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Nepal Medical Show 2024

Destination Nepal

When the Nepal Medical Show, the largest exhibition of its kind, is held next month, EEPC India will be participating with its own Healthcare Supply Chain Show, a one-stop solution to meet all requirements of the healthcare segment

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25000	67 +	11 +	70 +
Sq. ft. Total Area	No of People Working	Countries we export to	Tons of production per month

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EXCLUSIVE MEMBER SECTION AT
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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

INDIA BELGIUM TRADE IN ENGINEERING GOODS

Congratulations to EEPC for successfully managing the Virtual Session on 14 December and for its intense support and also for bringing in many Indian companies from different engineering sectors. Truly, EEPC India did an intense support.

Welcome address by Mr Arun Kumar Garodia, Chairman, EEPC India, followed by opening address by Mr Debasish Prusty, Chargé d'affaires, Embassy of India, Brussels, pictured well the status on engineering goods – India's number one export product sector to the EU and also gave good awareness of the strategies/excellence needed for competitiveness.

Also presentation given by Ms Elena Suárez from Business Europe gave meaningful insight into EU's challenges being faced in the current global scenario and also on the current EU legislation on CBAM. CBAM really gave the Indian participants the awareness/preparedness they need to take while exporting carbon-intensive products to EU market.

N Ashok Kumar, *Advisor (Industry & Engineering), Embassy of India, Brussels*

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FACTORY VISIT INVITE

I express my heartfelt gratitude for the warm welcome and kind courtesy extended to both Ms Lata Sachdeva and myself during the EEPC Chapter meet held in Delhi on 15 December 2023. Your gracious hospitality made our participation in the event truly memorable. Your leadership and commitment to promoting exports through EEPC India are commendable, and it was an honour to be a part of the gathering.

I would also like to acknowledge the invaluable efforts and exceptional support provided by the EEPC team. Their dedication and prompt assistance were instrumental in making our experience at the event seamless and enjoyable. We were pleasantly surprised by the efficiency and enthusiasm displayed by your office.

Moreover, we are amazed by the initiatives taken by EEPC to foster and promote exports. It is evident that the organisation is making significant strides in creating a conducive environment for businesses to thrive in the international market.

As informed during our interactions, we take pride in our state-of-the-art manufacturing unit located in Haridwar. As a part of our association with EEPC, we would like to extend an invitation to you and your team for a factory visit at your convenience. This visit will provide an opportunity to update you on our manufacturing capabilities and showcase the innovative technology employed in our manufacturing processes.

We believe that such an interaction will not only strengthen our partnership but also offer insights into the advanced technologies that contribute to our manufacturing excellence.

Sunil Ramteke, *Vice President – Global Business, V-Marc India Limited, Haridwar*

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MANDATORY E-FILING EXTENSION

In continuation to the earlier Trade Notice 27/2022-2023 dated 28.03.2023, it is informed that the transition period for mandatory filing of applications for Non Preferential Certificate of Origin through the e-CoO Platform has been further extended till 31 December 2024.

Accordingly, the exporters and Non-Preferential CoO Issuing Agencies as notified under Appendix-2E of the FTP would have the option to use the online system; the online application process shall not be mandatory till 31 December 2024. In this interim period, the existing systems of processing non-preferential CoO applications in manual/paper mode are permitted.

For guidance on registration and online application submission process, the Help Manual & FAQs may be seen on the landing page at https://coo.dgft.gov.in.

Manoj Kumar Meena, *Deputy Director, Directorate General of Foreign Trade*

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NEPAL MEDICAL SHOW 2024

Destination Nepal

When the Nepal Medical Show, the largest exhibition of its kind, is held next month, EEPC India will be participating with its own Healthcare Supply Chain Show, a one-stop solution to meet all requirements of the healthcare segment

From the Chairman's Desk

> ... we seek guidance and support from the government to face the difficult times. Factors such as raw material prices and high cost of logistics are becoming additional burden for Indian exporters in the face of global trade depression. We urge the government to look into these matters and continue supporting us ...

2023 has been a significant year for Indian engineering exports. The year marked the introduction of the much awaited Foreign Trade Policy. India also stepped up its bilateral engagements with Oceania – the India-Australia FTA which is now being expanded is a definitive step towards that. Finally, India also hosted its first G20 Conclave successfully in New Delhi and projected himself as an able representative of the Global South.

Despite such feats, Indian engineering exports experienced fluctuations led by global economic factors. After recording increase in the last few months, engineering exports experienced a decline of 3.1 percent in November 2023. Cumulative exports (April-November 2023) also declined by approximately 2 percent. Decline was witnessed in major engineering panels including iron and steel, aluminium, electrical machinery, automobiles, and industrial machinery. In terms of destinations, exports to the USA continued to decline. Decline was also noticed in major EU economies including Germany and Italy. Also, since signing of the FTA with Australia, engineering exports to the country declined for the first time. Decline was also noted in ASEAN, Latin America, and South Asia.

The decline in engineering exports can be explained by global trade trends to a significant extent. In December 2023, UNCTAD came out with its Global Trade Update. The report clearly indicated a significant decline in merchandise trade – nearly $2 million in 2023. The report also stated the factors that roughly contributed towards this decline. While global trade survived the huge pandemic shock, the revival and growth that followed had disparities based on countries or region. Also, economic activities in many countries across the world are hindered by high interest rates – based on the latest Purchaser's Manager Index (PMI), industrial output will remain subdued in many major economies, most prominently the USA and China, in the coming days. The situation has been further worsened by frequent geopolitical tensions and volatile commodity prices. Countries especially the developed ones have also adopted a number of trade restrictive or protectionist measures that are meant to impact imports especially from that of developing countries. Overall the report predicts that global trade is set to decline by almost 5 percent in 2023. Also, as per OECD, falling energy trade contributed to reduction in trade volume in both North America and Europe. In the first nine months of 2023, merchandise imports in EU declined by 4 percent and that in USA declined by 4 percent on a y-o-y basis. Import decline was also noticed in Brazil, South Africa and Russia.

Overall factors like high interest rates and weakening industrial output, volatility in commodity prices and increase in trade restrictive measures are affecting global trade and in turn India's engineering exports. South Asia as a region is also not being able to achieve its full growth potential. In October 2023, The World Bank introduced the South Asian Development Update which claimed that the region will experience the fastest growth among all developing country regions in the world in FY 2023-24. In the same publication it was also stated that India will continue to have a robust growth in FY 2023-24. However, the regional growth will not reach its pre-pandemic levels.

So we can surmise that Indian exporters may face some adverse situations in the coming months due to unstable global economic factors and the industry needs to be prepared for that. Therefore, we seek guidance and support from the government to face the difficult times. Factors such as raw material prices and high cost of logistics are becoming additional burden for Indian exporters in the face of global trade depression. We urge the government to look into these matters and continue supporting us to keep us competitive in the global market.

Finally in spite of the adversities, EEPC India is continuing its journey to promote Indian engineering exports abroad. In January 2024, EEPC India will be participating in IMTEX, which will be held in Bengaluru, and Arab Health, which will be held in Dubai. The final culmination of these efforts will take shape in India's biggest engineering sourcing show, IESS, which will be organised in Tamil Nadu. I invite you to voluntarily participate in these events as these are key to popularising Brand India Engineering across the world.

And last, but not the least, I wish you all a happy and fruitful New Year!

Arun K Garodia

Arun K Garodia

SPOTLIGHT

Promoting LeVs: A case for repair kiosk in petrol pumps

Light electric vehicles (LeVs) are set to be the future sustainable means of transport. As more developments take place in this crucial sector, the need to find ways to service and repair LeVs are coming to the forefront

FUEL-driven cars are an expensive option for commuting, especially for the predominant middle class of India. Besides, more often than not, just one or a couple of people travel by cars, so the cost per passenger is exorbitant. For the ordinary citizen, commuting can be a nightmare as public transport services are not up to the mark in most cities of India, coupled with air pollution on the roads because of fuel-driven vehicles.

However, the situation is likely to change for the better in the near future, with several countries, including India, promoting light electric vehicles (LeVs) in a big way. LeVs are easy to use and operate, need little parking space, are relatively quiet, and require much less energy than fuel-guzzling vehicles. Most important, LeVs have the potential to help in the transition to sustainable transport systems.

While the advantages of LeVs are many, there are some major drawbacks at present, such as lack of charging and repair facilities. To overcome these problems, I propose the use of petrol pumps for servicing LeVs. I'll be discussing the advantages of doing so later in this article.

LeVs are projected to be a $40 billion

market by 2030, according to a study by Deloitte. Just the revenue from charging electric vehicles is likely to exceed $300 billion globally by 2027.

As per India's EV Vision 2030, the Government of India has targeted 30 percent EV penetration. There are similar or larger targets in other countries, too. Already much development has recently taken place in several countries, especially in Europe and the US.

'This will not only help reduce air pollution but also ensure that we become a global manufacturing champion for electric two-wheelers and three-wheelers. Public mobility is the backbone of a civilised society,' said Mr Amitabh Kant, G20 Sherpa of India, at the 'National Dialogue on Emerging Trends in E-Mobility', organised by the Council on Energy, Environment and Water (CEEW) in New Delhi.

To get an idea of LeVs, there are many different types – eBicycles, eScooters, Cargo eBikes, etc. Some are classified by product group and we will soon see the evolution of other types of LeVs as there are many startups in India and in other countries.

LeVs including eBicycles and Cargo eBikes are already becoming famous as compared to manual bicycles. In fact in the Taipei bicycle show in March 2023, the eBicycles and Cargo eBikes had 40 percent more exhibitors then the normal bicycles.

KPMG and All India Cycle Manufacturers Association (AICMA) have prepared an estimate for 2030 of Indian eBicycles.

This can be much higher in case we are able to promote LeVs as can be seen from the potential given in Deloitte study.

Due to India's predominantly scooter- and motorcycle-based culture, these comprise mostly of two-wheeler LeVs and so the Government of India has been promoting these by way of schemes, etc. The present market share of two-wheeler LeVs are given in **Figure4**. However, eBicycles and similar vehicles have not got its due recognition and so have not come in focus.

ADVANTAGES OF LeVs

LeVs in general:

- are simple, affordable, reliable, clean, and environmentally sustainable means of transportation
- will be cheaper and will have lower operating cost due to smaller engines
- have less maintenance and longer life as the number of working parts is less
- will have no requirement of fuel. This will lead to less fuel imports.
- can be charged in kiosk with solar energy so no need to depend on electricity grid which will again save fuel
- will cause no pollution in cities
- will have no noise as there is no fuel engine.
- will cause less congestion on roads. Also, they can be driven on narrow lanes.
- will enable mobility for short distances and so it is the best option for first and last mile connectivity
- will need less parking space. So, it is possible that in the future Metros/Railways may allow the carrying of such LeVs (especially eBicycles) on trains and coaches
- will improve wellness as people get to do exercise as LeVs are also manually operable. When riders feel tired, they can switch to the electric engine
- are especially good for the elderly and those who have to transport children and for longer distances.
- will help tourists to move around quicker and further
- will cause less pollution to dispose as compared to a standard motorised vehicle.
- will decrease the wear and tear on roads.

Further, Cargo eBikes have become famous especially in European countries and the USA for delivering products to homes/shops/offices, etc because of these advantages. There are other advantages as well:

- stable and easy to control
- where there is no parking for bigger vehicles in front of delivery place.
- no need for a licence or helmet, etc.
- cargo eBikes can carry loads of up to 100 kg at a time.

One can imagine the decrease in vehicles on roads and parking spaces, even if 25 percent of the people start using LeVs. In fact some cities in other countries are planning to redesign roads and parking space to gardens as there will be less need of these due to advent of LeVs.

FUTURE OF LeVs

The one drawback in LeVs is the initial cost due to the use of batteries and later maintenance cost and disposal of lithium batteries. However, there is a lot of development like solid state lithium batteries, sodium batteries, etc. happening and this will bring down its cost and make disposal less polluting. Also, India is looking at hydrogen and there have been some experiments with other substances as fuel.

LeVs including eBicycles, once they

Figure1: Electric vehicles in Germany

a) Cargo eBike

b) eBike with children carrier

start to be produced in bigger quantities in India, will bring more R&D into the country. This, in turn, will result in new models which can have a major export potential especially to European countries and the USA as the LeV usage in these countries will grow phenomenally.

So, there is a need to promote LeV use in India and for this we need some major policy changes.

In India, LeV charging and repairing is a big hindrance and so we now discuss possible solutions.

Charging of LeVs

The LeVs are charged with a DC current as compared to AC current which is for charging of bigger vehicles. AC charging is available at many locations in India and many more are being installed. However, DC charging is not available.

So, for charging LeV at these spots with AC current, the rider must carry AC to DC converter, commonly known as the 'onboard charger.'

Repair of LeVs

At the moment, there are no repair kiosks for LeVs, specially for eBicycles. There are mechanics for bicycles who operate on pavements, but they are not always easy to find and may not be capable of repairing LeVs.

For instance, if a person wants to ride an LeV from Delhi to Chandigarh and he has some trouble with the vehicle, he may have to go to the next city to look for a repair shop. This is a big hindrance for bicycling at present and will be for LeVs in future.

PETROL PUMPS

To find a solution we will need to discuss the petrol pumps which are spread all over the country.

Current status

At the moment, the petrol pumps on national and small highways as well as in cities/towns/villages, etc are equipped for dispensing fuels (petrol, diesel, gas, etc.). Some of them have additional services like tyre air filling, shops, toilets, four-wheel repairing, etc.

Recently, some of them have upgraded to have battery swapping for electric vehicles.

Future

There is a need to relook at the utility of the petrol pumps as they have evolved for the present and now need to evolve to be 'future ready.'

The economies of petrol pumps that are only selling fuel is expected to go down with the large advent of electric vehicles over the coming years/decades.

Solution for LeV charging and repair

Looking at the charging and repair issue of LeV, I propose that petrol pumps include a small repair kiosk of approximately 10'x10' inside their compound. It can be similar to the area being provided for pollution certification.

The kiosk will have not only LeV riders coming for repair but also manual bicycle riders as tools required may be very similar.

Few tools as under will be required for repairing LeVs as well as bicycles/eBikes:

- Spanner set
- Hammer, pliers, screw driver, etc
- Cleaning and polishing solutions
- Air with gauge
- Puncture repair set
- Oil and grease
- Cloth.

All these items do not require a lot of space. Such items can be added to depending on space availability and for wider range of LeVs to be serviced.

A compressor is already available in the petrol pumps for filling tyres of car/

Figure2: LeV product groups and markets

scooter, etc. A pipe can be taken out with a valve to reduce pressure to insert air in an LeV tyre. Or a separate small compressor can be used for the same.

As the charging requirement is not very high, solar panels can be installed at the repair kiosk for LeV charging to provide DC.

As far as revenue model for the LeV/bicycle kiosk is concerned, it can cover:

- Repair of LeV/eBicycles/bicycles
- Charging of LeV
- Selling parts for LeV/eBicycles
- Selling accessories like helmets, gloves, bags, etc
- Collecting carbon credits (this may be futuristic).
- The kiosk will see the revenue growing over a period of time. A good link for revenue model of charging station is: https://www.energetica-india.net/articles/how-ev-charging-stations-could-be- viable-business-opportunities-in-tier-ii-and-tier-iii-towns

Rating of petrol pumps

By setting up LeV/eBicycle kiosks, petrol pumps will be showing themselves to be 'green' and their contribution to save the environment as they are dispensing fuel, which is causing pollution. It may be regarded as their obligation to serve the society and being carbon neutral.

