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COVID-19 PANDEMIC

Rising to the occasion

MANUFACTURERS THE WORLD OVER ARE REPURPOSING THEIR PRODUCT LINES TO PRODUCE CRUCIAL MEDICAL AND HEALTHCARE PRODUCTS

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EXCLUSIVE MEMBER SECTION AT www.eepcindia.org

An exclusive member's section has been introduced on EEPC India's website. The User ID and Password has been sent to members on their email ID that is on record with EEPC India. If any member has not received it, please contact EEPC India at: eepcho@eepcindia.net.

The email IDs of some members are not available with EEPC India. Please provide your email ID at eepcho@eepcindia.net so that we can mail the details to you. It is also recommended that all members view their details in the Member's Directory on EEPC India's website and verify their email ID.

All members are also requested to provide mobile numbers of key contact persons over email. This will enable EEPC India to send important alerts and messages on SMS.

LETTERS

CHAIRMAN ON CNBC

I just watched you on CNBC. I share your views 100 percent. We are engineering exporters and have customers in over 150 countries. The surprising part in this lockdown is that not only are our customers across the globe functioning and asking for our products but we have suppliers in the USA, Italy, and Spain who are all engineering companies and have been working during their lockdowns and are eager to make their supplies to us.

I feel there is a much better way to handle this else we are handing our life's work to other countries. You have our full support. Please let me know how we can help.

Thank you for Chairing EEPC and god bless. If there is anything else you need, please let me know.

Dinesh Advani, *Director, Powermaster Ltd, Navi Mumbai*

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GST CLARIFICATION

Circular No. 138/08/2020-GST

Circular No.136/06/2020-GST, dated 03.04.2020 and Circular No.137/07/2020-GST, dated 13.04.2020 had been issued to clarify doubts regarding relief measures taken by the Government for facilitating taxpayers in meeting the compliance requirements under various provisions of the Central Goods and Services Tax Act, 2017 (hereinafter referred to as the 'CGST Act') on account of the measures taken to prevent the spread of Novel Corona Virus (COVID-19). Post issuance of the said clarifications, certain challenges being faced by taxpayers in adhering to the compliance requirements under various other provisions of the CGST Act were brought to the notice of the Board, and need to be clarified.

The issues raised have been examined and in order to ensure uniformity in the implementation of the provisions of the law across the field formations, the Board, in exercise of its powers conferred under section 168(1) of the CGST Act, hereby clarifies as under:

Issue: Notification No. 11/2020 – Central Tax dated 21.03.2020, issued under section 148 of the CGST Act provided that an IRP/CIRP is required to take a separate registration within 30 days of the issuance of the notification. It has been represented that the IRP/RP are facing difficulty in obtaining registrations during the period of the lockdown and have requested to increase the time for obtaining registration from the present 30 days limit.

Clarification: Vide notification No.39/2020- Central Tax, dated 05.05.2020, the time limit required for obtaining registration by the IRP/RP in terms of special procedure prescribed vide notification No. 11/2020 – Central Tax dated 21.03.2020 has been extended. Accordingly, IRP/RP shall now be required to obtain registration within thirty days of the appointment of the IRP/RP or by 30th June, 2020, whichever is later.

Issue: Another doubt has been raised that the present notification has used the terms IRP and RP interchangeably, and in cases where an appointed IRP is not ratified and a separate RP is appointed, whether the same new GSTIN shall be transferred from the IRP to RP, or both will need to take fresh registration.

In cases where the RP is not the same as IRP, or in cases where a different IRP/RP is appointed midway during the insolvency process, the change in the GST system may be carried out by an amendment in the registration form. Changing the authorizsd signatory is a non-core amendment and does not require approval of tax officer.

Yogendra Garg, *Principal Commissioner, GST Policy Wing, Central Board of Indirect Taxes and Customs*

***

[The detailed circular can be found on https://www.cbic.gov.in/resources//htdocs-cbec/gst/Circular_Refund_138_8_2020.pdf – Ed]

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COVID-19 PANDEMIC

Rising to the occasion

Manufacturers the world over are repurposing their product lines to produce crucial medical and healthcare products

MONTHLY MUSINGS

From the Chairman's Desk

Amidst such issues, there is one silver lining for the Indian exporters – diversification of the global supply chains beyond China ... countries across the world are now looking towards diversifying their supply chains to countries other than China which may include Brazil, Mexico, India, other South Asian and Southeast Asian countries

THE March figures of engineering exports have been released and as expected the devastating impact of the COVID-19 pandemic has become clearly evident. Echoing the trend in India's merchandise exports, which exhibited a y-o-y decline of 35 percent in March 2020 India's engineering exports for the same period declined by a whopping 42.5 percent. Within the engineering sector all major product panels exhibited sharp decline in March 2020. Overall, this fiscal (April-March 2019-20), India's cumulative engineering exports declined by 5.8 percent when compared to the last fiscal. The pandemic has surely brought a halt to the trend of record growth in exports, which the Indian engineering sector was witnessing in the last two fiscals.

The fall in exports has been majorly attributed to the rapid spread of the disease across the globe and subsequent stoppage of manufacturing activity in different countries, which resulted in mass cancellation of orders. At the same time, the shutdown in Chinese factories implied shortage of key inputs for Indian engineering exporters. Additionally the strict lockdown within India resulted in the absence of labour and logistics. Exporters were unable to transport their finished products and raw materials to and from ports.

Amidst such issues, there is one silver lining for the Indian exporters – diversification of the global supply chains beyond China. As the pandemic first affected the industrial city of Wuhan, which caters to a significant percentage of China's industry, global supply chains across several product categories including engineering faltered. Consequently, it highlighted the problems of over-dependence on China. As a result countries across the world are now looking towards diversifying their supply chains to countries other than China which may include Brazil, Mexico, India, other South Asian and Southeast Asian countries. This is already evident from the fact that we at EEPC India are in constant touch with our Missions abroad who are getting us connected to potential buyers in traditional as well as new markets. This is, therefore, a golden opportunity for the Indian engineering exporters to expand their footprint globally.

The question now remains whether the Indian exporting community is in a position to grab these new opportunities. Sadly the current scenario is not so positive. While both the central and the state governments have done a wonderful job in containing the pandemic, the lockdowns came at a severe economic cost to the exporters who are facing issues mainly in three areas: access to labour, logistics and capital.

The state governments are sceptical in issuing passes for workforce in the factories. Currently most of the states are only allowing permits to 10-15 percent of the workforce whereas the industry's requirement remains close to 35-40 percent.

Most engineering exporters in India are MSMEs. They are finding it very difficult to maintain their cash flow and make payments such as salary, rent, etc. While the RBI has allowed the banks to impose moratorium on loans, banks are slow in extending the benefits. Even when they extend, exporters are sceptical to avail the benefits since it may lead to significant interest burden. As the possibility of extension of lockdown becomes clear, the burden of payment is bound to increase and several companies may face solvency issues in the coming months. We feel that a moratorium along with an interest waiver scheme for at least a few months would prove to be beneficial for all industrial sectors in such a situation.

Finally, I would like to mention that, with the gradual opening up of the USA and EU countries such as Italy, Spain, and Germany, this is the most opportune time for the Indian engineering industry in the international markets. If India cannot gear up at this point, it may lose important markets to competitors. While we laud the Indian government for coming in support of the industry, we hope that further actions will be brought into force to alleviate the above-mentioned issues. With the support we are sure to turn the tide and take the current situation in our stride.

Ravi Sehgal

SPOTLIGHT

COVID-19 IMPACT

Diversification of global supply chains beyond China

Countries all over the world are looking for new markets to offset their overdependence on China as a crucial hub for supplies

EEPC INDIA

THE rapid spread of the COVID-19 outbreak has been termed as the Black Swan of 2020 – an unpredictable event with an impact much beyond what is normally expected of the situation. The event has compelled several countries around the world to impose complete or partial lockdowns, thereby bringing movement of people and goods across borders to a screeching halt. Most of all, it has impacted the manufacturing industry in China, the crucial participant in various important global supply chains. The severe negative impact of the pandemic is evident in a WTO press release of 8 April 2020.

Over the last two to three decades as China developed its manufacturing prowess, it emerged as the preferred world production centre and consolidated its leadership position in the global trade and supply chains. However, as the spread of COVID-19, a disease originating from Wuhan, China, disrupted Chinese manufacturing and global supply chains, a lot of attention is drawn towards how the global supply chains have been over-dependent on China. Even as China proclaims to have controlled the pandemic by coming out of lockdown and starting economic activities, several countries including the USA have become sceptical of such supply chain shocks that may again emerge in future due to the growing overdependence on one source. Countries, therefore, are looking into alternative sources of import. It is expected that in the post-COVID scenario, several countries may emerge in that position. Does India's engineering sector have the potential? Can India take this opportunity to emerge as an alternative source of engineering inputs to China in non-traditional markets such as Africa, Latin America, or CIS? This article tries to answer these questions.

Some points of the Trade Statistics Outlook in the WTO press release of 8 April 2020

- World merchandise trade is set to plummet by between 13 and 32 percent in 2020 due to the COVID-19 pandemic
- Nearly all regions will suffer double digit declines in trade volumes in 2020, with exports from North America and Asia hit hardest
- Trades will likely fall steeper in sectors with complex value chains, particularly electronics and automotive products

GLOBAL SUPPLY CHAINS: OVERDEPENDENCE ON CHINA

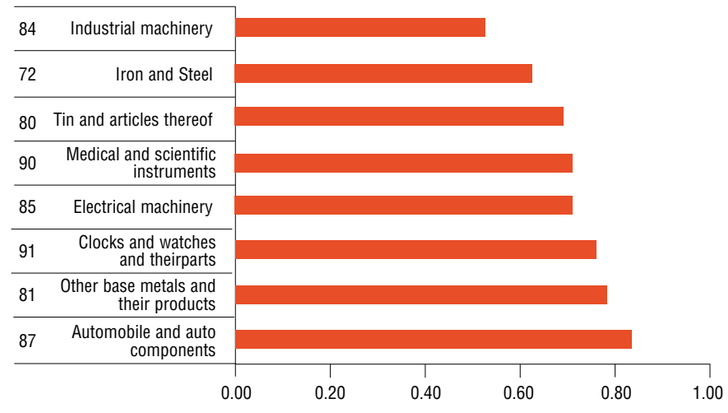
China provides the bulk of components, processes, raw materials, and subsystems for several major industries including automotive, electronics, medical equipment, machinery, and consumer goods across the world. In this section we look into the extent of China's integration into the global supply chains through the Grubel-Lloyd Index.

The Intra-industry Trade Index or the Grubel-Lloyd Index measures the extent of intra industry trade in a particular sector between two countries. Nations can hugely benefit from intra-industry trade due to economies of scale. The formula for calculating the index is as follows:

Gli = 1- |Xi- Mi|/ (Xi + Mi), where Xi = Exports; Mi = Imports
If Gli = 1, there is only intra-industry trade
If Gli = 0, there is no intra industry trade

The extent of China's current economic integration as measured by the Grubel-lloyd Index is shown in **Figure1**. As is evident from Figure1, there is high intra-industry trade between China and the World in some of the major engineering sectors and the highest intra-industry trade is evident in the auto and auto component sector. Therefore, it can be concluded that Chinese manufacturing is essential to several supply chains in the engineering industry and any disruption in China's supply in these sectors is expected to have a ripple effect on the producers in the rest of the world.

Figure1: China's integration in global value chains across sectors



Source: Authors' calculations from ITC Trade Map

CURRENT STATUS OF CHINA'S MANUFACTURING INDUSTRY

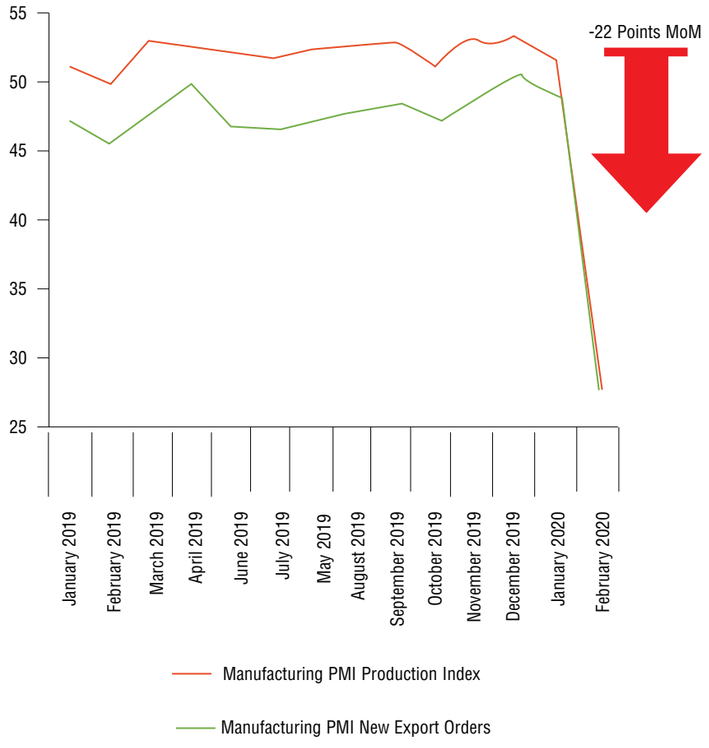
The Covid-19 pandemic has significantly slowed China's manufacturing capability. The most recent data from China indicates a substantial decline in output. In February 2020 China's Manufacturing Purchasing Manager's Index (PMI) for production, a critical production index, fell by about 22 points when compared to February 2019. This is shown in the **Figure2**. The figure further indicates that this had a direct impact on the manufacturing PMI for new export orders as that also plunged in February 2020. In fact such a decline implies a reduction in exports of about 2 percent on an annualised basis.

Even as the Chinese leadership proclaims to have control over the pandemic and partially comes out of lockdown, companies inside the country still face difficulties in resuming production due to several factors including shortage of labourers still trapped in locked-down parts of the country, shortage of parts suppliers, stringent regulations in implementing social-distancing norms, and lack of adequate protective gear for the employees. Even resumption of logistics activities is slow. In such a scenario, it is becoming difficult for Chinese companies to fulfil the existing export orders, thereby affecting the manufacturing capability of other countries.

Additionally, even as the Chinese manufacturing opens, the spread of the disease across Europe and USA ensures partial lockdown in those regions which has a domino effect on global supply chains. A recent article in *Diplomat*[1] shows how factories in China struggling to reopen after the COVID-19 shock face new threats from the US-Anti Disease Control that threatens the supply of microchips and other components to China. The article further states that Chinese manufacturers assemble 80 percent of smart phones for companies such as Apple, Samsung etc, half of the world's personal computers, and a big share of home appliances and other goods. However, for this they are dependent on processor-chips and high value components from America and Korea. A full or partial closure of factories in these countries would, therefore, have direct impact on the manufacturing capabilities of China. Similar instances are also present for Europe. So, even if the Chinese manufacturing resumes, it would take some time for it to actually regain its original position.

To counter these issues, many countries have been scrambling to find alternative sources for imports from countries such as Mexico, Brazil, India, etc. For Indian engineering exporters this is really an opportunity to step up their actions into new markets, which were until now dominated by Chinese suppliers especially in the Africa, Latin America, and CIS regions and expand their presence in traditional European, Asian, and American markets.

Figure2: China's manufacturing PMI for production and new export orders



Source: https://unctad.org/en/PublicationsLibrary/ditcinf2020d1.pdf

POTENTIAL REGIONS FOR EXPORTS FROM INDIA

In the next section, we look into these regions, both non-traditional and traditional markets, for India's engineering exports, their dependence on China for engineering imports and whether India can emerge as an alternative source of import for these regions.

Africa

Africa is heavily dependent on China for industrial components and manufactured goods. As per a recent research paper by Baker McKenzie and Oxford Economics, African imports from outside the continent reveal that industrial machinery, manufacturing, and transport equipment constitute over 50 percent of Africa's combined needs. The most important suppliers in this regard are Europe (35), China (16), and the rest of Asia, including India (14) percent, respectively. As such, disruptions due to the impact of COVID-19 will lead to a decrease in the availability of manufactured goods imported into Africa.

Adding to the supply chain challenges are the travel restrictions that have been imposed by several African countries, including, most recently, South Africa, on citizens from high risk countries. This is causing further uncertainty in a continent already grappling with widespread geopolitical and economic instability. Africa is also facing reduction in demand for raw materials produced in the Chinese market due to decline in manufacturing activities in China.

Africa is considered to be the next emerging destination for Indian engineering sector exports that have witnessed impressive growth. Between 2017 and 2018, India's engineering exports to Africa increased more than 17 percent. However, among India's top 25 destinations, only two African countries feature – Nigeria and South Africa – and a large potential remains untapped. For instance, while East Africa is geographically one of the closest regions to India with large markets such as Kenya and Tanzania, these countries do not feature in India's top export partners' list. The monthly reports from the Embassies in the African region also show considerable scope for Indian engineering exports in areas such as medical instruments, pharmaceutical machineries, agricultural machineries, printing machineries, and so on.

Latin America and Caribbean Region (LAC)

The outbreak of COVID-19 is a source of volatility and a threat to the macroeconomic stability of Latin America and the Caribbean. Latin America and the Caribbean have significant links to China, trade and economic links have skyrocketed recently as China is already the second largest trading partner. China's six main trading partners in Latin America and the Caribbean are Brazil, Argentina, Chile, Peru, Colombia, and Venezuela, whose exports are concentrated in four products that represent 75 percent of the total Latin American exports – soy, copper, crude oil, and iron ore. China represents 28.1 percent of total Brazilian exports, as well as 10.5 percent of Argentina's and 32.4 percent of Chile's exports. Although China mainly imports primary products such as minerals and metals, agricultural products and fuels, its exports to LAC consist of machines and electrical equipment, textiles, chemicals, and metals. In fact in engineering, China is the largest exporter to the LAC region with almost 25.3 percent share. Thus a slowdown in the Chinese economy will have a strong impact in countries such as Brazil, Chile, and Peru.

India's share in LAC's total engineering imports is only 1.2 percent. Our recent analysis on potential export markets for India show that the main trading partners of the LAC region mentioned here can also provide huge potential to become important export destinations for India's engineering sector given their significant engineering demand. Among all the Latin American nations, only Brazil feature in the top 25 list of India's export destinations. India can cautiously make its presence felt in these markets in the aforementioned demanding sectors. Some of the major potential markets for India remain Argentina, Chile, Colombia, Peru, and Ecuador.

As per the recent monthly economic reports by the Indian Mission in various LAC countries there is substantial scope for Indian exports in the automotive, metals, and machinery sector. It needs to be mentioned that the LAC has already understood the need to engage with non-FTA partners such as India to diversify their supply chains beyond China. Consequently Brazil, Argentina, Colombia, Ecuador, Paraguay, and Dominic Republic have reduced import duties of the engineering products to 0 percent as a temporary measure and India can take advantage of the tariff elimination to boost its exports.

Commonwealth of Independent States (CIS)

Based on the WTO analysis, the CIS region will be spared double-digit decline both in exports and in imports in 2020. The relatively small estimated decline in exports stems from the fact that countries from these regions rely heavily on exports of energy products, demand for which is relatively unaffected by fluctuating prices. If the pandemic is brought under control and trade starts to expand again, most regions could record double-digit rebounds in 2021 of around 21 percent in the optimistic scenario and 24 percent in the pessimistic scenario. Russia, one of the largest trading partners among CIS nations, will be under pressure from quarantine measures in the European Union – the EU countries account for 43

percent of Russia's foreign trade.

India can very well tap into these markets where there is adequate demand, which is not getting filled. In fact, India's engineering exports to Russia accounts for more than 60 percent exports to CIS region. Thus India needs to engage more with these countries and conduct B2Bs, which will help in increasing engineering exports from India. However, demand for engineering goods is also present in Kazakhstan, Ukraine and Belarus. In the weekly economic and commercial report of 19 April 2020, the Indian Mission in Kazakhstan states that the government has already put zero duty on imports of socially important goods, personal protective equipment, certain types of medical equipment, etc. Furthermore, the country is slowly restarting its major industrial enterprises in the fields of construction and transport industries. With disruptions in Chinese supply chains Indian exporters can find opportunity to penetrate these markets.

Asian markets

In Asia too, major industrial countries such as Japan and Korea are looking towards diverting their supply chains beyond China as the COVID-19 hit their supply chains hard. A recent article in the Japan Times states that Japan has already empanelled a State Investment Council chaired by the Prime Minister, which will consider encouraging manufacturers to source from markets other than China.[2] This decision has been heavily influenced by the huge loss Japanese manufacturers faced as Chinese manufacturing declined during this pandemic. This has been most evident in the automobile sector which is heavily dependent on auto parts sourced from China.

In Korea, several industries are reeling under the impact of declining manufacturing in China. Recent news articles state that manufacturers of key components for smartphones and other electronic devices in the country have been significantly impacted.[3] Indian exporters in the electronic parts and components sector already mention a rise in demand from Japan and South Korea, which is a very positive step for India.[4]

ASEAN markets are significantly dependent on China in trade and investment and the COVID-19 outbreak severely impacts their industrial sectors. Most importantly overdependence on China has disrupted ASEAN's capacity to fulfil their export orders in other markets. For instance, supply chain disruptions in China meant drying up of resources in Vietnamese plants manufacturing and supplying key components to South Korean smartphone manufacturers.[5] The recent ASEAN Policy Brief strongly recommends diversification of both export and import products as well as markets to reduce the impact of such pandemics on supply chains in the future. All these factors, therefore, present significant opportunities for Indian engineering exporters in key Asian markets.[6]

Europe

European markets, especially those of Germany, UK, and France, are heavily reliant on China for components and parts in industrial machinery, electronic machinery, and automotive sectors. Reeling under the supply chain disruptions, European countries are also looking towards diversification of import bases. In a recent interview by the head of European Union Chamber of Commerce in China it was stated that China's dominance in certain sectors is a cause of concern in Europe especially in recent times. It was further mentioned that while companies across Europe are finding it difficult to identify new import bases with similar infrastructure as China, they have understood the need to diversify in the present situation.[7]

USA

According to a recent article in the Wall Street Journal, the American Chamber of Commerce in China and Shanghai have stated that the Coronavirus pandemic has made the decoupling between US and Chinese companies easier. There is a growing sentiment among US companies to diversify their supply bases. A survey by the chambers show that in March 2020 only 44 percent of 25 large US companies in China said decoupling would be impossible as against 66 percent in October 2019.[8] Industry experts in the USA proclaim that while a lot of diversification will happen domestically and to local overseas markets such as Canada and Mexico, there would be substantial scope for countries such as Brazil, Vietnam, Bangladesh, or India.[9]

What can India do to take these opportunities?

The Indian government, realising the possibilities for expansion of export markets, has tasked the Indian missions located in the regions mentioned to come up with potential areas where India can intervene in the absence of Chinese supplies. The missions have been directed to contact key export councils and associations so that queries can be taken up by the respective member exporters. As the major representative of the Indian engineering export industry, EEPC India has also received several queries in this respect and contacted key member exporters who can take up these queries. The missions have even helped the exporters to get in touch with the buyers in the respective markets. Additionally the government has also set up a DGFT Help Desk to resolve any export-related queries in these regions.

These measures have been welcomed by the exporting community. However, intensified lockdown in the transport and logistics sector disrupted movement of key consignments from the factories to ports and key inputs from ports to factories. Companies are increasingly facing difficulties in fulfilling existing export orders. In such a scenario even if India gains new opportunities in these markets it would be difficult for the exporters to fulfil the orders. Now as the government is gradually lifting lockdown on some economically key sectors, the exporters have urged the authorities to look at export as an essential commodity to restart the economy in these difficult times.

Furthermore, India's dependence on China in key engineering sectors is also a cause for concern for our industries. A recent report by the HDFC Bank on Assessing the Impact of COVID-19[10] accepts this problem and suggests the development of a holistic ecosystem in the country that not only focuses on assembling of key products but also manufacturing of these products within the country. India should also look towards increasing their diplomatic and economic cooperation with the countries mentioned so as to strengthen their relations. In the long run India can really complete signing of key FTAs with African regions including SACU (South African Customs Union) and COMESA (Common Market for Eastern and Southern Africa), Eurasian Economic Union (EAEU), and the LAC countries including Peru. At the same time it should also expand existing PTAs such as the MERCOSUR and Chile PTAs. These steps would help these countries to diversify their import bases to India thereby strengthening India's position in case of such future exigencies.

