in the next five years. Plus, there have been supply issues from Australia.

"The benefits from trade protection measures, which helped in the recovery in HRC prices by Rs 8,500 a tonne between February and October of CY2016, are likely to largely disappear after the end of Q3 FY2017," a recent ICRA report said. "Gross contribution levels of domestic blast furnace players in Q4 FY2017 is likely to dip by around Rs 4,000 a tonne over Q3 FY2017 unless the increased coking coal costs are accompanies by commensurate price hikes by the steel makers." Steel producers are not hopeful of passing the entire increase in coking coal to consumers because of muted demand. "The increase in prices has been announced but to what extent it can be realised is uncertain," a secondary producer said. Most of the impact of increase in coking coal prices is likely to be felt in the fourth quarter, as the inventory holding period for imported coking coal for steel companies is 70-90 days.

Not so long ago, HRC prices were hovering around $250 a tonne, a steel producer pointed out. It's now at around $450 a tonne. Cheap imports from China, South Korea and Japan had put the industry in dire straits, not just in India, but globally. This had led to a stress in the banking sector, too. The situation had prompted the Indian government to come out with a slew of trade measures — safeguard duty, minimum import price and anti-dumping duty — to support the industry. The Indian Steel Alliance, a producers' body, has now made a representation to the government that no anti-dumping duty should be imposed on met coke, a by-product of coking coal. In December 2015, the ministry of commerce had initiated an anti-dumping investigation into low-ash met coke from Australia and China.

Source: Metaljunction

Govt working for innovative, cost-effective R&D solutions in steel

The Union Minister of Steel, Chaudhary Birender Singh has said that the Steel Ministry is working

towards innovative and cost-effective R&D solutions for becoming a global hub of centre of excellences in steel industry. The Steel Minister said that the entire industry will have to come up with joint strategies to take on the challenges being faced by the industry. He further said that his desire is that public, private sector and ministry will have to prepare themselves to jointly face the challenges coming from abroad. The joint strategies should be 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, said Singh. "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", he added.

The Secretary, Steel, Dr Aruna Sharma said that in-line with Prime Minister, 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.

Source: Metaljunction

Indian Steel Industry – Market Trends and Forecasts Until 2020: Technavio

Technavio's latest report on the global Indian steel industry market provides an analysis on the most important trends expected to impact the market outlook from 2016-2020. Technavio defines an emerging trend as a factor that has the potential to significantly impact the market and contribute to its growth or decline. Ajay Adikhari, a lead analyst from Technavio, specializing in research on metals and minerals sector, says, "The construction, infrastructure, and transport segments will be the major end-users of the finished steel products in India as there has been extensive rise in investments in these segments." The Indian steel industry will be dominated by the flat steel products due to the rise in consumption of the flat steel products in automotive, construction, infrastructure and transport, domestic appliances, and other industrial applications (office furniture, heating, ventilating, air conditioning, and packaging). It is estimated that the consumption of steel as a sustainable material will continue to grow during the forecast period as technological progressions and extensive R&D will decrease the consumption of energy in the steel production process. The Indian steel industry is affected by hindrances in iron ore supply, stable domestic iron ore prices, uncompetitive steel export because of stable Indian Rupee, and dumping of steel on India by steel-surplus nations such as China.

Source: Metaljunction

SAIL major supplier for Sardar Patel's statue in Gujarat

Largest domestic steel producer SAIL will be the major supplier of the metal to be used for constructing Sardar Vallabbhai Patel's statue in Gujarat. The over 182-meter statue of India's first Deputy Prime Minister -- Statue of Unity -- is Prime Minister Narendra Modi's pet project and is billed to be the world's tallest. It is coming up near the Sardar Sarovar dam across Narmada River in Narmada district of Gujarat. "SAIL will be the largest steel supplier for the project. It is already supplying around 18,000 tonnes of rebars. Besides, the statue will require around 15,000 tonnes of plates of which the state-run company will also get a major chunk," a senior government official said. It will take around 32,000-33,000 tonnes of steel for the complete project, of which the Maharatna firm will have the lion's share, he added. "The statue is one of the most celebrated moments for the 'Make in India' initiative. Everything required for the project will be from within the country," the official said.

Engineering giant Larsen & Toubro is responsible for design, engineering, procurement, construction, operation and maintenance of the project. While a consortium comprising Turner Project Management India Pvt Ltd, Meinhardt India Pvt Ltd and Michael Graves & Associates will provide the design, engineering, project management and construction management services for it. Sculptor and Padma Bhushan awardee Ram V Sutar has been chosen by the Gujarat government to build the 'State of Unity'. Sutar had shot to fame with the 45-feet-high Chambal monument at Gandhi Sagar dam in Madhya Pradesh. His other notable sculpture includes a 10-feet high bronze statue of Govind Ballabh Pant overlooking Rafi Marg in the national capital.

Source: The Economic Times

Govt imposes safeguard duties on some steel imports

The Modi government has imposed a safeguard duty on certain hot rolled flat sheets and plates with effect from November 23, 2016 till May 22, 2019. As in the case of hot rolled coils, the safeguard duty would be tapering, with the peak duty being 10%. Subsequently, it would taper to 8% and 6% up to 2019. "The petition for the safeguard duty on hot rolled sheets and plates had been filed after the safeguard duty was imposed on hot rolled coils last year. The notification has just happened," a producer said. In September 2015, the Centre had imposed a safeguard duty of 20% hot-rolled coils for a period of 200 days. This March, a tapering safeguard duty was extended till 2018 with the peak duty at 20%. The prevailing safeguard duty on hot rolled coils, however, is 18%. Producers pointed out a provisional anti-dumping duty was already in place on hot rolled coils, sheets and plates. However, the duties had become infructuous because international prices had increased following a surge in coking coal prices, one of the key raw materials for producing steel through the blast furnace route. Spot coking coal prices which were at $90 a tonne in July have now breached the $300-mark.

Source: Metaljunction

Steel feels the pinch of demonetisation

From construction to automotive to small enterprises, there has been a fall in the demand for steel since the demonetisation drive and the pain may last for the rest of the year.

Economic forecasters are no soothsayers. Their projections are prone to go wrong if the government makes out-of-the-blue interventions such as the recent culling of high-denomination notes of Rs 500 and Rs 1000 which constitute as much as 86 percent of the country's total currency in circulation. Even while the media remains largely focused on inconveniences faced by the masses, the country's steel industry, which only recently started seeing signs of a turnaround after four difficult years, is feeling the pinch of an already low demand withering further. From construction to automobile to small and medium manufacturing enterprises, there is a fall in indenting of long and flat steel products. Rural India, where the per capita steel consumption is as low as 12 kg normally, the cash shortage is forcing farmers to postpone construction as well as repair of their dwellings. Contrary to the October forecast by the World Steel Association that Indian steel demand will grow at 5.4 percent in 2016, by far the highest among all countries, the actual consumption growth till October was around 3.5 percent. According to industry officials, demonetisation is shaving steel demand growth, but it's early to make an estimate of the damage.