Further there could be a rating of the petrol pumps developed. The rating standard could include:

- LeV/bicycle kiosk
- Educating riders for safety and using LeV on roads
- Support for EV like battery swapping, etc
- Using solar and other renewable energies for their operation
- Facilities like toilets, etc
- Pollution kiosk
- Tyre air filling

Conclusion

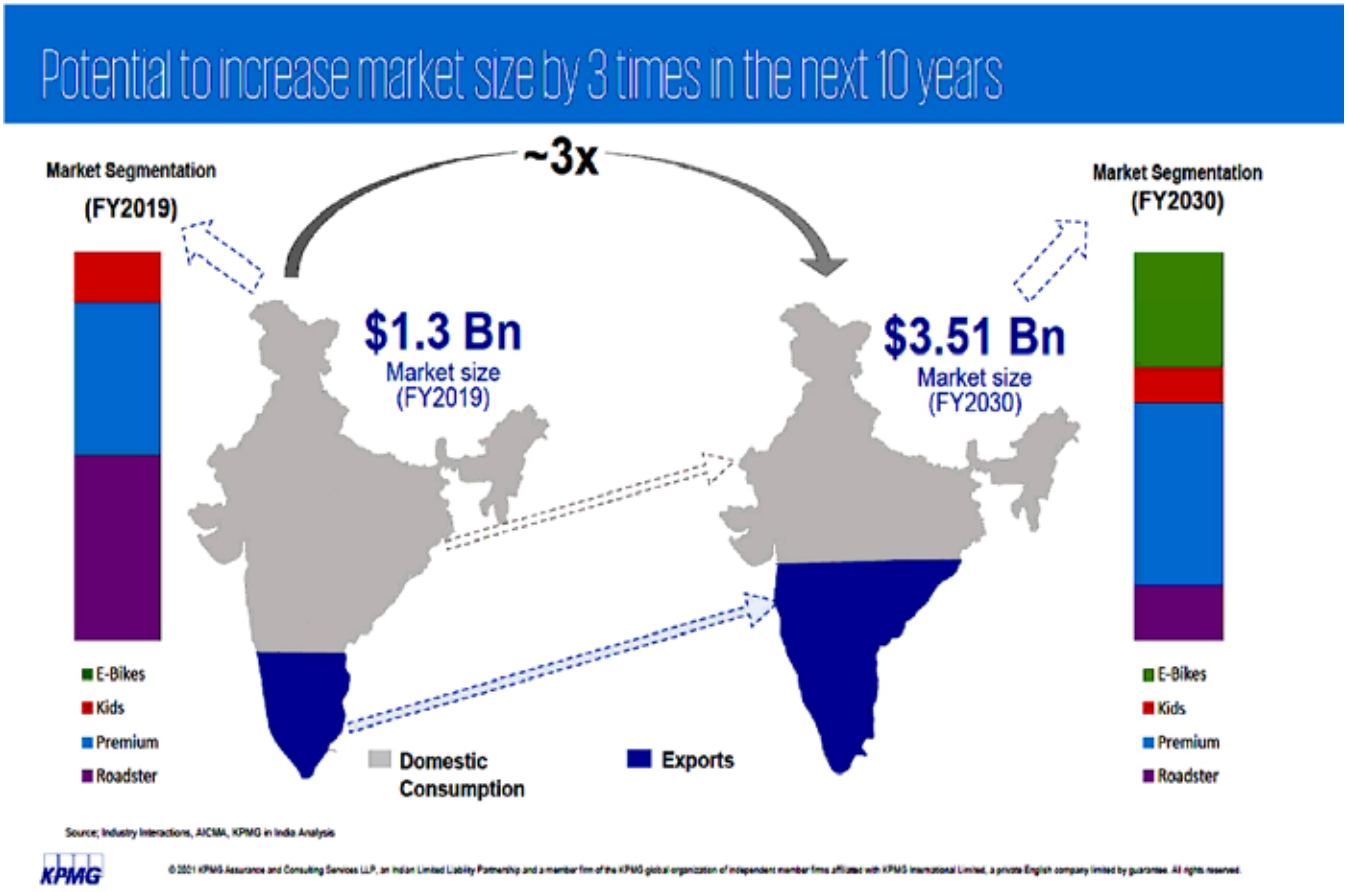
In case the LeV/eBicycle kiosks are allowed in petrol pumps in India, we will be the first country to do so and it will show the world our intent to go green and working towards being carbon neutral.

This will also help in faster adoption of LeVs and decrease the requirement of finances like roads, parking space, etc. Also, overall environment and life of people in cities/towns will improve with lesser congestion and pollution and healthier way of transportation, etc.

These kiosks will also bring employment as there will be at least two people required in a kiosk which is likely to increase in future. Also, the LeV manufacturing industry will grow and thus will increase employment. There will be more people involved in R&D and testing, etc.

The installation of LeV/Bicycle kiosks can be done step by step starting from

Figure3: Estimated market size of Indian eBicycles by 2030



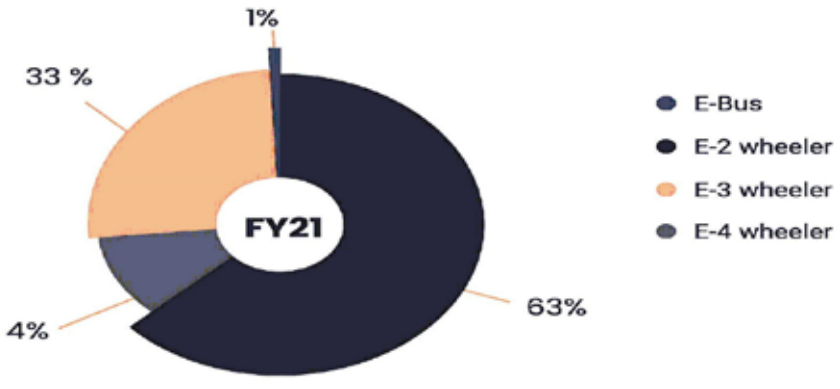
petrol pumps in cities and then on nationals and small highways.

The support from the Petroleum Ministry is needed to introduce LeV/bicycle repair kiosks in the petrol pumps.

Further to these suggestions, the other important issues in India are to have LeV lanes as well as having a separate HS code which is being followed by other Ministries.

It is suggested that the kiosk in petrol pumps should be implemented as soon as possible.

Figure4: Market share of two-wheeler LeVs



About the author

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Mr Aggarwal is Ex-Technical Member, Bicycle Development Council (under aegis of DPIIT, GoI); Ex- Patron; Delhi Bicycle Association (under aegis of Cycling Federation of India). He has been in the bicycle parts industry for 35 years and attended various foreign exhibitions, etc.

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Azadi Ka Amrit Mahotsav

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EXPERTEYE

Non-banking financial companies: An overview

Non-banking financial companies (NBFCs) are a major part of Non-Bank Financial Institutions (NBFIs) that perform an important intermediary role in the financial landscape. We bring you the first part of an overview of how NBFCs operate and their role in the financial sector

TR SHASTRI

Prof. TR Shastri is a former Banker in Bengaluru

NON-BANK Financial Institutions (NBFIs) – of which Non-banking Financial Companies (NBFCs) is a major subset – perform an important intermediary role in the financial landscape. NBFIs accounted for almost half the global financial assets in 2020 (increased from 44 percent in 2002 to 49 percent in 2020), as stated in a BIS report. Even in emerging market economies like India, non-banks have established themselves as an integral and indispensable part of the financial landscape. At the end of 2022, NBFCs' aggregate credit was nearly 24 percent of total scheduled commercial banks' credit. NBFCs' credit to GDP ratio was 12.3 percent compared to 51.6 percent of SCBs.

As per the latest FSR report (June

2023) of RBI, NBFCs are the largest net borrowers from the financial system, as a sector. NBFCs were the second-largest (next only to banks) recipients of their funds from both AMCs-MFs and Insurance companies (not much behind banks – nearly 33 percent and 75 percent respectively of what banks received). A substantial part of their funding comes from banks. As per the RBI, 'By end-March 2023, idiosyncratic failure of the NBFC with the maximum capacity to cause solvency losses to the banking system would have knocked off 2.51 percent (2.63 percent in September 2022) of the latter's total Tier 1 capital.' Thus, the importance of NBFCs in the financial market hardly needs any emphasis; and more importantly, it should be realised that NBFCs are deeply entrenched in the financial system thereby alerting regulators on the stability implications due to any mishap in that segment. Recently, the RBI Governor explicitly advised that banks needed to be watchful of exposure to NBFCs.

Though most reports suggest that NBFCs started in 1960s, private non-banking lending activity was in existence much before that, mostly undocumented and unstructured. As per the RBI bulletin of August 2022, they existed in India from the pre-independence period. There have been steep growth and degrowth periods for such institutions during the last two decades due to variety of reasons. Market demand, business opportunities, and technological innovations enabled diversified types of financial servicing institutions. Causes of failures of couple of major NBFCs required greater regulatory interventions. Thus, the sector has seen significant developments. Here we will discuss the evolution of NBFCs, their diversified role, and applicable and updated regulatory guidelines in response to the evolving scenario.

NBFCs have emerged in India as agents for formalising finance by facilitating financial inclusion through innovative financial products and novel delivery mechanisms. They got a fillip after the bank nationalisations in 1969 and 1980, following which banks accorded higher priority to developmental objectives and giving scope for other intermediaries to fill the vacuum of reaching to the retail and other unserved sectors. Again, the importance of NBFCs as providers of commercial credit increased in the 2010s when banks were experiencing asset quality stress after 2015. Liberal and differentiated regulatory environment helped in their growth faster than that of banks.

The Financial Stability Board (FSB) defines the NBFI sector as comprising all financial institutions that are not (because they are 'NB') central banks, banks, or public financial institutions. Therefore, it includes a wide range of institutions, covering, inter alia, insurance companies, pension funds, money market funds (MMFs), hedge funds and finance companies. As per the RBI Act, non-banking institution means a company, corporation, or cooperative society. Non-banking financial company means a financial institution which is a company or a non-banking institution which is a company and whose ***principal business*** is receiving of deposits, under any scheme or arrangement or in any other manner, or lending in any manner or such other non-banking institution or class of such institutions, as RBI may, with the previous approval of the Central Government and by notification in the Official Gazette, specify. As per the Companies Act 2013, financial institution includes a scheduled bank, and any other financial institution defined or notified under RBI Act 1934.

The term 'principal business' is not defined in the RBI Act. But RBI has separately defined it to identify and segregate companies predominantly engaged in financial activity for its regulatory coverage. When a company's financial assets constitute more than 50 percent of the total assets and income from financial assets constitute more than 50 percent of the gross income, financial activity is deemed to be the ***principal business*** of the company (generally referred to as 50-50 test). Such companies need to get registered with RBI, as we shall examine later, including built-in exemptions. RBI has further clarified, as example, that companies engaged in agricultural operations, industrial activity, purchase and sale of goods, providing services or purchase, sale or construction of immovable property as their principal business and are doing some financial business in a small way, will not be treated as or regulated by RBI as NBFCs. Such companies which do not satisfy the 50-50 test are considered as non-banking non-financial companies. Acceptance of deposits by a non-banking non-financial company is governed by the rules and regulations issued by the Ministry of Corporate Affairs.

It may be noted that from the RBI's perspective, for being classified as an NBFC, an essential condition is that the entity has to be in the form of a limited company. There were and there continue to be other entities which are in the business related to financing. Some of them are unincorporated entities like partnership firms, groups of influential people, rich individuals, and even prominent HUFs in villages and small towns. As clarified by RBI, they are still not regulated and, where needed, enforcement action is taken by the respective state governments. On the other hand, if an LLP undertakes financial activities, it is regulated and supervised and where needed, enforcement action taken by the Ministry of Corporate Affairs. Cooperative societies (not to be misread as cooperative banks) are regulated and supervised by the Registrar of Cooperative Societies. Urban Cooperative Banks are registered as cooperative societies under the provisions of either the State Cooperative Societies Act of the State concerned or the Multi State Cooperative Societies Act, 2002. Their banking related activities are supervised and regulated by RBI.

The NBFIs regulated by RBI broadly comprise the following:

• Five All India Financial Institutes – NABARD, SIDBI, Exim Bank, NHB, and the recently established National Bank for Financing Infrastructure and Development (NaBFID), which provide long-term funding to agriculture, small industries, foreign trade, housing finance companies and infrastructure, respectively.

• 21 Primary Dealers (PDs) of which 14 are bank departments acting as PDs and rest standalone PD companies ensuring subscription to primary issuances of and acting as market makers in government securities.

• Large number of NBFCs including housing finance companies, asset reconstruction companies, account aggregators, factoring companies, P2P lending platforms, etc along with the main category of NBFCs – those into core activity of investment and lending. It may be noted that many of the financial service providers (who do not lend or accept deposits on their own but only facilitate) like the fintech companies required to be regulated are all classified as NBFCs. Similarly P2P lending platforms are largely tech companies registered under the Companies Act and acting as an aggregator for lenders and borrowers thereby, helping create a match between them. Once the borrowers and lenders register themselves on the website, due diligence is carried out by the platform and those found acceptable are allowed to participate in lending/borrowing activity. To facilitate regulation, such companies require to be registered and NBFC window therefore encompasses entities not necessarily which collect deposits or extend finance on their own! Thus, the huge list of NBFCs in the website of RBI has a large number of fintech companies; many of course, still in the formative stage of their activities.

NBFCs can be classified into different categories based on their asset (or liability) structure, asset size or asset composition, i.e. target lending segment. In terms of asset/liability structures, NBFCs are subdivided into deposit-taking NBFCs (NBFCs-D) – which accept and hold public deposits – and non-deposit taking NBFCs (NBFCs-ND). Among non-deposit taking NBFCs, those with asset size of Rs500 crore or more were classified as non-deposit taking systemically important NBFCs (NBFCs-ND-SI). The NBFCs-ND-SI category accounted for around 86 percent of the total assets of the NBFC sector at end-March 2022. Of the 422 NBFCs of this category, 19 are government-owned NBFCs and they hold 45.4 percent of the assets in this subsector. The two largest NBFCs in this category (Power Finance Corporation Limited and REC Limited) are owned by the government.

After the regulatory overhaul in October 2022, NBFCs are now segregated into four layers, namely, Base Layer (NBFC-BL), Middle Layer (NBFC-ML), Upper Layer (NBFC-UL), and Top Layer (NBFC-TL), based on their size, activity, and perceived level of riskiness. We shall discuss these 'scale based regulations' later.

Table1: Classification of NBFCs

#	Classification	# of NBFCs
1	Investment and Credit Companies	9137
2	MFIs	100
3	Core Investment companies	53
4	P2P lending	24
5	Account aggregators	12
6	Factoring companies	8
7	Infrastructure Finance Company	8
8	PDs	7
9	Infrastructure Debt Fund	3
10	Non-Operative Financial Holding Company	3
11	Mortgage and Guarantee Company	1
	Total	9356

Based on the activity, NBFCs are classified into ten categories (besides PDs and HFCs) as under:

1. NBFC-Investment and Credit Company (NBFC-ICC), which are into lending and investment and most commonly referred by the generic name NBFCs and is the largest class within the NBFC group
2. NBFC-Infrastructure Finance Company (NBFC-IFC) for financing of infrastructure sector
3. Core Investment Company (CIC) which undertake investment in equity shares, preference shares, debt, or loans of group companies
4. NBFC-Infrastructure Debt Fund (NBFC-IDF) which facilitates the flow of long-term debt only into post commencement operations in infrastructure projects which have completed at least one year of satisfactory performance
5. NBFC-Micro Finance Institution (NBFC-MFI) provides collateral free small ticket loans to low-income households
6. NBFC-Factors finance acquisition of receivables of an assignor or extend loans against the security interest of the receivables at a discount
7. NBFC-Non-Operative Financial Holding Company (NBFC-NOFHC) facilitates promoters/promoter groups in setting up new banks
8. NBFC-Mortgage Guarantee Company (NBFC-MGC) undertakes mortgage guarantee business
9. NBFC-Account Aggregator (NBFC-AA) collects and provides a customer's financial information in a consolidated, organised, and retrievable manner to the customer or others as specified by the customer
10. NBFC–Peer to Peer Lending Platform (NBFC-P2P) provides an online platform to bring lenders and borrowers together to help mobilise funds
11. Housing Finance Company (HFC) extends finance for purchase/construction/reconstruction/renovation/repairs of residential dwelling units (these are regulated now by RBI but continue to be supervised by NHB).