Notes

1. https://thediplomat.com/2020/03/chinese-factories-face-new-threat-us-anti-virus-controls/
2. https://www.japantimes.co.jp/news/2020/03/06/business/japan-aims-break-supply-chain-dependence-china/#.XqL_fcgzbIU
3. https://www.japantimes.co.jp/news/2020/03/06/business/coronavirus-south-korean-tech-vietnam/#.XqMcf8gzbIU
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9. https://www.cnbc.com/2020/04/21/supply-chains-will-move-away-from-china-after-coronavirus-mark-mobius.html
10. https://retail.economictimes.indiatimes.com/news/industry/covid-19-india-can-replace-china-as-global-sourcing-base/74458859

COVID-19: EEPC India adopts Hazra market

1

2

3

Following the West Bengal government's decision to appoint EEPC India to adopt Hazra Market in Kolkata in the campaign to combat COVID-19, EEPC India has taken over the sanitisation project of the market. The task was entrusted to EEPC India by the Chief Minister of West Bengal, Ms Mamata Banerjee, over a Consultation Meeting with Trade Bodies and Councils on 9 April 2020 at Nabanna.

The Chief Minister had requested different industry bodies and councils to come forward to ensure proper sanitisation arrangements at the selected market spots in Kolkata as one of the remedial measures to prevent the spread of COVID-19. On 18 April, Mr Sobhandeb Chattopadhyay, Minister for Power & Non Conventional Energy sources, West Bengal, joined Mr Ravi Sehgal, Chairman, EEPC India, in the distribution of hand sanitisers, masks, hand gloves, temperature measuring devices and so on to members of the Hazra Boys Association at Hazra Market

The EEPC India Chairman said, 'This is a month-long endeavour and so far EEPC India has distributed 550 face masks, 150 hand gloves and 30 litres of hand sanitisers.' Mr Dhrubo Jyoti Basu, Senior Joint Director, EEPC India, said EEPC India officials were regularly visiting the market to check that all visitors were given sanitisers, their temperatures taken at the entry point, and everyone was using gloves and masks. EEPC India members have contributed to cover the costs.

(**1**) Mr Sobhandeb Chattopadhyay, Minister for Power & Non Conventional Energy sources of Government of West Bengal, speaking to media during the handing over of sanitisation monitoring devices in Hazra Market in the presence of Mr Ravi Sehgal Chairman (to the left of the minister), Mr Dhrubo Jyoti Basu, Senior -Joint Director (far left), and Mr Krishno Ganguly, Sr Assistant, EEPC India at Hazra Market. (**2**) Mr Ravi Sehgal, Chairman, EEPC India, taking the temperature of a visitor to the market. (**3**) Mr Ravi Sehgal, Chairman, EEPC India, handing over sanitisers, gloves, and masks to the Hazra Boys' Association representative. (**4**) Random checking of temperature of visitors at the entry point of Hazra Market.

4

Need for a corporate bond market

While India has a healthy equity market, the corporate bond market has not really taken off, despite long years of effort by the authorities

TR SHASTRI

Prof. Shastri is a former Banker based in Bengaluru

THE traditional method of raising funds by a corporate has been to either bring in equity or raise debt or both. Equity was brought in by the promoters or raised through the capital market. Over the years, regulatory guidelines, investor appetite, and orderliness in the equity market have helped in stabilising this route for raising equity. For debt, the obvious choice was to approach financing institutions. It could be banks for working capital requirements or specialised institutions called development financial institutions (DFIs) such as ICICI, IFCI, and IDBI earlier and subsequently established sector-specific DFIs like Exim Bank and SIDBI for raising long-term loans for the projects. NBFCs and financial intermediaries like MFs also pitched in.

Over a decade ago, banks also started extending long-term loans, particularly for infrastructure requirements. Raising debt from the public was never a popular or a successful experiment. Companies issued debentures but these instruments were not popular. Either there were instances of public being taken for a ride by unscrupulous companies or the interest rates were not attractive enough. The secondary market was never active and hence investors faced liquidity issues. Sweeteners like debenture being fully or partly convertible into equity shares, supported by tangible security or favoured tax treatments also did not help in sustaining the debentures as popular investment instruments similar to equity.

There was another type of instrument called bonds. The difference between a debenture and a bond is not sharp. The terms are interchangeably used though certain market practices may differentiate depending on the class of issuer, availability of security, pricing, etc. The definitions differ from American and British usage perspective. Companies were also permitted to raise funds in the form of accepting deposits from public. These highly illiquid and unsecured instruments did not find favour with the investors.

The original DFIs did not find the going smooth. There was concentration risk, mismatch of assets and liabilities and deterioration of quality of assets during the phases when the economy was not doing well. ICICI and IDBI transformed themselves into regular commercial banks to tide over these challenges. IFCI has a steadily shrinking balance sheet, declining operational income, and capital adequacy ratio and a comprehensive loss for the latest year. As much as 85 percent of the lending by SIDBI is in the form of refinance to banks, 8 percent is assistance to NBFCs and SFCs, and only the rest, i.e. 7 percent, is direct lending to other borrowers, for the latest year. For Exim Bank, direct lending ratio was 46 percent as per latest available data.

In banks, over 40 percent of the deposits are callable on demand (like SB and CA deposits) and nearly 75 percent of the remaining term deposits have residual maturity of less than one year. Hence technically it is unwise for the banks to lend on long-term basis to any large extent, though the 'core' part of these deposits may mitigate the circumstances in practice. Thus, there appears to be none equipped to lend to projects on long-term basis. Thus, it looks like we have reached a stage where banks are reluctant to finance projects, there are no DFIs and public fundraising through debt instruments is not stabilised.

A leading financial newspaper mentioned in January this year that consequently, 'there has been a rising clamour for the government to set up a new DFI, to provide long-term capital for infrastructure projects.' However, the article argued that it is necessary to tackle the issues involved in raising long-term funds rather than creating a new DFI, which will only be another savings pool to invest in projects. Present financial intermediaries are unable to raise long-term funds. The paper concluded that 'this yearning for new DFIs is just an excuse to put off confronting the hard job of developing a market for corporate bonds.'

Investment pools like mutual funds and insurance funds have long-term deployable resources. They do invest in projects based on detailed appraisal, credit rating, and risk analysis. However, as a finance minister mentioned years ago, there is need to dis-intermediate the funding pattern of projects. In other words, there is need to raise debt directly from the retail investors subject to proper regulatory oversight. This will require the reshaping and rejuvenation of the moribund debentures as dynamic retail debt instruments and raising the share of the corporate bond market as a source of finance from the present ~4 percent, that too accessible mainly by large Indian companies.

Long-term lending

It has been recognised since several years that long-term lending is a class with its own special characteristics. The resources available are to be of matching duration. The lender or investor may prefer the originate to distribute model and not like to hold on to the assets till maturity and, hence, there has to be an active secondary market to enable liquidity. More importantly, project finance has inherent risks beyond the usual textbook descriptions. Each large project is so unique that no appraisal can visualise and fully risk-proof it. Hence a financial intermediary may be doing injustice to resource providers. In such circumstances, it is best that the retail investor directly takes the risk with an informed decision based on templated disclosure documentation issued under regulatory guidelines with the confidence of an active secondary market for liquidity concerns. If the perceived risk is compensated by the risk premium loaded in the coupon rate in the form of spread over the ongoing interest rate, the residual uncertainty for the investor will be the base interest rate. The pricing in the secondary market will reflect this and will normalise the yield to the investor. This looks fine conceptually but issuing debt instruments in this way faced challenges from time to time.

Several committees have examined the issues relating to developing this debt instrument for companies, popularly referred to as corporate bonds, both in issuing (primary market) and in subsequent trading (secondary market).

The high-level Expert Committee on Corporate Bonds and Securitisation (RH Patil Committee, 2005) recommended several steps to develop the primary market (standardising stamp duty, removing TDS, etc), broadening issuer class, enhancing investor base, trade reporting system, order matching trading system with clearing, and settlement system etc. It even recommended steps for development of a securitised debt market.

The high powered expert committee on making Mumbai an International Financial Centre (Percy Mistry Committee,

2007) set up by the government identified that a liquid spot market for INR denominated corporate bonds is one of the most critical financial market components missing in India. It recommended that no limits should apply to purchases by foreign clients of INR denominated corporate bonds; short selling of the bonds to be permitted enabling to derive an arbitrage free yield curve etc.

A Hundred Small Steps (report of Raghuram Rajan Committee, 2009) recommended allowing domestic financial institutions greater leeway to invest in corporate bonds, raising limits on foreign investment in corporate bonds, reducing transaction costs in issuing and trading (including stamp duty) etc. Banks preferred loan to, rather than investment in, bonds of a company since the former need not be valued, provided for and capital earmarked. Hence an interesting recommendation was for 'reducing the artificial preference of banks for loans by subjecting loans and bonds to similar mark-to-market requirements, especially for aspects such as interest rate exposure that are easily measured.'

New Thinking on Corporate Bond Market in India (Union Finance Ministry, 2011), a working paper on this topic of strategic economic policy, academically discussed the issues involved. Its generic recommendations included 'the policymakers must apply quantum forces to break the vicious circle of low level participation and poor liquidity.' It included suggestions on effectiveness of credit rating agencies and SIDBI offering Repo window to market makers dealing with SME bonds.

The Working Group on Development of Bond Market in India (HR Khan Committee, 2016) made a number of recommendations across all relevant issues including already highlighted issues like rationalisation of stamp duty, allowing enhanced institutional and foreign investments, repositories etc. It recommended banks and NBFCs providing partial credit enhancements (i.e. support in the form of guarantees) to higher than then allowed 20 percent and not necessarily only for infrastructure companies as then prevailing. However, it did not specify the ceiling and did not discuss the implication of corporate bond essentially becoming a bank bond from risk perspective if the percentage is large. It even made a list of key recommendations of earlier committees/reports not fully implemented by then.

RBI went one step further and set up a Task Force on the Development of Secondary Market for Corporate Loans (TN Manoharan, 2019). Its terms of reference included making recommendations for facilitating the development of a secondary market in corporate loans, including loan transaction platform for stressed assets. The report noted that when its recommendations are implemented, it could further facilitate the development of the corporate bond market as well. It summarised that corporate loans would not have the degree of liquidity currently enjoyed by corporate bonds, though it did not quantify the degree of liquidity currently enjoyed by corporate bonds.

Asian Development Bank had brought a report 'India's Bond Market: Developments and Challenges Ahead' in 2008. TheCityUK, an industry-led body representing UK-based financial and related professional services, published a report in 2015 titled 'IUKFP: Development of a Corporate Bond Market' focusing on increasing the depth of the bond market in India as well as making it easier for Indian companies to issue bonds overseas. The World Bank had brought out a report on Developing India's corporate bond market in 2016. CRISIL, CCIL and many other agencies have also brought out reports on this subject over the years.

What the Deputy Governor of RBI mentioned in one of his speeches can be taken as the overview on this subject. He had said,

'... the fact that I spoke about the same issue at the same forum three years back and many other fora earlier reflects the deep-rooted, inertial nature of underlying factors. At least for more than 10 years now, development of corporate bond markets in India has been the focus of all stakeholders but the arduous pursuit of the 'holy grail' has not delivered desired results. In the process this has unfortunately become a convenient stick to flag the policy and regulatory intent. Every set of stakeholders has its own views on what needs to be done but much of the prognosis ends up giving a limited perspective.'

He mentioned this in 2015 and the situation remains more or less the same even now. The latest SEBI report confirms this with its remarks that 'There is no doubt that the equity market in India is quite well developed and plays a crucial role in the growth of Indian economy. Government Securities market in India has also experienced a tremendous growth in the last decade. Despite a lot of policy and regulatory attention in the past, the corporate debt segment in India still requires lot of focus on its development so as to make it more liquid.'

Equity market

The Indian equity market is well developed and follows global best practices. India's contribution to total global market capitalisation stood at 2.6 percent compared with the 10-year historical average of 2.56 percent. It stands within the top ten global equity markets in terms of market capitalisation. As per the latest SEBI annual report, NSE ranked second globally in terms of number of trades in equity shares while BSE ranked 11th. India accounted for 6 percent of the total number of IPOs made globally during 2018 and 9.9 percent of the total number of IPOs made in the Asia-Pacific region. In quantum of capital so raised, the percentage was 2.7 and 5.2 respectively. NSE ranked first among the global equity derivatives exchanges in terms of number of stock index options contracts traded. NSE and BSE occupied the top two slots in the number of currency derivatives contracts traded. Derivatives on the USD-INR pair traded on BSE and NSE accounted for four slots including the first. Nifty Bank Index Options contracts and Nifty 50 Index Options contracts ranked first and third respectively among all the stock index options contracts traded globally. Multi Commodity Exchange of India Ltd (MCX) stood at the eighth position among the global derivatives exchanges in terms of commodity derivatives contracts traded. MCX ranked fourth among global derivatives exchanges in terms of both the derivatives contracts traded on non-precious metals and the derivatives contracts traded on precious metals.

The establishment of the present market regulator in 1992 followed by the introduction of global standards enabled healthy and orderly growth of these segments of the capital market. The government or the regulator neither formed sequential multiple committees nor took steps to synthetically grow the equity market. The market attracted investors and grew naturally. Hence it is of concern to observe why the corporate debt market has not grown and become popular equally, particularly at the retail level.

CORPORATE BOND MARKET

Actually, there is a corporate bond market at present. As per RBI bulletin, the corporate debt market in India remains small, accounting for nearly 17 percent of GDP, compared to 123 percent in the USA, 44 percent in Malaysia, and 19 percent in China as at June 2018. As per the latest annual report of SEBI, the current year witnessed Rs6,10,318 crore raised through 2358 issues by the way of private placement listed at BSE and NSE while there were 25 public debt issues worth Rs36,679 crore in 2018-19. In the secondary market, the equity derivatives segment constitutes the highest market share of 86.7 percent, followed by currency derivatives (5.8), equity cash segment (3.2), commodity derivatives (2.7), corporate bonds (1.5) and interest rate derivatives (0.1) percent, respectively, indicating a low share of the corporate bond market.

Apart from the size, some of the areas of concern are:

- The demand for corporate bond as an investment is mostly confined to institutional investors with retail investors accounting for only 4 percent of the outstanding issuances
- Nearly 99 percent of the debt is placed privately
- Finance and infrastructure companies together accounted for over 90 percent of total cumulative value outstanding during 2017-19. The share of manufacturing was less than 1 percent.

RBI data confirms that more than 85 percent of corporate bond issuance in India is by borrowers with ratings of 'A' and above. The Rajan Report of 2009 confirms these by mentioning that 'Most of the large issuers are quasi-government, including banks, public sector oil companies, or government sponsored financial institutions. Of the rest, a few known names dominate. There is very little high yield issuance, and spreads between sovereign debt, AAA debt and high yield debt are high in comparison to other markets. Very few papers trade on a regular basis. Trading in most papers dries up after the first few days of issuance, during which the larger players 'retail' the bonds they have picked up to smaller pension funds and cooperative banks. Most trading is between financial institutions.' In other words, a yet to be well-rated manufacturing company raising funds in corporate bonds market from retail investors and its trading like in equity market are uncommon.

Causes for shallow corporate bond market

Committees have enlisted the reasons for poor volume of funds raised by corporates through bonds and also the reasons for poor trading of such bonds in secondary market. While some of the issues have been addressed by the authorities, there are still demands both on demand (investors) and supply (issuers) side of these bonds. The stamp duty on these instruments is not uniform across all States. Moreover, for an efficient trading of these bonds, the cost should be very low implying whether the stamp duty can be dispensed with or made significantly low. This is an issue pending for long. In fact, the latest Manoharan Committee has devoted four paragraphs for this long-pending issue. Proposal for credit enhancement fund is being discussed over four years and has not yet fructified. Regulatory constraints on the quantum and type of investments by institutions like pension funds, foreign investors and though marginal, MFs and insurance companies still exist.

However, there appears one other major reason, which none of the committees have examined. The equity market is very active because the investors look for capital appreciation during price fluctuations. Considering the high PE ratio, an investor will not get a satisfactory RoI unless the market price appreciates. Investors in currency market do not have any 'return' like dividend or interest on the investment, unless it is a foreign currency denominated money market instrument, which is not accessible to Indian investors. It is purely the price fluctuation that attracts the investor. This is true for commodity market and also for the short term

Important guidelines on Partial Credit Enhancement (PCE) to corporate bonds by banks

1. With a view to encouraging corporates to avail of bond financing, banks can provide PCE to bonds issued by corporates/special purpose vehicles (SPVs) for funding all types of projects.

2. Bonds issued for funding projects by corporates/SPVs do not necessarily get high ratings from the Credit Rating Agencies, because of the inherent risk in the initial stages of project implementation. Insurance and provident/pension funds, whose liabilities are long term, may be better suited to finance such projects. The regulatory requirement for insurance and provident/pension funds is to invest in bonds of high or relatively high credit rating.

3. The objective behind allowing banks to extend PCE is to enhance the credit rating of the bonds issued so as to enable corporates to access the funds from the bond market on better terms.

4. Banks can provide PCE to a project as a non-funded subordinated facility in the form of an irrevocable contingent line of credit which will be drawn in case of shortfall in cash flows for servicing the bonds and thereby improve the credit rating of the bond issue. It cannot be in the form of a guarantee. The documentation for the facility must clearly define the circumstances under which the facility would be drawn upon.

5. The aggregate PCE provided by all banks for a given bond issue shall be limited to 50 percent of the bond issue size (per bank max 20 percent). Each bank's exposure is limited to 5 percent of the single group exposure limit. Aggregate of bank's exposure should not exceed 20 percent of its Tier 1 capital. Recording the accounting exposures, capital provisions etc., are similar to other credit limits.

• Interestingly, when this facility was introduced initially in September 2015 it was 20 percent but it was enhanced to 50 percent in August 2016, even though 'no such PCE has been provided till date by the banks.'

6. Banks may offer PCE only in respect of bonds whose pre-enhanced rating is BBB minus or better (by a minimum of two external credit rating agencies at all times).The project should have a robust and viable financial structure. Banks should exercise necessary due diligence and risk appraisal and should not entirely rely on the ratings with a system of regular (quarterly or half-yearly) tracking of the financial position of the issuer.

7. Additional guidelines for systemically important NBFCs and HFCs.

8. Banks are expected not to invest in corporate bonds which are credit enhanced by other banks or by themselves.

money market like T bills. In all these market segments, the underlying variable – equity price, currency exchange rate, commodity price, and short term interest rate – all fluctuate quite well. This gives scope for 'forecasting' or 'speculating' on the price and hence trading takes place. Corporate bonds are long-term instruments and in our financial market, long-term interest rates do not fluctuate much in short horizons. The long-term interest rate is generally much higher than short term interest rate. Hence if there is an instrument whose price depends solely on long-term interest rate, its price will remain stable. Thus, there is no incentive to the investor through price fluctuation.

The remedy appears to have the long-term interest rate also to fluctuate. But this cannot be done artificially. The recent Operation Twist conducted by RBI which involved simultaneous purchase of (long-term) securities and sale of (short-term) securities is helpful for this. This will bring correction in the yield curve by reducing the differential between the long and short-term bond yields. Essentially this will apply to G-secs. A corporate bond is generally priced on the basis of price of G-sec of comparable tenure. The longer end of the yield curve is predominantly dominated by debt papers of public sector undertakings, financial institutions and select housing finance companies, while shorter end is dominated by non-banking finance companies. The yield curve is fragmented because trading is concentrated in maturities of 10 years and in short term buckets. The trading in corporate bonds, being of varying maturities, will fill up this gap. As the SEBI Chief recently (but before RBI's surprise operation twist) said, 'The first issue is the fragmented yield curve. I feel the fundamental challenge is the absence of a continuous corporate bond yield curve spanning across different maturities and different rating buckets.'

Credit enhancement means essentially enhancing the credit quality or improving the creditworthiness of the loan proposal by offering external instrumental support. This will enthuse the lenders and may favourably consider a loan proposal which was otherwise not acceptable before such credit enhancement. Corporate guarantee, guarantee of directors, collateral security, coacceptance, letter of credit, and letter of comfort are examples of this synthetic strengthening. RBI has allowed banks to offer credit enhancement to corporate bonds partially, though it is not in the form of bank guarantee. There are a number of conditions, some of which are listed on page ..... It is partial because such partial credit enhancement (PCE) can be only up to 50 percent (originally only 20 percent) of the bond issue size. Thus, for an investor, the credit risk is underwritten up to 50 percent. This is in vogue since the last four years but has not yet energised the corporate bond market, which means that there is a basic aversion for retail investors to invest in corporate bonds. Interestingly, not a single PCE was done by banks during the first year and its usage in subsequent years is reported to be miniscule. For the last over a year, the attention of everyone stood diverted to similar credit guarantee scheme offered to nonbank lenders (i.e. rescuing NBFCs).

Steps taken to promote corporate bonds

Based on the recommendations of the various committees, a number of steps have been introduced to activate the corporate bond market from time to time, e.g. introduction of DvP in settlement of OTC transactions, setting up reporting platform, banks allowed to issue long-term bonds for financing long-term projects, banks and PDs becoming members of stock exchange to trade in such bonds, FPI investment limits enhancement, simplification of disclosure and listing requirements etc. In the recent budget announcements, the finance minister specifically mentioned about the government planning to increase investment limit of foreign portfolio investors (FPI) in corporate bonds from 9 percent to 15 percent. the government also mentioned that 'The Credit Guarantee Enhancement Corporation fund is being set up as a Non-Banking Financial Company with partnership of IIFCL, LIC, PFC, REC and similar other companies. A CCEA Note in this regard is under process,' though as per the previous budget 'A Credit Guarantee Enhancement Corporation for which regulations have been notified by the RBI, will be set up in 2019-20.' This idea of credit enhancement fund is being discussed over several years. In the 2016-17 Budget speech, then finance minister had proposed that LIC will set up a dedicated fund to provide credit enhancement to infrastructure projects. However, LIC could not anchor the proposed company because of regulatory issues. There are now indications that this would be done through creation of a special purpose vehicle – the National Infrastructure Credit Enhancement Ltd or NICE Ltd, to be piloted by the IIFCL – though the current budget document still mentions about LIC's participation. It may be noted that the PCE scheme has not made the bond market popular, even after allowing banks to offer such credit enhancement up to 50 percent. The latest budget document also assured that 'Policy initiatives that are to be taken for development of bond market in India have been identified. Steps are being taken by regulators and Govt. to deepen the Bond Market.'

The government recently said that it will take further action to develop the credit default swaps (CDS) markets in India, and will ask the RBI to initiate measures to increased trading in the bond market further. However, the market opinion is that 'the CDS is unlikely to gain popularity anytime soon. Except for a few foreign banks, nobody is comfortable with that instrument.'

What needs to be done further

There are contrasting expectations. Corporates, not necessarily the larger ones, need to raise debt funds from the market, directly from investors. It has to be under regulated conditions as, otherwise, unscrupulous entities will exploit and permanently spoil the market. The cost of raising such debt funds should be acceptably low. Regulators could consider allowing regional issues. For example, for a small issue by a well-known entity in a state, the issue could be confined to investors in that state, by having the issue documents in regional language and issue efforts locally, reducing the cost. Retail investors either directly or through investment pools like MFs will need to invest in such instruments. While the coupon rate should be attractive enough to take care of the credit risk, the yield (on account of market price in traded secondary market) should be attractive and, more importantly, the yield should fluctuate to attract speculative investors. Investments by institutions are anyway a major part of the total. Authorities are also considering further relaxations in their quantum limits. There could be monetary incentives like taxation benefits to individual investors (e.g. commencement of long-term capital gains, dividend distributed by debt MFs, exemption from TDS etc), eligibility as security including for REPOs etc, till the corporate bond market stabilises. Such efforts to popularise the corporate bond market among retail investors will have a long-term impact. Unlike the earlier committee, the latest RBI task force (of 2019) submitted its report exclusively for developing a secondary market in corporate loans. When its recommendations are implemented, the secondary market for corporate bonds hopefully will also get activated along with that for corporate loans.

Advanced light-weight materials

The Council of Scientific and Industrial Research and the Advanced Materials and Processes Research Institute (CSIR-AMPRI) have developed and are in the process of developing light-weight materials that are in demand in a wide range of industry sectors – from sports goods and automobiles, to medical, aerospace, electronic and optical components, to name a few

CSIR-AMPRI

INTEREST in light-weight materials is increasing across industry and in research areas. Demand for light-weight, high performance materials in the Automotive, Aerospace, and Construction sectors and other related industries has increased multifold due to concerns in government regulations, environment, and consumer requirements.

Light-weight materials are a preferred choice for industries due to their weight reduction, energy savings, increased payoff loads, savings of natural resources, improved performances and environmental control aspects.

Light-weight materials include polymers, ceramics, aluminium and its alloys, magnesium and its alloys, composites and ultra high strength steel. They successfully replace steel and cast irons, lead, brass, bronze parts, and heavy duty concretes with 20-80 percent reduction in weight.