"Mind you, this is happening when the country's new steel capacity through greenfield and brown field routes is to grow between 11 percent and 12 percent this financial year," says an industry insider. Till a few years ago, it was taken as normal that in emerging economies such as China and India, where stimulus is provided in more than one way for infrastructure and house construction on a massive scale, steel demand growth would be a few percentage points more than the growth rate of gross domestic product (GDP). But last year, India's steel use was up 6.6 percent to 80.5 million tonnes, while GDP advanced 7.6 percent, consolidating

India's position as the fastest growing major economy. The steel industry in China fared a lot worse where the demand for the grey metal shrank 5.4 percent, despite GDP growing 6.9 percent.

Sounding the alarm

From former Prime Minister Manmohan Singh to Moody's Investors Service, everyone is in agreement that demonetisation will weigh on GDP growth for a few quarters. Moody's observation that the move would "significantly disrupt economic activity, resulting in temporarily weaker consumption and GDP growth" is highly unnerving for steelmakers who are using only about 75 percent of their 120 million tonnes capacity. After providing for domestic consumption, the industry is still left with a surplus of over 10 million tonnes, which is to be exported in an increasingly difficult condition caused by the estimated global capacity surplus of 600 million tonnes. As steelmakers come under the twin pressure of coking coal prices rising more than threefold to over $300 a tonne since January and steel demand taking a demonetisation knock, banks with big exposure to the industry are braced for further rises in steel related non-performing assets.

Banks have an exposure of Rs 3.13 lakh crore to the steel industry, of which Rs 1.15 lakh crore, or 36.94 percent, turned into non-performing assets by March 2016. Some relief has come the big defaulting groups' way under the Reserve Bank of India's flexible refinancing repayment option (5:25) scheme, sustainable structuring of stressed assets (S4A) scheme and strategic debt restructuring facility. "Whatever is done on RBI's behalf will give results, provided the industry becomes profitable on a sustainable basis. Except for a few, the second quarter working of steel groups was disappointing. Demonetisation will take its toll in the rest of this financial year, if not beyond," says an industry official.

Flat steelmakers are looking at the grim prospect of their unsold stocks rising as producers of cars and two-wheelers will be compelled to "rationalise" production to ensure that their dealers are not burdened with unmanageable inventories". Footfalls at dealer showrooms have thinned. Conversion of showroom visits and inquiries to actual sale is down anything between 40 percent and 60 percent. Working capital shortages and falling demand are forcing manufacturers of original equipment and also for the replacement market (for the automobile sector) to cut production and lay off workers.

Cascading effect

In India, steel is mostly used in making cars and its replacement by aluminium and plastic is yet to gain momentum. Therefore, steel more than aluminium or any other substitute materials will suffer the most from falling auto sales. Aluminium will not go unscathed either: the demand for white goods such as refrigerators, air-conditions and washing machines is down and dealer inventories are sharply up.Arguably, no other sector is bearing the brunt of demonetisation as much as housing and construction, where steel is used in very large quantities. A big number of real estate projects executed by members of the Confederation of Real Estate Developers Association of India and promoters in the unorganised sector have come to a standstill across the country as currency shortage is not allowing them to pay labourers. Industry officials are right in believing that a big market for steel is awaiting them in rural India where the use of the metal is low. Some industry constituents took upon themselves the task of promoting the use of the metal in the countryside by convincing people connected with farming that they stand to gain by constructing "steel-intensive dwelling houses and grain silos and using carts and all farm equipment made of steel." But this is going to be a lost season for steel in the country's villages where farmers are finding it difficult to dispose of harvested crops at fair and remunerative prices and buy seed and fertiliser for the upcoming rabi season. They will think of house construction only when things settle down. Hopefully, economic activity in urban and rural areas will crawl back to normal around the beginning of the next financial year.

Source: Business Standard

ArcelorMittal tempers steel's recovery hopes

As the industry bellwether crimps fourth quarter results due to rising coking coal prices, fears grow others might be hurt too.

Ideally, steel mills that take the blast furnace route should maintain coking coal inventory of at least two months, lest they should be visited by events like the devastating floods triggered by La Nina in 2010-11 in Queensland. Well nothing like that has happened in Australia or in any other major metallurgical coal production centre. More than China exercising production discipline at its mines in a drive to cut coking and non-coking coal mining by 500 million tonnes in the next five years and contain flat steel output in other countries, it's speculation that has driven the price of the fuel from $93 a tonne in June 2015, the lowest since 2004, to over $300 a tonne now. Much to the concern of the steel industry, which started believing that it had overcome the worst of times wreaked by high global capacity and big Chinese exports, coking coal is fast approaching the high of $330 a tonne seen five years ago.

Galloping coking coal prices has caught steelmakers by surprise. They, having used up the inventory, must now start working in an environment of much higher raw materials costs. ArcelorMittal Chief Financial Officer Aditya Mittal admits to being taken aback by the "rapid and unexpected rise" in coal prices, which he hopes will be reflected in steel prices. But as there is always a time lag in that happening, industry margins will come under pressure – in the next few months at least.

Dampening outlook

Luxembourg-based ArcelorMittal, which is by far the world's largest steelmaker with production foot-print in all the continents (mostly independently and also by way of joint ventures), will have its profitability crimped in the final quarter of 2016 by a combination of "lower steel prices in the US and impact of rapidly rising coal prices on steel spreads in other geographies." The company is expected to use around 35 million tonnes of coking coal in 2016 and another 9 million tonnes of non-coking coal across its mills in different geographies, while its own production of the fuel is expected at six to seven million tonnes. Coking coal is a major cost component in the blast furnace route of steel production since around 700 kg of the fuel is required to make one tonne of crude steel. There is no running away from the headwinds caused by the surge in raw material prices compounded by likely steel consumption growth of a meagre 0.5 percent in 2016.

In the US, a market of strategic importance for ArcelorMittal, steel demand and prices have of late been impaired by stagnation in the manufacturing sector and falling machinery demand linked particularly to the continuing weakness in the energy sector. Both for the size of its operation – ArcelorMittal's crude steel production in 2015 at 92.5 million tonnes was more than India's cumulative production of 89.58 million tonnes – and big investment in research to be able to introduce a series of advanced high strength products, specially for the automotive sector to fend off emerging competition from aluminium and composites, the company is globally seen as the bell-wether for the grey metal.

Widespread impact

The changed supply and price paradigm for coal is set to take the shine off the working of ArcelorMittal in the current quarter and perhaps beyond. If the company of this stature could make a forward looking statement to this effect, then the negative impact of the changed price environment will become the common experience for the industry everywhere. Let's take Steel Authority of India Limited (SAIL) as a representative case. When P K Singh was appointed chairman of SAIL in December 2015, one of his two principal tasks was to turn around the country's largest steelmaker which made a loss of Rs 4,137 crore in 2015-16. (The other was to complete the investment of Rs 72,000 crore in the modernisation and expansion of SAIL mills and mines.) Now, the reason that will make ArcelorMittal trip could also postpone SAIL's return to profit.

ArcelorMittal's third-quarter earnings before interest, tax, depreciation and amortisation

(EBITDA) of $1.9 billion marked a 40.4 percent rise over the corresponding quarter of the previous year when both steel and mining were in the dumps. Steel-only EBITDA had a quarter-on-quarter improvement of 5.3 percent to $1.7 billion, helped by 7.4 percent rise in average prices but offset to some extent by a dip in shipments. Mining EBITDA, up 25 percent over the second quarter, could have been still better but for lower iron ore marketable shipments. Though nothing compared to metallurgical coal, iron ore has also moved up well from a 10-year low of $37 a tonne in December 2015 to $80 a tonne. While not contesting the claim of ArcelorMittal Chairman Lakshmi Mittal that the "result reflect the progress the company is making to improve the underlying performance," steel prices improving by over 40 percent since the beginning of this year, even though coking coal is becoming a point of concern, came to the rescue of the steel industry.