As on 30 September 2023, there were 9356 registered NBFCs (besides 27 ARCs and 93 Housing Finance Companies) broadly classified as given in **Table1**.

The first two categories of companies along with HFCs are more relevant for analysing the commercial credit flows to the market.

Interestingly, the list of NBFCs and ARCs whose Certificate of Registration has been cancelled by RBI, which is also published as a next chart in the RBI website, has 5628 names!

The consolidated master direction issued on 19 October 2023 on updated regulatory guidelines run into 325 pages, though the operative rules are in lesser number of pages. With too many types, subsets, and classifications within the ambit of NBFC registrations, perhaps there is widespread confusion among applicant NBFCs. In fact, it reached such proportion that RBI had to issue the following decision as a circular on 26 October 2023 to all regulated entities to clarify one particular situation:

It has been observed that certain entities, which are eligible to join Account Aggregator (AA) ecosystem as Financial Information Provider (FIP), have onboarded as Financial Information User (FI-U) only. Consequently, such entities are accessing financial information from other FIPs but are not providing the financial information held by them. As such, with a view to ensure efficient and optimum utilisation of the AA ecosystem, it has been decided that regulated entities of the Bank joining the AA ecosystem as FI-U shall necessarily join as FIP also, if they hold the specified financial information and fall under the definition of FIP.

Banks and NBFCs

The minimum capital requirement for an NBFC is generally Rs2 crore (Rs10 crore for starting new NBFCs and existing NBFCs-ICC, NBFCs-MFI and NBFC-Factors are required to attain NOF of Rs10 crore by March 2027 following a glide-path); while for banks, it is Rs500 crore for starting a universal bank. In the absence of an Authorised Dealers' licence, NBFCs cannot intermediate in international trade. Their names do not add much to credit enhancement in domestic transactions.

The scope of activity of NBFCs differs from that of banks mainly in the type of deposits that can be accepted. NBFCs cannot accept demand deposits – Savings account and Current account deposits. They therefore cannot extend cheque book facilities to customers and consequently can't participate in clearing operations. The time deposits with NBFCs do not have the guarantee cover offered by DICGC. In 2017, a senior official of RBI had indicated that RBI is not in favour of NBFCs accepting deposits from the public (for protecting depositors' interests and fostering financial stability). In fact, RBI has not allowed any new NBFC to accept public deposits for more than 15 years now. The number of deposit-taking NBFCs has seen a sharp decline, from a high of 220 as of March 2015 to 49 as of March 2022 (of which four were government-owned NBFCs and rest 45 privately owned). Amongst these, 89.7 percent of the deposits were held by just five NBFCs, with all of them having total deposits of greater than Rs5000 crore. During a meeting of the RBI Governor with select NBFCs in August 2023, discussions were held on diversifying the resources for NBFCs and HFCs to contain the increasing reliance on bank borrowings. NBFCs requested that the route to accepting public deposits must be available to them. There could be RBI permissions coming up in the future.

While we discussed an overview of NBFCs so far, we shall examine their general performance, registrations with RBI, the applicable regulatory guidelines, and the challenges faced in the next parts of the article.

OVERSIGHT

Engineering exports decline again

Factors such as falling energy trade, high interest rates and weakening industrial output, volatility in commodity prices, and increase in trade restrictive measures are affecting global trade and in turn India's engineering exports

POLICY WONK

ENGINEERING EXPORTS

The monthly engineering figures for 2023-24 vis-à-vis 2022-23 are shown in **Table1** as per the latest DGCI&S estimates.

Top 25 engineering export destinations

We now look at the export scenario of the top 25 nations that had highest demand for Indian engineering products during November 2023 over November 2022 as well as in cumulative terms during April-November 2023-24 vis-à-vis April-November 2022-23. The data shows that top 25 countries contribute almost 76 percent of total engineering exports.

Table1: Engineering exports: Monthly trend in 2023-24 ($ million)

Month	2022-23	2023-24	Growth %
April	9676.81	8968.46	-7.32
May	9713.43	9308.61	-4.17
June	9580.73	8528.37	-10.98
April-June	**28970.97**	**26805.43**	**-7.47**
July	9367.90	8744.88	-6.65
August	8405.08	9063.50	7.83
September	8344.70	8912.96	6.81
July-September	**26117.68**	**26721.34**	**2.31**
October	7550.69	8085.41	7.08
November	8104.24	7852.61	-3.10
April-November	**70743.58**	**69464.79**	**-1.81**

Source: DGCI&S, Govt of India

Region-wise India's engineering exports

Table3 depicts region-wise India's engineering exports for April-November

After three months of upturn, engineering export declined again in November 2023

After achieving year-on-year growth for three straight months from August to October 2023, engineering exports in November 2023 declined once again due to lower shipments of all major engineering segments such as iron and steel, industrial machinery, electrical machinery and automobiles. Engineering exports in November 2023 was recorded at $7852.61 million as against $8104.24 million in November 2022, registering 3.1 percent decline. Cumulative decline was witnessed at 1.81 percent y-o-y.

Engineering exports started fiscal 2023-24 with 7.15% y-o-y decline in April 2023

Trade flow	Export figures ($ billion)				% growth	
	Nov 2022	Nov 2023	Apr-Nov 2022-23	Apr-Nov 2023-24	Nov 23 over Nov 2022	Apr-Nov 23-24 over Apr-Nov 22-23
Engineering exports	8.10	7.85	70.74	69.46	-3.10%	-1.81%
Overall exports	34.89	33.90	298.21	278.80	-2.84%	-6.51%
Share of engineering	23.23%	23.17%	23.72%	24.92%	---	---
Service exports	26.93	28.69	208.3	220.66	6.54%	5.93%

Source: Derived from DGCI&S and Government of India's Quick Estimates

Comparing engineering exports with exports excluding steel segment ($ million)

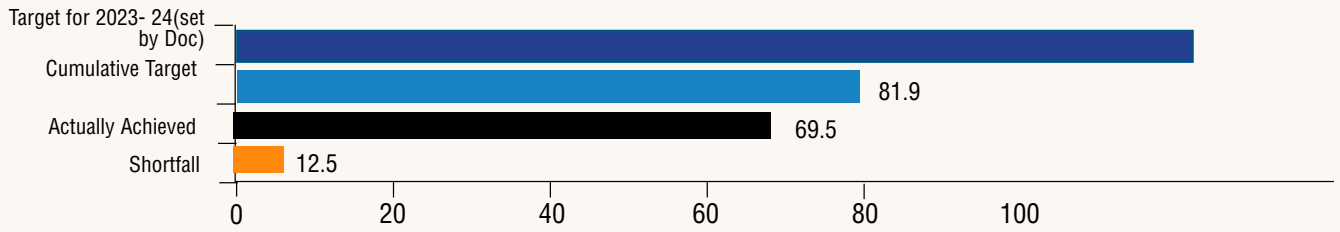
Trade flow	Exports in Nov 2022	Exports in Nov 2023	Growth %	Exports in Apr-Nov 22-23	Exports in Apr-Nov 23-24	Growth %
Overall engineering exports	8104.24	7852.61	-3.10	70743.58	69464.79	-1.81
Engineering exports excluding Iron and Steel	7396.00	7196.47	-2.70	61455.83	61938.90	0.79

Source: DGCI&S, Govt. of India

Excluding iron and steel, engineering exports recorded marginal 0.79 percent y-o-y growth during April-November 2023-24. However, it declined y-o-y during November 2023.

EXPORT TARGET 2023-24

Engineering export performance during April-November 2023-24 ($ billion)



HIGHLIGHTS

- After achieving y-o-y growth for three months in a row from August to October 2023, engineering exports from India declined once again in November 2023.
- Engineering exports from India declined by 3.1 percent to $7852.61 million in November 2023 from $8104.24 million in November 2022.
- Cumulative engineering exports also conceded 1.81 percent decline as it dropped to $69,464.79 million during April-November 2023-24 from $70,743.58 million during April-November 2022-23.
- The share of engineering exports in India's total merchandise exports was recorded at 23.17 percent in November 2023 as against 24.11 percent in October 2023, while cumulative share was higher at 24.92 percent during April-November 2023-24.
- In November 2023, 10 out of 34 engineering panels saw positive y-o-y growth, while 24 panels, including major raw materials like iron and steel, non-ferrous sectors, and machinery experienced negative export growth.
- On a cumulative basis, 16 out of 34 engineering panels recorded negative growth during April-November 2023-24.
- Region-wise, positive y-o-y growth in November 2023 was observed in CIS, WANA, and NE Asia while the rest of the defined regions reported decline on a y-o-y basis.
- Among top exporting destinations, exports to Saudi Arabia, Russia, South Korea, Mexico, Singapore, UAE, and Brazil experienced y-o-y growth in November 2023, while shipments to USA, UK, Germany, Italy, China saw negative export growth.

Table2: Engineering exports, country-wise ($ million)						
Country	**November 22**	**November 23**	**Growth %**	**Apr-Nov 22-23**	**Apr-Nov 23-24**	**Growth %**
USA	1476.53	1319.10	-11	12851.02	11457.81	-11
UAE	338.29	384.90	14	3152.88	3428.74	9
Saudi Arabia	256.62	484.72	89	1843.05	3090.49	68
Germany	323.86	263.73	-19	2545.09	2699.11	6
UK	253.21	238.55	-6	2110.50	2368.99	12
Italy	260.23	191.97	-26	2586.36	2361.44	-9
Mexico	223.77	300.34	34	2330.06	2130.89	-9
Singapore	160.96	197.90	23	2294.31	2088.23	-9
Turkey	216.14	172.85	-20	1721.62	1855.07	8
Indonesia	210.58	119.88	-43	1663.10	1820.38	9
South Korea	137.40	234.56	71	1483.95	1805.46	22
China	263.57	201.96	-23	1748.79	1644.04	-6
South Africa	182.07	144.10	-21	1555.49	1486.88	-4
Bangladesh	179.94	175.23	-3	1849.85	1478.28	-20
Nepal	152.39	119.05	-22	1578.12	1457.14	-8
France	180.43	158.28	-12	1330.10	1419.41	7
Brazil	153.41	156.93	2	1246.23	1333.74	7
Netherlands	129.19	111.31	-14	1874.97	1287.01	-31
Malaysia	175.09	143.09	-18	988.90	1231.53	25
Thailand	148.56	135.90	-9	1470.66	1216.13	-17
Japan	172.17	149.06	-13	1119.69	1179.15	5
Belgium	111.27	86.50	-22	1275.66	1004.89	-21
Spain	85.78	74.28	-13	875.84	957.03	9
Australia	143.62	118.47	-18	917.39	944.52	3
Russia	64.88	113.49	75	378.89	902.25	138
Total engineering exports to top 25 countries	**5999.94**	**5796.14**	**-3**	**52792.51**	**52648.63**	**-0.3**
Total engineering exports	**8104.24**	**7852.61**	**-3**	**70743.58**	**69464.79**	**-2**
Share % of top 25 destinations	74.0	73.8		**74.6**	**75.8**	

Source: DGCI&S

Table3: Region-wise engineering exports, Apr-Nov 23-24 vs Apr-Nov 22-23 ($ million)

Region	November 22	November 23	Growth %	Apr-Nov 22-23	Apr-Nov 23-24	Growth %
North America	1809.89	1704.30	-6	16175.30	14353.42	-11
European Union	1434.18	1235.08	-14	13431.34	12723.26	-5
WANA	1026.59	1387.63	35	8191.24	9845.89	20
ASEAN	933.15	742.26	-20	8426.29	7670.79	-9
SSA (Sub-Saharan Africa)	649.59	596.20	-8	5602.32	5330.98	-5
NE ASIA	631.73	642.21	2	4934.69	5214.59	6
Other Europe	507.85	434.55	-14	4111.71	4471.47	9
South Asia	427.56	423.81	-1	4439.36	3907.33	-12
Latin America	440.98	421.87	-4	3891.30	3820.80	-2
CIS	89.45	134.04	50	519.68	1092.49	110
Oceania	152.31	129.39	-15	1002.70	1015.94	1
Others	0.97	1.29	33	17.65	17.84	1
Grand total	**8104.24**	**7852.61**	**-3**	**70743.58**	**69464.79**	**-2**

Note: Myanmar has been included in ASEAN and not in South Asia, since ASEAN is a formal economic grouping Source: DGCI&S

2023-24 as against April-November 2022-23.

Panel-wise analysis

In this section we look at the engineering panel-wise exports for November 2023 vis-à-vis November 2022 as well as the cumulative exports for April-November 2023-24 vis-à-vis April-November 2022-23. These are indicated in **Table4**.

Engineering exports – state-wise analysis

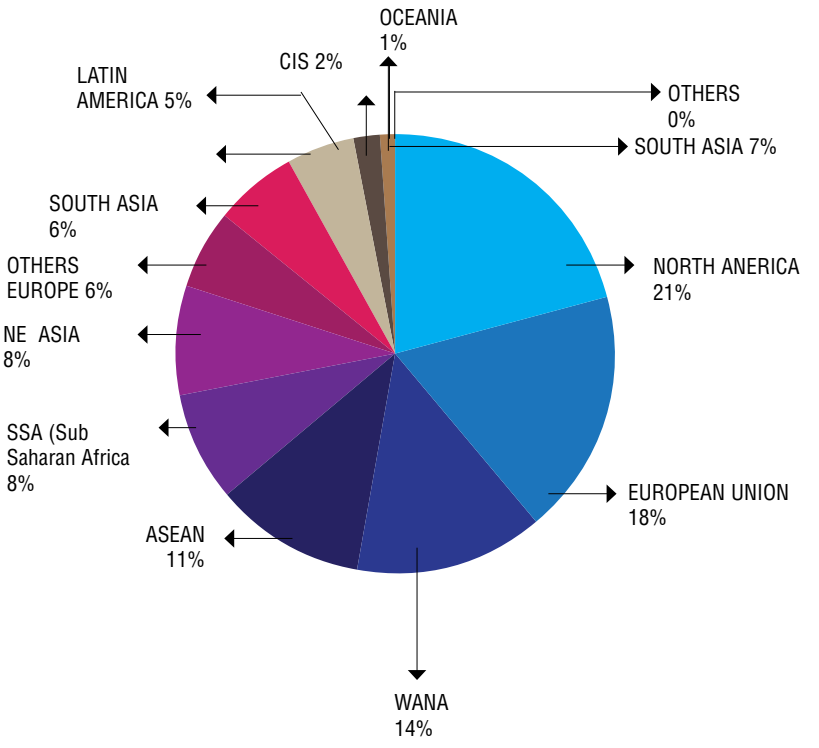
Table5 indicates the exports from top Indian states. It is evident from the table that almost 91 percent of India's exports are contributed by the listed 12 states. Within this almost 50.5 percent of exports is done by Maharashtra, Tamil Nadu, and Gujarat together.

State-wise engineering exports – some observations

• Top 12 states constitute over 91 percent of India's engineering exports. Odisha has moved to 4th position, compared to previous months.