Researches adapt suitable methodologies such as improved alloy design, advanced processing technique, development in heat treatment schedule, advanced casting, secondary processing, heat treatment etc and intelligent materials and processing.

Intervention by CSIR-AMPRI towards further developments in these methodologies are active in Al-alloys and composites, Magnesium alloys and composites, Al-foams, Carbon foams, Ti-foams, Foam core sandwich panels, Squeeze casting, EMF forming, and Shape memory alloys.

Light-weight materials have found their applications across various domains – from sports goods and automobiles, to medical, aerospace, electronic and optical components. A few are listed here.

Sports: Golf clubs, tennis rackets and the handles of archery bows, bicycle frame and the chassis of in-line skates

Automobiles: Engine block, wheels, steering columns, seats, front consoles, and hoods, gearboxes, steering columns, and driver's air bag housings as well as in steering wheels, seat frames, and fuel tank covers.

Medical: Biodegradable plates and screws for orthopaedic surgery

Aerospace: Magnesium can be found in the thrust reversers for the Boeing 737, 747, 757, and 767, as well as in engines and aircraft and helicopter transmission casings, intercontinental missiles and spacecraft.

Advantages of light-weight materials

• Density: 1.75 to 1.8 g/cc (lightest structural materials, even lighter than FRP)
• Room temperature strength equivalent to that of aluminium alloys
• Lower cost, high damping capacity, vibration and noise reduction, improved EMI shielding
• Huge energy savings, cost competitive, increase payoff load, biocompatible

Current problems

• Highly reactive (greater safety and precaution to be taken during processing)
• Poor high temperature stability
• Inferior creep properties
• Highly corrosive

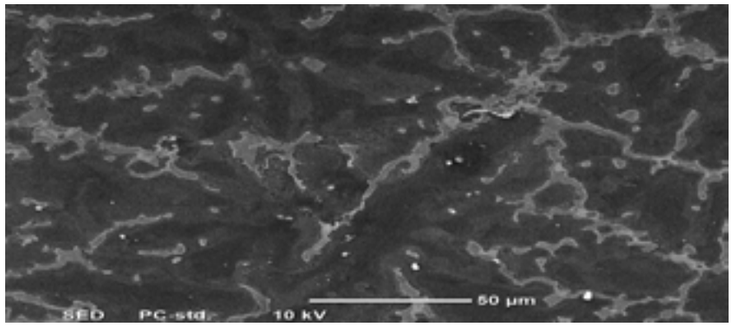
Solutions

• Melting and casting under controlled atmosphere, reduce oxygen pressure over melt – (direct metal pumping to the mould – inert atmosphere in the mould)
• RE and TE alloying addition – Pressure die casting: (thin walled casting), SPS (corrosion resistant Mg alloy)
• RE: Zr, Nb, Ce; TE: Ca, Mn, Zn; Coating: Anodising
• CSIR-AMPRI has developed the capability of melting and casting of these alloys without any difficulty
• Solid casting: Addition of 5wt% Si led to 50 percent improvement in strength of AZ91 alloys

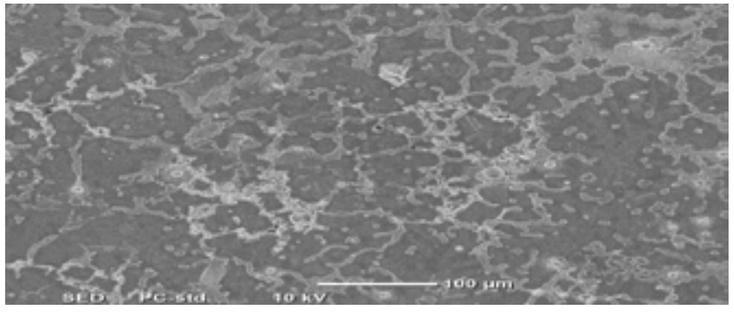
APPLICATIONS OF LIGHT-WEIGHT MATERIALS

MAGNESIUM ALLOYS AND ITS APPLICATIONS

AZ91



AZ91+0.3% Si



AZ91 + 0.3% Si (Micro structural refinement, almost 60 percent improvement in hardness/strength)

High speed train

• The newest train includes six passenger carriages, and the front end is tapered to a fine sword-like point
• The power of this train is 22,800 kilowatts
• It is constructed of lightweight plastic (Mg alloy and reinforced with carbon fibre)

Benefits

• 1/5th the weight of steel
• RE and TE improve flame retardance, creep resistance, and corrosion resistance
• Less noise and sound, good damping capacity

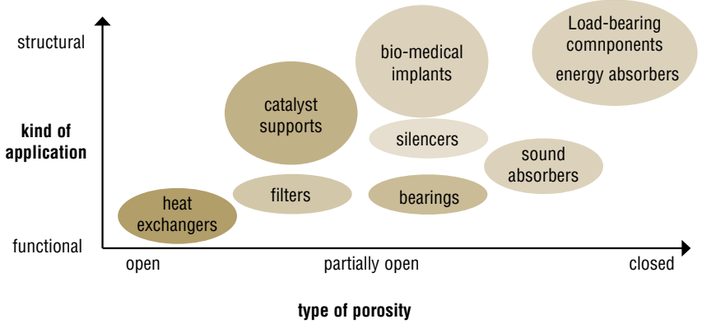
Mg-alloy melting

• Simple flux melting and casting can be adopted
• Parameters optimised for melting, bottom pouring would be best way
• Thin wall casting could be done using low pressure die casting
• AZ91 when added with 5wt% Si the hardness increase from 80 HV to 135 HV.
• The same methodology could be adopted for making composite and foam

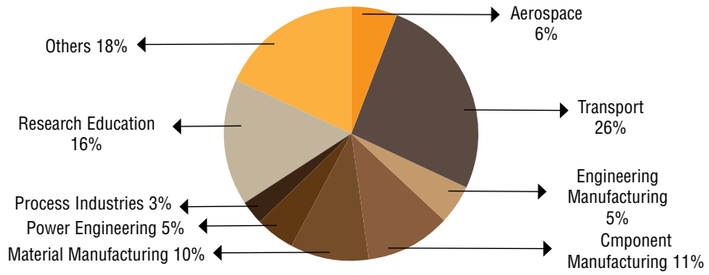
METALLIC FOAM AND ITS APPLICATIONS

Brass foam for water treatment

Major applications of metallic foam



Major applications of metallic foam



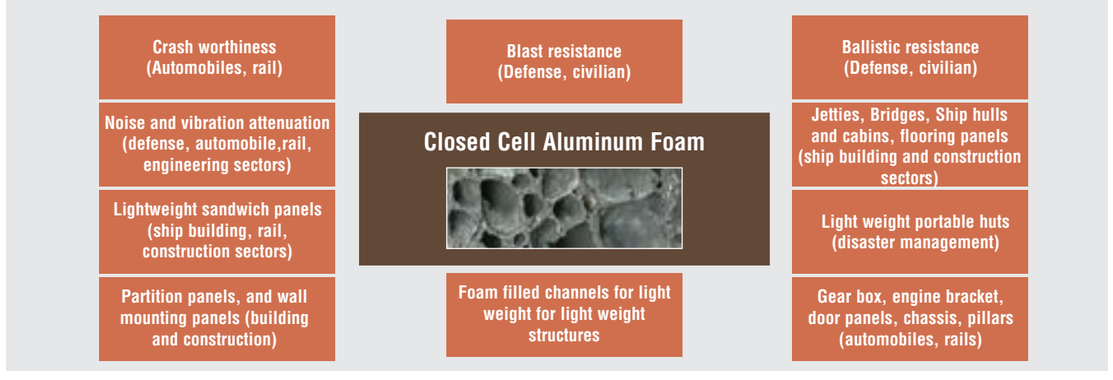
Ti-foam: Bone implants, teeth grafting, catalyst, high temperature filters and high energy absorptions

Ni foam: Battery, heat exchanger

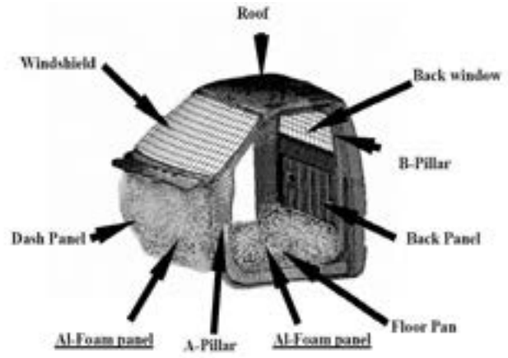
Al-foam and Copper foam: Heat exchanger, gas scrubber, solar heat arrester, hydrogen storage, energy absorption, vibration and sound attenuation, lightweight structure

ALUMINIUM FOAM AND ITS APPLICATIONS

Closed cell aluminium foam

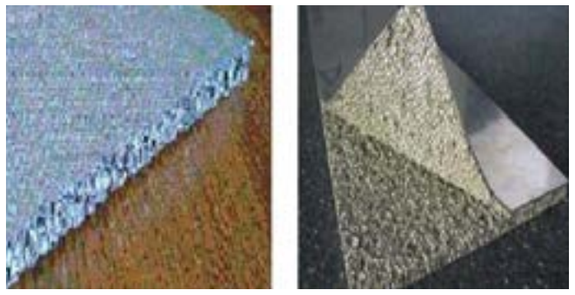


Possible locations for Al-foam in automobile applications

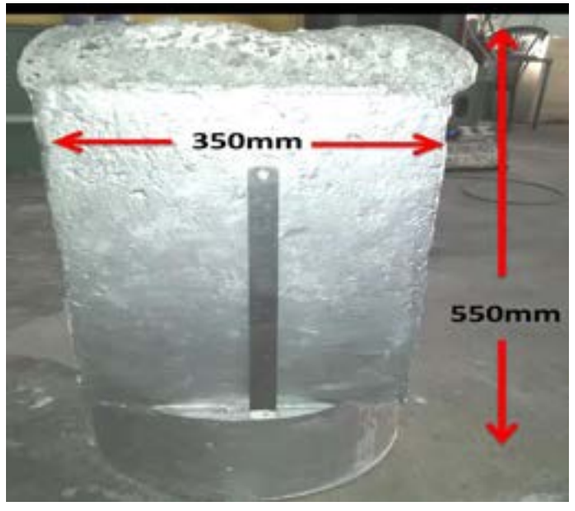


Foam filled tubes

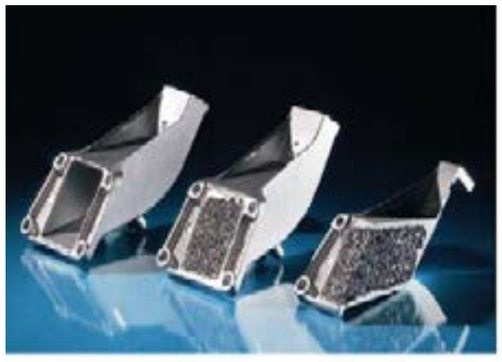
Sandwich panels



Large size foam billets

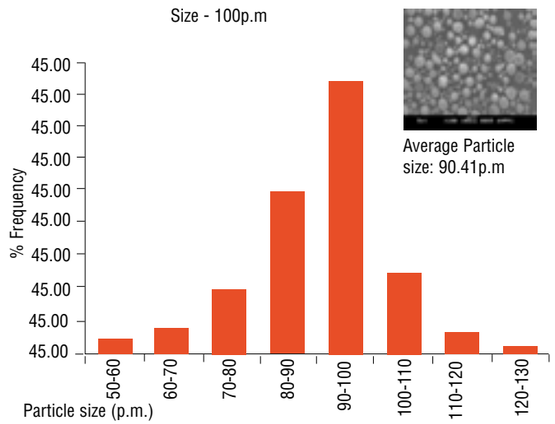


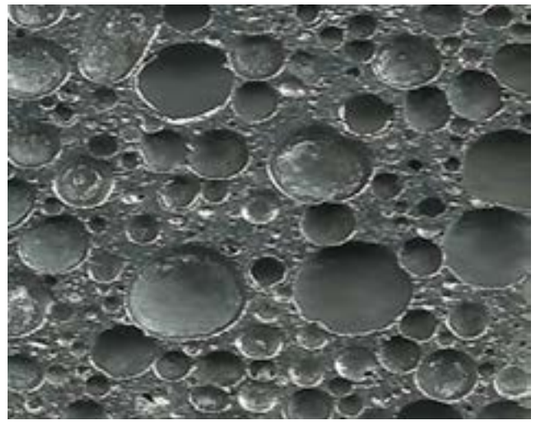
Engine bracket

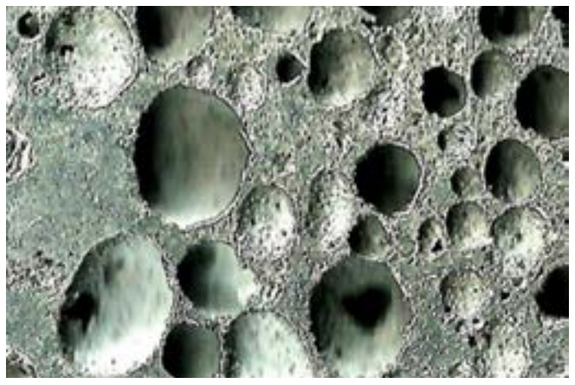


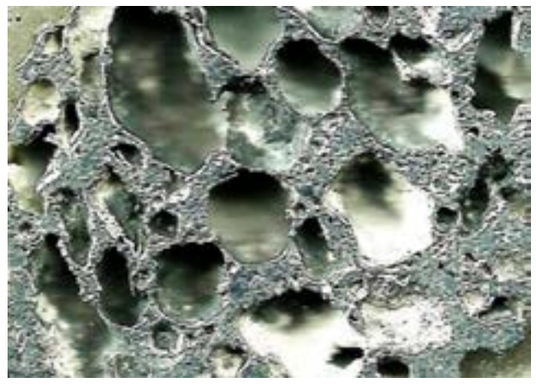
Foam Casting weighing 30kg

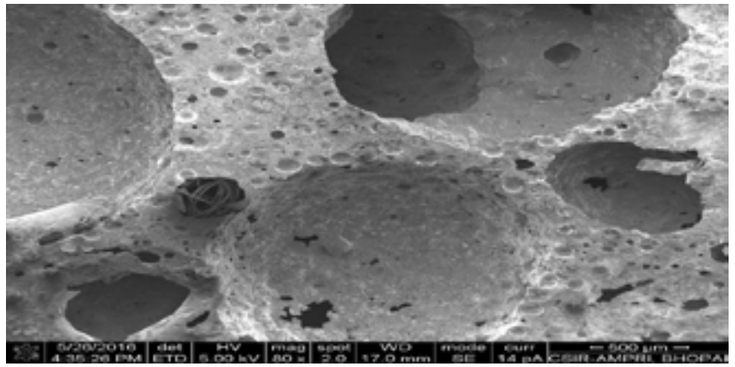
FOAM SAMPLES AND MICROSTRUCTURE











Factors affecting foams structure

(i) Melt temperature
(ii) Viscosity (concentration of thickening agent)
(iii) Cooling rate of foam structure

Benefits

- Cost of foam reduced to Rs800 per kg
- 200 g of cenosphere/fly ash per kg could be used

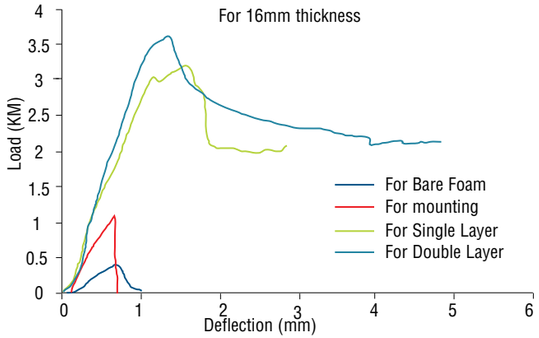
Aluminium foam property (comparison with internationally available foam)

Sl no.	Property	AMPRI-foam	Aluminium light foam
1	Yield strength/plateau strength (MPa) (compression) at strain rate of 0.001/s	4 – 25	3 – 26
2.	Flexural stress (MPa)	5 – 25	5 – 28
3.	Energy absorption (Mj/m3)	2 – 18	
4.	Density (g/cc)	0.20 – 0.7	0.2 – 0.75
5.	Modulus (GPa)	0.2 – 5.0	0.15 – 5
6.	Cell size (mm)	1.5 – 5.0	1.0 – 5.0

Foam core sandwich panels

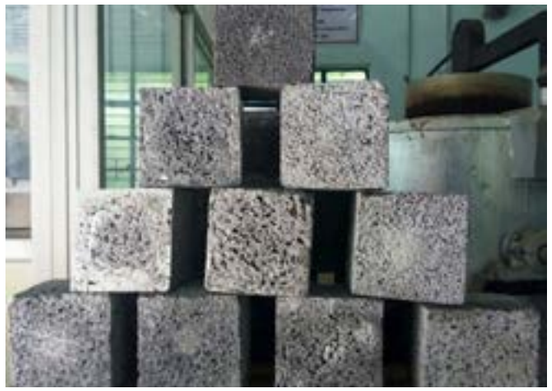
Sample	Density of the sample (kg/m3)	Load (kN)	Bending stiffness (N-m2)	Specific stiffness (m6/s2)
Bare foam	428.11	0.442	9.728	0.0227
With mounting	574.7	1.11	26.34	0.0458
With single layer	612.94	3.236	32.18	0.0525
With double layer	707.4	3.63	41.533	0.0587
Bare foam	365.32	0.501	12.18	0.033
With mounting	554.91	1.34	28.89	0.052
With single layer	603.17	3.3	36.31	0.0602
with double layer	651.58	5.33	62.26	0.0955
Bare foam	303	0.8	15.73	0.052
With single layer	501.3434	3.77	39.21	0.0782

Foam core sandwich panels



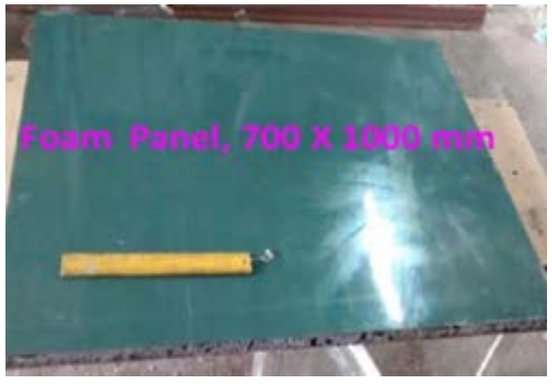
Al prototype products made

Foam billets made at 80 percent reproducibility, large size foam billet preparation demonstrated



Foam blocks supplied to Tata Motors

Aluminium foam core 2014 Al-alloy (0.5 mm thickness) faced sandwich panels (size 1m x 2m x 0.025 m) (areal density: 3.5 kg/m2)



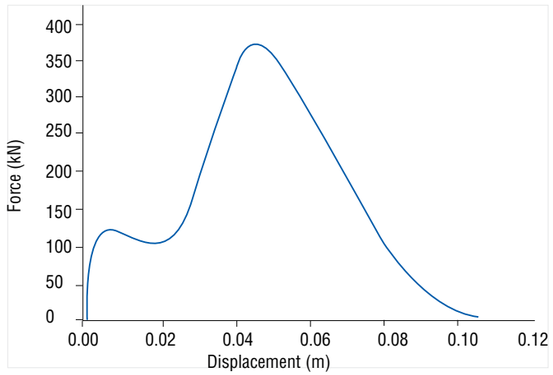
FRP faced Al-foam core sandwich panel, 30 mm thickness (areal density: 7.0 kg/m2)

PROJECT-1

Drop weight test of empty/foam filled crash box

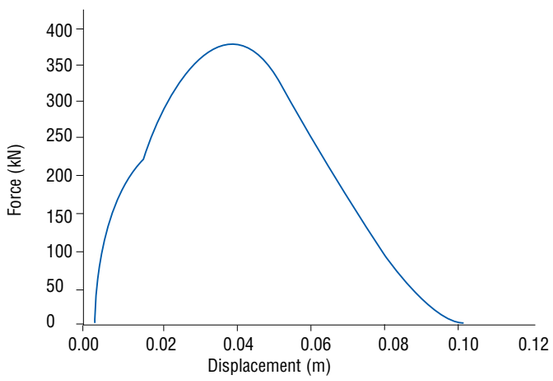
Empty/foam filled crash box

Energy absorption: 9.8 kJ

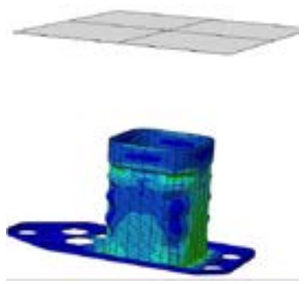


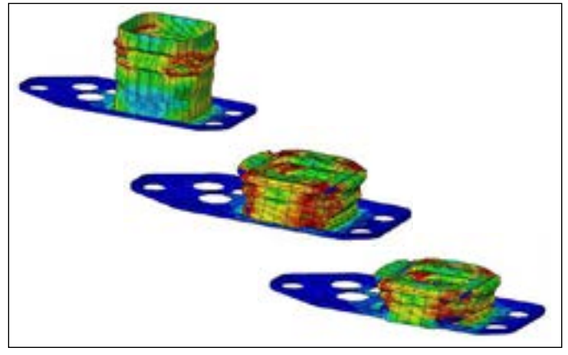
Foam filled crash box

Energy absorption: 19.8 kJ



FEM results
Energy dissipation: 2 times





FEM results

130mm crash box > 35mm

Same as experimentally determined

Use of 400 gm of foam
Crash box weight: 800 gm

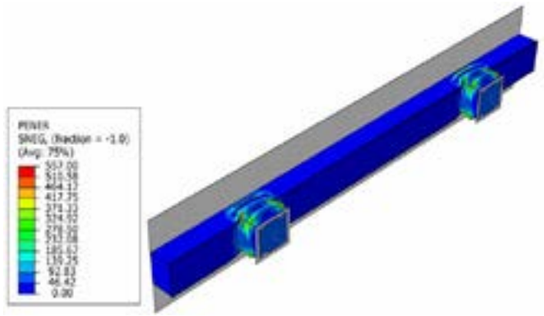
Energy absorption with foam filled > double

PROJECT-2

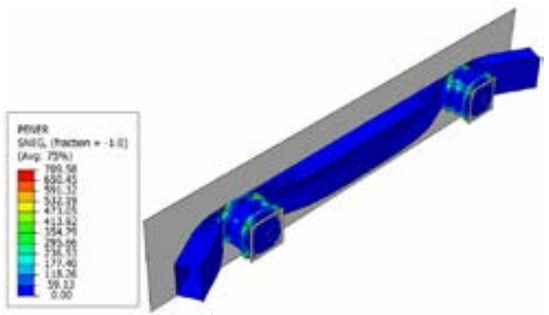
FEM simulation
Empty/foam filled bumper and crash box assembly

Car crash analysis: Euro NCAP Standard (135-165 kJ)
Energy dissipation at 150 mm deformation

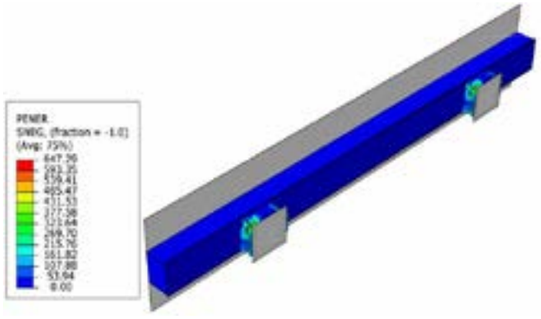
Case1: Foam: Bumper + crash box (200 kJ)



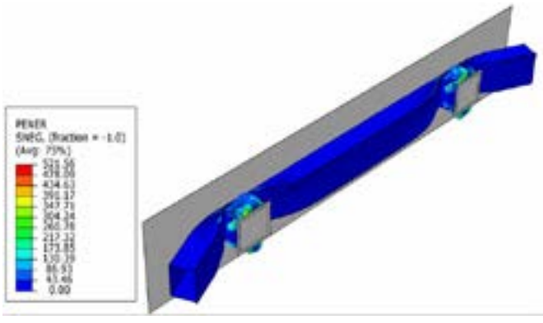
Case 2: Foam: Only crash box (97 kJ)



Case3: Foam: Only bumper (16.5 kJ)



Case4:-Empty: Bumper + crash box (11 kJ)



Product samples

Foam filling methodology established, simulation done

Tata Motors will be conducting tests

(1500 gm of foam insert ~ 200 kJ)