Steel price improvement of this order can be largely attributed to China providing stimulus to infrastructure and housing development in order to stabilise gross domestic product growth at about 6.7 percent. There was a 27 percent surge in new building construction in China between January and October and house prices are up 16 percent over the past year. The global steel market is drawing some relief that unlike last year, the demand will not shrink in 2016. Instead, according to ArcelorMittal, world steel usage growth should be 0.5 percent and China too can register identical consumption growth. The industry, including ArcelorMittal, speaks in one voice that sustainability of steelmakers' health depends on how quickly the world gets rid of an estimated 600 million tonnes of surplus capacity, half of which is in China, and the resolve of countries to stamp out unfairly priced steel exports, whatever the origin.

Source: Business Standard

Achieving Global Competitiveness

Today, many Indian steel majors are experiencing tough environmental challenges. Key issue, however, is not the challenge but a company's response to it. To a large extent, responses made by these enterprises will determine their future success.

To deliver the correct responses and thereby make the present and future sustainable, firms need to be prepared. New challenges will appear, but a firm has to be battle ready to respond to them. If one analyzes the cyclical ups and downs in the industry, the responses of the companies and reasons underlying those responses, it can be seen that the challenges were not really disastrous, but lack of preparation was the root cause of all evil. Today's challenges, too, as an eye-opener to new business dynamics, is providing an opportunity to re-engineer organizations to beat the challenges knocking and waiting at the door.

No wonder that strengthening the core platform of strategic planning has become a hot topic among managers and policy-makers in many companies. Yet, the expression and understanding of how to prepare for and respond to the challenges are appearing quite inferior in most cases. This article, therefore, seeks to present a roadmap for building necessary capabilities and competitiveness for companies in India.

It is about adopting a disciplined, analytical approach in sustaining a company's premium position in every context. It starts with proper understanding of what kind of marketing is essential and what kind is irrelevant. Then strategically doing something and not doing the other. Importantly, leadership is a journey and not a destination. That is why it evolves over time. In essence, this organizational strategy drives the organization on the path of more and more value creation while staying away from decisions, activities and systems that only destroy value. Both directed and emergent strategies should be guided by this philosophy. To do this, a firm's marketing encompasses all important functions and processes. Company-wide change is a prerequisite to success in external market. When successful, a firm gets opportunities to sell to the industry's best customers and earn an above average return in the industry.

It is a bridge between company management and its employees, customers and suppliers – the three most important constituencies in any business. The main building block of the bridge should be trust (T). To develop, maintain and enhance trust, a company needs to ensure supplying at least two important antecedents; commitment (C) and satisfaction (S). Sustaining high level of satisfaction, eliciting extraordinary commitment, building enduring trust and remaining trust-worthy are not easy tasks and there is no easy way. A company has to be relationship oriented with segment specific focus. Once the bridge is strong, it is the most effective and efficient way of doing business.

It is a customized, long-term, transparent and proactive process of pricing that also considers relationship costs. This concept takes into account the fact that prices are determined by the customers and a steel supplier is only a price taker. So the supplier needs to move from the policy of cost led pricing to price led costing. Detailed information on the industry, competition, customer's requirements, profitability of customer and supplier etc are required to decide what factors are relevant in making a relationship pricing decision. It is suitable for the steel sector where new product development is rare. While, the idea is to share the co-created value, usually a suppler gains in declining market. However, such a pricing is best practiced for relationship minded customers.

For several reasons including globalization, the barrier separating domestic and international firms is very thin today in most business sectors and in most countries. This distinction will dissolve further and it is likely to be irrelevant soon. Furthermore, most customers now associate and compare their local suppliers with foreign suppliers. A supplier therefore should not confine them within the domestic market parameters and best practices. The firms should gather information about international benchmarks and produce export worth goods and services. They may also find it lucrative to differentiate their offer by incorporating a global standard into their offering. However, this can not be accomplished overnight. A local firm therefore may attempt to be glocal (global + local) and then graduating to a truly global firm. To be successful, many Indian firms will be required to acquire new competencies and develop a step by step launch plan. Thereafter, when a firm is confident about satisfying customers internationally, it should create plans for global branding by assessing the country's potential and perspectives.

It is the way of reducing cost in an innovative manner. While innovation itself is a cost element, in this process, innovation is used to reduce costs. It can be done through technology innovation, product innovation, process innovation and deployment of underutilized resources to alternative and more profitable uses. Key idea is that ruthless and unwise cost cutting should be avoided as they create more problems than they solve. Achieving simultaneous cost reduction and long-term results, therefore require special out of the box thinking and non-traditional efforts.

Detailed description of each process is beyond the scope of this article. To implement these strategies, a firm should promote collaboration, clearly communicate about shifting goals, empower frontlines, develop expertise about changing organizational cultures, especially when participants have diverse perspectives. Strategies suggested above are advanced level, organization-wide strategies involving whole business. Therefore organizational fundamentals have to be strong before rolling out these efforts. Board level involvement and able leadership are essential to bring about the change and focus relentlessly on improvement.

Indian steel sector represents a sizeable global industry and is using significant portion of the country's resources. The whole country is optimistic about the performance of the steel industry. Prosperity of steel majors therefore not only determines their well-being but also contributes greatly to the determination of a country's living standards in the future. This festive season, we all pray blessings of the Almighty for victory over all evils. Let this be true in everybody's life and in all businesses.

Source: Steel 360

THE FOURTH INDUSTRIAL REVOLUTION AND ITS EFFECT ON THE STEEL INDUSTRY

The Fourth Industrial Revolution is bringing massive changes to mankind through accelerated integration of traditional industries and ICT. The Internet of Things (IoT), Big Data, Artificial Intelligence (AI), virtual reality/augmented reality and 3D printing are forcing traditional industrial structures to rapidly change. The scale, scope and complexity of these changes will be unprecedented. Steelmakers are also actively developing advanced technologies to respond to the massive paradigm shift. The leading steel mills customize technologies such as AI and virtual factories and apply them to the production sites. They will strengthen integration along value chains by connecting clients and suppliers through smart factories. With the advancement of the Fourth Industrial Revolution, many traditional industries now face the destruction of industrial structures, and countries are intensifying competition to take the leadership in the future of manufacturing. Under these circumstances, manufacturing will face new changes in the future. On the consumers' front, the era of "mass personalization" will be heralded and dynamic intelligence, real-time enterprise, and servitization will become new trends on the suppliers' front. The Fourth Industrial Revolution is bringing changes in many established companies.

GE has a long history and tradition as an automation company in power generation and energy, but it has declared itself to be a software company. Likewise, a steel company in the Fourth Industrial Revolution might need to become a "software engineering company that produces steel," not a "company that buys and uses software well."