• Major negative growth witnessed in states like Tamil Nadu, Odisha, Andhra Pradesh, Uttar Pradesh, Rajasthan, West Bengal, Punjab, and Madhya Pradesh during April-November 2023-24 compared to

Figure1: Region-wise shares of India's engineering exports, April-July 2023-24



Source: Data from DGCI&S and EEPC India analysis

Table4: Panel-wise export analysis for April-November 2023-24						
Product panel	**November 22**	**November 23**	**Growth %**	**Apr-Nov 22-23**	**Apr-Nov 23-24**	**Growth %**
FERROUS						
Iron and steel	708.2	656.1	-7	9287.7	7525.9	-19
Products of iron and steel	717.1	712.5	-1	6409.5	6386.6	0
Subtotal	**1425.3**	**1368.6**	**-4**	**15697.2**	**13912.5**	**-11**
NON-FERROUS						
Copper and products	126.7	213.1	68	1081.2	1602.1	48
Aluminium and products	670.0	543.0	-19	6185.4	4707.4	-24
Zinc and products	97.5	52.3	-46	900.0	502.5	-44
Nickel and products	19.6	14.7	-25	143.6	116.9	-19
Lead and products	25.3	79.3	214	256.2	460.4	80
Tin and products	0.5	1.5	178	7.5	10.2	36
Other non-ferrous metals	58.3	55.8	-4	517.6	488.2	-6
Subtotal	**998.0**	**959.7**	**-4**	**9091.6**	**7887.8**	**-13**
INDUSTRIAL MACHINERY						
Industrial machinery like boilers, parts, etc.	33.2	52.3	58	422.6	463.8	10
IC engines and parts	300.9	244.5	-19	2406.5	2403.6	0
Pumps of all types	106.7	101.3	-5	857.4	905.5	6
Air condition and refrigerators	125.7	133.3	6	1049.5	1092.6	4
Industrial machinery for dairy, food processing, textiles etc.	671.6	614.2	-9	5691.0	5258.8	-8
Machine tools	55.6	61.1	10	455.8	490.5	8
Machinery for injecting moulding, valves and ATMs	203.4	191.5	-6	1492.1	1624.4	9
Subtotal	**1497.0**	**1398.3**	**-7**	**12374.9**	**12239.4**	**-1**
ELECTRICAL MACHINERY						
Electrical machinery	953.5	890.2	-7	7105.9	8114.1	14
AUTOMOBILE AND AUTO COMPONENTS						
Motor vehicle/cars	704.1	667.9	-5	5619.1	5598.2	0
Two- and three-wheelers	222.1	201.4	-9	1939.1	1738.6	-10
Auto components/parts	608.7	576.7	-5	4792.6	4988.6	4
Auto tyres and tubes	237.5	221.9	-7	2056.5	1827.7	-11
Subtotal	**1772.4**	**1667.8**	**-6**	**14407.2**	**14153.2**	**-2**
AIRCRAFT AND RELATED PRODUCTS						
Aircraft and spacecraft parts and products	130.8	264.6	102	956.7	1143.1	19
SHIPS BOATS AND FLOATING PRODUCTS AND PARTS						
Ships boats and floating products and parts	165.5	108.9	-34	2355.9	2344.2	0
MISCELLANEOUS ENGINEERING PRODUCTS						
Medical and scientific instruments	230.3	196.2	-15	1443.3	1591.8	10
Railway transport	50.0	27.8	-44	263.4	214.4	-19
Hand tools and cutting tools	73.3	68.1	-7	639.5	608.9	-5
Bicycle and parts	31.6	24.4	-23	265.1	236.5	-11
Cranes lifts and winches	61.5	92.4	50	509.1	665.5	31
Office equipment	29.3	24.4	-17	194.0	221.5	14
Other construction machinery	204.0	297.0	46	1537.8	1977.2	29
Prime mica and mica products	1.4	2.2	60	18.5	25.3	37
Project goods	0.2	0.1	-61	1.6	2.1	28
Other rubber product except footwear	132.2	130.8	-1	1147.4	1093.6	-5
Other misc. items	347.9	331.1	-5	2734.5	3033.6	11
Total engineering exports	**8104.2**	**7852.6**	**-3.10**	**70743.6**	**69464.8**	**-1.81**

Table5: Top state-wise engineering export performance, Apr-Nov 2023-24 ($ million)

Top state	Apr-Nov 22	Apr-Nov 23	Growth %	% share in India's engg exports	Remark
Maharashtra	14427.9	14636.1	1.4%	21.1%	91% share covered by top 12 states
Tamil Nadu	11574.9	11085.3	-4.2%	16.0%	
Gujarat	8791.9	9356.3	6.4%	13.5%	
Odisha	5507.3	4384.1	-20.4%	6%	
Karnataka	3746.4	4347.5	16.0%	6%	
Haryana	4113.4	4305.7	4.7%	6%	
Andhra Pradesh	3767.6	3300.7	-12.4%	5%	
Delhi	2119.7	3038.9	43.4%	4%	
Uttar Pradesh	3214.5	2732.7	-15.0%	4%	
Rajasthan	2279.1	2097.3	-8.0%	3%	
West Bengal	2425.9	2085.9	-14.0%	3%	
Punjab	1807.2	1784.2	-1.3%	3%	

Source: NIRYAT portal

Table6: Region-wise exports from India ($ million)

Region	November 22	November 23	Growth %	Total exports Apr-Nov 22-23	Total exports Apr-Nov 23-24	Growth %
Eastern	882.76	811.74	-8.0	9718.5	7704.9	-20.7
Northern	1628.86	1685.24	3.5	14125.3	14689.0	4.0
Southern	2427.03	2394.14	-1.4	20810.2	20739.1	-0.3
Western	3004.86	2956.54	-1.6	25428.4	26342.3	3.6
Total	7943.5	7847.7	-1.2	70082.4	69475.3	-0.9

Note: The total engineering exports given in the table is taken from NIRYAT as per the latest available data of November 2023 and may not tally with the total engineering exports as given by DGCI&S
Source: NIRYAT portal

Table7: Engineering exports growth vis-à-vis manufacturing growth from April 2022

Month/Year	Engg exports growth %	Manufacturing growth %
April 2022	21.37	5.6
May 2022	12.64	20.7
June 2022	3.09	12.9
July 2022	-1.85	3.1
August 2022	-13.00	-0.5
September 2022	-11.39	2.0
October 2022	-19.68	-5.8
November 2022	0.09	6.7
December 2022	-11.60	3.6
January 2023	-9.76	4.0
February 2023	-9.73	5.9

Table7: Engineering exports growth vis-à-vis manufacturing growth from April 2022

Month/Year	Engg exports growth %	Manufacturing growth %
March 2023	-7.49	1.2
April 2023	-7.27	5.5
May 2023	-4.13	6.3
June 2023	-10.94	3.5
July 2023	-6.65	5.3
August 2023	7.83	9.3
September 2023	6.81	4.9
October 2023	7.20	10.4
November 2023	-3.10	N A

Source: Department of Commerce and CSO

Table8: USD-INR monthly average exchange rate in 2023-24 vs 2022-23 (1USD to INR)

Month	2022-23	2023-24	Change y-o-y %	Direction	Change m-o-m %	Direction
April	76.17	82.02	7.68	Depreciation	-0.33	Appreciation
May	77.32	82.34	6.49	Depreciation	0.39	Depreciation
June	78.04	82.23	5.37	Depreciation	-0.13	Appreciation
July	79.60	82.15	3.20	Depreciation	-0.10	Appreciation
August	79.56	82.79	4.06	Depreciation	0.78	Depreciation
September	80.23	83.04	3.50	Depreciation	0.30	Depreciation
October	82.34	83.24	1.09	Depreciation	0.24	Depreciation
November	81.81	83.30	1.82	Depreciation	0.07	Depreciation

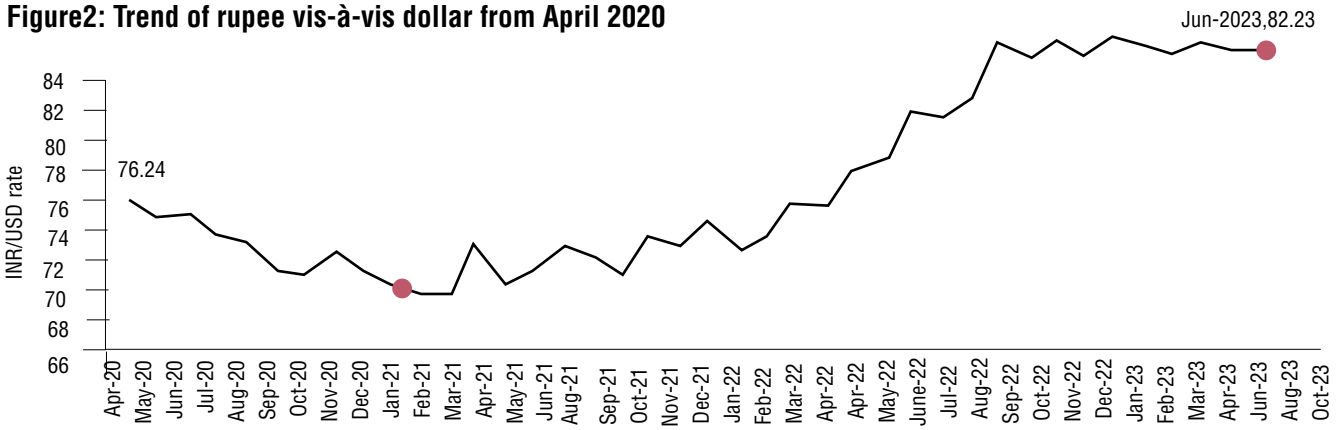
Source: FBIL

Table9: USD-INR monthly average exchange rate, 2022-23 vs 2021-22 (1USD to INR)

Month	2021-22	2022-23	Change y-o-y %	Direction	Change m-o-m %	Direction
April	74.47	76.16	2.27	Depreciation	4.63	Depreciation
May	73.27	77.32	5.53	Depreciation	1.52	Depreciation
June	73.56	78.07	6.14	Depreciation	0.98	Depreciation
July	74.53	79.60	6.80	Depreciation	1.95	Depreciation
August	74.18	79.56	7.25	Depreciation	-0.05	Appreciation
September	73.56	80.23	9.07	Depreciation	0.84	Depreciation
October	74.92	82.34	9.90	Depreciation	2.63	Depreciation
November	74.50	81.81	9.82	Depreciation	-0.64	Appreciation
December	75.37	82.46	9.41	Depreciation	0.79	Depreciation
January	74.44	81.90	10.02	Depreciation	-0.68	Appreciation
February	75.00	82.61	10.15	Depreciation	0.87	Depreciation
March	76.24	82.29	7.94	Depreciation	-0.39	Appreciation

Source: FBIL,

Figure2: Trend of rupee vis-à-vis dollar from April 2020



same period last fiscal.

• Arunachal Pradesh had the most positive growth deviation (though at a very low base) in the current month, the growth rose to 25.83 percent this month from an average growth rate of 11.99 percent per month. Meghalaya had the most negative growth deviation in the current month, the growth decreased to 0.00 percent this month from an average growth rate of 36.32 percent per month. (SOURCE: Niryat portal)

• Maharashtra being the highest state in terms of engineering goods exports is leading by $305.52 million from Tamil Nadu (second-highest state) in November 2023.

India's region-wise engineering exports

In terms of region, Western region, which includes industrial states like Maharashtra and Gujarat, is the frontrunner in terms of exports with 34.5 percent share. Tamil Nadu from the Southern region has improved its export performance and it ranked second after Maharashtra, while Gujarat and Odisha ranked third and fourth during April-November 2023-24 and Karnataka came down to fifth position compared to the previous month.

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 exports 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.

Engineering exports growth and manufacturing output growth moved in the same direction in as many as nine out of 12 months in each of the fiscal years 2019-20 and 2020-21. During fiscal 2021-22, engineering exports growth and manufacturing growth moved in the same direction in seven out of 12 months while in fiscal 2022-23, as many as10 out of 12 months saw engineering exports and manufacturing output moving in the same direction.

The first seven months of fiscal 2023-24 saw engineering exports growth and revised manufacturing output growth moved in the same direction. During April, May, and July 2023, engineering exports witnessed slower decline and manufacturing output managed higher growth over the previous month while in June 2023, engineering exports conceded higher decline and manufacturing output growth slowed down. In August 2023, engineering exports came back to the growth path and manufacturing output recorded higher growth while in September 2023, both of them conceded slower growth. In October 2023, both engineering exports growth and manufacturing growth accelerated.

The link between these two may not be established on a monthly basis, but a positive correlation may be seen if the medium-to-long-term trend is considered.

Impact of exchange rate on India's exports

How did the exchange rate fare during November 2023 and what was the recent trend in rupee-dollar movement? In order to get a clearer picture of the recent trend, we not only took the exchange rate of November 2023, but also considered the monthly average exchange rate of the rupee vis-à-vis the dollar for each month of fiscal 2023-24 as well as 2022-23 as mere one-month figure does not reflect any trend. **Table8** depicts the short-term trend:

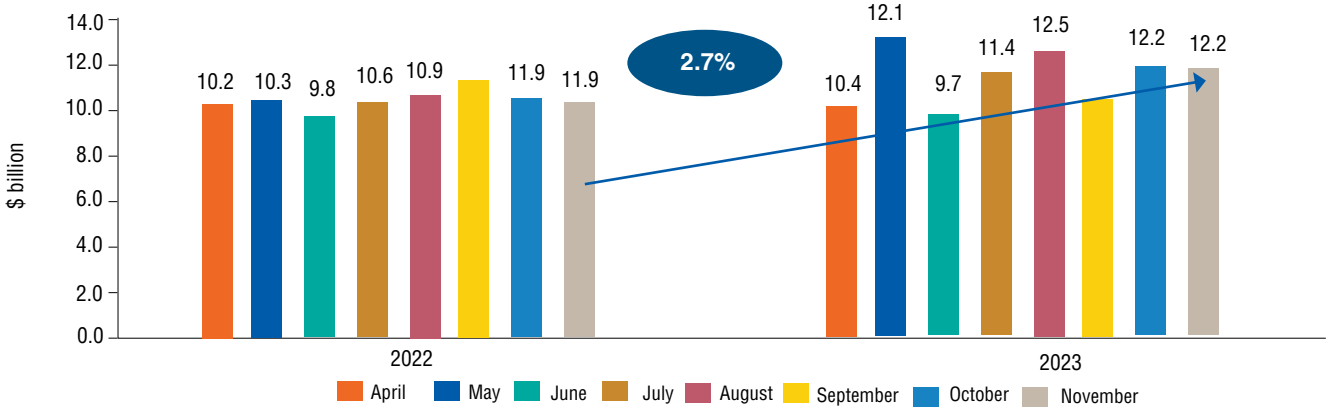
Depreciation of the rupee vis-à-vis the dollar continued both on a y-o-y basis and a month-on-month basis during November 2023. Rapid rise in benchmark interest rate by the US Fed is the major reason for many currencies losing ground this year. Moreover, according to market experts, dollar demand from importers, hedging, speculative positioning by private banks and block-deal related equity outflows weighed on the rupee. It hit a record low at 83.30 during November 2023.

ENGINEERING IMPORTS

India's engineering imports during November 2023 were valued at $12,180.1 million compared to $11,861.7 million in November 2022, recording positive growth of 2.7 percent in dollar terms. Barring transport equipment, all sectors witnessed a rise in imports during November 2023 compared to November 2022.

The share of engineering imports in India's total merchandise imports in November 2023 was estimated at 22.4 percent, higher than that of November 2022, which was estimated at 20.8 percent. Table10 and **Figure3** depict engineering imports for November 2023 compared to November 2022.

Figure3: Monthly engineering imports, May 2023 vis-à-vis May 2022



Source: EEPC India analysis

TREND IN ENGINEERING TRADE BALANCE

Table11: Monthly trend in engineering trade balance for FY 2023-24 ($ billion)

Trade flow	Apr	May	June	July	Aug	Sep	Oct	Nov
Engineering export	9.0	9.3	8.5	8.7	9.1	8.9	8.1	7.9
Engineering import	10.4	12.1	9.7	11.4	12.5	10.7	12.2	12.2
Trade balance	-1.4	-2.8	-1.2	-2.7	-3.4	-1.8	-4.1	-4.3

Source: DGCI&S, EEPC India Analysis

We now present the trend in two-way yearly trade for the engineering sector for 2023-24 depicted in **Table11**.