ALUMINIUM MATRIX COMPOSITES

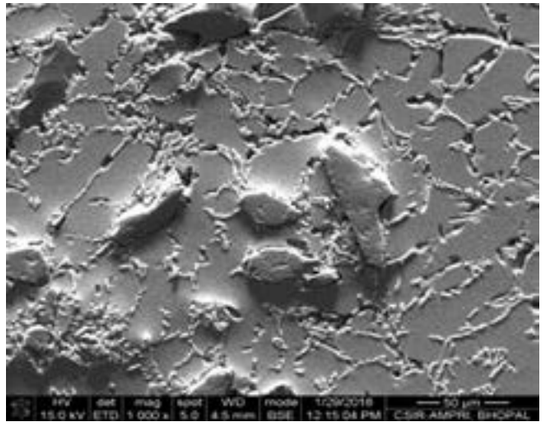
Advantages
- Light-weight
- Higher specific strength and stiffness
- Higher damping capacity
- Comparable TEC to steel and cast iron
- Higher wear resistance

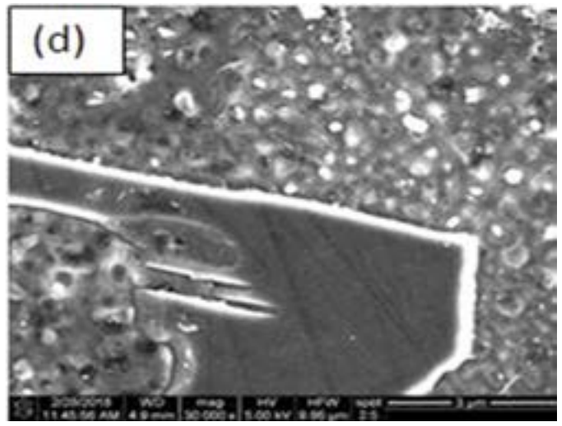
Limitations
- Uniformity in reinforcement distribution
- Interface bonding
- Poor machinability light-weight

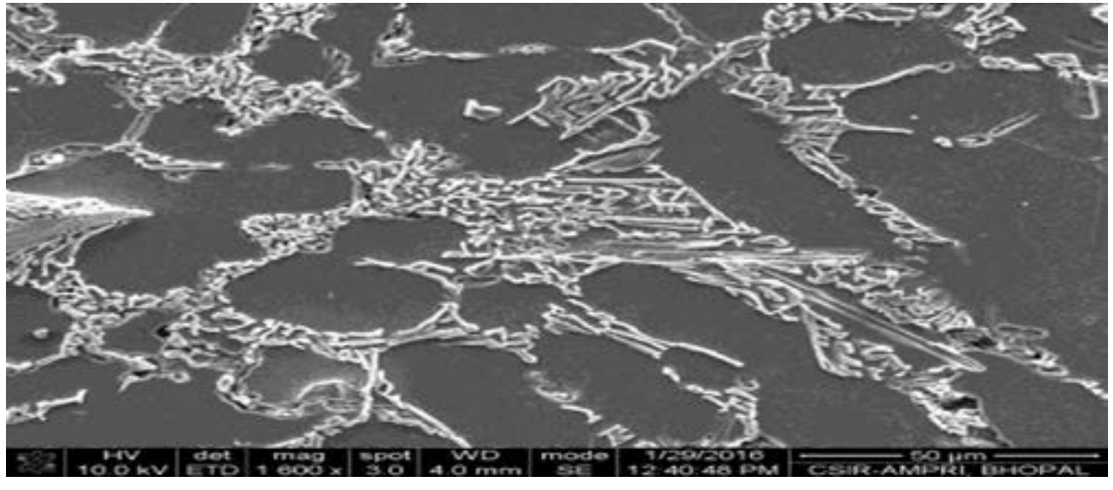
Solutions
- Near net shape casting and forming
- Squeeze casting/pressure die casting/ thixocasting
- Nano particle dispersion using secondary dispersion
- Ultrasonic stirring

Probable automobile components
Connecting rods, cylinder liner, engine blocks, brake drums/discs, pistons, clutch plates etc

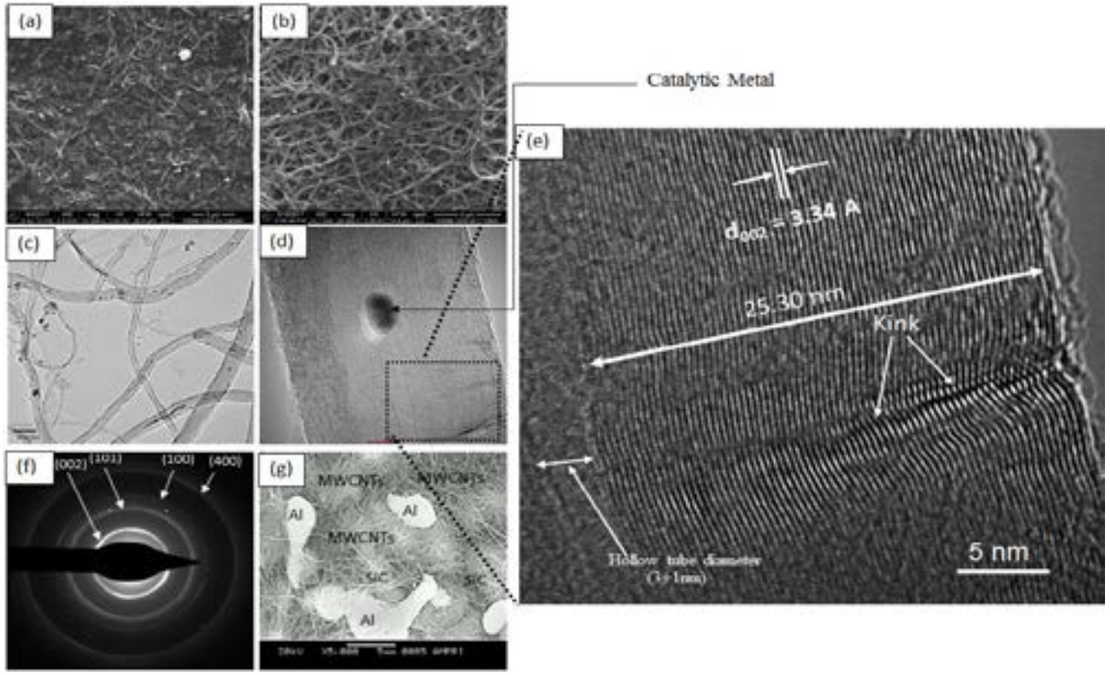
Pressure die cast and squeeze cast composite
Yield strength: 170 to 220 MPa; UTS: 200 to 280 MPa



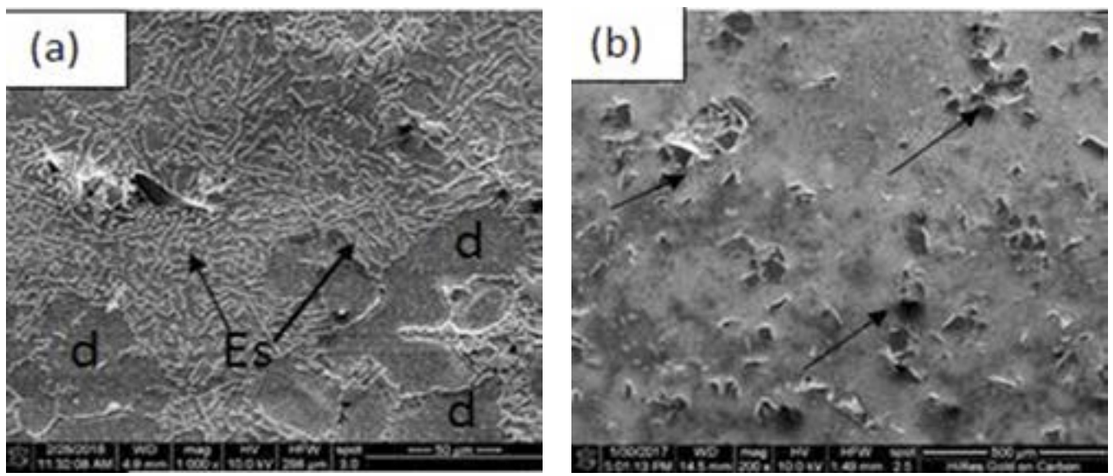


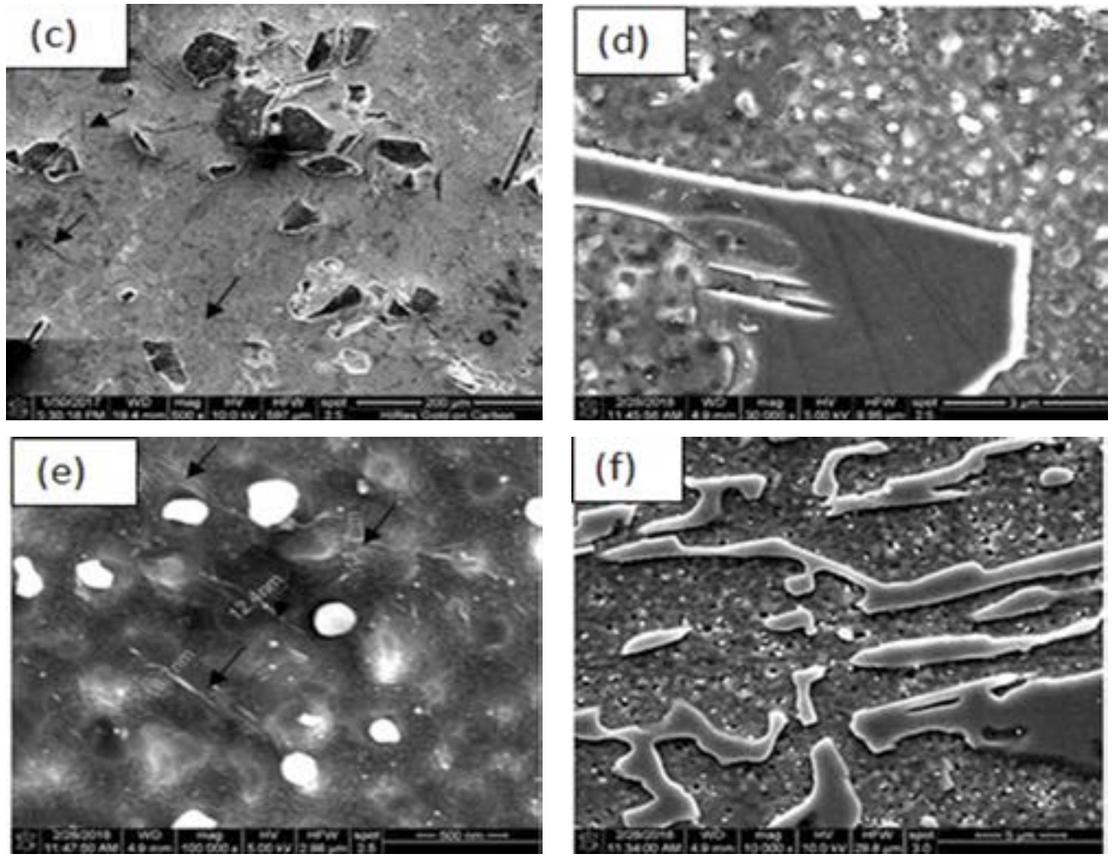


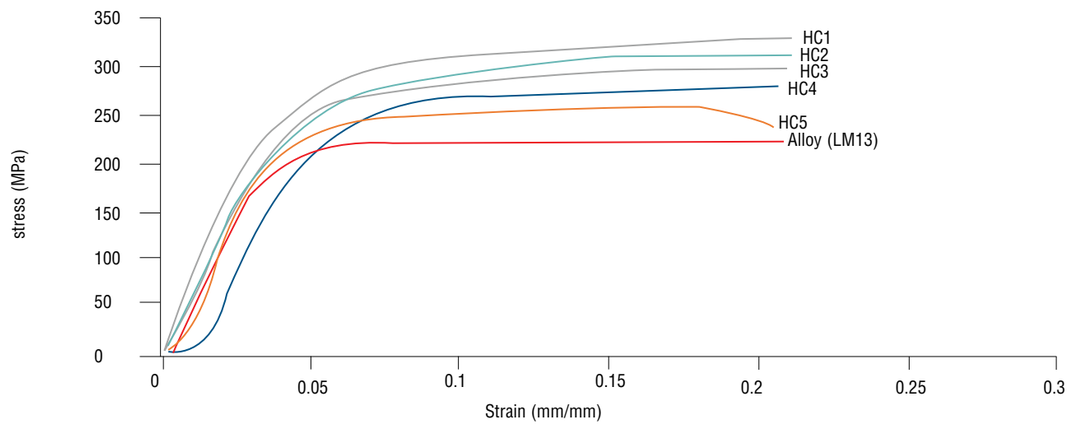
FUNCTIONALISATION OF CNTS, PARTICLE PROCESSING



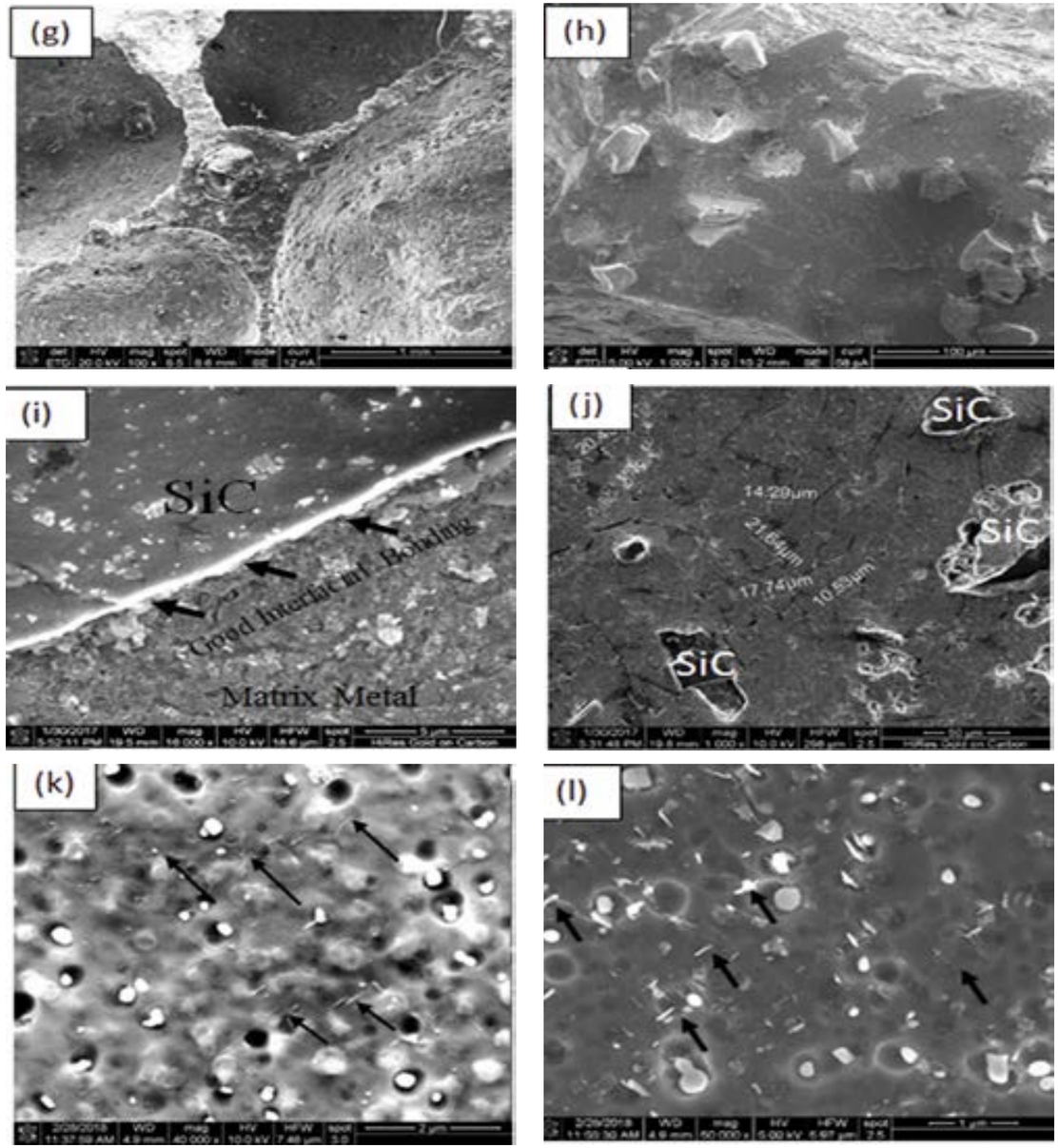
NANO COMPOSITE AND HYBRID COMPOSITE

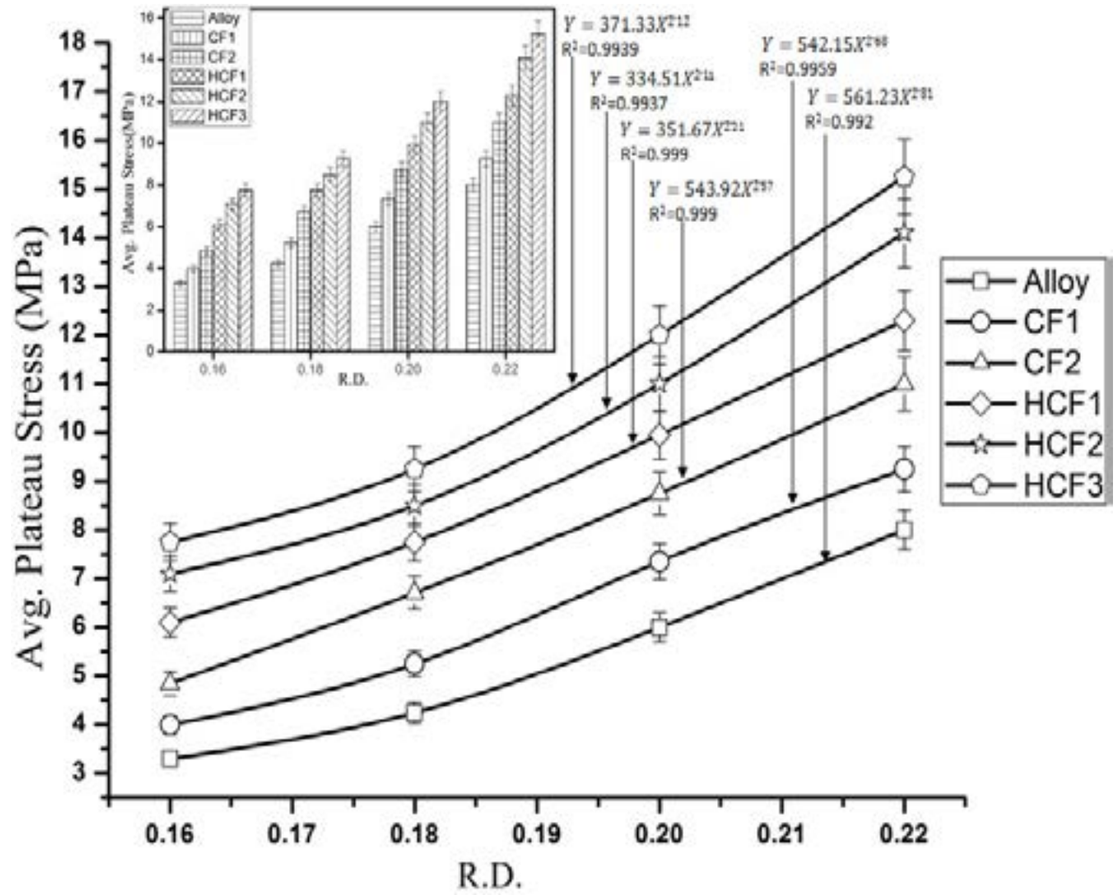






MICROSTRUCTURE AND MECHANICAL PROPERTIES OF HYBRID FOAM





METAL FOAMS AND MMCS AT CSIR-AMPRI

Aluminium metal matrix composites
(Stir casting & in-situ technology, 60 kg/heat)
Technology developed and licensed
Strength: 200 to 450 MPa (cast, rolled/forged)

Density – 1/3rd of steel
Automobile, Defence, Aerospace and General Engineering

Connecting rod

Nose Cone

Break drum

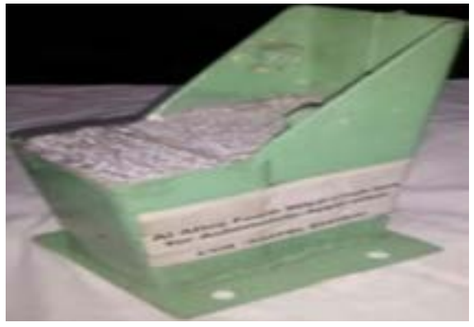
METAL FOAMS AND MMCS AT CSIR-AMPRI

Closed cell Al-foams (100 kg/day)

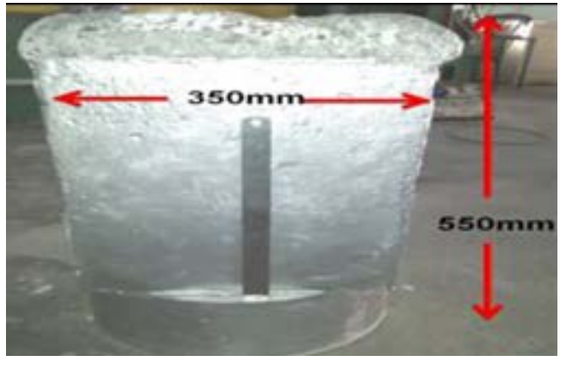
- Density: 0.2 to 0.8 g/cm3
- Porosity: 40 to 90 percent; Strength: 2 to 35 MPa
- Sound absorption: Equivalent to glass wool

– Auto industries: Crash-worthiness, weight reduction, sound and vibration control
– Defence: Blast resistance, armour
– Rail and ship building: Flooring, cabins & hulls

crash box and bumber



Blast resistant panel, foam (30 kg) & structure



METAL FOAMS AND MMCS AT CSIR-AMPRI

Open Cell Foams (Porosity: 50 to 90%)

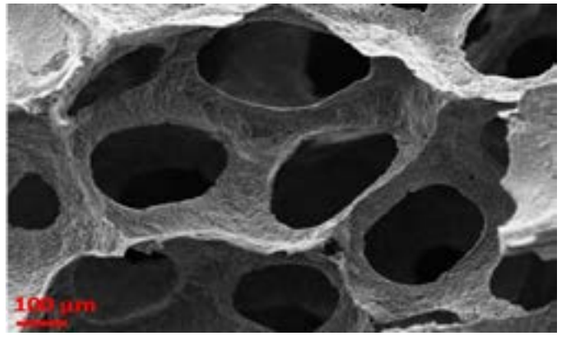
- Nickel , Copper, Carbon and Titanium
- Aluminum, Titanium, Stainless steel
- Process developed. Animal trials made with Ti-foam

Bio medical applications

- Filters , Heat Sink, Catalyst, Batteries
- Capacitors, EMI shielding

Ti-foam (bone scaffold and joining applications)

Carbon-foam/energy storage and Ni-foam/high temperature applications



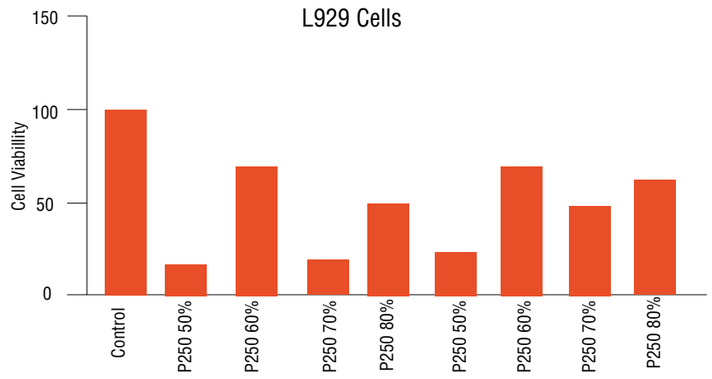
TI-FOAMS FOR FILTERS AND PROTOTYPE BIO-IMPLANTS AT CSIR-AMPRI

• Partially open cell Ti-foam with precise control of cell size and pore fraction could be made

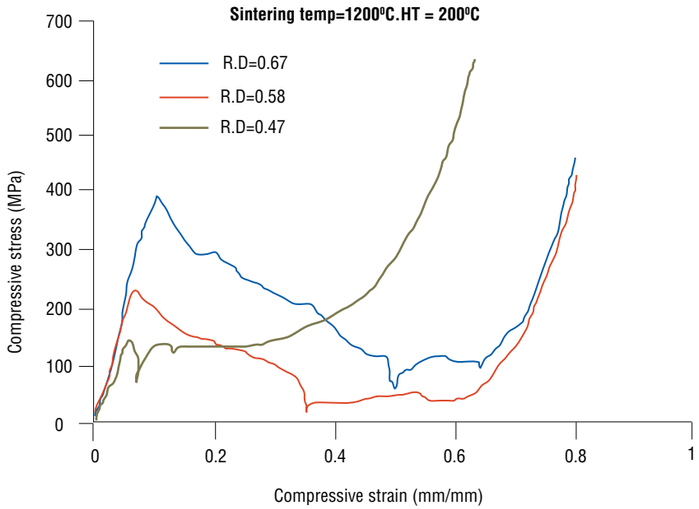
• These could be coated with HAP solution for improved bio-compatibility