The innovation is breaking down every aspect of traditional industries at an alarming speed. Conventional labour structures are collapsing because of advent of AI. AI is writing reports using more analytical and descriptive language than human journalists and a very useful tool for making financial reports helping investment decisions. AI has significant presence in manufacturing as well. Robots are now available at much lower prices working 24x7. These will replace large no. of clerical and administrative jobs besides manufacturing and production jobs.

Traditional companies are losing their footing due to appearances of new competitors equipped with innovative technologies and differential business models. Internal combustion engines are giving way to electric vehicles and self-driving cars which will affect automotive parts supply chain manufacturing engines and transmissions. There are changes in the energy and financial sectors also. Renewable energy is replacing fossil fuel-based power companies. In the financial sector, the emergence of mobile payment providers is upsetting the traditional payment market structure.

Accelerating Digital Transformation with Smart Factory to Unlock New Value: case of POSCO

In the face of the great paradigm shift brought on by the Fourth Industrial Revolution, many Asian steelmakers are taking pre-emptive measures to maintain competitiveness and contribute to the advancement of manufacturing. POSCO is also one of the leading global steelmakers in this arena. POSCO is building the world's first continuous-process steel plant model in its Gwangyang Steelworks plate factory that houses integrated processes for steelmaking, continuous casting, and rolling. POSCO has achieved major outcomes in the realization of a smart factory, such as the development of the "digital genome map" to tackle challenge of smart factory initiatives and the construction of PosFrame-POSCO's smart factory platform for continuous process industries. It also has conducted various smart factory projects, including material to final product defect tracking, minimizing unnecessary scarfing in the continuous casting process, and new product development simulation in cyberspace.

China is Shifting to the "Smart Factory of the World"

To prepare for the Fourth Industrial Revolution, represented by "Industry 4.0" in Germany and "Industrial Internet" in the USA, the Chinese government released the "Made in China 2025" policy in May 2015 and the "Internet Plus" action plan two months later. The Chinese government's massive support makes the

prospect of smart factories even brighter. It plans to designate two to three companies in each industry to support the construction of smart factories. Using its vast market as a bargaining chip in summit diplomacy, China induces cooperation from advanced global firms. As a result, China can elicit technological support for smart factories from advanced countries. However, it would take much time and energy to fully realize smart factories in China's manufacturing and steel industries. Just as the explosive growth of China's steel industry has shocked the world in the early 21st century, the world might be shocked again by China, if it successfully adopts Industry 4.0 and smart factories in the future.

The Rise, Prospects, and Impact of China's Steel E-Commerce

China's steel e-commerce is gaining ground in China. The rapid growth of China's steel e-commerce after 2012 was caused by three factors that collectively intensified competition in online platforms : the changing landscape of the steel trading market due to a slump in China's steel industry; China's "Internet Plus" and other related policies; and an online fever across the industry. The Chinese government aims to increase total steel trade through e-commerce by about 20%, or 150-200 Mt, until 2020. China's steel e-commerce market will be led by a few competitive firms. Most steel e-commerce firms in China are pioneering or considering overseas expansion. Therefore, their influence will become stronger in overseas markets. As China's steel e-commerce develops, the functions of offline steel traders in countries which import Chinese steel products will be reduced. In this process, existing offline steel distribution channels will be upgraded through integration with online channels.

Influence of the Fourth Industrial Revolution on the Steel Industry

The steel industry has a long history of technological adaptation and product innovation.

Today, the industry is already extremely efficient in iron and steelmaking, as well as processing. Within this environment, the Fourth Industrial Revolution could continue to play an important role, but additional progress will be incremental owing to the already high level of technological achievement. It is rather in the field of the use of steel in applications that the Fourth Industrial Revolution could play an important role. The Fourth Industrial Revolution may influence the design and production of consumer goods to the extent that waste is reduced, and the lifetime of steel in use increases. It is therefore quite possible that the Fourth Industrial Revolution will have little direct influence on the steel industry. The indirect influence through changing the manufacturing process and product design of items requiring steel as an input may have a vastly more influential role in the steel industry.

Source: Steel Tech

POSCO and SAIL sign MoU on technical collaboration for operational improvements & HR development

POSCO and Steel Authority of India have signed a Memorandum of Understanding (MoU) on technical collaboration for operational improvements and human resource development. Dr Oh-JoonKwon, Chairman cum CEO, POSCO and P K Singh, Chairman SAIL were present at the signing ceremony a few days back. Speaking on the occasion P K Singh said that signing of this MOU 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 said he hopes both companies will work together to make it a success. The MOU was signed by Dr. In-Hwa Chang, Chief Technical Officer, POSCO and Mr Raman, Director (Technical), SAIL at POSCO Centre, Seoul. R K Rathi, CEO of ISP Burnpur, SAIL was also present at the event. Incidentally, SAIL and Posco have been in discussions to set up a Finex-based integrated steel plant collaboration in R&D and energy efficient, environment friendly green technologies and waste utilization etc. Earlier this year, a South Korean delegation led by the mayor of Pohang visited Delhi in February and met with the then

union steel minister Narendra Singh Tomar to discuss various areas where the two countries can collaborate and work together in the steel sector.

Source: The Economic Times

India Makes The Steel Tariff Mistake Again

Much economic reform is being done in India and this is all to the good. The population will, in the future, be richer as a result of the changes being made. However, India still doesn't quite get the point of trade. And this is leading the country to make the same mistake again on steel imports. They're adding a tariff to cheap steel imports–this is a mistake because the entire point of trade, the very purpose of it, is to get our hands upon cheap imports. Yes, really, imports are the part of the process that make us richer. So, to tax ourselves with a tariff to stop ourselves getting cheap imports is simply ridiculous. It's common I agree. Again, I insist, the wrong thing to be doing. Why it happens is well known. The producers are a small number of people but a small number of people who are very, very, interested in being protected from competition. The users of steel are everyone in the country. Who are only very mildly interested in the price of steel. Sure, we all use some every day but if the price of steel doubled, or halved, it would make very, very, little difference to us. A refrigerator might cost $5 more or something and how often do we buy one of those? But those steel producers are very, very, interested in this price. And it is always true in politics that a concentrated interest will defeat a dispersed one. Thus producers generally win on the subject of trade tariffs and consumers lose. All of which is why we've got to decry this protectionism each and every time we see it. We're supposed to be running the economy in the interests of the consumers, not the producers. And no tariffs, yea in the face of cheap imports, even dumping, benefits consumers. Thus we should never have tariffs against imports, no matter how much the producers complain and whine.

Source: Metaljunction

New age steel, composites competing AL for lightweighting

Looking at the trends in automotive engineering one has to wonder if aluminium is really the correct solution for our light-weighting projects, perhaps it's not. It has been a reasonably good interim solution, but as the steel guys fight back with some absolutely wonderful new high strength steel it allows us to down gauge the vehicle like we've never been able to do before, on top of that we're moving to plastics as another lightweight solution which is gaining ground at a great rate of knots, in such a way as to displace aluminium where one wouldn't have expected it. Automotive professionals are demonstrating their positive approach to weight saving, one subject matter is of the engine mounts, and where old cast iron mounts were used to be fit on vehicles, and then the auto companies moved their focus towards aluminium with the premise that it could do the job better and was much lighter, but that hasn't lasted very long, because along comes polyamides engine mounts, 55 percent lighter than the aluminium, and stronger and far more durable, and General Motors has embraced this on most of their product range.