Conclusion

After recording increase in the previous few months, engineering exports experienced a decline of 3.1 percent in November 2023. Cumulative exports (April-November 2023) also declined by approximately 2 percent. Decline was witnessed in major engineering panels including iron and steel, aluminium, electrical machinery, automobiles and industrial machinery. In terms of destinations, exports to the USA continued to decline. Decline was also noticed in major EU economies including Germany and Italy. Also, since signing of the FTA with Australia, engineering exports to the country declined for the first time. Decline was also noted in ASEAN, Latin America, and South Asia.

The engineering exports decline can be explained by global trade trends to a significant extent. As per OECD, falling energy trade contributed to reduction in trade volume in both North America and Europe. In the first nine months of 2023, merchandise imports in the EU declined by 4 percent and that in the USA declined by 4 percent on a y-o-y basis. Import decline was also noticed in Brazil, South Africa, and Russia. Overall factors like high interest rates and weakening industrial output, volatility in commodity prices, and increase in trade restrictive measures are affecting global trade and in turn India's engineering exports.

Given the above situation, we seek guidance and support from the government to face these difficult times. Factors such as raw material prices and high cost of logistics are becoming additional burden for Indian exporters in the face of this global trade depression. We urge the government to look into these matters and continue supporting us to keep us competitive in the global market.

ANNEXURE I

Engineering product panels – country-wise analysis

We now analyse the performance of some of the important products for fiscal April-November 2023-24 vis-à-vis April-November 2022-23. We have taken the major panels and computed the top importers to get an idea of the current trade pattern. (**I.1**)

Engineering product panels – some observations

• In April-November 2023-24, Italy, Nepal, and the UAE ranked as the top importers of Indian iron and steel, while the USA, UAE, and Saudi Arabia led in importing products of iron and steel.

• The USA stood out as the primary importer of Indian industrial machinery, making up 20 percent of India's global exports in this category, followed by Germany and Thailand with 5 and 4 percent shares, respectively.

• Saudi Arabia, South Africa, and Mexico were the top three importers of India's automobiles during April-November 2023-24 in India's global exports respectively over the same period last fiscal.

• USA, South Korea, and Saudi Arabia were the top three importers of India's non-ferrous metals and products during April-November 2023-24 while USA, Singapore, and UK were the top three importers of Indian electrical machinery and components during the same period.

• USA, France, and UK were the top three importers of India's aircraft and spacecraft during April-November 2023-24 in India's total global exports of the product followed by Kuwait and Turkey.

• Singapore, Indonesia, and UAE became the largest importers of ships, boats and floating structures followed by Sri Lanka and Oman. For the auto components' product group, USA remained the top importer in April-November 2023-24 followed by Germany, Turkey, and Brazil.

I.1: Engineering product panel – country matrix ($ million)

Product panel	Top 5 nations	Apr-Nov 2022-23	Apr-Nov 2023-24	Growth %
Iron and steel	Italy	1146.0	1054.5	-8
	Nepal	618.0	577.7	-7
	UAE	771.0	425.6	-45
	China	255.2	373.3	46
	Belgium	508.5	373.2	-27
Products of iron and steel	USA	2106.0	1804.1	-14
	UAE	279.7	369.4	32
	Saudi Arabia	172.0	318.0	85
	Germany	314.6	293.0	-7
	UK	222.8	238.8	7
Industrial machinery	USA	2518.0	2416.4	-4
	Germany	622.9	670.2	8
	Thailand	686.7	526.8	-23
	UAE	455.0	524.5	15
	China	527.7	465.9	-12
Automobiles (motor vehicles/cars and two- and three-wheelers)	Saudi Arabia	609.8	1100.2	80
	South Africa	944.7	845.1	-11
	Mexico	782.0	772.6	-1
	UAE	333.2	355.9	7
	Indonesia	292.4	278.0	-5

I.1: Engineering product panel – country matrix ($ million)

Product panel	Top 5 nations	Apr-Nov 2022-23	Apr-Nov 2023-24	Growth %
Non-ferrous metals	USA	1137.4	971.2	-15
	Korea	873.5	808.3	-7
	Saudi Arabia	242.5	764.5	215
	Malaysia	447.6	741.0	66
	China	498.7	336.3	-33
Electrical machinery and components	USA	1971.5	1574.3	-20
	Singapore	292.6	657.2	125
	UK	433.3	651.5	50
	France	371.1	484.0	30
	Germany	417.6	471.2	13
Aircraft and spacecraft	USA	300.2	326.8	9
	France	123.3	142.7	16
	UK	73.1	85.7	17
	Kuwait	0.5	82.0	17499
	Turkey	24.1	62.2	158
Ships, boats and floating structures and parts	Singapore	935.9	638.2	-32
	Indonesia	343.1	556.2	62
	UAE	286.2	506.5	77
	Sri Lanka	281.0	271.5	-3
	Oman	41.6	182.6	339
Auto components (including auto parts and auto tyres)	USA	1670.3	1532.0	-8
	Germany	332.4	371.5	12
	Turkey	267.5	363.7	36
	Brazil	370.8	326.8	-12
	Mexico	258.3	295.1	14

Source: DGCI&S

ANNEXURE II

Country-wise analysis

During November 2023 compared to November 2022, it has been observed that certain key export destinations, which showed significant demand for Indian engineering products, witnessed a decline in cumulative growth from April to November 2023-24 compared to the same period last fiscal.

USA and Mexico

Engineering exports from India to the USA and Mexico have witnessed a consistent decline in the recent year. The cumulative exports amounted to $11,457.8 million in April-November 2023-24, compared to $12,851 million during the corresponding period in the previous fiscal to the USA. Similarly, engineering exports to Mexico have experienced an 8.5 percent decline during the same timeframe. However, there has been a significant upswing in India's engineering exports to Mexico in November 2023 compared to November 2022, registering a notable increase of 34.2 percent.

An important factor influencing this scenario is the weakened state of the global economy, marked by subdued demand and elevated inflation. This situation is exacerbated by ongoing geopolitical tensions across various countries. These have weakened the supply chains and have significantly affected consumer confidence across the globe. Among the nations witnessing significant decline in their exports to the USA and Mexico are key participants in global trade, including China, South Korea, the UK, France, Saudi Arabia, and others.

Both in the USA and Mexico, a distinct pattern has arisen favouring near-shoring or on-shoring, where manufacturers predominantly move various elements of their production processes to nearby locations. This transition has brought about notable alterations in global trade patterns. The impact of on-shoring is

II.1: Negative engineering exports country-wise ($ million)

Country	November 22	November 23	Growth %	Apr-Nov 22-23	Apr-Nov 23-24	Growth %
USA	1476.5	1319.1	-10.7	12851.0	11457.8	-10.8
Italy	260.2	192.0	-26.2	2586.4	2361.4	-8.7
Mexico	223.8	300.3	34.2	2330.1	2130.9	-8.5
Singapore	161.0	197.9	23.0	2294.3	2088.2	-9.0
China	263.6	202.0	-23.4	1748.8	1644.0	-6.0
South Africa	182.1	144.1	-20.9	1555.5	1486.9	-4.4
Bangladesh	179.9	175.2	-2.6	1849.8	1478.3	-20.1
Nepal	152.4	119.0	-21.9	1578.1	1457.1	-7.7
Netherlands	129.2	111.3	-13.8	1875.0	1287.0	-31.4
Thailand	148.6	135.9	-8.5	1470.7	1216.1	-17.3
Belgium	111.3	86.5	-22.3	1275.7	1004.9	-21.2
Total engineering exports to these countries	**3288.5**	**2983.4**	**-9.3**	**31415.3**	**27612.7**	**-12.1**
Total engineering exports	**8104.2**	**7852.6**	**-3.1**	**70743.6**	**69464.8**	**-1.8**
Share %	**41**	**38**		**44**	**40**	

Source: DGCI&S

II.2: Countries with negative export growth rate to USA and Mexico ($ million)

Exporting country	April-September 22-23	April-September 23-24	Growth %
USA			
China	301667.2	227027.6	-24.7
South Korea	62321.6	61138.3	-1.9
UK	33226.7	32693.8	-1.6
France	30418.1	29596.6	-2.7
Thailand	32737.8	29323.1	-10.4
Saudi Arabia	13423.7	8601.7	-35.9
Mexico	237596.1	243014.9	2.3
	2021	**2022**	**Growth %**
Mexico			
Saudi Arabia	119.5	103.9	-13.1
Europe Others Nes	137.1	90.6	-33.9
Ukraine	217.2	72.3	-66.7
USA	221311.7	265424.1	19.9
Canada	11224.3	13174.0	17.4

Source: ITC Trade Map

noticeable in the inter-regional trade dynamics of North American countries, as depicted in the table. Importantly, there has been an increase in imports into the USA from Mexico, and conversely, Mexico has seen rising imports from the USA and Canada.

Given limited access to essential raw materials and congested global supply chains, exporters recognise the need to reconsider and revamp their manufacturing strategies. This involves careful consideration of whether the production of specific goods should be strategically located closer to their intended markets.

Italy, Netherlands, and Belgium

India's engineering exports to Italy, Netherlands, and Belgium have declined by 8.7, 31.4, and 21.2 percent respectively during April-November 2023-24 vis-à-vis April-November 2022-23. These countries' imports from other major exporting nations also declined in April-August 2023-24 against the same period last fiscal.

The diminished demand can be attributed primarily to the conflict in Ukraine, tightening monetary policies, ongoing disruptions in the supply chain, and persistent inflation in the EU. In Italy and other European nations, consumption levels have stayed modest due to the erosion of real incomes. As a result, there has been a decline in domestic demand for India's engineering exports.

Moreover, India's exports to the EU have been impacted due to the bloc's implementation of various non-tariff measures (NTM), including the Carbon Border Adjustment Mechanism (CBAM), which entered its transitional phase on 1 October 2023 and the country's exports to the region is likely to be further impacted due to these high trade barriers characterised by stringent standards and regulatory frameworks for various engineering goods.

Singapore and Thailand

Engineering exports to Singapore and Thailand declined by 9 and 17.3 percent respectively in April-November 2023-24. On the other hand, if we look at India's

II.3: Countries with negative export growth rate to Italy, Netherlands, Belgium ($ million)

Exporting Country	Apr-Aug 2022-23	Apr-Aug 2023-24	Growth %
ITALY			
China	25934.6	21734.2	-16.2
USA	11341.6	10644.9	-7.10
Algeria	7949.1	6711.2	-15.6
Turkey	5307.7	5065.1	-4.6
Saudi Arabia	3347.3	2879.4	-14.0
South Korea	2890.6	2729.5	-5.6
NETHERLANDS			
China	58488.7	52438.3	-10.3
Brazil	5481.0	5156.9	-5.9
Malaysia	4856.8	3906.3	-19.6
South Korea	4187.7	3332.5	-20.4
Turkey	2800.9	2655.8	-5.2
Thailand	2878.4	2816.2	-2.2
BELGIUM			
China	14254.6	13071.3	-8.3
Turkey	2830.1	2173.0	-23.2
Vietnam	1732.7	1134.6	-34.5
South Korea	2127.5	2120.6	-0.3
Canada	2226.7	1790.3	-19.6
Brazil	1744.7	1150.3	-34.1

Source: ITC Trade Map

II.4: Countries with negative export growth rate to Singapore and Thailand ($ million)			
Exporting country	**April-September 2022-23**	**April-September 2023-24**	**Growth %**
SINGAPORE			
China	32926.4	28198.0	-14.4
USA	28039.4	25836.4	-7.9
South Korea	16361.5	12406.4	-24.2
Japan	14390.1	10209.3	-29.1
UAE	8766.3	6472.5	-26.2
THAILAND			
China	36433.8	35006.0	-3.9
Japan	17326.2	15356.3	-11.4
UAE	9935.4	8262.0	-16.8
South Korea	5191.0	4275.7	-17.6
Saudi Arabia	4813.2	3115.9	-35.3

Source: ITC Trade Map

engineering exports to Singapore in November 2023 over November 2022, there has been a substantial increase of 23 percent.

Various shocks, such as Russia's conflict in Ukraine, have caused disturbances in commodity prices and global trade. Furthermore, considerable devaluation in comparison to the dollar has sparked concerns about potential inflationary impacts arising from exchange rate pass-through, particularly in countries already dealing with elevated inflation. Additionally, Singapore has been facing a downturn in their exports also, deepening worries that the country may have entered a technical recession.

While some of these currencies have regained some value against the dollar, they generally remain in a weaker position compared to the beginning of the monetary tightening phase. Additionally, Thailand is also experiencing an overall growth slowdown, due to subdued external demand and reduced production, resulting in a decline in the country's industrial sector.

These challenges have dampened demand not only for Indian products but also for goods from other countries. Imports in Singapore have significantly declined from China, South Korea, Japan, UAE, etc. In case of Thailand, imports have declined from some of the major destinations including China, Japan, UAE, Saudi Arabia, and others.

Nepal

India's engineering exports to Nepal declined during April-November 2023-24 by 7.7 percent. Due to the deceleration in economic activities and a reduction in the overall market demand caused by a consistently high inflation rate and a tightening of liquidity in the financial sector, consumers' spending have been impacted. Consequently, there has been a decline in the imports of high revenue-generating goods, including industrial raw materials, vehicles, and other engineering products in this fiscal period.

Amid ongoing economic slowdown in many countries including Nepal, not only have Nepal's imports experienced a decline of 13.1 percent in 2022, but exports have also seen a decrease of 22 percent. The reduction in overall trade is attributed to the government's revision of its taxation policy on imported goods amidst the ongoing economic slowdown.

Decreasing demand in the domestic market has largely discouraged the import of foreign goods from major import destinations such as China, UAE, USA, Australia, Argentina, and others.

Bangladesh

India's engineering exports to Bangladesh declined by 20.1 percent in April-November 2023-24 compared to the same period last fiscal. The global economy is facing significant challenges as a result of the far-reaching consequences of conflicts in Ukraine, the Middle East, and other economic challenges. Developing countries are the hardest hit and have already been struggling to regain their production levels while emerging from the impacts of the Covid19 pandemic. Ongoing government efforts to tighten fiscal measures, aimed at relieving pressure on foreign exchange reserves, continue to restrict imports. Bangladesh is not immune to these challenges, witnessing a prolonged impact on its trade relations with various countries.

Exports from most of the destinations such as China, Brazil, USA, Japan, Australia, Germany etc. to Bangladesh declined in April-November 2023-24 over April-November 2022-23. Another significant reason for declining engineering exports from India is the threat from Chinese exports to Bangladesh.

II.5: Nepal's trade pattern ($ million)

	2021	2022	Growth %
Nepal's global exports	1665.7	1299.6	-22.0
Nepal's global imports	15792.7	13716.4	-13.1

Source: ITC Trade Map

II.6: Countries with negative export growth rate to Nepal ($ million)

Exporting country	2021	2022	Growth %
China	2377.6	1849.5	-22.2
UAE	414.8	321.1	-22.6
USA	297.6	293.2	-1.5
Argentina	450.0	235.5	-47.7
Australia	227.7	141.7	-37.8
Ukraine	197.5	137.1	-30.6

Source: ITC Trade Map

II.7: Countries with negative export growth rate to Bangladesh ($ million)

Exporting country	April-October 2022-23	April-October 2023-24	Growth %
China	16048.9	10669.6	-33.5
Brazil	1645.0	1232.5	-25.1
USA	1612.8	992.6	-38.5
South Korea	1627.5	872.2	-46.4
Japan	1533.1	778.3	-49.2
Australia	839.3	574.1	-31.6
Germany	540.5	493.7	-8.7

Source: ITC Trade Map

ANNEXURE III

Price analysis for Indian ferrous and non-ferrous metals

Metals including both ferrous and non-ferrous are the most important raw materials for the engineering industry. Therefore, metal prices are a major factor affecting engineering exports. Weak demand amid slow global economic growth and a two-decade-high dollar has adversely hit the prices of industrial commodities including metals. Due to surging inflation, central banks across the world were prompted to hike interest rates. A high rate of interest would control the purchasing power of customers, which in turn would lead to low demand.