• The powder metallurgy technology for Ti-foam is developed at CSIR-AMPRI

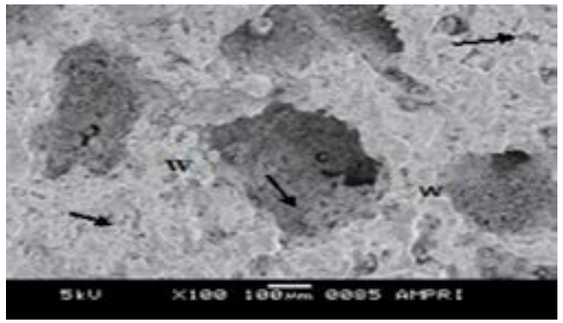
• Because of porous and bioactive coating, these implants help faster cell growth and adherence vis-à-vis faster recovery and increased life

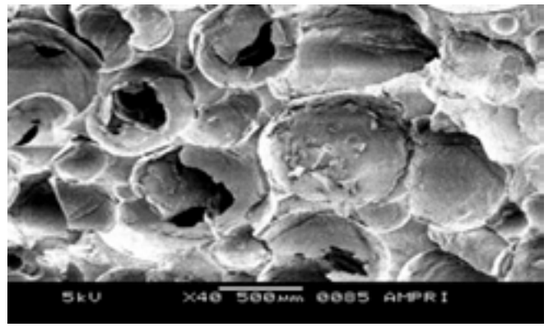


Stress-strain curves



Ti-foam lumber fusion





Foam filter

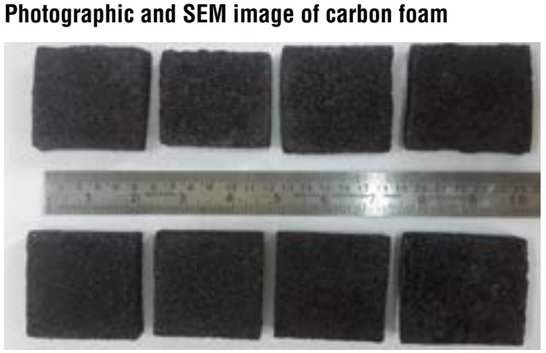
Microstructure of Ti-foam

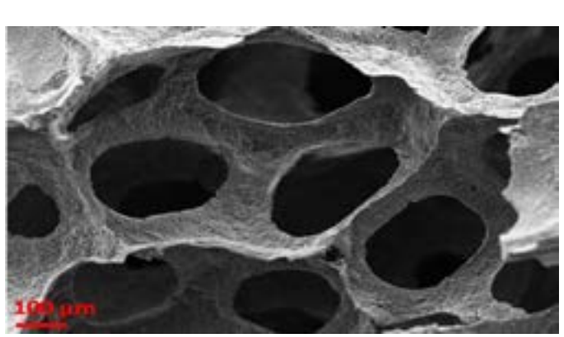
CARBON FOAM AND ITS APPLICATIONS AT CSIR-AMPRI

- Porous solid
- Light-weight
- Low density (>0.5 g/cc)
- Thermal expansion is very low
- High thermal conductivity (>100 W/m.K)
- High temp tolerance (up to 3000°C, inert atm)
- Large surface area with open cell structures
- Porosity (70-80 percent)

Properties	Carbon foam
Density (g/cm3)	< 0.50
Compressive strength (MPa)	5-8
Electrical conductivity (S/cm)	80-150
Thermal conductivity (W/m.K)	>60
Total EMI shielding (dB)	>80
Open porosity (%)	75-80

Photographic and SEM image of carbon foam





FOCUS

COVID-19 PANDEMIC

Rising to the occasion

Manufacturers the world over are repurposing their product lines to produce crucial medical and healthcare products

EEPC INDIA

AS COVID-19 continues its wayward way all over the world irrespective of location, a crisis in the supply of critical healthcare items such as masks, test kits, ventilators and so on has become a global phenomenon. This has led policymakers across the globe to call upon capable business houses across all segments of manufacturing to come forward and repurpose their production capabilities to produce these much-needed healthcare products in order to address the supply shortage during this medical emergency.

In response to the call from their respective governments, leading global businesses across different sectors of manufacturing have been quick enough to start planning on repurposing their production capabilities and R&D potentials to ensure adequate supply of healthcare and related products much needed to save human lives at a time of such a never-seen-before exigency.

The global economy has been passing through unprecedented hardships over the past few months due to a purely noneconomic shock in the wake of the COVID-19 pandemic, resulting from the menacing spread of the Coronavirus, with China as its origin. The outbreak of the virus has already caused innumerable deaths and infected millions across the globe and the worst is yet to be seen or estimated. Almost all nations around the globe have been doing their best to tackle the disease given the existing medical infrastructure and have gone for complete socioeconomic lockdown, barring a few essential services, as the most effective preventive measure. The global economy, which had already conceded a slowdown, especially in developed and emerging regions, has started witnessing a disastrous phase following the outbreak of the virus and the subsequent lockdown as economic activities have taken a backseat. For some economists, this debacle can only recall the era of the Great Depression of the 1930s while, for others, the pitfall may turn even worse.

ECONOMIC RUPTURES

CLEARLY, the socioeconomic lockdowns imposed by the governments of almost all nations have pushed the global economy virtually to a standstill for the time being. Although strategic relaxations have been implemented by various governments, the global economy is still far from performing in full swing. Enough damage has been done and much more is apprehended to come as a ripple effect. The gravity of the economic damage can easily be understood from the fact that the price of crude oil in the US has, for the first time in history, turned negative as demand dried up following the uncertainties of recovery. The International Monetary Fund (IMF) in its global outlook saw comprehensive GDP per capita shrinkage in as many as 170 nations of the world and predicted that, even if short-lived, the outbreak could drag the world into a 3 percent GDP contraction. However, a sluggish recovery in 2021 was also projected.

Indian scenario

India, as a frontline emerging economy being placed at the centre of the world economic order, was already facing an economic slowdown with growth declining to a six-year low of 4.7 percent in the third quarter (October-December) of the last fiscal. Now, the situation is almost certain to weaken further following the emergence of the additional challenge of the pandemic. The tourism, hospitality, and aviation sectors are the worst hit in this crisis while manufacturing is soon to follow suit as sectors such as automobiles, pharmaceuticals, electronics, chemical products etc are facing imminent raw material and component shortages. IMF has predicted India's real GDP growth would moderate to 4.2 percent in 2019 and then fall further to 1.9 percent in 2020 due to the pandemic.

ADVERSITY IN INTERNATIONAL TRADE

THE Coronavirus outbreak, right from its very initial stage, led to large-scale disruptions in supply chains and demand resulting in cancellation of orders from overseas buyers. International trade of goods came to a near-halt as an inevitable consequence. Sectors with complex value chains such as electronics, automobiles etc. were the worst hit. According to an estimate published by the United Nations Conference on Trade and Development (UNCTAD), the slowdown of manufacturing in China due to the Coronavirus outbreak is disrupting world trade and could result in lowering exports by as much as $50 billion across global value chains. According to the World Trade Organisation (WTO), global merchandise trade volume has already been down by 0.1 percent in 2019 over the previous year and this ongoing pandemic may cause it to decline between 13 to 32 percent in 2020, depending on the duration of the crisis as well as the extent of damage done. A recovery in trade volume is projected in 2021 by the WTO but, again, it is dependent on the course of the outbreak and effectiveness of government policies.

Indian scenario

India, like other nations, has also been witnessing dismal merchandise trade since March 2020 that has suddenly slumped by 31 percent in the month. The UNCTAD report estimated the trade impact of the Coronavirus epidemic for India to be around $348 million with sectors such as chemicals, textiles and apparel, automotive, electrical machinery, and leather to be the most affected.

OVERCOMING THE INITIAL SHOCK

NO economy can afford to be in deadlock for a long period of time, whatever the force acting against it be. Governments and businesses across the world need to react in all possible ways to repair the damages done and also to ensure taming of the adversities going forward to the extent possible. Fortunately for the world, this has already been started on a war footing. Governments are on their toes to ensure restoration of socioeconomic normalcy while fending off the pandemic at the same time. Several nations, both the developed as well as the developing ones, have already announced hefty stimulus packages in order to provide much-needed support to the revival of their respective economies while some more are in the pipeline. Businesses around the world on the other hand have started finding new avenues to ensure business continuity and revenue generation in order to bring the global economy back on track as soon as possible. Support from the governments at this stage will definitely help them to overcome operational hurdles.

REPURPOSING PRODUCTION LINES

THE crisis in the supply of critical healthcare items such as masks, test kits, and ventilators since the Coronavirus outbreak has led policymakers across the globe to call upon capable business houses across all segments of manufacturing to come forward and repurpose their production capabilities to produce these much-needed healthcare products. In response to the call from their respective governments, leading global businesses across different sectors of manufacturing have been quick enough to start planning on repurposing their production capabilities and R&D potentials to ensure adequate supply of the much-needed healthcare and related products.

Repurposing means shifting of the product base by a company to produce a different product or a set of products that is in high demand in the economy due to some specified reason, by using the existing machinery and workforce. The ongoing threat of COVID-19 has led to a clamour for healthcare products such as face masks, hand sanitisers, and ventilators among others. Potential business houses from the manufacturing sector, therefore, are joining hands with leading healthcare firms to meet the supply crisis of essential medical products to play active role in resisting the Coronavirus.

Products in shortage and facilities to repurpose

The World Health Organisation (WHO) has published a list of essential items required to combat the spread of COVID-19 virus that are in severe shortage or expected to be in shortage soon. These products are grouped into three categories. An article by Carlos López-Gómez, Lucia Corsini, David Leal-Ayala, and Smeeta Fokeer published on the website of the United Nations Industrial Development Organisation (UNIDO) provided some examples of facilities that might be repurposed to meet the shortage of healthcare essentials by referring those product categories identified by WHO and presented in tabular form in **Table1**.

Rationale for repurposing

The rationales for repurposing production lines are manifold. However, serving peoples of the world is the first and foremost reason during the time of crisis. The key challenge for businesses across the world during the phase of socioeconomic lockdown following the current COVID-19 pandemic is to protect their workforce and keep operations running. The challenge is more in the case of companies engaged in manufacturing as it requires the physical presence of the workers in almost all cases. Now, at the time of such an economic disaster, demand for almost all products has dropped substantially as panic-stricken buyers develop a propensity to save more at times of uncertainty. Only essential items see a surge in demand. The ongoing crisis makes some healthcare products essential as mentioned earlier and they are being recognised as lifesavers at this stage. Companies from all other sectors with good infrastructure setup, therefore, have started building their production capacities in response to the present demands of the economy. By doing so, business houses are ensuring business continuity and protecting the existing workforce on one side while earning goodwill by their active contribution towards the wellbeing of society.

Repurposing: Global instances

Among all the essential healthcare products, the ventilator is the most in demand as COVID-19 attacks the respiratory system of human beings. Manufacturers from the automobile, aerospace, and beverage industries have joined the trend to meet the global demand for ventilators. Analytics Company Global Data reportedly estimated the global demand for ventilators as 880,000, as an estimated 10 percent of patients infected by Covid-19 will require the respiratory support machines.

In the US, the Food and Drug Administration (FDA) took bold steps to increase the availability of ventilators to support Corona positive patients. While the US government promised all sorts of procedural and legal relaxations for companies wanting to produce ventilators, it has also invoked the Defence Production Act to compel some companies like General Motors to make ventilators.

However, for most of companies, it was intention rather than compulsion to counter the pandemic. Here are some noteworthy initiatives by leading business houses.

- Apart from General Motors, Tesla and Ford also stepped in to support the US government in their bid to provide healthcare. Ford is using parts usually installed in vehicles, such as fans and batteries, to produce modified respirators and ventilators by working alongside health industry manufacturers GE Healthcare and 3M. Tesla decided to venture with US medical technology giant Medtronic to make ventilators at its Giga factory in Buffalo, New York, which usually makes solar PV cells.
- In Britain, aerospace multinational Airbus has led the Ventilator Challenge UK consortium, which brings together rival manufacturers from a range of industries in a unified national effort to increase the number of ventilators in the NHS from 8175 to 30,000 within weeks.
- Engineering firms Rolls-Royce, Siemens, GKN, Meggitt, Formula 1 team McLaren, aerospace company BAE Systems, and Ford are among those offering their facilities to build more machines based on proven designs already used by medical device manufacturers Smiths Medical and Penlon.
- A division of Mercedes, the Daimler-owned automotive giant that makes Formula 1 engines, set a target to produce 10,000 continuous positive airway pressure (CPAP) machines that provide oxygen before ventilators are needed.
- Vehicle producer Seat joined hands with a factory in Barcelona started making medical ventilators where normally it would be building Leon hatchbacks.
- Dyson, better known for its innovation in bagless vacuum cleaners and hand dryers, will work alongside the Technology Partnership, a group of British scientists and engineers aiming to drive innovation to develop its new system, called the CoVent.

Apart from medical devices, face mask, hand sanitisers, and visors are the much-demanded healthcare products being produced by several companies from other industries who decided to repurpose their production lines in order to serve the society at a time of severe healthcare crisis.

- Lamborghini, the iconic carmaker from Italy, is engaged in making surgical masks and face shields at its factory near Bologna.
- Gucci has pledged to transform production lines usually reserved for luxury clothing to make more than a million masks, while Prada – whose joint CEOs have donated money to build two intensive care units in Milan – planned to have 110,000 masks ready by 6 April.
- High street brand Zara aims to send 40,000 surgical masks to hospitals and H&M has also pledged to offer protective equipment.

Table1: COVID-19 critical Items and what might be repurposed

Category	Critical items identifiled by WHO	Example of facilities that might be repurposed
Protective personal equipment (PPE)	• Gloves, examination • Gloves, surgical • Goggles, protective • Gown, protective • Face shield • Mask, particulate respirator • Mask, surgical	• Textile factories • Garment plants • Yarn spinning mills • Electronics assembly plants • Injection moulding facilities • Prototyping shops (including 3D printing)
Diagnostic equipment	• Lab screening test kit • Lab confirmation test kit • RT-PCR kit • Extraction Kit • Cartridges for RT-PCR automatic systems • Swab and viral transport medium	• Pharmaceutical preparations • Biopharmacetical preparations • Pilot biotech plants • Clinical research laboratories
Clinical care equipment	• Pluse oximeter • Concentrator O2, 10L, 230V, 50Hz + acc. • Nasal oxygen cannula, with prongs, • Ventilator patient, for adult, pediatric. • CPAP with tubing and patient interfaces for adult and pediatric. • Suction pump, mechanical • High-flow nasal cannula (HFNC)	• Automotive production lines • Aerospace manufacturing plants • Specialized engineering service and testing facilities • Manufacturing technology and innovation centres • Vacuum cleaner assembly plants • Machining shops

Note: List of critical items was identified by WHO while examples of manufacturing facilities were provided by the authors based on government communications and media reports.
Source: Article published by Carlos López-Gómez, Lucia Corsini, David Leal-Ayala and Smeeta Fokeer on UNIDO Website.

• Britain's Wales-based Royal Mint, started producing plastic visors for health workers in late March, in addition to the coins and precious metal investment products it is known for.
• Apple is designing and producing face shields to protect health workers and medical staff from the Novel Coronavirus.

Repurposing in India

Taking lessons from the topmost COVID-19 effected nations in Asia, Europe, and North America, India has made an early move to arrest the spread of the virus and has succeeded to a large extent to control its wild run on Indian soil.

However, a populous geographical entity like India cannot escape such a global epidemic completely, especially when its medical infrastructure is not as developed as its counterparts in Europe and North America. Moreover, the country needs to be well-equipped once the lockdown is withdrawn. Medical devices and other healthcare-related products are in acute shortage in India. Currently, the subcontinent has around 40,000 ventilators but estimates say that the demand could go up to 80-100 times of the existing availability if the situation worsens rapidly after the lockdown phase.

Indian medical device manufacturers have drawn up plans to deliver 50,000 ventilators by May 2020 to meet the growing demand for this lifesaving device. Indian business houses from different sectors, like their global peers has also jumped into the drive to meet the shortages of medical essentials in order to combat the corona outbreak.

The government and industry plan to tackle the shortage of ventilators with the development of two-three different models. While one will be a low-cost respirator model, another will be a high-end ICU model.

Quick response from large cap EEPC India members

Several large-scale firms among EEPC India's 13,000 member base have responded superfast to the ongoing crisis. Some of them are listed here.
• Tata Motors, is in last-minute negotiations with a Mysuru-based manufacturer to ramp up ventilator manufacturing. 'Tata Group is looking at setting up a plant to manufacture ventilators. We are working on this on priority,' said Mr N Chandrasekaran, Chairman, Tata Sons.
• Mahindra & Mahindra, along with BEL and BHEL, has joined a consortium formed by leading ventilator manufacturer SkanRay to ramp up production of ventilators from standard 2000 pieces per month to currently 5000 pieces per month and 30,000 pieces per month by May 2020. 'Mahindra Group will immediately begin work on how our manufacturing facilities can make ventilators, stated Mr Anand Mahindra, CEO, Mahindra & Mahindra.
• Hyundai India has already initiated the development of an in-house ventilator and the prototype has been submitted to the Tamil Nadu government.
• Maruti has tied up with medical device manufacturer AgVa, to scale up production from 400 pieces per month to 4000 pieces per month in April and to 10,000 pieces per month by May. According to Mr R C Bhargava of Maruti Suzuki, Maruti's tieup with AgVa will use ventilator design and technology designed by AgVa. As AgVa is a small setup, it does not have working capital to ramp up production, so Maruti will use its own premises and vendor's premises to manufacture ventilators. At present AgVa has no imported components in stock and is looking for sources other than China. Production will begin as soon as the first lot of imported components arrive.

Others are similarly gearing up to address the challenge.

Initiatives by other member companies

Small- to medium-sized manufacturers are also taking part in this repurposing venture and offering masks, sanitisers, and other essential supplies to counter the shortage. Some of these initiatives are listed in **Table2**.

DRDO gears up to counter Coronavirus

• A body suit developed by India's premier research and development organisation DRDO can protect doctors and other health-workers attending to Covid-19 patients. The suit is washable and has passed the ASTM international standards. Frontier Protective Wear Pvt Ltd, Kolkata and Medikit Pvt Ltd, Mumbai are producing 10,000 suits per day. The body suit is one of the four instruments developed by the DRDO.
• Another instrument developed by DRDO is the five-layer N99 mask with two layers of nano mesh. The production vendors of this advanced mask are Venus Industries Mumbai, and IMTEC Kolkata. The capacity is 10,000 masks per day.
• The DRDO has also developed hand sanitiser, a basic instrument against spread of Covid-19. It has provided about 4000 litres of hand sanitiser to the Indian armed forces, Armed Forces Medical Corps, and the Defence Security Corps; 1500 litres to the Ministry of Defence; 300 litres to Parliament; and 500 litres to various security establishments and high offices.

Challenges faced in repurposing process

Despite the full fledged attempts of business houses to response to the need of the times, the results have not been as expected so far. In reality, it is not an easy task to shift to a new product line

Table2: Initiatives by SMEs

Organisation	Location	Product
ACE Micromatic	Bengaluru	Ventilators
Canadian Crystalline Water India Limited	Tamil Nadu	Advanced ultraviolet disinfection, ozone disinfection equipment's for air and surface sterilisation and disinfection
Cognify Tech	Pune, Maharashtra	Anti-droplet face shield
Janatics	Tamil Nadu	Ventilators
Jyoti CMC	Rajkot	Ventilators
MSB Consulting (dealer for a Chinese company)	New Delhi	Machines for 3-layer surgical masks
Nantex Machineries	Haryana	Surgical masks
Noble Eco System Pvt Ltd	Chennai	Disinfection generator for Covid-19
Nuva Machine Works India Pvt Ltd (dealer for a Chinese company)	Tirupur, Tamil Nadu	Mask-making machinery
Pushpak Products India Pvt Ltd	Bengaluru	3-ply mask, N95 respirator, gloves, Coronavirus protective kit, Hand sanitiser, disinfectant wipes, ICU beds, etc
Rodas Impex Pvt Ltd	Bhilwada, Rajasthan	Surgical masks
Samanjas Udyog Pvt Ltd	Jamnagar, Gujarat	Brass parts for ventilators for hospital
Uniq Engineering	Surat, Gujarat	3-fold mask-making machine – capable of manufacturing N-95 mask
UPL group	Mumbai	Sodium hypo chloride for sanitiser
Vishwakarma industries	Bhiwandi, Thane, Maharashtra	Mist Shower which can be used for Decontamination and to stop spread of such COVID-19 virus

overnight by just using the existing infrastructure, as production processes in modern manufacturing are highly specialised with the objective of maximising efficiency. Moreover, the level of repurposing depends on the level of complexity of the products. Repurposing to produce high-tech ventilators is far more difficult than producing masks and gloves. Difficulty in assessing the risk of entering a new market with insufficient domain knowledge, lack of specialised skill, and, above all, lack of adequate time-span to source factor inputs and develop product design are among the other bottlenecks faced by the repurposing facilities. As per media reports, several essentials to resist COVID-19 produced by repurposed facilities have been rejected in the US and the UK on the grounds of technical non-compliance.

Way forward

Notwithstanding the limitations, there are several successes too that necessitates repurposing as an effective way to arrest the spread of the virus and then its eradication. When the products recognised as lifesavers are in short supply at this current juncture and traditional business houses are unable to meet the scarcity, repurposing is the only avenue left. Needless to say, adequate policy response from the governments can help the repurposing units to eliminate hindrances to production. Ensuring supply of raw material, removing procedural delay, and relaxing stringency in business norms among others are the measures expected from the governments in order to help these units to develop a well thought-out roadmap for repurposing and to deliver the best feasible outcome in turn.

To conclude, let's hope to see a COVID free natural world very soon.

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OVERSIGHT

Pandemic spurs fall in engineering exports

The last month of fiscal 2019-20 witnessed a fall in engineering exports spurred mainly by the continuing COVID-19 crisis

POLICY WONK

ENGINEERING EXPORTS

The monthly engineering figures for 2019-20 vis-à-vis 2018-19 are depicted in **Table1** and **Figure1** as per the latest DGCI&S estimates.

Correlation between manufacturing production and engineering exports

The engineering sector is an important component of the broader manufacturing sector and the share of engineering production in overall manufacturing output is quite significant. As exports generally come from what is produced within a country, some correlation between manufacturing production growth and engineering export growth should exist. We briefly looked at the trend in manufacturing growth as also engineering export growth to see if they move in tandem. It may be mentioned that manufacturing has 77.63 percent weightage in India's industrial production.