Now, we're seeing people who thought they should go to aluminium change direction for several other uses, steel is back in a big way. Yes, automotive design engineers now have some great opportunities to embrace these new ultra-high strength steels that will allow us to be stronger and much lighter. "I think the future lies with two main products – steel and composites, not aluminium for several reasons, is it too expensive? Is it losing its competitive edge? Will we see a dramatic drop off in the use of aluminium by the time we reach the 2020 vehicles, and what will be the percentage content of the 2025 extra light-weight vehicles," said an experienced automotive professional. However, Shailendra Goswami, Chairman & Managing Director, at the Pune-based Pushkaraj Group, which deals with the manufacturers of diesel engine, automotive, engineering, etc, said "While I agree that the substitute to steel

in future could be plastics / composites but aluminium could never be replaced totally for its mechanical and chemical properties. It certainly will be dictated by the application and the endurance / fatigue strengths/life cycle requirements of the application. Industry will never accept light weighting at the cost of quality and reliability even if it means they have to shell out an extra dollar for the same.

"My views are based on the interactions I have had with OEMs (diesel engine manufactures and automotive manufacturers) for over three decades and having experience in undertaking cost reduction exercises with these OEMs. I am also involved in offering solutions in the area of light weighting to Indian OEMs. Weight reduction is all about structure. If you know how to create innovative structure you can increase the utility of the structure with the spinoff of less mass (weight reduction). The answer in lightweight materials is not knowing the answers to overcome questions not asked. Some experts feel, aluminium is not the answer, it cost more to weld and rivet the cost in much more to build 2-3 times as much as conventional to save a marginal weight reduction of approx. 15 percent. The biggest complaint at the moment is damage to the panels due to the properties of aluminium over steel. Added Guy Ignafol, Past Engineering Manager at the US-based automotive firm WEFA Cedar Inc, "There are a lot of ways to make improvements and the focus on weight has been at the top of the list for years. With the new ways of getting the power to the wheels, gearing, aero dynamics, fuel options, electronics, there just may be technology on the horizon that will show a better payback than weight reduction.

Source: MMR

China to probe illegal expansion in coal, steel sectors

China will send inspection teams to investigate and severely punish illegal expansion by coal and steel firms as part of its efforts to slim down the two industries, the country's cabinet said a few days back. With most of the country's steel and coal enterprises making losses in 2015, China promised in February to slash 500 million tonnes of coal production capacity and 100 million to 150 million tonnes of crude steel capacity over the next three to five years in a bid to reduce price-sapping supply gluts. The State Council said in a notice posted on China's official government website (www.gov.cn) that this year's targeted closures had already been "basically completed", but some firms were still illegally expanding capacity. The cabinet named as culprits the Hebei Anfeng Steel Corp, based in the northern port city of Qinhuangdao, as well as a small steel plant in eastern China's Jiangsu province.

China has traditionally struggled to rein in its massive steel and coal sectors, with local governments often turning a blind eye to expansion projects that provide additional local employment and economic growth. But this year Beijing has been trying to keep its regions on a tighter leash, and inspection teams from the Ministry of Environmental Protection have criticized several provincial authorities for failing to restrict capacity growth in the two sectors.

The State Council statement said it will also encourage "high-quality firms" in the two sectors to step up restructuring efforts along the lines of the merger between the state-owned Baoshan Iron and Steel and Wuhan Iron and Steel groups. It added that China would unveil financial incentives for regions currently trying to deal with overcapacity, and would provide more support when it comes to re-employing laid-off workers.

Source: Metaljunction

Global iron ore to stay at $50-70/tonne for 36 months

Aided by growth in demand from China, the world's largest steel maker, iron ore prices are expected to rule in the range of $50-70 per tonne in the near term, BMI Research said recently. "We expect iron ore prices will trade between $5070 a tonne over H1 2017 as additional Chinese stimulus measures will tighten the market, providing support to prices over the next six to nine months," BMI Research,

part of the Fitch Group, said in a statement. However, by 2018, the prices will retest lows due to an oversupply in the seaborne iron ore market, driven by strong production in Australia and Brazil and weakening consumption growth in China, it added. "Whereas our previous core scenario expected the iron ore balance to loosen in H2 2016, providing downwards pressure on prices going into 2017, additional Chinese infrastructure stimulus measures will tighten the market, providing support to prices over the next six to nine months," it explained. Iron ore prices will be supported by sustained demand from steel mills restocking iron ore as resilient Chinese steel prices will continue to incentivise domestic steel production. In the long term, BMI Research said: "We have revised up iron ore forecast out to 2020, and expect iron ore prices to average $55 per tonne in 2017 and $48 a tonne in 2018, up from our previous forecast of $45 per tonne in both 2017 and 2018." The upward revision is predicated on the agency's core view turning more bullish towards metal prices. "We now see it likely that infrastructure stimulus measures by China will stay strong through to the end of 2017, rather than our previous core view for stimulus measures to fade in H2 2016," it added. By 2017end, prices will head lower as stimulus driven ore price rally's upside effects to ore consumption will fade, loosening the market, putting downwards pressure on prices. The global iron ore market will continue to see strong supply from low-cost producing countries Australia and Brazil, the world's second and third largest producers, respectively, which will only partially offset the slowdown in Chinese iron ore production, it said. "From 2018 onwards, continued high cost Chinese iron ore production cuts and slowing growth from major producers will reduce the global oversupply, and thus prevent a further weakening of iron ore prices," BMI Research said. This will sustain the existing trend of Chinese iron ore demand being increasingly met by seaborne iron ore imports, it added. Over the first 9 months of 2016, Chinese iron ore imports grew strongly, averaging 9.3 per cent year-on -year (yoy), in marked contrast to the muted 0.5 percent growth in national steel production (iron ore demand) over that same period.

Source: Metaljunction

Tata plans to turn around Port Talbot steel plant

The Tata group is working towards turning around Port Talbot, which could entail a phased investment in assets and an overhaul of systems. "The Tatas under Ratan Tata would like to turn around Port Talbot and a plan is in the works. The group realises that Scunthorpe was sold too soon," people familiar with developments said. The Tata Sons' latest explanation on why Cyrus Mistry was 'replaced' said that in the past three years the group had written down, written off or made provisions for impairment worth thousands of crores. "Tata Steel alone has written off a large part of its investment in its UK/European assets. It is interesting to note that the new buyers of some of the steel assets for one pound in the UK have claimed a dramatic turnaround in the very first year of their takeover. In our view, these sub-par results cannot be blamed on the commodity cycle or economic conditions".

According to media reports in the UK, the new owners of Scunthorpe were targeting a 10% profit margin on its annual revenues of 1.2 billion pounds, meaning it could make a profit of 120 million pounds a year. Indeed, people familiar with the UK plants said that UK plants' performance could not be just linked to raw material. The plan to turn around could be a three-pronged exercise with investment in leadership and assets and an overhaul of supply chain. "The investment in the plant could be around $500 million but this may be staggered. The blast furnace at Port Talbot may call for relining in 2019 which is when the company will have to weigh in whether they will go for relining or a shift in technology like the electric arc furnace route," sources close to the development said. Also, an overhaul of supply chain servicing could bring down the cost. "The supply chain cost in the UK is much higher than Germany and France. It is expensive to import raw material and service markets using roads. But if waterways is used, then it is possible to bring down the cost by $10-$12 a tonne. It will also be possible to reach out to the right markets," sources explained.