Ferrous segment

While India's export price is being made competitive globally, the domestic price is higher than export FOB price. The difference in export and domestic prices for India has been in the range of $100 to $170 per tonne focused during November 2021 to November 2023 (**III.1**). This price differential is also affecting India's iron and steel exports as producers are preferring to sell them in the domestic market for higher realisation.

Non-ferrous segment

Aluminium, zinc, and nickel are among the important non-ferrous metals that have experienced fall in domestic average prices (**III.2**). It is evident from the table that like the ferrous segment, the non-ferrous segment has also become more lucrative in the domestic market.

Compared to the global market, the domestic market is more beneficial for exporters. Even though India is working to make its export prices competitive on a global scale, the domestic average price is greater than the LME prices. Because they can make more money, it has been shown that domestic producers prefer to sell their products there. Also, there has been a continuous decline in LME prices of aluminium, zinc, and nickel in April-November 2023-24 as compared to the same period last fiscal. The falling prices of important industrial metals have led their producers to shift to the domestic economy, eventually affecting their exports.

LME official prices of the aluminium, zinc, and nickel products are indicated in the Tables below.

III.1: Price differential (export price – domestic price) for HRC products ($/tonne)

Month	Price: HRC, FOB East Coast (export price), India: 2.5 mm, SAE1006	Price: HRC, JPC domestic 2 mm	Price differential
January 21	776	809.1	33.1
February 21	727.4	789.4	62
March 21	764.8	755.4	-9.4
April 21	925.8	839.3	-86.5
May 21	1027.3	909.8	-117.4
June 21	989.2	912.7	-76.5
July 21	894.5	876.8	-17.7
August 21	904.4	888.6	-15.8
September 21	875.3	880.2	5
October 21	873.5	936.1	62.6
November 21	841.4	961.4	120
December 21	759.5	905.7	146.2
January 22	736	892.1	156.1
February 22	849.5	908.7	59.2
March 22	964.5	1002.1	37.6
April 22	970	1023.5	53.5
May 22	863.7	951.8	88.1
June 22	703.3	827.8	124.6
July 22	617	783.4	166.4
August 22	579.4	754.4	175
September 22	581	719	138
October 22	577.3	713.6	136.4
November 22	534.4	705.3	170.9
December 22	572.3	676.1	103.9
January 23	643.6	715.6	72
February 23	709.8	733.4	23.7
March 23	712	743.9	31.9
April 23	695	744.2	49.2
May 23	598.6	727.3	128.7
June 23	567.8	696.2	128.5
July 23	570	696.3	126.3
August 23	571.7	692.2	120.5
September 23	580	706.2	126.2
October 23	NA	716.6	
November 23	NA	698.9	

III.2: Comparison of domestic and export prices of aluminium and its products (Ch 76)

2022-23	Exports ($)	Exports (qty '000)	Domestic avg price ($/t)	2023-24	Exports ($)	Exports (qty '000)	Domestic avg price ($/t)	Price growth %
Apr-Jul	3284850000	946283.87	3471.32	Apr-Jul	2443860000	851917.29	2868.66	-17.4
Apr-Aug	4093900000	1219930.73	3355.8	Apr-Aug	3039890000	1062159.65	2862.0	-14.7
Apr-Sep	4743590000	1439934.79	3294.3	Apr-Sep	3602380000	1266407.6	2844.6	-13.7
Apr-Oct	5499120000	1723993.5	3189.8	Apr-Oct	4145840000	1461284.79	2837.1	-11.1

Source: DGCI&S

III.3: Comparison of domestic and export prices of zinc and its products(Ch 79)

2022-23	Exports ($)	Exports (qty '000)	Domestic avg price ($/t)	2023-24	Exports ($)	Exports (qty '000)	Domestic avg price ($/t)	Price growth %
Apr-Jul	551430000	126752.53	4350.45	Apr-Jul	293500000	102000.20	2877.45	-33.9
Apr-Aug	621950000	147345.6	4221.0	Apr-Aug	348720000	122892.21	2837.6	-33
Apr-Sep	706080000	169916.65	4155.4	Apr-Sep	390180000	138560.32	2816.0	-32
Apr-Oct	802500000	198657.1	4039.6	Apr-Oct	450110000	160622.6	2802.3	-31

Source: DGCI&S

III.4: Comparison of domestic and export prices of nickel and its products (Ch 75)

2022-23	Exports ($)	Exports (qty '000)	Domestic avg price ($/t)	2023-24	Exports ($)	Exports (qty '000)	Domestic avg price ($/t)	Price growth %
Apr-Jul	94520000	3317.78	28488.93	Apr-Jul	58550000	2081.3	28131.46	-1.3
Apr-Aug	102920000	3562.42	28890.5	Apr-Aug	72810000	2491.80	29219.8	1
Apr-Sep	113350000	3912.55	28970.9	Apr-Sep	86820000	2981.92	29115.5	0.5
Apr-Oct	123410000	4259.29	28974.3	Apr-Oct	100460000	3464.51	28996.9	0.1

Source: DGCI&S

III.5: LME official prices of aluminium ($/tonne)

2022-23			2023-24			Growth %	
	Al alloy	Aluminium		Al alloy	Aluminium	Al alloy	Aluminium
April	2670	3262	April	-	2390.5	-	-26.7
May	1860	2881	May	1951	2300	4.9%	-20.2
June	1675	2462	June	1951	2157	16.5%	-12.4
July	1710	2460	July	1896	2096	10.9%	-14.8
August	1760.00	2376.00	August	1450.00	2129.00	-17.6%	-10.4
September	1760.00	2191.00	September	1500.00	2202.00	-14.8%	0.5
October	1600.00	2297.00	October	1543.00	2180.50	-3.6%	-5.1
November	1860	2397	November	1600	2258	-14.0%	-5.8
Apr-Nov	**14895**	**20326**	**Apr-Nov**	**11891**	**15322.5**	**-20.2%**	**-24.6**

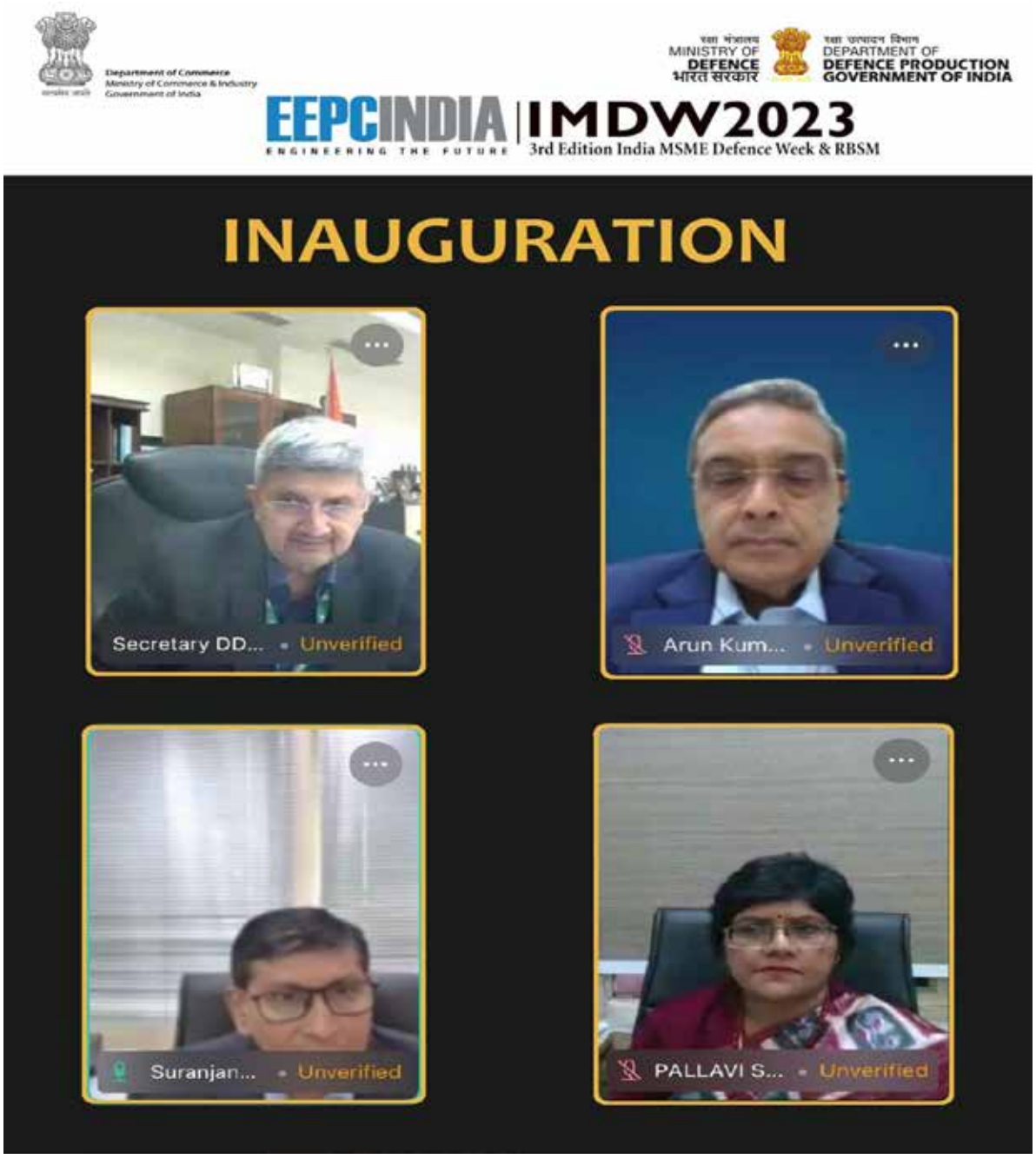
III.6: LME official prices of zinc ($/tonne)

2022-23	Zinc	2023-24	Zinc	Growth%
April	4485	April	2703.5	-39.7
May	3769	May	2491.5	-33.9
June	3572	June	2338	-34.5
July	3045	July	2341.5	-23.1

III.6: LME official prices of zinc ($/tonne)				
2022-23	**Zinc**	**2023-24**	**Zinc**	**Growth%**
August	3532.00	August	2328.50	-34.1
September	3132.00	September	2511.50	-19.8
October	2985.00	October	2445.50	-18.1
November	2906.5	November	2546	-12.4
Apr-Nov	**27426.5**	**Apr-Nov**	**19706**	**-28.1**

III.7: LME official prices of nickel ($/tonne)				
2022-23	**Nickel**	**2023-24**	**Nickel**	**Growth%**
April	33775	April	24110	-28.6
May	26280	May	21465	-18.3
June	25230	June	21350	-15.4
July	21530	July	20685	-3.9
August	21575.00	August	20525.00	-4.9
September	24860.00	September	19635.00	-21.0
October	22250.00	October	18435.0	-17.1
November	26293	November	16992	-35.4
Apr-Nov	**201793**	**Apr-Nov**	**163197**	**-19.1**

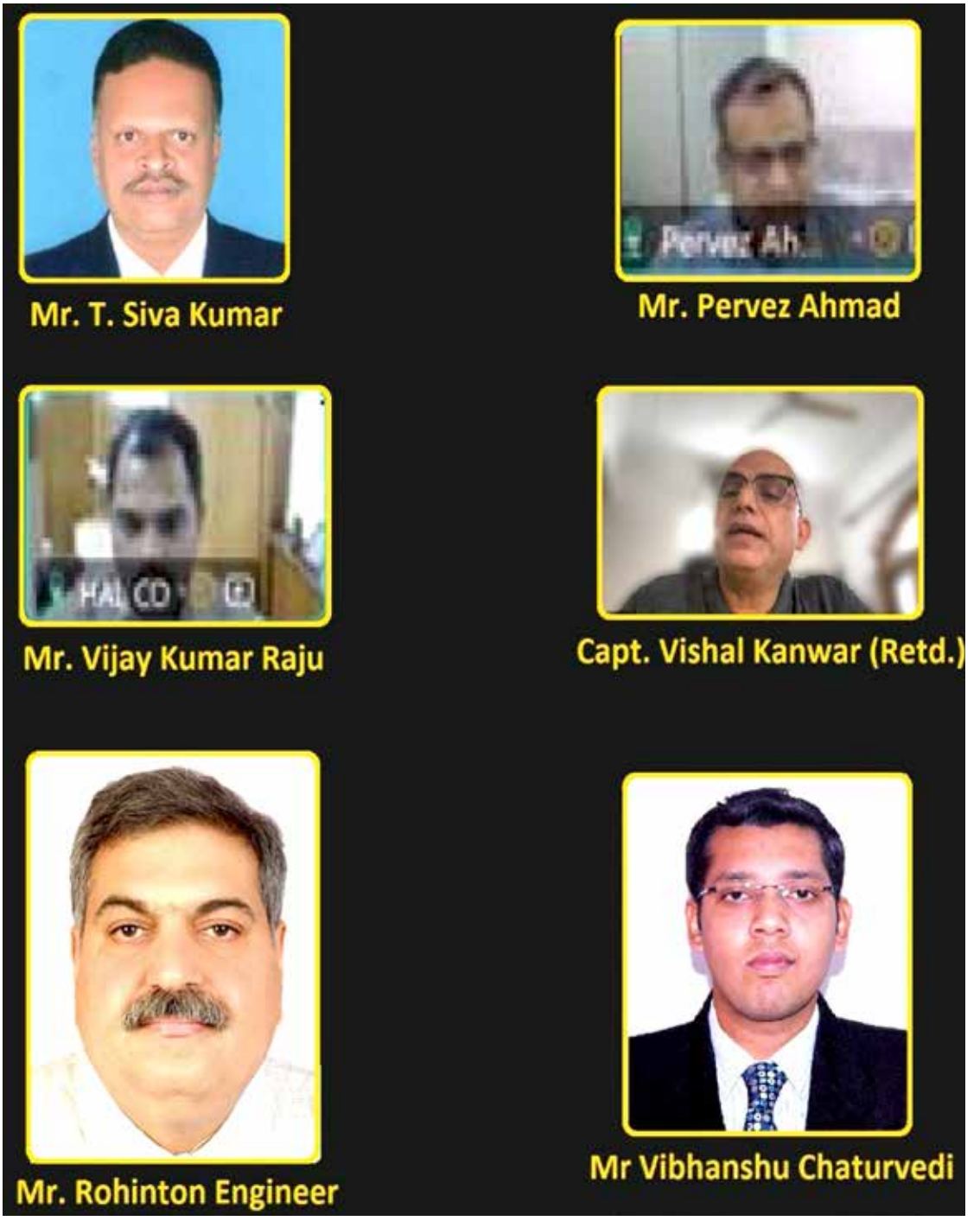
India MSME Defence Week 2023



EEPC India inaugurated the 3rd edition of India MSME Defence Week (IMDW) 2023 on 5 December 2023. The event, supported by the Union Departments of Commerce, and Defence Production and the Ministry of Defence was inaugurated virtually by (1) the Chief Guest, Dr Samir V Kamat, Secy, Dept of Def R&D & Chairman, DRDO. (2) Mr Arun Kumar Garodia, Chairman; (3) Mr Suranjan Gupta, Executive Director; and (4) Ms Pallavi Saha Joint Director; all EEPC India, were present.