Table1: Engineering exports: Monthly trend ($ million)

Month	2018-19	2019-20	Growth (%)
April	7020.54	6480.13	-7.70
May	6928.08	7244.53	4.57
June	6512.31	6352.16	-2.46
April-June	**20460.93**	**20076.82**	**-1.88**
July	6052.64	5949.01	-1.71
August	6974.48	6347.76	-8.99
September	6769.15	6344.77	-6.27
April-September	**19796.27**	**18641.54**	**-5.83**
October	6151.93	6252.68	1.64
November	5740.17	6199.17	8.00
December	6905.63	6811.53	-1.36
October-December	**18797.73**	**19263.38**	**2.48**
January	6295.94	6011.39	-4.52
February	6442.37	7015.51	8.90
March	**9162.3**	**5266.9**	**-42.52**
January-March	**21900.61**	**18293.8**	**-16.47**
April-March	**80955.54**	**76275.54**	**-5.78**

Source: DGCI&S, Govt of India

The first month of fiscal 2019-20 saw engineering exports growth and manufacturing growth moving in the opposite direction but the next four months saw just the reverse. In April 2019, manufacturing growth accelerated while engineering exports dropped to negative. During May, engineering exports bounced bank to growth path and manufacturing growth accelerated. Engineering exports declined once again in June 2019 and manufacturing growth also slowed down noticeably. The decline in engineering exports continued in July but at a slower pace while manufacturing witnessed accelerated growth. During August, engineering exports decelerated faster and manufacturing growth turned negative. September 2019 again saw both moving in opposite directions when decline in engineering exports moderated but decline in manufacturing growth accelerated. Again during October to December 2019, both moved in the same direction. Engineering exports bounced back to the growth path in October 2019 while growth accelerated in November 2019. On the other hand, decline in manufacturing moderated in October and then registered decent growth in November 2019. During December 2020, both engineering exports and manufacturing output conceded y-o-y decline. The trend was reversed in January 2020, when manufacturing output registered a rise against a decline in engineering exports. In February 2020, however, engineering exports came back to the growth path while manufacturing growth witnessed acceleration. As per the latest figures, manufacturing output and engineering exports moved in the same direction in eight out of the first 11 months of fiscal

OVERALL SCENARIO

India's merchandise exports declined by ~35 percent in March 2020 as COVID-19 pandemic led to cancellation of overseas orders

- After experiencing a downtrend for five months to January 2020, India's merchandise exports managed around 3 percent growth in February 2020 over the same month last fiscal. However, exports in March conceded an unprecedented 34.57 percent decline year-on-year as outbreak of the Coronavirus caused large-scale disruptions in supply chains and demand resulting in cancellation of orders. Merchandise exports were recorded at $21.41 billion during the month as against $32.72 billion in March 2019. In rupee terms, the decline was somewhat lower at 29.98 percent.
- Except iron ore, which registered a growth of 58.43 percent, all other commodity/commodity groups registered negative growth in March 2020 vis-à-vis March 2019.
- Cumulative value of merchandise exports for the period April-March 2019-20 was $314.31 billion as against $330.08 billion during the last fiscal, registering a 4.78 percent fall in dollar terms. In rupee terms, the decline was 3.52 percent.
- Imports, due to the same reason, declined by 28.72 percent in dollar terms during March 2020 to $31.16 billion from $43.72 billion in March 2019. The decline was somewhat lower at 23.72 percent in rupee terms.
- Trade deficit narrowed down marginally to $9.76 billion in March 2020 from $11 billion in the same month last fiscal, registering 11.27 percent decline as both exports and imports were hit by the ongoing crisis. On a cumulative basis, trade deficit shrank by 16.91 percent to $152.88 billion during April-March 2019-20 from $184 billion during the same period last fiscal.

India's engineering exports declined by 42.5 percent in March 2020 following the broader merchandise exports

- Engineering exports from India also recorded y-o-y increase in February 2020, but as the COVID-19 pandemic started biting the global economy, engineering exports, following the broader merchandise trend, slumped by 42.5 percent to $5.3 billion in March 2020 from $9.2 billion in the same month last fiscal. However, a little bit of base effect was also there behind this massive decline.
- Cumulative engineering exports during fiscal 2019-20 dropped by 5.8 percent as a consequence. India's engineering exports stood at $76.3 billion in 2019-20 as against $81 billion during fiscal 2018-19.
- The share of engineering exports in India's total merchandise exports, however, remained largely unchanged at 24.6 percent as against 24.1 percent in February 2020. On a cumulative basis, the contribution of engineering exports in India's total merchandise exports was recorded at 24.3 percent during April-March 2019-20.
- Out of 33 engineering panels, only zinc and products made of zinc recorded 53.4 percent growth in exports during March 2020 while the remaining 32 panels conceded decline in y-o-y exports. On a cumulative basis, 21 panels recorded negative growth in April-March 2019-20 over the last fiscal.
- During March 2020, exports to 22 nations out of India's top 25 export destinations for engineering products recorded y-o-y decline. On a cumulative basis for April-March 2019-20, the number of such nations was 16.

India's March engineering imports down by 24.1 %

- India's engineering imports during March 2020 were valued at $7.1 billion compared to $9.4 billion in March 2019, recording significant negative growth of 24.1 percent in dollar terms.
- Cumulative engineering imports during April-March 2019-20 were recorded at $100.55 billion as against $111.21 billion during the same period last fiscal, registering a fall of 9.6 percent.
- The share of engineering imports in India's total merchandise imports during April-March 2019-20 has been estimated at 21.5 percent.

2019-20. Perhaps, the trend in **Table2** shows a lagged effect of a month. We need to see how this plays out during the last quarter of the fiscal.

We also present the month-wise corresponding revised engineering exports for 2018-19 as opposed to 2017-18.

Impact of exchange rate

How has the exchange rate been changing in 2020 vis-à-vis 2019? We look at the monthly average exchange rate for both 2020 and 2019. **Table4A** and **Figure2A** provide the scenario.

As the figures of just one month does not determine a trend, we will continue to include the rupee-dollar trend analysis table and the movement chart for 2019 so that the short-term trend can be understood clearly.

Rupee weakens significantly in March 2020 vis-à-vis the dollar: After appreciating from September to November 2019 over the dollar, the rupee again started weakening from December 2019 and conceded as much as 7.1 percent depreciation in March 2020 over the greenback as the outbreak of Coronavirus led to outflow of dollars from the Indian capital market following withdrawal of investments, mainly by foreign portfolio investors. The fear of debt monetisation by the Indian government following the increase in expenditure in order to manage the COVID-19 crisis also played a role in weakening the rupee.

Rupee-dollar trends in 2019

A noteworthy feature of the rupee-dollar movement in 2019 had been the relative hardening of the rupee in 2019, as indicated by the narrowing in the rate of depreciation over corresponding months of last year between January and July 2019 (**Table4B**). After a somewhat higher depreciation in August 2019, the rupee started appreciating against the dollar for the next three months. However, the rupee saw an increasing depreciating

Figure1: Monthly engineering exports in 2019-20 vis-à-vis 2018-19

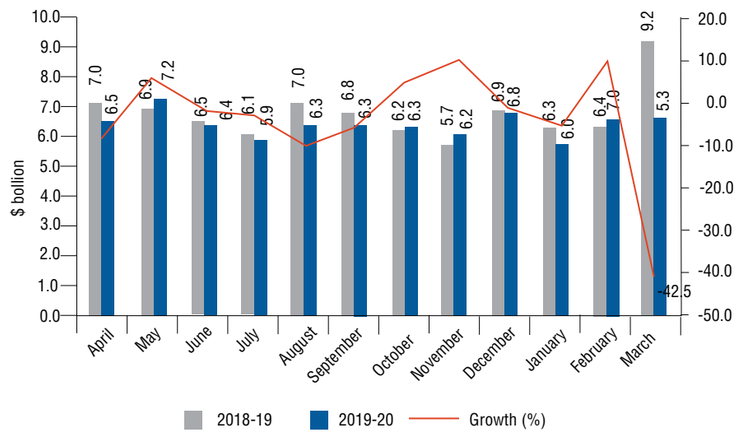


Table2: Engineering exports growth vis-à-vis manufacturing growth (2019-20)

Month/Year	Engg export growth (%)	Manufacturing growth (%)
April 2019	-7.70	2.5
May 2018	4.57	4.4
June 2019	-2.46	0.3
July 2019	-1.72	4.8
August 2019	-8.99	-1.6
September 2019	-6.27	-4.0
October 2019	1.63	-2.1
November 2019	8.00	3.0
December 2019	-1.05	-0.7
January 2020	-4.52	1.6
February 2020	8.90	3.2
March 2020	-42.52	N A

Source: Department of Commerce and CSO

mode in the later months and reached an alarming low in March 2020 as impact of the COVID-19 pandemic started taking its toll on investors' sentiments. The pictorial representation in **Figure2B** provides a clearer picture.

Top 25 engineering export destinations in March 2020

We now look at the export scenario of the top 25 nations that had highest demand for Indian engineering products during April-March 2019-20 over April-March 2018-19 (**Table5**).

India's top 25 engineering export destinations: Some observations

• Only 9 out of 25 countries, recorded positive cumulative growth of engineering exports during April-March 2019-20 over April-March 2018-19.

• India's engineering exports to its top 25 nations accounted for 75.5 percent of India's total engineering exports in April-March 2019-20, which is marginally higher than its share in April-March 2018-19.

• Interestingly, USA ranked as the numero uno destination for India's engineering products during March 2020 over March 2019 as well as for April-March 2019-20 over April-March 2018-19. Unlike the previous month's trend, India's exports to US recorded substantial negative growth in March 2020 over March 2019, with marginal positive cumulative growth in April-March 2019-20 over April-March 2018-19.

• Vietnam for the seventh time in a row recorded highest positive cumulative growth during April-March 2019-20 over April-March 2018-19, followed by Malaysia and Nigeria.

• Among the ASEAN countries under the top 25 engineering exports destinations, Vietnam and Malaysia only recorded high positive growth while Singapore and Indonesia recorded significant negative growth during April-March 2019-20 over April-March 2018-19, while Thailand recorded nominal negative growth during the same period.

• India's engineering exports to China recorded high positive cumulative growth during April-March 2019-20 over April-March 2018-19 but a negative monthly growth for March 2020 over March 2019, like the previous month.

• All the European nations falling under the top 25 engineering exports destinations, recorded negative monthly as well as negative cumulative growth during April-March 2019-20 over April-March 2018-19.

• India's engineering exports to its top 25 destinations during April-March 2019-20 over April-March 2018-19 recorded moderate negative growth, which is a little less than in comparison to the negative growth in India's total global engi-

Table3: Revised engineering exports for 2017-18 ($ million)

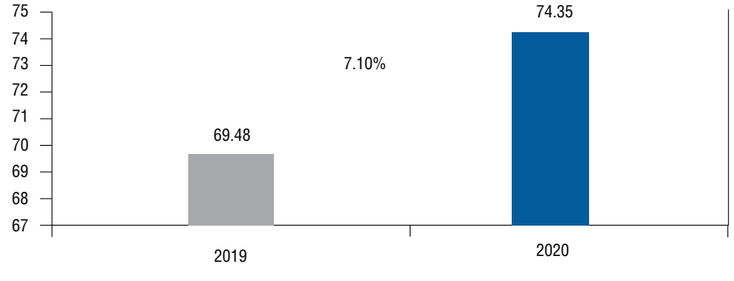
Month	2017-18	2018-19	Growth (%)
April	5902.86	7020.54*	18.93%
May	6047.26	6928.08*	14.57%
June	5703.28	6512.31*	14.19%
Quarter 1	**17653.40**	**20460.93***	**15.90%**
July	5595.63	6052.64*	8.17%
August	5766.60	6974.48*	20.95%
September	7088.19	6769.15*	-4.50%
Quarter 2	**18450.42**	**19796.27***	**7.29%**
October	5669.59	6151.93*	8.51%
November	6872.84	5740.17*	-16.48%
December	7163.56	6905.63*	-3.60%
Quarter 3	**19705.99**	**18797.73***	**-4.61%**
January	6217.28	6295.94*	1.27%
February	6332.92	6442.37*	1.73%
March	7839.32	9156.46*	16.88%
Quarter 4	**20389.52**	**21900.61***	**7.41%**
April-March	**76199.33**	**80955.54***	**6.24%**

** Revised data*
Source: DGCI&S

Table4A: USD-INR average exchange rate(1USD = INR) in March 2020

Month	2019	2020	Change y-o-y (%)	Direction
March	69.48	74.35	7.10	Depreciation

Figure2A: Movement of USD-INR exchange rate in March 2020



Source: RBI, FBIL, EEPC Research

neering exports during the same period.

India's region-wise engineering exports

Table6 and **Figure3** depict region-wise India's engineering exports for April-March 2019-20 as opposed to April-March 2018-19.

Region-wise engineering exports: some observations

• North America retained its numero uno position like before as the region with the highest shipment of engineering products from India during April-March 2019-20 over April-March 2018-19 with a share of 19.9 percent of total engineering exports.

• India's exports to CIS recorded highest positive growth for the third time during April-March 2019-20 over April-March 2018-19, followed by NE Asia.

• India's exports to EU and ASEAN+2 ranked second and third in global shipments of Indian engineering goods in April-March 2019-20 with a share of 18.8 percent and 14.9 percent of total engineering exports respectively.

• Only three regions – CIS, NE Asia, and MEWA – recorded positive cumulative growth in exports of engineering products from India during April-March 2019-20 over April-March 2018-19.

Panel-wise engineering exports

We begin by looking at the engineering panel-wise exports for March 2020 vis-à-vis March 2019 as well as April-March 2019-20 vis-à-vis April-March 2018-19. The data is given in **Table7**.

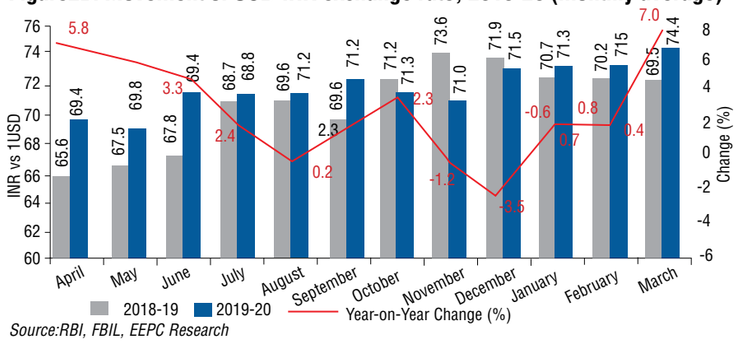
Panel-wise engineering exports: Some observations

• Year-on-year decline for March 2020 was witnessed in almost all the panels except for zinc and products panel. Out of 33 engineering panels 32 panels witnessed decline in exports during March 2020 vis-à-vis March 2019. Sharp decline was observed in some of the major panels

Table4B: USD-INR average exchange rate (1USD = INR) in 2019-20

Month	2018-19	2019-20	Change y-o-y (%)	Direction
April	65.64	69.42	5.76	Depreciation
May	67.53	69.77	3.32	Depreciation
June	67.79	69.44	2.43	Depreciation
July	68.69	68.81	0.17	Depreciation
August	69.55	71.15	2.30	Depreciation
September	72.21	71.33	-1.22	Appreciation
October	73.63	71.03	-3.53	Appreciation
November	71.85	71.45	-0.56	Appreciation
December	70.73	71.19	0.65	Depreciation
January	70.73	71.31	0.82	Depreciation
February	71.22	71.49	0.37	Depreciation
March	69.48	74.35	7.10	Depreciation

Figure2B: Movement of USD-INR exchange rate, 2019-20 (monthly average)



Source:RBI, FBIL, EEPC Research

like iron and steel and products, copper and products, industrial machinery like boilers, air condition and repair machinery, railway transport equipments, etc. In cumulative terms, 21 out of 33 panels exhibited a y-o-y decline.

• After recovering from monthly decline during December 2019, iron and steel figures continued its negative trend since January 2020 and observed sharp decline to the extent of 31 percent in March 2020 compared to March 2019. In cumulative terms, too, iron and steel figures dipped by 5 percent during the fiscal 2019-20 vis-à-vis the same period last fiscal.

• Products of iron and steel also displayed negative trend similar to the one observed in previous month, dipping sharply by 36.2 percent in March 2020 vis-à-vis March 2019. Cumulative exports also registered negative growth of 3.5 percent during April-March 2019-20 compared to same period last fiscal. The significant drop in products of iron and steel led to monthly decline in combined iron and steel and products of iron and steel of 33.24 percent in March 2020 corresponding to the same period last year. However, in cumulative terms the two panels together registered a fall of 4.27 percent.

• The non-ferrous metal segment witnessed sharp decline in export growth in copper and products of 55.07 percent in the month of March 2020 vis-à-vis March 2019, unlike the previous month of February 2020. Decline was also witnessed in the panels of aluminium, nickel, lead and tin of 22.3, 25.8, 29.8, and 61.6 percent respectively during March 2020 vis-à-vis March 2019. Zinc and products is the sole panel that recorded positive export growth to of 53.4 percent in March 2020 vis-à-vis March 2019. In cumulative terms though fall was noticed of 5.63 percent during April-March 2019-20 vis-à-vis April-March 2018-19.

• All the seven panels under industrial machinery exhibited negative growth in March 2020 that led the total industrial machinery panel dip by 37.5 percent during March 2020. In the month of March 2020, panels like industrial machinery for boilers dipped by 61.7 percent, machinery for IC engines (30.2), pumps and valves (37.8), air condition and repair machinery (49.5), industrial machinery for dairy (34.1) percent, machine tools (41), and machinery for ATMs (29.5) percent respectively. In cumulative terms, too, the panel registered negative growth of 6.79

Table5: Engineering exports country-wise, 2019-20 ($ million)

Country	March 2019	March 2020	Growth (%)	Apr-Mar 2018-19	Apr-Mar 2019-20	Growth (%)
USA	1141.13	929.61	-18.54	11905.72	11929.38	0.20
UAE	371.42	370.41	-0.27	4303.60	4465.50	3.76
Germany	272.60	189.15	-30.61	3244.12	2988.93	-7.87
Nepal	229.38	183.64	-19.94	2992.34	2633.93	-11.98
UK	283.46	139.36	-50.84	2801.10	2598.18	-7.24
Bangladesh	333.70	183.04	-45.15	2864.80	2452.78	-14.38
Mexico	207.07	136.85	-33.91	2505.31	2348.44	-6.26
Malaysia	147.55	192.86	30.71	1759.35	2327.67	32.30
Singapore	1431.23	106.06	-92.59	3483.59	2259.70	-35.13
China	219.27	126.51	-42.31	1834.60	2124.58	15.81
Italy	297.59	145.33	-51.16	2352.39	1937.29	-17.65
Korea	165.21	114.36	-30.78	1734.49	1887.65	8.83
Vietnam	171.59	109.50	-36.18	1179.44	1752.21	48.56
Nigeria	179.66	132.17	-26.43	1338.10	1743.97	30.33
Saudi Arabia	132.03	160.94	21.90	1438.95	1646.14	14.40
Indonesia	627.31	96.68	-84.59	2362.64	1618.40	-31.50
Thailand	148.49	98.94	-33.37	1619.36	1599.75	-1.21
South Africa	114.48	108.67	-5.08	1553.84	1527.70	-1.68
France	146.68	74.03	-49.53	1402.41	1360.89	-2.96
Sri Lanka	118.88	65.51	-44.90	1740.10	1222.18	-29.76
Turkey	91.70	101.11	10.26	1732.03	1172.39	-32.31
Brazil	126.52	87.62	-30.75	1028.34	1075.12	4.55
Japan	103.63	66.37	-35.95	1233.39	1004.42	-18.56
Belgium	109.57	59.13	-46.04	1615.09	993.24	-38.50
Netherlands	82.96	54.47	-34.34	1007.25	924.49	-8.22
Total engineering exports to top 25 countries	**7253.10**	**4032.32**	**-44.41**	**61032.36**	**57594.94**	**-5.63**
Total engineering exports	**9162.31**	**5266.90**	**-42.52**	**80955.54**	**76275.54**	**-5.78**
Share (%)	**79.16**	**76.56**		**75.39**	**75.51**	

Source: Department of Commerce, Government of India

Table6: Region-wise exports trend ($ million)

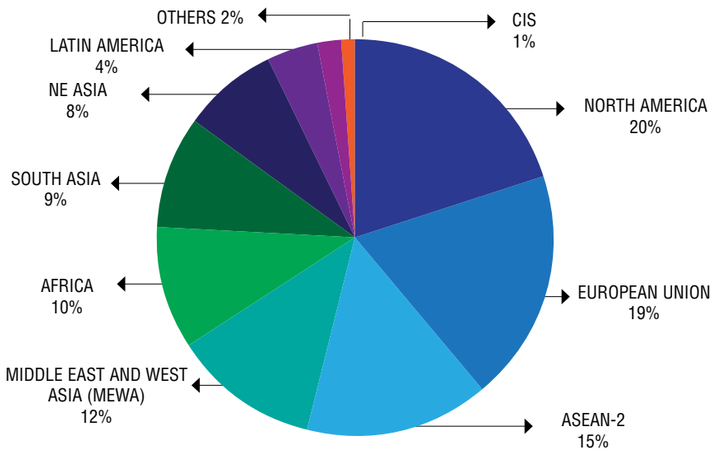
Region	March 2019	March 2020	Growth (%)	Apr-Mar 2018-19	Apr-Mar 2019-20	Growth (%)
North America	1445.44	1117.23	-22.7	15297.46	15168.29	-0.8
European Union	1519.90	869.29	-42.8	16133.27	14314.93	-11.3
ASEAN+2	2732.93	725.94	-73.4	12397.22	11370.85	-8.3
Middle East and West Asia (MEWA)	733.37	755.98	3.1	8798.83	8814.30	0.2
Africa	799.46	544.58	-31.9	7964.36	7771.91	-2.4
South Asia	762.28	463.10	-39.2	8242.22	6818.84	-17.3
NE Asia	552.32	353.18	-36.1	5771.50	5895.96	2.2
Latin America	413.94	248.98	-39.9	3452.40	3410.24	-1.2
Others	120.14	123.71	3.0	2108.40	1740.02	-17.5
CIS	82.54	64.91	-21.4	789.88	970.20	22.8
Grand total	**9162.31**	**5266.90**	**-42.5**	**80955.54**	**76275.54**	**-5.8**

*Note: *Figures have been rounded off. **Myanmar has been included in ASEAN+2 and not in South Asia, since ASEAN is a formal economic grouping.*
Source: DGCI&S; Department of Commerce, Government of India

percent during April-March 2019-20 compared to the same period last year.

- Electrical machinery and equipment, which is a major engineering exporting sector for India, experienced negative monthly export trends of 11.25 percent in March 2020 when compared to March 2019. In cumulative terms there was 6.46 percent growth in exports in April-March 2019-20 when compared to April-March 2018-19.
- The panel automobiles recorded 32.4 percent negative growth during March 2019 due to major drop in export of motor vehicles of 36.5 percent. In cumulative terms, the panel experienced a declining trend to the extent of 6.7 percent and, in both the cases, motor vehicles under automobiles registered a decline of 8.2 percent in April-March 2019-20 compared to the same period last year.
- Exports of aircrafts and spacecraft parts and products recorded negative monthly growth (55.96 percent) and negative cumulative growth (16.8 percent). Similarly, ship, boats and floating bodies exhibited negative monthly growth in exports (87.01 percent) and negative cumulative exports (19.93 percent).
- Negative monthly growth was witnessed in all the miscellaneous sectors including the major sectors like railway transport (-88.87), hand tools (-31.35), electrodes and accumulators (-25.94), accumulator and batteries (-22.07), bicycle and parts (-41.78), cranes, lifts and winches (-21.94), office equipments (-18.01), other construction machinery (-45.22), and prime mica products (-47.15) percent, respectively. Most prominently, medical and scientific devices registered 23.89 percent negative growth in exports in monthly terms and 4.96 percent positive growth in cumulative terms.