"The investment in Port Talbot has been 185

million pounds in blast furnace and 60 million pounds in gas recovery after acquisition. The plants were under-invested at the time of acquisition and even after acquisition, investment proposals mooted by the Tata Steel management were met with resistance from the erstwhile management of Corus," sources said. However, sources indicated it was possible to turn around Port Talbot and make it profitable and a plan was being put in place for the same. Tata is a turnaround man, and he doesn't give up easily, another source said. In March, Tata Steel decided to explore all options for the UK business, including sale. Tata Steel had said then that group had extended substantial financial support to the UK business and suffered asset impairment of more than two billion pounds in the last five years.

The statement in March had also said that the Tata Steel board had reviewed the proposed restructuring and transformation plan for Strip Products UK, prepared by the European subsidiary in consultation with an independent and internationally reputed consultancy firm but the plan was found to be 'unaffordable'. Seven bidders were shortlisted for the sale, but the process was put on hold in July, on Brexit concerns. According to an earlier plan, however, in May, Tata Steel completed sale of its long products Europe business - which included Scunthorpe steelworks, two mills in Teeside, an engineering workshop in Workington, a design consultancy in York, and associated distribution facilities as well as a rail mill in norther France - to Greybull Capital LLP. Currently, Tata Steel is pursuing a consolidation strategy in Europe which includes a potential joint venture with ThyssenKrupp and a separate process for selling the South Yorkshire-based specialty steels business.

Source: Business Standard

Contemporary Materials and Alloys for Strategic Applications

Abstract

The success of any strategic endeavour depends on its adeptness which represent attributes and proficiency in understanding the philosophy and meeting requirements consistent with the need of the hour. To respond to increased strategic requirement, one must learn how to build sustained competitive advantage. It's an internal analysis, which includes research and development in various areas including advent of contemporary strategic materials and alloys. The author, through this article highlights the recent developments in strategic materials and alloys and analyzes application of such materials and alloys in achieving edge over the conventional ones for strategic sector and later for civilian sector. The paper dwells upon strategic materials namely SAM2X5-630 bulk metallic glass and strategic alloys like fighter Jet alloys, iron-gallium alloys, alloys with two different atomic arrangements, titanium alloys, etc. The article concludes that these materials and alloys if harnessed techno-economically will render a distinct strategic and competitive edge to a nation and its citizens. The article is just a humble attempt from the academic point of view.

Introduction

Beyond victory and defeat, wars across history have brought mankind many useful things. It is as if military action holds tears and destruction on one hand and elation and creation on the other. From Jungle boots, canned foods, water purifiers, microwave oven, duct tape, aviators (special sun glasses), synthetic rubber (nylon), jerry cans, digital camera, the walkie-talkie, radar, jet engines, NBC (Nuclear, Biological and Chemical) suits, X-Ray machine, ENIAC (Electronic Numerical Integrator and Computer), Internet, GPS (Global Positioning System) to MEMS (Micro Electro Mechanical Systems), to name a few, many military inventions have entered our daily lives, changing the way we live. All these were by-products of military technology, invented primarily to win a war. But they survived the battlefields and persisted with mankind for improving the quality of life and to change the life styles forever. Strategic materials and alloys are those which offer distinct competitive advantage in defence and aerospace applications. Materials namely SAM2X5-630 bulk metallic glass and alloys namely fighter Jet alloys, iron-gallium alloys,

alloys with two different atomic arrangements, titanium alloys, etc. are few such recently developed strategic materials and alloys which are proposed to be used for strategic applications. These materials and alloys, with suitable modification may later be adapted for civilian application for betterment of the mankind. To start with, usage of these may help a nation to boost security measures (internal and external), by economizing on time, cost and efforts, thereby achieving the goals.

SAM2X5-630 Bulk Metallic Glass (BMG)

Researchers from the University of Southern California (USC) and California Institute of Technology (Caltech) have developed a new material named as SAM2X5-630 bulk metallic glass (BMG), which has a unique chemical structure that makes it incredibly hard and yet elastic, strong as well as shock resistant. This material can withstand heavy impacts without deforming, even when pushed beyond its elastic limit. It doesn't fracture, instead retains its original strength upon deformation. That makes it potentially useful in a variety of applications from drill bits to body armor to meteor-resistant casings for satellites.

This SAM2X5-630 BMG is produced using a spark-plasma sintering process in which the iron composite is powdered by heating up to 6300C, placed in a dye, zapped with a current, superheating it to the point of binding without liquefying it and then rapidly cooling it to low temperature. This material performed well under shock testing and impact loading. This material possesses the highest impact resistance among the BMGs. BMG is a class of artificially generated materials first discovered in the 1960s that possess disproportionate strength, scratch resistant, difficult to fracture, resilience, and high elasticity due to their unusual chemical structure. BMGs are formed when metal and metal alloys are subjected to high temperature heat treatment (say around 6300C for iron composite) and then rapidly cooled, thereby exciting their atoms into disorganized high entropy arrangements, and then freezing them to low entropy arrangements at low temperature. As we know, zirconium-based BMG is twice as strong as titanium whereas a SAM2X5-630 BMGs are stronger than zirconium-based BMG and can withstand high impact stress in addition to all other properties of BMGs.

What makes SAM2X5-630 BMG special is that it's not entirely a glass. The exact time and temperature of heat treatment is instrumental to its unique nature. A similar iron composite when heated treated somewhat differently yields a random atomic arrangement that lacks the impressive elastic properties. The SAM2X5-630 BMG has almost no internal structure, like glass, but it possesses tiny regions of crystallization, which makes a difference under shock loading. The elastic limit of SAM2X5-630 BMG was measured to be from 10.50 GPa to 13.02 GPa. For reference, stainless steel has an elastic limit of 0.2 GPa, while that of tungsten carbide is 4.5 GPa. This is not to conclude that SAM2X5-630 BMG has the highest elastic limit of any material known; diamond tops out at a whopping 60 GPa, but they are not feasible for many real life applications.

Jet Fighter Alloys

When it comes to aircraft design, the focus is on developing light and strong materials to have the maximum efficiency. Researchers at Ames Laboratory's Materials Preparation Centre in association with Pratt & Whitney (aircraft engine manufacturer) and others have developed aluminium-yttrium-nickel alloy (Al-Y-Ni) to replace heavier components in the cooler section of jet engine and wing. Replacing different components in jet engine with the Al-Y-Ni alloy could potentially reduce the tare weight of the engine substantially. This enables the aircraft to carry significantly more fuel or payload.

The Al-Y-Ni alloy is produced using a process called high-pressure gas atomization (HPGA). Pioneered by metallurgist Iver Anderson at Ames Laboratory, the HPGA process uses a special nozzle to blast a stream of molten alloy material with a pressurized gas such as helium or nitrogen. The product is fine power metal particles that are highly symmetric because they cool quickly, exhibit the amorphous structure of the liquid metal rather than the crystal structure normally found in bulk metals. The powdered metal is vacuum not-pressed and hot extruded, that bonds the particles together while retaining some of the amorphous structure. This partially amorphous, partially crystalline structure material

produced by HPGA enhances properties, such as strength and ductility. Preliminary tests of the Ames Laboratory's Al-Y-Ni alloy shows that the tensile strength of this alloy exceeds that of any material available. For instance, the commercial available aircraft-grade aluminium alloy has a tensile strength of around 490 MPa while this Al-Y-Ni alloy has exceeded 700 MPa.