Webinar on International Partnerships in Defence Sector. Speakers: Dr Saroj Bishoyi, Research Fellow, Centre for Technology and Scientific Studies, Vivekananda International Foundation; Lt Col Taposh Munjal, Associate Director, Aerospace and Defence, KPMG India ; Mr. Balpreet Singh, Sr Consultant, Aerospace and Defence, E&Y India; Capt Shiv Kumar, Defence Attache, Embassy of India, Jakarta, Indonesia; Mr Arun Shukla, Dy Regional Chairman (NR), EEPC India; Mr Mayank Krishna, Sr Asst Director, EEPC India

Webinar on Sourcing Opportunities in Indian Naval & Shipbuilding Sector. Speakers: Mr D Subbarao, General Manager Commercial, Hindustan Shipyard Ltd. (HSL); Mr Hareram Singh, General Manager (Materials), Mazagon Dock Shipbuilders Ltd. (MDS); Ms. Asmita Priolkar, Senior Manager (Purchase), Purchase-Engg, Commercial Dept, Goa Shipyard Ltd. (GSL); Mr BD Agarwal, Regional Chairman (ER), EEPC India; Mr Vibhanshu Chaturvedi, Project Coordinator, EEPC India

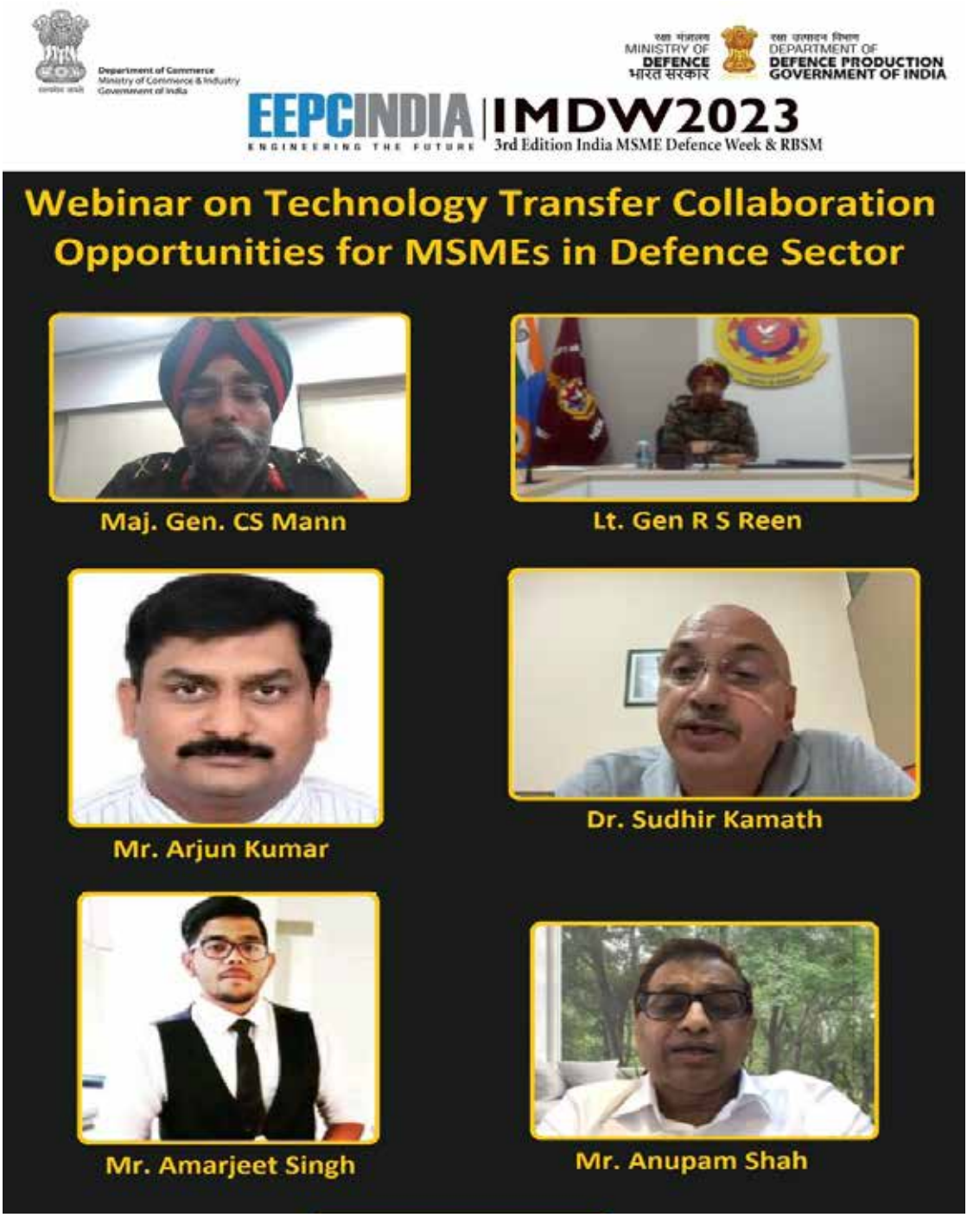


Webinar on Sourcing Opportunities in Defence PSUs in Aerospace & Defence Manufacturing. Speakers: Mr T Siva Kumar, Asst Manager (Vendor Development), Bharat Earth Movers Ltd (BEML); Mr Pervez Ahmad, Asst General Manager, DABG, Bharat Heavy Electricals Ltd (BHEL); Mr Vijay Kumar Raju, Sr Manager, (Indigenisation), Hindustan Aeronautics Ltd (HAL); Capt. Vishal Kanwar (Retd), Managing Director, Aerospace and Defence, PricewaterhouseCoopers International Limited; Mr Rohinton R Engineer, Deputy Regional Chairman (WR), EEPC India; Mr Vibhanshu Chaturvedi, Project Coordinator, EEPC India

Webinar on Sourcing Opportunities in New Defence PSUs (erstwhile OFB). Speakers: Mr JP Yadav, General Manager, Advanced Weapons & Equipment India Ltd (AWEIL); Mr CR Sandeep, Dy General Manager (Operations), Armoured Vehicles Nigam Ltd (AVNL); Mr Raghav Gupta, Dy General Manager (Materials Management), India Optel Ltd (IOL); Mr Shailesh Vagerwal, IOFS, General Manager, Munitions India Ltd (MIL); Mr Ravi Sehgal, Former Chairman, EEPC India; Mr Vibhanshu Chaturvedi, Project Coordinator, EEPC India

Webinar on Defence Modernisation & Building AatmaNirbhar Bharat in Defence Sector. Speakers: Wg Cdr P Madhusoodhanan, Vice President, Tamil Nadu Industrial Development Corporation Ltd (TIDCO); Col Sanjay Singh, Chief General Manager, (Defence Industrial Corridor), Uttar Pradesh Expressways Industrial Development Authority (UPEIDA); omm BK Munjal VSM (Retd), Defence Advisor, Government e Marketplace (GeM); Mr Animesh Singh, Defence and Aerospace Team, Invest India; Mr Binod Kumar Sarda, Dy Regional Chairman (ER), EEPC India; Mr Vibhanshu Chaturvedi, Project Coordinator, EEPC India

Webinar on Encouraging MSMEs in Defence Exports: Make in India for the World. Speakers: Dr Vivek Raghav, Scientist F, Addl Director, Directorate of Industry Interface & Technology Management (DIITM), DRDO; Ms Sunita Yadav, OSD, Exports Promotion Cell, Department of Defence Production, Ministry of Defence; Mr Shiv Kumar, Addl Director, Directorate of TDF, DRDO; Col (Dr) Rajneesh Singh (Retd), Research Fellow, Manohar Parrikar-Institute of Defence Studies and Analyses, IDSA; Mr Mahesh Desai, Immediate Past Chairman, and Mr Mayank Krishna, Sr Asst Director, EEPC India



Webinar on Technology Transfer Collaboration Opportunities for MSMEs in Defence Sector. Speakers: Maj. Gen. CS Mann, VSM, ADG, Army Design Bureau (Industry), Ministry of Defence; Lt Gen. RS Reen, DG, Directorate General of Quality Assurance, Department of Defence Production, Ministry of Defence; Mr Arjun Kumar, Add Director, Directorate of TDF, DRDO; Dr Sudhir Kamath, Director, DIA-RCoE (Defence Industry Academia Raman Centre of Excellence), Indian Institute of Science (IISc); Mr Amarjeet Singh, Program Executive, Defence Innovation Organization (DIO); Mr Anupam Shah,Former Chairman & Chairman, EEPC India Committee on Technology Upgradation















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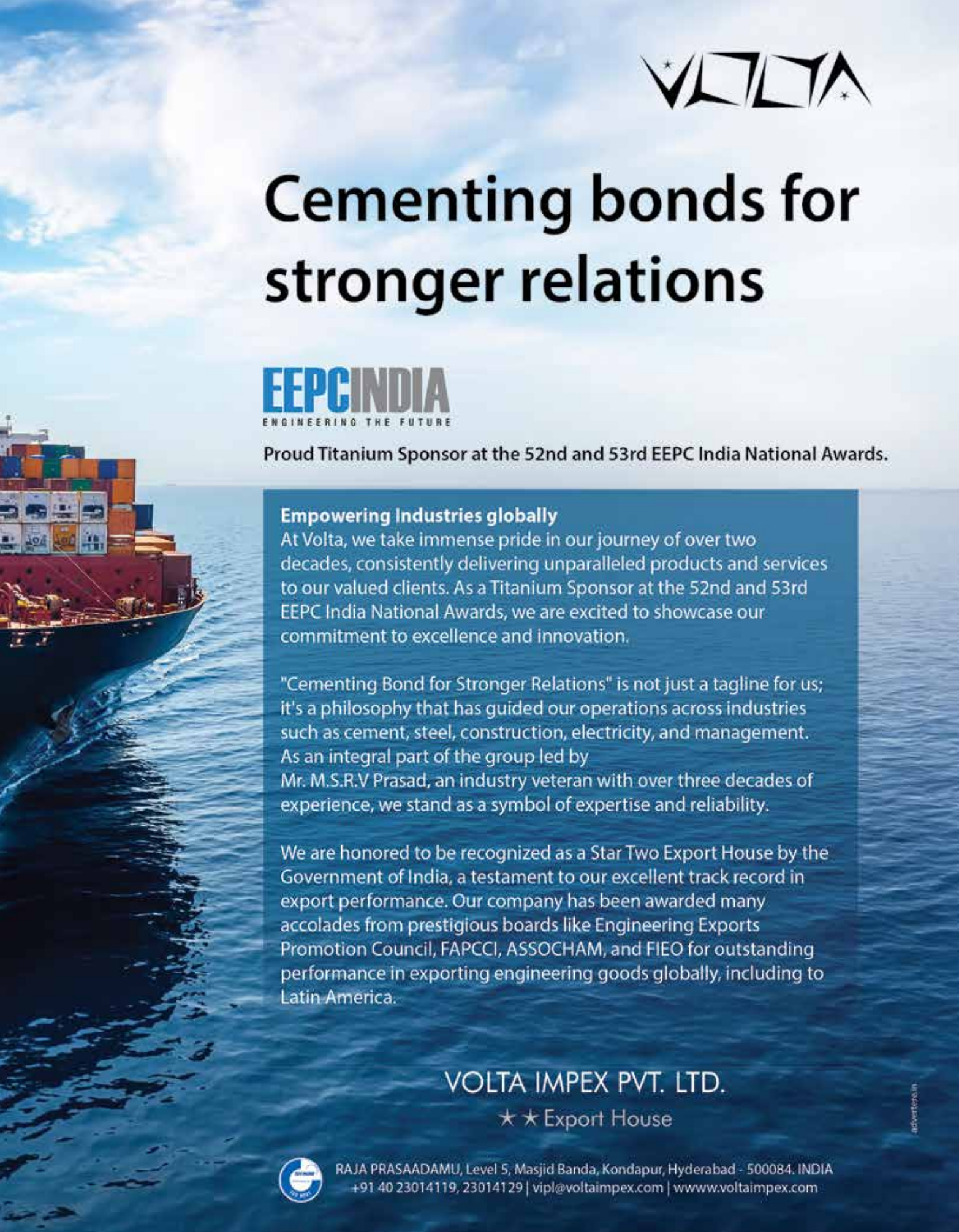

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FOCUS

Nepal Medical Show 2024

Destination Nepal

When the Nepal Medical Show, the largest exhibition of its kind, is held next month, EEPC India will be participating with its own Healthcare Supply Chain Show, a one-stop solution to meet all requirements of the healthcare segment

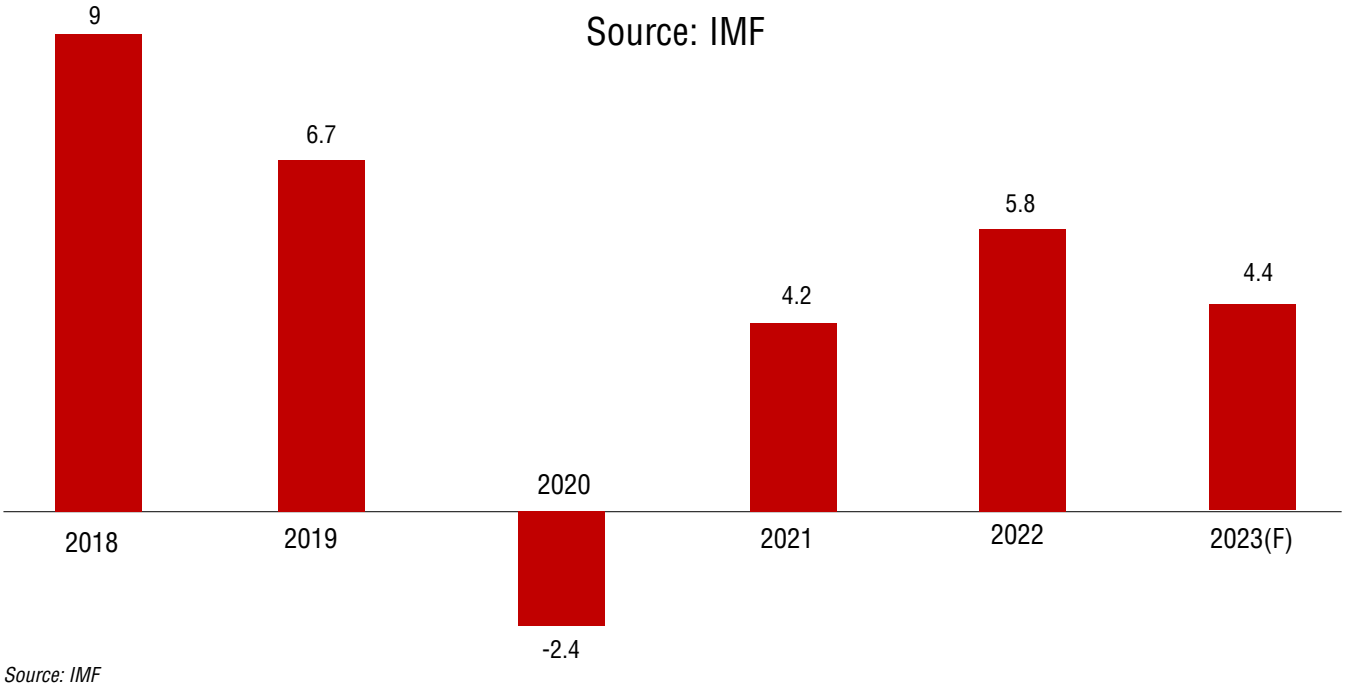
EEPC INDIA

NESTLING in the lap of eight of the highest snow-capped peaks of the world, the wildly beautiful land of Nepal is as close to paradise one can only dream of. The spectacular scenic beauty of the mighty Himalayas soothes the mind and warms the heart of distressed souls in search of peace. Not just that. Nepal is also the land that regularly hosts the Nepal Medical Show, among the world's largest events of its kind. The 7th edition of the Nepal Medical Show is scheduled to be held over 29 February-2 March 2024.