Figure3: India's region-wise exports during April-March 2019-20



Source: Data from DGCI&S and EEPC India analysis

Table7: Trends in engineering panel exports for March 2020 compared to March 2019, and April-March 2019-20 vis-à-vis April-March 2018-19 ($ million)

Product panel	March 2019	March 2020	Growth %	Apr18-Mar19	Apr19-Mar20	Growth %
Iron and steel and products made of iron and steel						
Iron and steel	906.93	627.05	-30.9	9731.16	9260.74	-4.8
Products of iron and steel	723.35	461.36	-36.2	7259.37	7004.58	-3.5
Subtotal	**1630.28**	**1088.41**	-33.24	**16990.5**	**16265.3**	-4.27
Non-ferrous metals and products made of non-ferrous metals						
Copper and products	128.83	57.88	-55.07	1067.18	918.11	-13.97
Aluminium and products	490.7	381.49	-22.26	5730.87	5114.52	-10.75
Zinc and products	36.86	56.54	53.39	603.01	569.07	-5.63
Nickel and products	5.58	4.14	-25.81	73.55	98.74	34.25
Lead and products	37.86	26.57	-29.82	402.9	372.06	-7.65
Tin and products	1.25	0.48	-61.60	9.83	9.86	0.31
Other non-ferrous metals	53.5	39.11	-26.90	545.67	546.37	0.13
Subtotal	**754.58**	**566.21**	-24.96	**8433.01**	**7628.73**	-9.54
Industrial machinery						
Industrial machinery like boilers, parts, etc	127.16	48.72	-61.7	824.42	815.68	-1.1
IC engines and parts	269.85	188.36	-30.2	2759.32	2555.68	-7.4
Pumps of all types	100.18	62.33	-37.78	1002.73	959.07	-4.35
Air condition and refrigerators	189.77	95.74	-49.5	1983.63	1383.08	-30.3
Industrial machinery for dairy, food processing, textiles etc	628.5	414.01	-34.1	5884.8	5674.27	-3.6
Machine tools	47.38	27.98	-40.95	491.84	438.54	-10.84
Machinery for injecting moulding, valves and ATMs	176.18	124.23	-29.5	1631.24	1761.4	8.0
Subtotal	**1539.02**	**961.37**	-37.5	**14578**	**13587.7**	-6.79
Electrical machinery	776.41	689.08	-11.25	8415.06	8958.81	6.46
Auto components and parts						
Motor vehicle/cars	831.33	528.06	-36.5	8510.5	7810.65	-8.2
Two and three wheelers	191.49	163.44	-14.6	2126.31	2110.78	-0.7
Auto components/part	546.73	365.77	-33.10	5784.5	5304.39	-8.30
Subtotal	**1569.55**	**1057.27**	-32.64	**16421.31**	**15225.82**	-7.28
Aircrafts and spacecraft parts and products	**175.74**	**77.4**	**-55.96**	**1715.28**	**1427.19**	**-16.80**
Ships, boats and floating products and parts	**1845.15**	**239.72**	**-87.01**	**5699.6**	**4563.9**	**-19.93**
Other engineering products						
Medical and scientific instruments	169.63	129.11	-23.89	1684.87	1768.37	4.96
Railway transport	48.52	5.4	-88.87	377.14	238.95	-36.64
Hand tools and cutting tools	71.84	49.32	-31.35	764.48	752.45	-1.57
Electrodes accumulators	5.32	3.94	-25.94	54.2	55.22	1.88
Accumulator and batteries	33.31	25.96	-22.07	375.37	410.83	9.45
Bicycle and parts	42.03	24.47	-41.78	396.28	373.15	-5.84
Cranes lifts and winches	53.46	41.73	-21.94	503.66	566.34	12.44
Office equipment	14.49	11.88	-18.01	141.27	189.24	33.96
Other construction machinery	160.83	88.1	-45.22	1660.78	1406.39	-15.32
Prime mica and mica products	3.69	1.95	-47.15	34.33	39.43	14.86
Other misc. items	268.45	205.58	-23.42	2710.39	2817.68	3.96
Subtotal	**871.57**	**587.44**	-32.60	**8702.77**	**8618.05**	-0.97
Total engineering exports	**9162.3**	**5266.9**	-42.52	**80955.54**	**76275.54**	-5.78

Source: Department of Commerce, Government of India

Engineering ferrous and non-ferrous products with negative growth in March 2020

- ***Export of iron and steel under chapter 72***: fell by 30.9 percent in March 2020 and 4.8 percent in April-March 2019-20
- ***Exports of products of iron and steel under chapter 73***: fell by 36.2 percent in March 2020 and 3.5 percent in April-March 2019-20
- ***Exports of copper and products under chapter 74***: fell by 55.07 percent in March 2020 and 13.97 percent in April-March 2019-20
- ***Exports of aluminium and products under chapter 76***: fell by 22.3 percent in March 2020 and 10.75 percent in April-March 2019-20
- ***Exports of nickel and products under chapter 75***: fell by 25.8 percent in March 2020 but cumulatively increased by 34.25 percent in April-March 2019-20
- ***Exports of lead and products under chapter 78***: fell by 29.8 percent in March 2020 and 7.65 percent in April-March 2019-20
- ***Exports of tin and products under chapter 80***: fell by 61.6 percent in March 2020 but cumulatively increased by 0.31 percent in April-March 2019-20.

Data for ferrous and non-ferrous panels experiencing decline in March 2020 vis-à-vis March 2019

Table 8A: Chapter 72: Iron and steel ($ million)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	900.36	837.85	**-6.9**	715.13	**-14.6**
May	787.41	776.79	**-1.3**	692.45	**-10.9**
June	691.32	735.22	**6.4**	653.72	**-11.1**
July	850.94	804.63	**-5.4**	749.6	**-6.8**
August	899.14	1053.2	**17.1**	907.48	**-13.8**
September	1064.53	843.61	**-20.8**	933.47	**10.7**
October	941.68	755.77	**-19.7**	903.55	**19.6**
November	1203.34	710.91	**-40.9**	831.35	**16.9**
December	1069.17	687.04	**-35.8**	851.57	**23.9**
January	916.07	816.34	**-10.9**	735.75	**-9.9**
February	**879.24**	**802.61**	**-8.8**	**637.73**	**-20.5**
March	**1015.85**	**906.93**	**-10.68**	**627.05**	**-30.9**
April-March	**11244.72**	**9731.16**	**-13.96**	**9260.74**	**-4.83**

Table8B: Chapter 72: Iron and steel ('000 tons)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	1286.78	1018.92	**-20.82**	1006.52	**-1.22**
May	1118.10	887.02	**-20.67**	941.31	**6.12**
June	952.26	860.95	**-9.59**	843.09	**-2.07**
July	1337.86	973.34	**-27.25**	1086.62	**11.64**
August	1300.24	1390.90	**6.97**	1462.13	**5.12**
September	1573.39	1060.65	**-32.59**	1561.48	**47.22**
October	1376.31	924.98	**-32.79**	1525.51	**64.92**
November	1798.00	874.52	**-51.36**	1440.58	**64.73**
December	1520.10	888.97	**-41.52**	1478.81	**66.35**
January	1225.14	1140.41	**-6.92**	1173.78	**2.93**
February	**1135.11**	**1164.30**	**2.57**		
March	**1264.93**	**1291.35**	**2.09 (April to January)**		**6.90**
April-March	**15888.26**	**12476.30**	**-21.47**	**12519.88**	

Table9A: Chapter 73: Products of iron and steel ($ million)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	529.64	565.04	**6.6**	558.78	**-1.1**
May	511.27	575.87	**12.6**	544.83	**-5.3**
June	518.62	587.78	**13.3**	591.46	**0.6**
July	520.50	539.72	**3.6**	596.79	**10.5**
August	593.79	691.22	**16.4**	624.46	**-9.3**
September	641.24	615.69	**-3.98**	570.35	**-7.36**
October	506.61	569.97	**12.51**	592.72	**3.99**
November	542.52	533.39	**-1.68**	572.77	**7.38**
December	674.25	666.88	**-1.09**	653.10	**-2.07**
January	492.37	562.16	**14.17**	628.11	**11.73**
February	**535.11**	**539.59**	**0.84**	**590.07**	**9.35**
March	**654.91**	**723.35**	**10.91**	**461.36**	**-36.2**
April-March	**6795.22**	**7259.37**	**7.28**	**7004.58**	**-3.51**

Table9B: Chapter 73: Products of iron and steel ('000 tons)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	310.06	265.94	**-14.23**	264.77	**-0.44**
May	311.18	295.46	**-5.05**	248.23	**-15.99**
June	296.59	288.75	**-2.64**	293.38	**1.60**
July	287.19	237.38	**-17.34**	271.11	**14.21**
August	343.02	327.95	**-4.39**	284.78	**-13.16**
September	362.63	293.51	**-19.06**	259.36	**-11.63**
October	253.61	247.69	**-2.33**	263.78	**6.49**
November	280.02	241.06	**-13.91**	**267.61**	**11.01**
December	370.05	323.76	**-12.52**	305.78	**-5.55**
January	327.68	278.10	**-15.13**	381.53	**37.19**
February	**301.15**	**276.80**	**-8.07**		
March	**360.09**	**349.72**	**-2.88**	**(April to January)**	
April-March	**3803.32**	**3426.18**	**-9.92**	**2840.38**	

Table10A: Chapter 74: Copper and products ($ million) contd

Month	2017-18	2018-19	Growth (%)	2019-20	Growth ()
April	202.47	109.54	**-48.6**	67.17	**-38.7**
May	236.24	66.38	**-74.01**	63.75	**-4.0**
June	281.22	69.23	**-77.19**	56.46	**-18.4**
July	257.73	55.65	**-80.19**	62.53	**12.4**
August	319.68	77.73	**-77.36**	62.71	**-19.3**
September	340.95	95.89	**-73.68**	87.55	**-8.7**
October	297.22	108.51	**-65.54**	115.43	**6.4**

Table10A: Chapter 74: Copper and products ($ million)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth ()
November	296.92	113.36	**-63.28**	**56.48**	**-50.2**
December	303.64	109.86	**-65.67**	135.37	**23.2**
January	315.88	75.44	**-77.81**	83.10	**10.2**
February	**248.80**	**56.76**	**-79.59**	**69.68**	**22.8**
March	**317.95**	**128.83**	**-62.61**	**57.88**	**-55.1**
April-March	**3418.76**	**1067.18**	**-70.00**	**918.11**	**-13.97**

Table 10B: Chapter 74: Copper and products (‘000 tons)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	33.06	15.12	**-54.26**	7.32	**-51.88**
May	37.93	7.34	**-80.63**	7.21	**-1.76**
June	46.04	7.03	**-84.73**	5.60	**-20.29**
July	42.88	6.44	**-84.97**	7.66	**18.84**
August	46.69	9.35	**-79.97**	6.78	**-27.24**
September	49.63	12.68	**-74.43**	11.53	**-9.13**
October	44.00	15.35	**-65.11**	15.91	**3.63**
November	42.62	15.24	**-64.23**	**7.12**	**-53.27**
December	43.36	15.24	**-64.84**	20.54	**34.73**
January	43.82	8.80	**-79.91**	39.59	**349.78**
February	**36.40**	**5.93**	**-83.71**		
March	**45.00**	**15.99**	**-64.45 (April to January)**		
April-March	**511.49**	**134.57**	**-73.69**	**129.30**	

Table11A: Chapter 76: Aluminium and products ($ million)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	395.75	412.51	**3.6**	407.91	**-1.1**
May	291.4	514.50	**75.9**	375.44	**-27.0**
June	331.32	542.75	**63.2**	412.74	**-24.0**
July	341.04	475.16	**38.8**	399.74	**-15.9**
August	359.46	504.19	**40.3**	417.68	**-17.2**
September	451.66	494.77	**9.5**	490.96	**-0.8**
October	405.08	478.33	**44.97**	399.72	**-16.4**
November	422.65	469.76	**11.1**	**470.45**	**0.1**
December	477.19	473.85	**-0.7**	524.59	**10.7**
January	439.12	463.83	**5.6**	428.82	**-7.5**
February	**271.85**	**410.52**	**41.09**	**404.16**	**-1.5**
March	**519.83**	**490.70**	**-6.14**	**381.49**	**-22.3**
April-March	**4775.76**	**4829.65**	**19.42**	**4328.05**	**-10.4**

Table 11B: Chapter 76: Aluminium and products (‘000 tons)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	164.65	163.31	**-0.82**	178.10	**9.05**
May	129.38	197.50	**52.65**	166.61	**-15.64**
June	147.60	207.71	**40.73**	190.31	**-8.38**
July	150.35	185.54	**23.41**	179.80	**-3.10**
August	156.97	198.46	**26.43**	186.99	**-5.78**
September	192.78	202.27	**4.92**	221.73	**9.62**
October	170.34	200.96	**18.00**	129.26	**-35.88**
November	174.01	197.03	**13.23**	**179.77**	**-8.79**
December	196.09	195.44	**-0.33**	245.15	**25.42**
January	179.89	202.26	**13.29**	199.89	**-1.37**
February	**152.94**	**178.03**	**16.41**		
March	**197.78**	**208.88**	**5.61 (April to January)**		**-22.3**
April-March	**2011.78**	**2337.85**	**16.21**	**1877.64**	

Table12A: Chapter 75: Nickel and products ($ million)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	2.74	6.1	**122.6**	4.45	**-27.0**
May	2.31	6.72	**190.9**	35.23	**424.3**
June	2.16	6.81	**215.3**	5.50	**-19.2**
July	2.65	6.08	**129.4**	4.80	**-21.1**
August	6.69	7.47	**11.7**	4.92	**-34.1**
September	3.28	5.24	**59.70**	6.07	**15.89**
October	6.42	5.90	**-8.16**	9.34	**40.46**
November	2.98	3.88	**30.22**	**4.91**	**26.58**
December	2.89	5.35	**85.33**	6.88	**28.47**
January	5.24	2.75	**-47.58**	6.24	**127.22**
February	**3.77**	**5.89**	**44.45**	**3.84**	**-34.8**
March	**3.73**	**5.58**	**38.23**	**4.14**	**-25.8**
April-March	**66.53**	**73.55**	**57.02**	**98.74**	**34.25**

Table12B: Chapter 75: Nickel and products (‘000 tons) contd

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	0.15	0.32	**115.74**	0.26	**-17.66**
May	0.14	0.32	**134.64**	0.23	**-29.68**
June	0.12	0.33	**170.02**	0.28	**-15.92**
July	0.18	0.28	**55.27**	0.31	**9.28**
August	0.56	0.35	**-37.04**	0.24	**-31.30**

Table12B: Chapter 75: Nickel and products ('000 tons)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
September	0.22	0.30	**38.77**	0.43	**43.57**
October	0.43	0.32	**-24.22**	0.33	**-1.04**
November	0.21	0.25	**19.32**	0.25	**-0.94**
December	0.14	0.22	**56.06**	0.34	**50.15**
January	0.20	0.34	**74.14**	0.43	**29.03**
February	0.25	0.36	**46.36**		
March	0.21	0.35	**67.50 (April to January)**		
April-March	2.8	3.76	**34.13**	3.10	

Table13A: Chapter 78: Lead and products ($ million)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	26.58	27.35	**2.91**	30.1	**10.1**
May	15.41	35.8	**132.35**	24.75	**-30.9**
June	15.02	32.68	**117.56**	19.5	**-40.3**
July	27.13	31.24	**15.15**	19.47	**-37.7**
August	35.27	33.04	**-6.33**	38.90	**17.7**
September	41.56	31.05	**-25.28**	36.69	**18.2**
October	30.09	38.15	**26.80**	39.60	**3.8**
November	31.63	28.69	**-9.31**	**45.76**	**59.5**
December	38.94	43.47	**11.64**	40.96	**5.8**
January	36.39	38.05	**4.9**	25.66	**-32.6**
February	**41.01**	**25.52**	**-37.78**	**23.25**	**-8.9**
March	**57.62**	**37.86**	**-34.29**	**26.57**	**-29.8**
April-March	**396.65**	**402.9**	**1.58**	**372.06**	**-7.65**

Table13B: Chapter 78: Lead and products ('000 tons)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	11.10	11.02	**-0.73**	13.89	**26.05**
May	6.39	14.68	**129.54**	11.92	**-18.81**
June	6.50	13.20	**102.92**	9.49	**-28.04**
July	11.81	12.34	**4.49**	9.42	**-23.67**
August	15.20	13.81	**-9.13**	18.73	**35.59**
September	17.14	13.81	**-19.43**	17.10	**23.84**
October	12.13	17.25	**42.13**	18.13	**5.12**
November	12.61	13.17	**4.53**	**20.53**	**55.87**
December	15.27	20.65	**35.23**	18.71	**-9.40**
January	14.00	17.89	**27.74**	12.12	**-32.24**
February	**15.67**	**11.84**	**-24.43**		
March	**21.67**	**17.13**	**-20.92 (April to January)**		**-29.8**
April-March	**159.54**	**176.84**	**10.84**	**150.13**	

Table14A: Chapter 80: Tin and products ($ million)

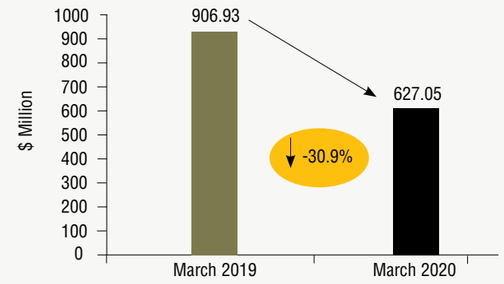
Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	1.18	0.56	**-52.46**	0.65	**16.1**
May	1.98	0.38	**-80.69**	0.91	**139.5**
June	0.73	0.84	**15.16**	0.97	**15.5**
July	0.45	0.84	**88.10**	0.48	**-42.9**
August	0.69	0.81	**17.60**	1.22	**50.6**
September	1.58	0.58	**-62.99**	0.84	**44.8**
October	0.50	0.69	**36.37**	0.78	**13.0**
November	0.66	1.17	**78.69**	1.10	**-6.0**
December	0.51	1.23	**139.90**	0.46	**62.6**
January	1.27	0.57	**-54.83**	1.24	**117.5**
February	**1.16**	**1.26**	**8.79**	**0.54**	**-57.1**
March	**1.12**	**1.25**	**14.79**	**0.48**	**-61.60**
April-March	**11.84**	**9.83**	**-13.50**	**9.86**	**0.31**

Table14B: Chapter 80: Tin and products ('000 tons)

Month	2017-18	2018-19	Growth (%)	2019-20	Growth (%)
April	0.15	0.07	**-49.5**	0.06	**-15.05**
May	0.16	0.12	**-24.5**	0.11	**-2.92**
June	0.14	0.13	**-5.7**	0.01	**-23.99**
July	0.069	0.068	**-2.1**	0.061	**-10.69**
August	0.562	0.727	**29.3**	0.11	**52.22**
September	0.038	0.038	**0.0**	0.065	**72.57**
October	0.037	0.043	**16.2**	0.13	**193.45**
November	0.05	0.06	**23.40**	**0.07**	**17.38**
December	0.04	0.07	**53.79**	0.04	**-42.63**
January	0.07	0.03	**-51.39**	0.13	**292.15**
February	**0.062**	**0.061**	**-1.39**		
March	**0.07**	**0.08**	**9.98 (April to January)**		
April-March	**0.996**	**0.859**	**-13.75**	**0.83**	

Slump in iron and steel exports

Figure4: Slump in iron and steel exports, March 2020 v/s March 2019 ($ million)

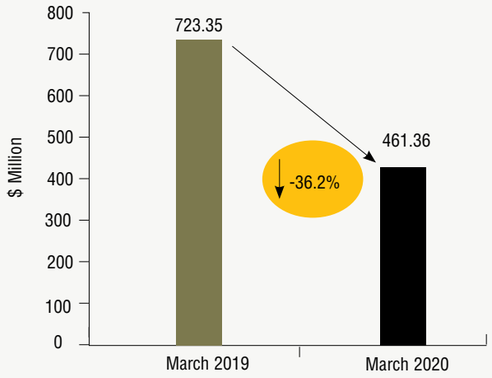


Reasons for the fall

Iron and steel exports experienced a decline in the last month due to various reasons including high domestic demand and poor access to raw materials. The impact of COVID-19 was not so significant owing to the fact that export orders had been received and export processing was happening smoothly. However, this month all of India's exports have been heavily impacted due to the rapid spread of the COVID-19 pandemic globally and disruption of global supply chains.

Slump in products of iron and steel exports

Figure5: Slump in products of iron and steel exports, March 2020 v/s March 2019 ($ million)

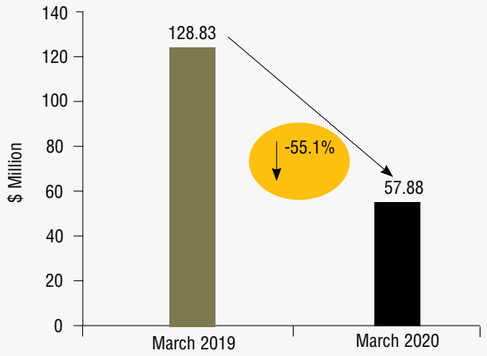


Reasons for the fall

As explained in the case of iron and steel exports, exports of products of iron and steel are also reeling under the impact of COVID-19 pandemic.

Slump in copper and products exports

Figure6: Slump in copper and products exports, March 2020 v/s March 2019 ($ million)

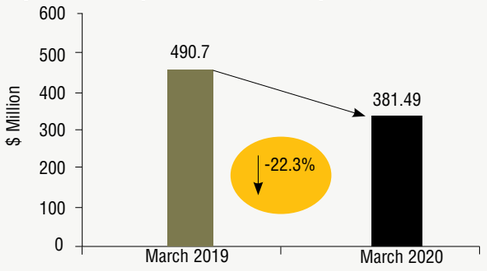


Reasons for the fall

India's copper exports have been on the decline during the last year mainly due to the closure of the Starlight Smelting plant in Tamil Nadu. However, since the last two to three months copper exports were improving in the country. This month's slump can be attributed to the global COVID-19 pandemic.

Slump in aluminium and products exports

Figure7: Slump in aluminium exports, March 2020 v/s March2019 ($ million)

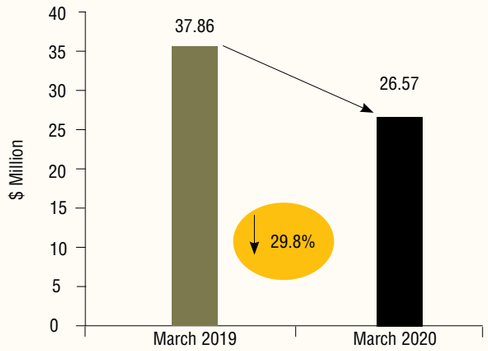


Reasons for the fall

The global COVID-19 pandemic and subsequent disruption of the global value chain is primarily accountable for the falling aluminium exports in March 2020. In fact the LME prices of aluminium have been on the decline since sometime which implies lesser gains from trade.

Slump in lead and lead products exports

Figure8: Slump in lead and products exports, March 2020 v/s March 2019 ($ million)

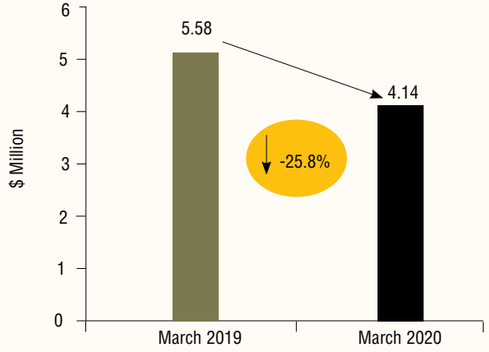


Reasons for the fall

Globally all base metal markets have been reeling under the COVID-19 pandemic, disruption of key value chains and falling LME prices.

Slump in nickel and products exports

Figure9: Slump in nickel and products exports, March 2020 v/s March 2019 ($ million)

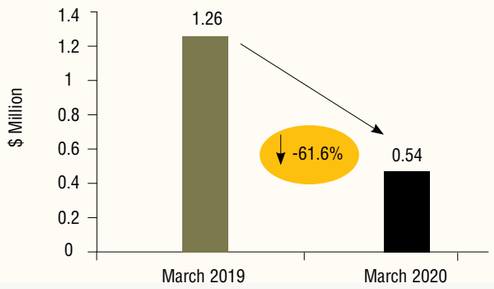


Reasons for the fall

Globally all base metal markets have been reeling under COVID-19 pandemic, disruption of key value chains and falling LME prices.

Slump in tin and products exports

Figure10: Slump in tin and products exports, March 2020 v/s March 2019 ($ million)



Reasons for the fall

Globally all base metal markets have been reeling under COVID-19 pandemic, disruption of key value chains and falling LME prices.

Engineering panels – country-wise analysis

We now analyse the performance of some of the important products during March 2020. We have taken the major panels and computed the top importers and sharp declines to get an idea of the current trade pattern. (**Tables 15-23**)

Export of iron and steel

• Vietnam, Nepal, and UAE were the three top importers of Indian iron and steel during April-March 2019-20 with market shares of 11.86, 10.61, and 8.36 percent respectively.

• Vietnam, China, and Egypt recorded more than 50 percent y-o-y growth in exports of Indian iron and steel during April-March 2019-20 compared to April-March 2018-19.

• Ethiopia, Saudi Arabia and Korea experienced sharp downfall to the extent of more than 35 percent drop in exports during April-March 2019-20 compared to same period last fiscal.

Export of products of iron and steel

• USA, UAE, and Germany were the three top importers of India's products of iron and steel during April-March 2019-20 with 22.69, 6, and 5.37 percent shares respectively in India's global import of the same.

• Peru, Libya, Cameroon, and Ethiopia experienced more than 250 percent growth in import of products of iron and steel during April-March 2019-20.

• Iraq, Mauritania, Egypt, and Tanzania conceded substantial decline in imports by more than 60 percent for the product group from India during April-March 2019-20.

Export of industrial machinery

• USA was the largest importer of Indian industrial machinery during April-March 2019-20 with 15.64 percent share in India's global import of the product group. Thailand and Bangladesh were the two immediate followers with 5.07 and 4.73 percent shares respectively.

• Russia and Uganda were among the major importing nations witnessing growth of 99.66 and 41.09 percent respectively in imports of industrial machinery from India during April-March 2019-20 over the same period last fiscal.

• Among the major importers, Iran, Vietnam, Indonesia, and Kenya recorded over 30 percent y-o-y decline in imports during April-March 2019-20.

Export of Automobiles

• Mexico, USA, and South Africa were the three top importers of India's automobiles during April-March 2019-20 with 14.12, 10.17, and 9.28 percent share in India's global exports respectively over the same period last fiscal.

• Saudi Arabia recorded over 100 percent growth in imports of the product group from India during April-March 2019-20 over the same period last fiscal.

• Countries like Belgium, Egypt, Spain, and Algeria saw their imports of automobile lower by more than 65 percent during April-March 2019-20 compared to same period last fiscal.

Export of non-ferrous metals

• Malaysia, Korea, and USA were the three top importers of India's non-ferrous metals and products during April-March 2019-20 with 17.27, 15.07, and 12.06 percent shares respectively in India's global import of the same.