Iron-gallium alloy (Galfenol)

An alloy named Galfenol (Iron-gallium alloy) provides an efficient new way to produce electricity. The material, Galfenol, consists of iron doped with the metal gallium. Researchers from University of California at Los Angles (UCLA), the University of North Texas (UNT), and the Air Force Research Laboratories have found that Galfenol can generate power under strong impacts. Galfenol is a magnetoelastic material, in which the state of magnetization can be changed by squeezing, pushing or otherwise deforming the material. When exposed to a magnetic field, magnetoelastic materials respond by changing shape. When such materials are prevented from deforming, they instead generate a large force. A magnetoelastic material can convert mechanical energy into magnetic energy which produces electric energy by the principle of electromagnetic induction. Galfenol is able to turn roughly 70 percent of mechanical energy into magnetic energy and electric energy with high efficiency. As such this magnetoelastic effect can be used to generate electricity.

The power-generating ability of Galfenol is tested in experiments using a device called a Split-Hopkinson Pressure Bar which generates high amount of compressive stress. It was observed that when subjected to strong impacts, Galfenol generates as much as 80 megawatts of instantaneous power per square meter. In addition to power generation, Galfenol-powered devices could also be used as wireless impact detectors. Devices can be designed to send a detectable electromagnetic wave, when a mechanical pulse moves through it. Such device could be embedded in vehicles, military or civilian, to detect collisions. Because electromagnetic waves travel much faster than mechanical waves, information about the impact could be transmitted ahead of the mechanical waves created by the impact. Thus, one could wirelessly determine that an impact has occurred, before it is physically felt thereby allowing to take measures to mitigate the damage.

Alloy with two different atomic arrangements

Researchers from the Max-Planck-Institute fur Eisenforschung in Dusseldorf (Germany) have developed a bulk material alloy that is extremely strong, but simultaneously ductile they succeeded in combining both properties in one material wherein, high strength and ductility coexist. It is contrary to the practice wherein one material property could be improved at the cost of the other. The reason for coexistence of high strength and ductility is atomic disorder. Such materials are strong because the disorder of the numerous different atoms in a structure makes it difficult for dislocations to move. Dislocations are defects in the crystal lattice that move through a crystal when a material becomes deformed. If the microstructure and the composition are further improved, strength and ductility can be even further enhanced.

Titanium Alloys

Titanium is an incredibly light and strong metal. It is as strong as steel and twice as strong as aluminium, but it is lighter than steel. To reduce total weight, titanium satisfies the need and has replaced conventional steel alloys and aluminium. Titanium and titanium alloys like Ti-6Al-4V widely used in aircrafts, missiles, rockets etc. where strength, low eight, and resistance to high temperatures and explosions are important design parameters. Titanium does not corrode easily under adverse environmental conditions. It is used in propeller shafts, rigging, other parts of ships that are exposed to sea-water. Therefore, it has proved to be very useful for naval applications, for safety of combat military vehicles etc.

Conclusion

Strategic materials and alloys could be the elixir for next-generation engineering and technology if harnessed techno-economically. The next generation of aircrafts, naval ships, artilleries could have greater efficacy, thanks to the strategic materials and alloys which possess enhanced mechanical and chemical properties.

Source: Steel Tech

A Shady Person Never Produces A Bright Life

There is no limit to the height you can attain by remaining on the level. Honesty is still the best policy. However, today it seems there are less policyholders than there used to be. "Truth exists, only falsehood has to be invented." "Truth will rise above falsehood as oil above water."

White lies leave back marks on your reputation. You can't stretch the truth without making your story look pretty thin. When you stretch the truth, it snaps back at you.

Truth will win every argument if you stick with it long enough. Though honesty may not be popular, it is always right. The fact that nobody wants to believe what's true, doesn't keep it from being true.

Two half-truths don't make a whole truth. In fact, beware of half-truths. You may have gotten a hold of the wrong half. You will find that a lie has no legs. It has to be supported by other lies. "Always tell the truth and you never have to remember what you said."

The truth is one thing for which there are no known substitutes. There is no acceptable substitute for honesty. There is no valid excuse for dishonesty.

Nothing shows dirt like a white lie. It may seem that a lie may take care of the present, but it has no future. Hope built on a lie is always the beginning of loss.

"Show me a liar and I will show you a thief." A lie's main assignment is to steal from you and others. "The liar's punishment is not in the least that he is not believed, but that he cannot believe anyone else."

Liars have no true friends. How can you trust them? "If you lie and then tell the truth, the truth will be considered a lie". A liar will not be believed even if they tell the truth. An honest person alters their ideas to fit the truth and a dishonest person alters the truth to fit their ideas.

There are no degrees of honesty. The only way to be free is to be a person of truth. Truth is strong and it will prevail. There is no power on earth more overpowering than the truth. "Truth is always exciting. Speak it, then. Life is dull without it.

This is the twenty-seventh 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.

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Platinum demand in India, Japan to be strong in 2017

Indian demand for platinum jewellery will grow by double digits next year, and Japanese consumption will stay strong, the head of Platinum Guild International said, with buyers drawn to prices that are off more than 20% from an August peak. Platinum was trading above $940 an ounce a few days back, up from an eight-month low hit the previous day, and it still remains up about 6% for the year so far. The drop-off in prices over the two months since August 12 has widened platinum's discount to gold to the most since June. While gold is a low-margin business for Indian jewellers, retailers can scoop up returns of about 50% for platinum, said Huw Daniel, chief executive of Platinum Guild International (PGI), an industry group funded by South African platinum producers and refiners.

"In 2017, we're expecting significant double-digit growth in India and reasonable growth in Japan," Daniel told Reuters on the sidelines of an industry conference in Singapore. Young Indians are now more keen on buying platinum either for themselves or as a gift, and that is "very different" to the traditional gold jewellery market in India, he said. "Most gold jewellery in India is easily convertible into other forms if necessary, so people buy gold as a savings vehicle. That's not the case with platinum. It's being bought as personal jewellery," he said. Platinum's steep discount to gold is also luring Japanese customers, he said. "With a price like this we can see platinum taking the share from white gold in jewellery," Daniel said. The World Platinum Investment Council in September forecast a 520,000-ounce deficit in the platinum market this year, up from a 455,000-ounce shortfall predicted three months earlier, citing robust demand and weak supply.

Source: Financial Express

Zinc Rally Speaks Volumes

Zinc prices have been rallying since the start of 2016, with markets gaining almost 78% since January. Markets started off on a sideways

note, after the sell-off since mid-2015, and gathered strength as the time went by. The build-up in volumes, as can be deciphered from the OBV (On Balance Volume) indicator, as prices rallied is testimony to the fact that the rally is well supported by market-wide participation. Prices are well above 50, 100 and 200 period EMA's (Exponential Moving Average) indicating strong bullishness. RSI (14) (Relative Strength Index), though treading near overbought territory, is trending higher indicating bullishness in the market. While there is a possibility of correction lower in the short run given the sharp rally witnessed in the last few weeks and the fact that RSI is treading near overbought conditions, the longer-term trend remains bullish. Prices have sustained well above the long term trend line resistance, which is now a strong support, around $2,200

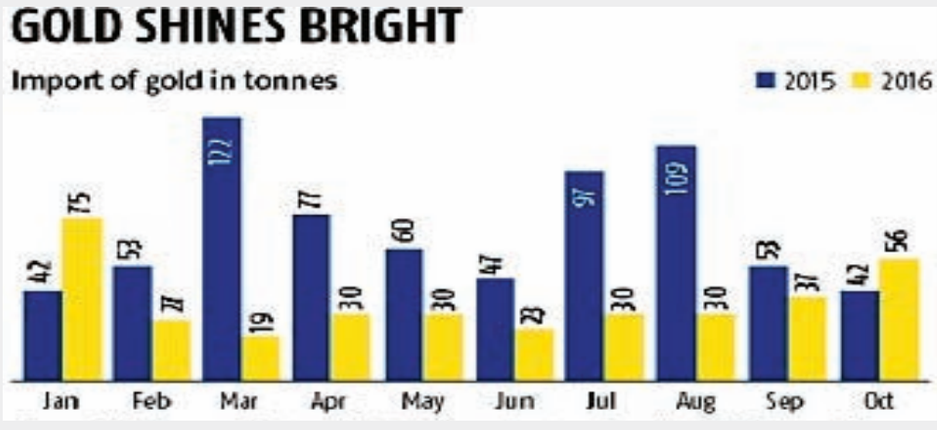
levels signalling the change in the long term trend. As such any dip in prices can be viewed as a long term investing opportunity, we believe that the rally has just started and there is long way to go before the strength wanes.

Source: The Economic Times

$1-BILLION GOLD IMPORTED SINCE NOVEMBER 9

A day after Prime Minister Narendra Modi announced that Rs 500 and Rs 1,000 currency notes would cease to be legal tender from the midnight of November 8 – a move aimed at cracking down on the flow of black money – those in possession of unaccounted wealth were seen rushing to jewellers to buy gold. While these people were willing to pay huge premiums, jewellers were ready to accept old currency notes. The transactions took place on past-dated bills; even Value Added Tax (VAT) was paid. As a result, there was a sudden spurt in demand for gold. According to market estimates, as much as $1 billion worth of gold, or around 30 tonnes, has been imported since November 9. GFMS Thomson Reuters estimates that India's gross official import of gold this year was worth nearly $1.5 billion as of November 14. Of this, as much as $900 million worth of the metal was imported after the demonetisation of high-value legal tenders. While this estimate does not exclude gold imported for exports, such gold would have been a small part of total imports. It should be noted that the government had last month said that for according the status of a nominated agency, the export of gold jewellery from export-processing zones (EPZs) and export-oriented units (EoUs) would not be taken into account.

The country's import of the yellow metal had stood at about $3.5 billion in October, according to GFMS Thomson Reuters estimates. The demand for gold had dropped in India during pitrupaksha, a 15-day period considered inauspicious by the Hindus for purchase or sale assets. But it significantly increased after that period, especially in the days leading up to Diwali. According to Shekhar Bhandari, senior executive vice-president and business head, global transaction banking and precious metals, Kotak Mahindra Bank, said: "Gold demand has been good since Diwali, and the trend continues. In the past few days, especially amid a marriage season, customers have been seen using debit cards to make payments for jewellery." This trend is being seen widely among organised or big jewellers.



Meanwhile at Zaveri Bazar, Indian Bullion and Jewellers Association (IBJA) recently sent messages to jewellers that there was the possibility of the income-tax department asking them to deposit old currency with it by November 15, to stop the malpractice of selling gold at a premium for banned currencies. The last date for depositing the banned

currency notes with banks or exchanges has otherwise been fixed as December 30. So far, however, there has been no official communication on this from any department, according Surendra Mehta, Secretary, IBJA. "No jewellers, to our best knowledge, are accepting old notes now," Mehta said. Against an average monthly import of 30 tonnes since February, October alone saw an import of an estimated $3.5 billion, or 56 tonnes, of gold. No one is ready to predict the import trend in the coming weeks, as there are fears that the government might impose a ban on gold imports. However, there has been no official word on this so far.

Source: Business Standard

Geoscience Australia to help GSI in hunt for new minerals

Geoscience Australia, Australia's national geological survey, has launched a programme to help Geological Survey of India (GSI) in adopting modern practices and upgrading its capacities to help uncover new mineral deposits. According to an agreement between the two countries last year, Geoscience Australia has taken a two-year programme to train the capable Indian scientists to adopt a geological process based understanding of ore deposits to add predictive capacity to their exploration techniques. "This is a change of approach and mindset. It's a shift from empirical documentation of the geology of the country in which GSI a long tradition to understanding geological process, which we refer as mineralisation approach that has much bigger footprint than simply the ore deposit itself," James Jhonson, Deputy CEO of resources division of Geoscience Australia, told BusinessLine. He was in the city in connection with the IMME and Global Mining Summit, 2016 in Kolkata.

Training scientists

Referring to Geoscience's involvement as 'training the trainers', Johnson said his organisation started training the first batch of scientists in the new approach and they will in turn train the rest of the manpower and create a capacity to asses the technology upgrades required. According to him, the change in approach should not require additional staffing as GSI has a few thousand employees when compared to 600-people strong Geoscience Australia. Of the 600 people, a mere 50 is dedicated in finding minerals.

Source: The Hindu BusinessLine

IISc breaks into top 15 in Times varsity rankings of 2017

The Indian Institute of Science (IISc) has, for the first time, broken into the top 15 universities in the latest Times Higher Education (THE)'s BRICS and Emerging Economies University Rankings 2017, on the back of improved scores for its teaching environment and research influence. Following IISc is Indian Institute of Technology-Bombay, which climbed three places to the 26th position, its highest ever rank, due to improved scores across all sections. According to THE, India could soon overtake Taiwan as the second most-represented country in the top 200, behind China. Overall, India has 19 universities in the top 200, up from 16 last year, while Taiwan has 21, down from 24. "India is also making great strides. In fact, India could soon overtake Taiwan as the second most-represented country in the top 200 of the

table, behind China… However, while these two countries have improved their standing, the performance of the other BRICS nations is waning, largely due to increased competition as a result of expanding the list to rank 300 universities from 41 countries, up from 200 institutions in 35 nations last year," said Phil Baty, editor of THE World University Rankings.

According to Baty, THE's BRICS & Emerging Economies University Rankings 2017 uses the same 13 performance indicators as the overall World University Rankings which include teaching, research, international outlook and knowledge transfer and compete with other leading research universities across emerging economy countries. Of the total 300 universities ranked, China saw the most representation at 52, followed by India at 27 institutions. "The clear trend, in the fourth year of this annual list, is China's continued dominance. The Asian giant takes 52 – or more than one in six – places in the top 300; 44 of these make the top 200, five more than last year. Meanwhile, six Chinese universities make the elite top 10, including Fudan, University, which rose 11 places to reach sixth place this year," said Baty. "With almost double the number of institutions in this ranking than the second most-represented country, India, China looks set to continue to dominate the list in the years to come, while other nations will have to run faster just to stand still," Baty added.

Source: Business Standard





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