• Tanzania and Egypt experienced more than 45 percent growth in import of non-ferrous metals and products during April-March 2019-20.

• Turkey, Mexico, and Spain conceded substantial decline in imports by more than 55 percent for the said product group from India during April-March 2019-20 vis-à-vis same period last fiscal.

Export of electrical machinery and components

• USA, Germany, and UK were the three top importers of Indian electrical machinery and components during April-March 2020 with market shares of 31.21, 9.84, and 7.14 percent respectively. Out of these top five importers, Singapore experienced a drop in imports during April-March 2019-20 compared to April-March 2018-19.

• Nigeria, South Africa, Turkey, and Poland recorded more than 50 percent growth in imports of India's electrical machinery and components during April-March 2019-20 vis-à-vis April-March 2018-19.

• Belgium and Indonesia experienced sharp decline of about 70 percent in their imports in April-March 2019-20 when compared to April-March 2018-19. It is also the case for Egypt and Japan which experienced more than 50 percent drop.

Export of aircrafts and space crafts

• USA, UK, and Singapore were the top three importers of India's aircrafts and spacecrafts during April-March 2019-20 with around 35.2, 12.08, and 11.78 percent shares respectively in India's total global exports of the product.

• Mauritius, UAE, and Mexico registered substantial growth of more than 100 percent in imports of the product group from India during April-March 2019-20 as compared with the same period last fiscal.

• On the flipside, demand for India's aircrafts and spacecrafts from Seychelles, Ireland, Belgium, and Switzerland dropped more than 65 percent on a y-o-y basis during April-March 2019-20 when compared to April-March 2018-19.

Export of ships, boats and floating structures and parts

• UAE, Singapore, and Indonesia became the largest importers of ships, boats and floating structures followed by Cyprus and Sri Lanka. Their respective shares were 28.66, 20.41, 11.56, 7.67, and 5.18 percent.

• Imports to Norway, UK, and Netherlands recorded meteoric increase as they

Table15: Export of iron and steel ($ million)

Country	March 18	March 19	Growth %	Apr-Mar 18-19	Apr-Mar 19-20	Growth %
TOP 5 IMPORTERS						
Vietnam	77.39	59.47	-23.15	486.22	1098.14	125.85
Nepal	75.50	82.61	9.42	1140.02	982.89	-13.78
UAE	83.74	71.43	-14.70	733.35	774.53	5.61
Italy	154.89	61.90	-60.04	884.33	727.25	-17.76
China	45.97	19.79	-56.96	318.91	513.90	61.15
HIGH CUMULATIVE GROWTH						
Vietnam	77.39	59.47	-23.15	486.22	1098.14	125.85
China	45.97	19.79	-56.96	318.91	513.90	61.15
Egypt	4.67	7.81	67.39	45.27	69.98	54.58
Bhutan	7.18	5.75	-19.85	55.09	81.61	48.13
Russia	8.17	7.54	-7.63	80.99	112.99	39.51
Oman	3.67	4.92	33.86	84.31	114.15	35.40
SHARP CUMULATIVE DECLINE						
Ethiopia	8.08	3.08	-61.90	85.79	49.13	-42.73
Saudi Arabia	3.86	8.47	119.13	158.72	98.96	-37.65
Korea	29.67	17.44	-41.22	448.98	284.22	-36.70
Mexico	8.16	5.19	-36.32	105.53	70.88	-32.84
USA	20.52	10.40	-49.31	247.40	170.58	-31.05
Spain	25.11	4.46	-82.25	310.76	215.47	-30.66

Source: Department of Commerce Government of India

Table16: Export of products iron and steel ($ million)

Country	March 18	March 19	Growth %	Apr-Mar 18-19	Apr-Mar 19-20	Growth %
TOP 5 IMPORTERS						
USA	158.14	98.60	-37.65	1692.91	1589.07	-6.13
UAE	46.95	32.35	-31.09	453.81	419.98	-7.46
Germany	34.26	23.50	-31.40	423.53	376.08	-11.20
Canada	20.01	14.83	-25.87	272.66	373.58	37.01
UK	28.39	17.02	-40.04	318.50	296.54	-6.89
HIGH CUMULATIVE GROWTH						
Peru	1.33	4.25	218.82	6.59	70.02	961.69
Libya	0.14	0.75	416.12	4.03	25.19	525.56
Cameroon	0.13	3.86	2894.29	4.56	26.34	478.06
Ethiopia	0.78	4.24	440.61	13.43	51.03	279.95
Oman	6.60	4.57	-30.77	77.67	120.50	55.15
Indonesia	6.20	7.10	14.57	58.75	90.20	53.52
SHARP CUMULATIVE DECLINE						
Mauritania	3.53	0.80	-77.42	39.30	6.39	-83.75
Iraq	0.32	0.82	156.60	32.00	6.29	-80.33
Tanzania	5.42	0.85	-84.28	80.89	30.07	-62.83

Table16: Export of products iron and steel ($ million) contd

Country	March 18	March 19	Growth %	Apr-Mar 18-19	Apr-Mar 19-20	Growth %
SHARP CUMULATIVE DECLINE						
Egypt	5.34	1.25	-76.64	89.72	34.51	-61.53
Chile	68.89	0.93	-98.65	123.83	52.47	-57.62
Kuwait	4.65	3.67	-21.10	103.16	63.62	-38.33
South Africa	5.22	4.76	-8.95	88.08	58.70	-33.36

Source: Department of Commerce Government of India

Table17: Export of industrial machinery ($ million)

Country	March 18	March 19	Growth %	Apr-Mar 18-19	Apr-Mar 19-20	Growth %
TOP 5 IMPORTERS						
USA	221.76	142.80	-35.61	2324.52	2125.33	-8.57
Thailand	64.25	53.39	-16.90	634.60	688.95	8.56
Bangladesh	109.96	38.91	-64.61	727.14	642.18	-11.68
Germany	71.83	35.66	-50.36	662.49	591.70	-10.69
China	53.81	50.18	-6.76	518.07	577.49	11.47
HIGH CUMULATIVE GROWTH						
Russia	17.04	11.12	-34.76	134.91	269.35	99.66
Uganda	8.15	5.19	-36.31	60.25	85.01	41.09
Singapore	27.21	19.76	-27.40	229.26	313.39	36.70
Myanmar	8.21	3.24	-60.51	55.76	69.95	25.45
Nigeria	71.30	37.17	-47.86	431.39	538.72	24.88
Brazil	15.88	24.12	51.90	189.35	233.44	23.29
Philippines	9.28	4.53	-51.19	78.33	95.99	22.55
SHARP CUMULATIVE DECLINE						
Iran	4.61	5.55	20.20	166.23	57.60	-65.35
Vietnam	38.63	11.29	-70.78	207.77	125.18	-39.75
Indonesia	39.93	17.36	-56.54	405.69	275.89	-31.99
Kenya	13.68	9.60	-29.82	196.20	135.41	-30.98
Saudi Arabia	33.73	17.86	-47.04	382.56	269.48	-29.56
Spain	21.01	14.48	-31.08	248.80	182.76	-26.54

Source: Department of Commerce Government of India

Table18: Export of automobiles ($ million)

Country	March 18	March 19	Growth %	Apr-Mar 18-19	Apr-Mar 19-20	Growth %
TOP 5 IMPORTERS						
Mexico	122.50	70.30	-42.61	1343.64	1400.42	4.23
USA	116.14	116.18	0.03	1178.07	1008.85	-14.36
South Africa	49.24	65.46	32.93	708.40	920.31	29.92
Saudi Arabia	46.50	85.14	83.10	335.14	726.68	116.83
Nigeria	46.13	39.99	-13.32	432.65	543.65	25.65

Table18: Export of automobiles ($ million) contd

Country	March 18	March 19	Growth %	Apr-Mar 18-19	Apr-Mar 19-20	Growth %
HIGH CUMULATIVE GROWTH						
Saudi Arabia	46.50	85.14	83.10	335.14	726.68	116.83
UAE	28.39	19.84	-30.11	225.55	330.88	46.70
Peru	11.88	11.86	-0.20	120.78	160.94	33.25
South Africa	49.24	65.46	32.93	708.40	920.31	29.92
Kuwait	9.57	1.69	-82.38	67.30	87.16	29.50
Nigeria	46.13	39.99	-13.32	432.65	543.65	25.65
Iraq	4.19	7.11	69.84	15.92	26.25	64.95
Qatar	3.60	7.67	113.24	18.99	28.94	52.36
SHARP CUMULATIVE DECLINE						
Belgium	5.98	0.00	-100.00	62.64	10.19	-83.73
Egypt	14.66	3.34	-77.20	149.20	36.54	-75.51
Algeria	41.81	0.00	-100.00	287.06	80.74	-71.87
Spain	4.22	0.18	-95.76	66.60	20.74	-68.86
Indonesia	20.12	10.06	-50.02	373.95	177.79	-52.46
Canada	16.18	6.56	-59.44	137.80	70.46	-48.87
Indonesia	37.27	4.49	-87.94	279.72	150.60	-46.16

Note: Automobiles sector includes motor vehicles and two- and three-wheelers
Source: Department of Commerce Government of India

Table19: Export of nonferrous metals ($ million)

Country	March 18	March 19	Growth %	Apr-Mar 18-19	Apr-Mar 19-20	Growth %
TOP 5 IMPORTERS						
Malaysia	78.10	129.12	65.33	965.47	1317.54	36.47
Korea	80.96	67.07	-17.15	860.38	1149.65	33.62
USA	101.32	57.50	-43.25	1069.34	919.88	-13.98
China	68.43	22.29	-67.43	332.98	458.36	37.65
Taiwan	11.92	15.07	26.39	341.96	256.15	-25.09
HIGH CUMULATIVE GROWTH						
Tanzania	1.38	2.32	68.56	19.87	31.06	56.27
Egypt	1.74	3.28	88.94	37.14	54.95	47.94
China	68.43	22.29	-67.43	332.98	458.36	37.65
Malaysia	78.10	129.12	65.33	965.47	1317.54	36.47
Korea	80.96	67.07	-17.15	860.38	1149.65	33.62
Israel	5.20	5.15	-1.00	49.34	62.12	25.90
SHARP CUMULATIVE DECLINE						
Turkey	3.85	4.45	15.73	507.22	51.57	-89.83
Spain	14.09	7.24	-48.61	216.88	85.71	-60.48
Mexico	14.80	11.90	-19.63	318.73	143.12	-55.10
Italy	22.35	18.90	-15.42	276.54	126.71	-54.18
Netherlands	12.15	5.58	-54.07	179.73	94.96	-47.16
Bangladesh	15.18	12.34	-18.68	251.75	171.91	-31.72

Source: Department of Commerce Government of India

Table20: Export of electrical machinery and components ($ million)

Country	March 18	March 19	Growth %	Apr-Mar 18-19	Apr-Mar 19-20	Growth %
TOP 5 IMPORTERS						
USA	190.42	280.32	47.22	1997.49	2796.10	39.98
Germany	55.47	65.66	18.38	880.72	881.20	0.05
UK	86.60	39.42	-54.48	557.74	639.97	14.74
Singapore	19.61	16.01	-18.34	512.40	422.38	-17.57
France	32.02	10.18	-68.20	260.63	297.05	13.97
HIGH CUMULATIVE GROWTH						
Nigeria	20.79	28.95	39.26	99.64	268.78	169.76
South Africa	4.53	12.18	169.03	39.07	76.22	95.09
Turkey	8.24	22.40	171.73	109.96	193.15	75.65
Poland	9.12	4.08	-55.22	80.56	123.97	53.89
USA	190.42	280.32	47.22	1997.49	2796.10	39.98
SHARP CUMULATIVE DECLINE						
Belgium	11.76	2.00	-83.02	330.03	99.74	-69.78
Indonesia	6.41	3.10	-51.58	166.69	50.60	-69.64
Egypt	4.21	2.21	-47.45	54.98	23.36	-57.51
Japan	5.17	4.45	-13.97	238.97	116.92	-51.07
Switzerland	3.26	0.84	-74.35	46.12	24.42	-47.06

Source: Department of Commerce Government of India

Table21: Export of aircrafts and spacecrafts ($ million)

Country	March 18	March 19	Growth %	Apr-Mar 18-19	Apr-Mar 19-20	Growth %
TOP 5 IMPORTERS						
USA	70.10	29.20	-58.34	557.49	502.38	-9.88
UK	29.79	9.06	-69.59	229.49	172.37	-24.89
Singapore	12.85	6.99	-45.62	226.49	168.10	-25.78
France	27.69	8.31	-69.98	238.52	165.79	-30.50
Germany	7.09	5.02	-29.22	109.07	76.42	-29.93
HIGH CUMULATIVE GROWTH						
Mauritius	0.08	0.00	-99.74	0.58	4.53	680.03
UAE	0.27	0.52	92.91	8.17	22.51	175.53
Mexico	0.70	1.29	83.66	5.98	12.64	111.33
Spain	0.55	0.34	-37.70	2.41	4.74	96.28
Russia	0.33	0.59	77.77	16.25	31.67	94.88
Vietnam	0.13	0.00	-100.00	3.17	5.93	86.81
SHARP CUMULATIVE DECLINE						
Seychelles	0.31	0.00	-100.00	26.39	0.15	-99.44
Belgium	0.04	0.13	212.61	13.15	1.91	-85.47
Ireland	0.14	0.02	-83.06	12.94	2.15	-83.37
Switzerland	0.80	0.15	-81.45	22.33	7.64	-65.77
Poland	0.51	0.35	-30.22	12.45	4.45	-64.30

Source: Department of Commerce Government of India

Table22: Export of ships boats and floating structures and parts ($ million)

Country	March 18	March 19	Growth %	Apr-Mar 18-19	Apr-Mar 19-20	Growth %
TOP 5 IMPORTERS						
UAE	34.44	119.37	246.64	1357.70	1307.85	-3.67
Singapore	1283.95	27.35	-97.87	1989.65	931.30	-53.19
Indonesia	504.08	19.95	-96.04	734.61	527.45	-28.20
Cyprus	0.00	0.00	-	0.00	349.98	-
Oman	0.00	62.45	1604545.94	276.46	236.56	-14.43
HIGH CUMULATIVE GROWTH						
Norway	0.00	0.00	-	0.00	58.33	7879122.47
U K	0.00	0.00	-	0.01	209.36	1810300.53
Netherlands	0.00	0.02	-	0.03	74.63	218931.12
Malaysia	0.00	0.00	-	8.52	198.93	2235.47
France	0.00	0.00	-	2.97	22.55	658.17
SHARP CUMULATIVE DECLINE						
Namibia	0.00	0.00	-	24.01	0.00	-100.00
South Africa	0.00	0.00	-	198.48	0.00	-100.00
Belgium	0.00	0.00	-	150.05	0.01	-100.00
Nigeria	0.00	0.00	-	24.87	0.00	-99.99
Qatar	0.00	0.00	-	29.39	0.01	-99.97
Saudi Arabia	0.03	0.00	-	104.63	4.71	-95.50
Bahrain	0.00	9.25	-	63.63	9.25	-85.47

Note: Export figures in case of some nations are showing zero due to rounding off but actually they are very small in value
Source: Department of Commerce and CSO

Table22: Export of auto components ($ million)

Country	February 18	February 19	Growth %	Apr-Feb 18-19	Apr-Feb 19-20	Growth %
TOP 5 IMPORTERS						
USA	116.01	75.43	-34.98	1269.36	1164.95	-8.23
Bangladesh	32.18	23.46	-27.10	315.13	283.45	-10.05
Brazil	31.84	20.51	-35.57	298.58	271.90	-8.94
Turkey	21.52	19.26	-10.52	308.66	267.33	-13.39
Germany	27.42	17.82	-35.01	272.72	258.14	-5.35
HIGH CUMULATIVE GROWTH						
Slovenia	0.53	1.49	182.48	6.65	15.07	126.54
Philippines	5.71	6.36	11.33	51.57	91.30	77.03
Czech Republic	2.86	2.06	-28.07	22.05	34.03	54.34
Morocco	1.19	1.23	3.54	11.58	16.85	45.47
Taiwan	2.39	2.14	-10.61	19.57	25.35	29.53
Malaysia	3.59	1.88	-47.75	23.59	28.67	21.55

Table22: Export of auto components ($ million) contd

Country	February 18	February 19	Growth %	Apr-Feb 18-19	Apr-Feb 19-20	Growth %
SHARP CUMULATIVE DECLINE						
Singapore	0.91	1.25	36.58	30.78	15.21	-50.60
Romania	7.48	1.99	-73.37	97.68	63.92	-34.57
Kenya	0.81	1.52	88.50	23.13	16.85	-27.16
Russia	9.76	4.08	-58.18	92.46	67.54	-26.96
Peru	2.09	0.68	-67.28	25.74	18.87	-26.66

Source: Department of Commerce and CSO

had practically no import in April-March 2018-19. Malaysia registered substantial growth of 2235.5 percent in import of the product group from India during April-March 2019-20 as compared with the same period last fiscal.

• However, sharp decline was noticed in exports to Saudi Arabia. In fact exports to that country have been less than $5 million in April-March 2019-20 except Bahrain, whereas exports dropped to zilch for Namibia, South Africa, Belgium, Nigeria, and Qatar.

Export of auto components

• USA remained the top importer of auto components in April-March 2019-20 with a share of 21.96 percent. It was followed by Bangladesh, Brazil, Turkey, and Germany with respective shares of 5.34, 5.13, 5.04, and 4.87 percent.

• Slovenia and Philippines recorded maximum increase of more than 75 percent in imports from April-March 2019-20 when compared to April-March 2018-19.

• However, Singapore and Romania recorded significant decline of more than 30 percent in April-March 2019-20 when compared to April-March 2018-19.

INDIA'S ENGINEERING IMPORTS

India's engineering imports during March 2020 were valued at $7132.2 million compared to $9402.1 million in March 2019 registering a negative growth of 24.1 percent in dollar terms.

Cumulative engineering imports during April-March 2019-20 were recorded at $100.55 billion as against $111.21 billion during the same period last fiscal, registering a fall of 9.6 percent.

The share of engineering imports in India's total merchandise imports during April-March 2019-20 has been estimated at 21.5 percent.

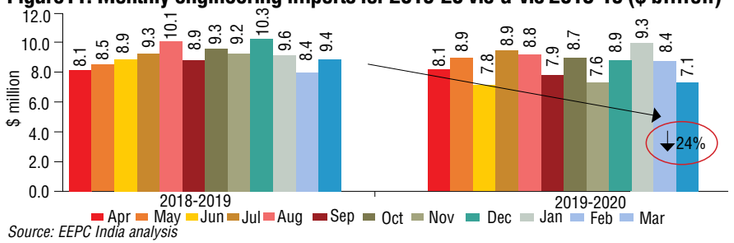
The monthly engineering import figures for fiscal April-March 2019-20 vis-à-vis April-March 2018-19 is depicted in **Table24** as per the latest availability of data. **Figure11** depicts the monthly trend in engineering imports for April-March 2019-20 compared to April-March 2018-19.

Table24: Engineering imports ($ million)

Months	2018-19	2019-20	Growth (%)
April	8139.45	8143.84	0.1
May	8536	8875.2	4.0
June	8890.89	7827.95	-12.0
July	9272.5	8938.2	-3.6
August	10097.3	8779.3	-13.1
September	8858.41	7915.5	-10.6
October	9346.29	8711.71	-6.8
November	9245.44	7611.71	-17.7
December	10331.2	8896.1	-13.9
January	9594.17	9271.98	-3.4
February	8381.48	8446.97	0.8
March	9402.1	7132.2	-24.1

Source: Department of Commerce, Government of India

Figure11: Monthly engineering imports for 2019-20 vis-à-vis 2018-19 ($ billion)



Source: EEPC India analysis

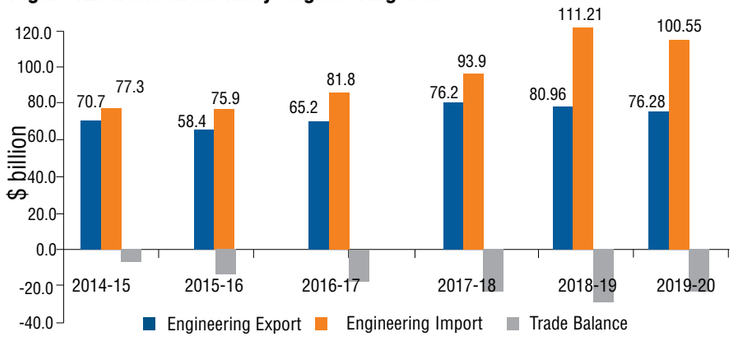
TREND IN TWO-WAY ENGINEERING TRADE

We now present the trend in the two-way yearly trade for the engineering sector from 2014-15 to 2018-19 as well as the current fiscal 2019-20 depicted in **Table25**. **Figure12** depicts the yearly trend in engineering trade from 2014-15 to 2019-20.

Table25: Engineering trade ($ billion)

Trade flow	2014-15	2015-16	2016-17	2017-18	2018-19	Growth %	Apr-Mar 19	Apr-Mar 20	Growth %
Engineering export	70.7	58.4	65.2	76.2	81.0	6.3	80.96	76.28	-5.8
Engineering import	77.3	75.9	81.8	93.9	104.2	10.9	111.21	100.55	-9.6
Trade balance	-6.6	-17.5	-16.6	-17.7	-23.1		-30.25	-24.27	

Figure12: Trend in monthly engineering trade



To conclude

After After experiencing a marginal increase last month, India's engineering exports have declined significantly this month owing to the global economic disruptions under the COVID-19 crisis. Almost all the major panels (33 out of 36) have experienced significant export decline in March 2020 when compared to the same period last year. Barring zinc and zinc products, all the base metal exports have fallen significantly.

India's engineering exports have been already performing weakly in the recent fiscal majorly due to global trade tensions, heavy protectionism among key markets, and high raw material prices within the country. However, the exporting community had been hopeful that the export performance will improve significantly in the last two months of the fiscal and India's engineering exports would continue to match up to last year's level of $81 billion. This hope, however, was shattered by the pandemic, which initiated in China in December 2019 and rapidly created a global health and economic crises. The current global economic situation has been compared to the global recession during the Great Depression era by both the World Bank and IMF. In her latest press conference, the IMF Managing Director, Ms Kristalina Georgieva, has clearly mentioned that the year 2020 could see the worst global economic fallout since the Great Depression in the 1930s with over 170 countries experiencing negative per capita income growth due to the pandemic.

The pandemic has compelled countries including India to take tough decisions such as lockdowns and shutting up of economic activities. This has heavy impacted supply chains and global value chains. As per the recent WTO press release world trade is expected to fall between 13 percent and 32 percent in 2020 due to the pandemic. Given the disruptions the pandemic has caused in global supply chains, WTO further mentions that industries with complex supply chains including automobile and electronics would be hardest hit. All the regions around the world are expected to suffer a declining trade with exports from USA and Asian economies undergoing the worst impact.

In such times, the Government of India has extended support to the exporting community by organising repeated conferences with key industries to understand and solve issues affecting exports. They have also extended key benefits such as Foreign Trade Policy for the next fiscal which is of great importance for the exporting community. The recent RBI announcements on access to finance for MSMEs during these difficult times have also benefited the engineering industry, a substantial percentage of which are MSMEs.

Since the lockdown in India, the supply chain has been significantly disrupted. While exporters have received orders for the month of March, they cannot procure raw materials or transport their products to the port due to lack of transporters and labourers. In such a scenario, exporters are worried that they may lose the markets to other competitors. With this background, the exporting community has requested the government to give exporters and manufacturing top priority and to permit engineering goods manufacturers and exporters to resume in a controlled manner during the lockdown phase keeping all safety measures in place. This will allow the community to fulfil existing orders and pre-empt cancellations.

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EEPC INDIA CALENDAR OF EVENTS

All events subject to change

Name of the event	Place	Date
Jimex	Amman, Jordan	22-25 Jun 2020
Kenya Pharma 2020	Kenya	3-4 Sep 2020
Automechanika, Frankfurt	Germany	8-12 Sep 2020
INDEE Tanzania	Dar-es-Salaam, Tanzania	9-11 Sep 2020
IMTS, USA	USA	14-19 Sep 2020
Pumps, Valves & Pipes, Africa	South Africa	16-18 Sep 2020
Feria De Bogota	Bogota, Colombia	21-25 Sep 2020
International Technical Fair	Plovdiv, Bulgaria	23-28 Sep 2020
SUBCON, UK	Birmingham, United Kingdom	28-30 Sep 2020
International Fasteners Expo	Las Vegas, USA	28-30 Sep 2020
ITM, Poland	Poland	3 - 6 Nov 2020

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