Nepal Medical Show is a well-proven platform for the manufacturers and exporters who are keen to explore, showcase, establish, and expand to new or existing markets in Nepal. It brings together healthcare leaders from a variety of disciplines to collaborate and learn. The focus area of the show is medical and surgical, clinical diagnostic hospital infrastructure, medical tourism, medical science and technology. The show offers the exhibiting companies to not only present their innovations, products, and services but also to meet the key decision-makers from the industry. It also provides an opportunity to professional visitors to gain comprehensive information about the developments in key industries.

EEPC India has been participating in this biggest display of medical devices for several years. In its attempt to promote the healthcare sector, EEPC India has been running a Healthcare Supply Chain Show under the umbrella of the Nepal Medical Show. 2024 will witness the 4th edition of the Healthcare Supply

Nepal's real GDP growth rate, 2018-23



Source: IMF

Chain Show (HSCS) that aims to link medicines, equipment, infrastructure, suppliers, vendors, and hospitals for efficient and effective utilisation of resources in various associated segments. In order to fulfil the needs of the entire healthcare sector, this event is conceived to provide a one-stop solution to meet all requirements of the healthcare segment – from medical devices to infrastructure.

Economy of Nepal

Nepal is a developing country, which ranks 165th in the world in nominal GDP per capita and 162nd in GDP per capita at PPP. Nepal's gross domestic product (GDP) for 2019 was $34.186 billion. With an annual growth rate calculated at 6.6 percent in 2019, and expected 2.89 percent in 2021, Nepal is one of the fastest-growing economies in the world. Nepal has been a member of WTO since 2004.

The 16.8-million-worker Nepali labour force is the 37th largest in the world. The primary sector makes up 27.59 percent of GDP, the secondary sector 14.6 percent, and the tertiary sector 57.81 percent. Nepal's foreign exchange remittances of $8.1 billion in 2018, the 19th-largest in the world and constituting 28 percent of GDP, were contributed to its economy by millions of workers primarily in India, the Middle East and East Asia.

Major agricultural products include cereals (barley, maize, millet, paddy and wheat), oilseed, potato, pulses, sugarcane, jute, tobacco, milk and water buffalo meat. Major industries include tourism, carpets, textiles, cigarettes, cement, brick, as well as small rice, jute, sugar and oilseed mills.

Nepal's international trade greatly expanded in 1951 with the establishment of democracy; liberalisation began in 1985 and picked up pace after 1990. By fiscal 2016-17, Nepal's foreign trade amounted to NPR 1.06 trillion, a 23-fold increase from NPR 45.6 billion in 1990-91. More than 60 percent of Nepal's trade is with India. Major exports include readymade garment, carpet, pulses, handicrafts, leather, medicinal herbs, and paper products, which account for 90 percent of the total. Major imports include various finished and semi-finished goods, raw materials, machinery and equipment, chemical fertilisers, electrical and electronic devices, petroleum products, gold, and readymade garments. Inflation was at 4.5 percent in 2019. Foreign exchange reserves were at $9.5 billion in July 2019.

In 2022, Nepal limited import of non-essential goods after its foreign currency reserves dropped. The Covid pandemic caused a decline in tourism spending and the money sent home by Nepalis working abroad, which in turn lowered the country's foreign currency reserve. However, the economy is on the rebound with increase in tourism and outmigration, and foreign exchange reserves and remittances are again on an upward journey. Given the high import demand in the country, there is a fair chance that imports will again grow in the coming months.

INDIA-NEPAL TRADE

NEPAL is a landlocked country with Tibet (China) along its north border and India stretching across the east, south, and west of the country. India is Nepal's largest trade partner and the largest source of foreign investments, besides providing transit for almost the entire third country trade of Nepal. India accounts for about two-thirds of Nepal's merchandise trade, about one-third of trade in services, one-third of foreign direct investments, almost 100 percent of petroleum supplies, and a significant share of inward remittances on account of pensioners, professionals, and workers working in India.

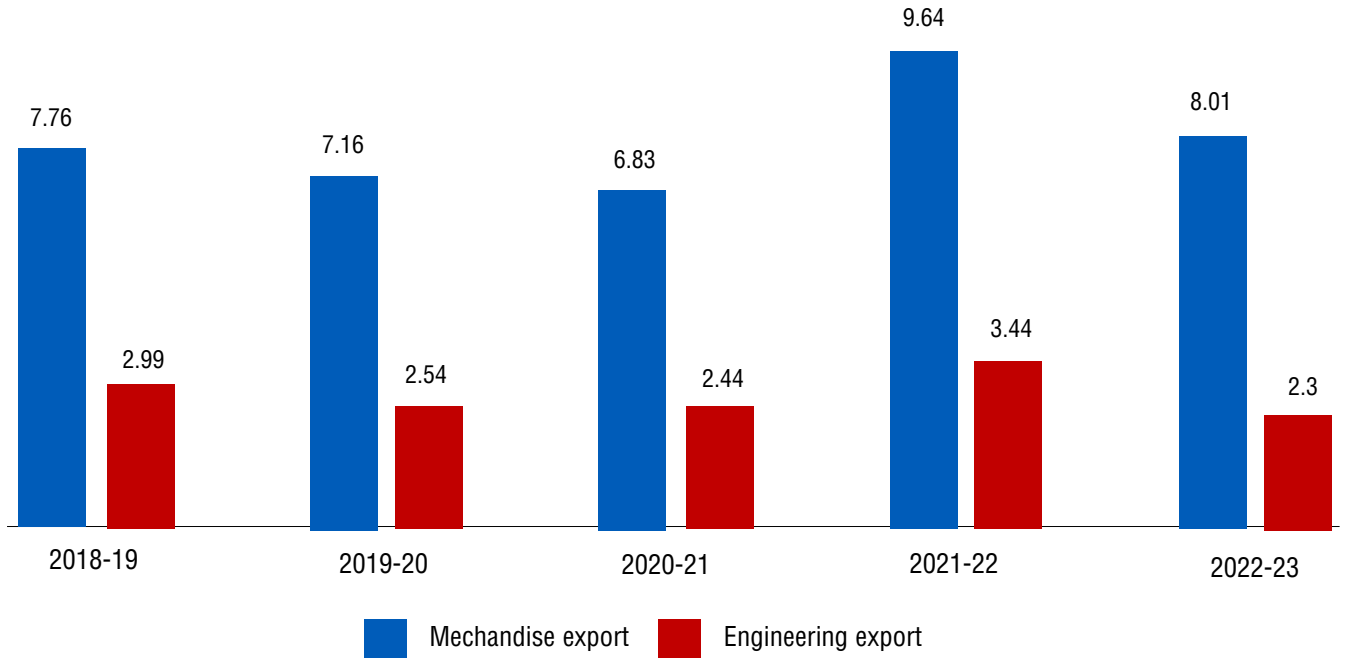
The bilateral framework for trade is anchored on the India-Nepal Treaty of Trade and Agreement of Cooperation to Control Unauthorised Trade, 2009. The revised Trade Treaty, valid for seven years, was signed on 27 October 2009. Both Treaties were automatically renewed for a further period of seven years in October 2016. The Trade Treaty allows Nepal unilateral duty-free access to the Indian market.

India and Nepal also have a Treaty of Transit, which confers transit rights through each other's territory through mutually agreed routes and modalities. Its revised version was signed on 6 January 1999 and has since been auto-renewed every seven years, the last being in 2020. The Treaty and the LoEs associated with it allow Nepal's merchandise to move seamlessly through India's road, railway and ports network.

The India-Nepal Rail Services Agreement (RSA) 2004 governs the rail-freight transport between the two countries. An LoE to the RSA was signed in June 2021 to liberalise the India-Nepal rail-freight traffic and bring it in line with latest operational and infrastructure status of Indian and Nepali Railways. The LoE has allowed market forces to come up in the rail freight segment and increased efficiency and cost-competitiveness, eventually benefiting Nepalese traders, transporters and the consumer.

During the last Indian financial year that ended in March 2022, bilateral trade between India and Nepal saw a 41 percent increase over the previous financial year. Further, Nepal's exports to India increased more than 100 percent over the previous financial year, and constituted three quarters of Nepal's total exports. By comparison, Nepal's second-largest export destination was the United States with 10 percent share, followed by Germany (2.3), the UK (1.1), Turkey

India's total vis-à-vis engineering exports to Nepal ($ billion)



Source: DGCI&S

(0.9), France (0.8), and Australia (0.7) percent respectively. Nepal is also India's 11th-largest export destination, up from 28th position in 2014. Main exports from India are POL, iron and steel, automobiles, machinery, and cereals. Nepal's exports mainly constitute edible oil, coffee, tea, spices, and jute.

Engineering trade

Nepal is also an important export destination for India's engineering industry in the neighbourhood. It regularly features among India's top 25 engineering export destinations. Between 2018-19 and 2022-23, India's exports to Nepal increased from $7.76 billion to $8.01 billion, though engineering imports from India declined. Therefore, there is significant potential for expansion.

Opportunity for Indian medical devices in Nepal

Due to the weaknesses exposed by the Covid pandemic in Nepal's health infrastructure, the Government of Nepal has increased its health budget by 45 percent for the next FY to build new hospitals as well as upgrade existing ones. Also, in recent years a large number of hospitals with modern medical technology and facilities have come up in the country especially in the capital, Kathmandu. These hospitals have continued to upgrade their testing and treatment facilities and therefore require modern medical equipment. There is significant competition from China, which is the number one supplier in the Nepalese market. Competitions from other suppliers from the US and Germany are also coming. In this background it is important for India to participate in the Nepal Medical Show to maintain their presence and increase their share in the Nepalese market.

Open border and connectivity projects have been major facilitators of increased India-Nepal trade. In the last fiscal, important developments like improvements in border infrastructure, enabling of Indian RuPay payments in Nepal, signing of LoE to bilateral Rail Services Agreement, signing of MoU on G2G supply of fertilisers from India to Nepal, and progress in bilateral power sector cooperation are likely to further boost bilateral trade.

An Inter-Governmental Committee (IGC) meeting on trade, transit and cooperation to control unauthorised trade between India and Nepal at Secretary-level is held on regular intervals. It is a platform to discuss and resolve issues relating to bilateral trade between India and Nepal, transit facilities provided by India to Nepal to facilitate trade with third countries, investment promotion, improvement of infrastructure at land customs stations, day-to-day problems in regulation of Nepalese traffic-in-transit, issues related to Indian investment in Nepal, etc. Another mechanism, the Inter-Governmental Sub-Committee (IGSC, Joint Secretary-level) is also held regularly and usually precedes the IGSC. The last meetings of the IGC and IGSC

India's engineering exports to Nepal ($ million)

Engineering sector	April-March 2021-22	April-March 2022-23	Growth %
Iron and steel	1361.1	902.3	-34
Industrial machinery for dairy etc	329.0	188.9	-43
Electric machinery and equipment	175.4	156.5	-11
Motor vehicle/cars	292.4	150.3	-49
Products of iron and steel	149.8	137.9	-8
Two- and three-wheelers	245.3	104.9	-57
Auto components/parts	126.9	103.8	-18
Aluminium, products of aluminium	88.6	87.2	-2
AC, refrigeration machinery etc	63.7	60.7	-5
Other construction machinery	153.5	38.3	-75
Zinc and products made of zinc	41.6	35.3	-15
Medical and scientific instruments	26.9	33.4	24
Other non-ferrous metal and products	44.3	33.0	-25
Other misc. engineering items	46.6	31.8	-32
Other rubber product except footwear	31.4	25.9	-18
Cranes, lifts and winches	27.3	24.1	-12
Copper and products made of copper	22.8	23.0	1
IC engines and parts	14.8	21.2	43
Pumps of all types	29.0	19.1	-34
Bicycle and parts	22.0	17.0	-23
ATM, injecting moulding machinery etc	24.7	15.7	-37
Machine tools	18.1	12.1	-33
Hand tool, cutting tool of metals	13.0	8.0	-39
Nuclear reactor, industrial boiler, parts	10.6	7.0	-34
Lead and products made of lead	2.1	1.5	-31
Office equipment	1.3	1.1	-16
Aircraft, spacecraft and parts	0.6	0.2	-67
Prime mica and mica products	0.2	0.1	-24
Nickel, products made of nickel	0.3	0.1	-47
Project goods	0.1	0.1	-21
Tin and products made of tin	0.3	0.1	-69
Railway transport equipments, parts	2.8	0.1	-98
Ship, boat and floating structures	0.1	0.0	-32
Auto tyres and tubes	83.0	64.7	-22
Grand total	**3449.5**	**2305.3**	**-33**

Source: DGCI&S

were held via videoconference on 7 December 2020 and 3-4 December 2020, respectively.

Nepal's transit trade is routed through 22 designated routes on the India-Nepal border and the ports of Kolkata/Haldia and Vishakapatnam. In addition, Nepal's trade with and through Bangladesh also transits through India. The Government of India is providing assistance for development of cross-border trade related infrastructure. It includes upgradation of four major integrated check posts at Birgunj-Raxaul, Biratnagar-Jogbani, Bhairahawa-Sunauli and Nepalgunj-Rupaidiha to international standards; upgrading approach highways to the border on the Indian side; upgrading and expanding the road network in the Terai region of Nepal; and, broad-gauging and extending rail links to Nepal. Integrated check posts at Birgunj and Biratnagar are fully functional and works on ICP Nepalgunj have commenced.

Indian investments in Nepal

India is the largest source of investment into Nepal, accounting for more than 32 percent of the total FDI stock of Nepal, which is worth nearly $520 million, as per NRB data until mid-2020. There are about 150 Indian ventures operating in Nepal engaged in manufacturing, services (banking, insurance, dry port, education, and telecom), power sector, and tourism industries. Indian companies and investments have played a key role in Nepal's national economic journey by contributing to industrialisation, employment generation, government revenue, and export earnings.

A Bilateral Investment Protection and Promotion Agreement (BIPPA) was signed on 21 October 2011. A model Bilateral Investment Treaty (BIT) is being discussed between the two countries. India and Nepal also signed a Double Taxation Avoidance Agreement (DTAA) on 27 November 2011. With the signing of this agreement, bilateral trade and investment from India got further boost.

Customs cooperation

A mechanism of Director General Level Talks on Customs Cooperation and exchange of information between the Customs Administrations of two countries has been in place since 1994. This mechanism provides an institutionalised arrangement to discuss issues relating to enforcement, trade, transit, and cooperation between the two Customs Administrations. The talks in the past have led to improved cooperation in the field of enforcement and facilitation of trade. Twenty rounds of talks have been held so far, the last of which was held virtually on 19-20 April 2021.

Civil aviation

The bilateral cooperation in this sector is governed by the India-Nepal Air Ser-

vices Agreement which was signed on 16 February 2010 to facilitate air traffic between the two countries and 30,000 seats per week have been allocated to each side in each direction. The last structured bilateral discussions on Civil Aviation cooperation were held on 21 December 2016 in New Delhi at the Joint Secretary-level.

Tourism

India is the largest source country for tourism into Nepal. Indians visit Nepal for its lofty mountains, hospitality and cultural diversity. A large numbers of Indians are also attracted to Nepal for religious tourism. The same is true for the Nepalis who visit tourist places, shrines, and temples located in the farthest corners of India. A memorandum of understanding on Cooperation in the field of Tourism was signed between the two governments on 25 November 2014 in Kathmandu. The MoU aimed to deepen and broaden cooperation in the field of tourism and also promote cooperation and direct communication between the stakeholders of tourism and hospitality industry for enhancing tourism cooperation and strengthening economic development and employment generation.

Lines of credit

The Government of India supports lines of credit (LoC) extended by the Export Import Bank of India to the Government of Nepal. It has agreed to provide four lines of credit to the Government of Nepal for $100 million, $250 million, $550 million, and $750 million. These lines of credit were signed in June 2006, September 2007, and September 2016, for execution of infrastructure development projects and post-earthquake reconstruction projects as prioritised by the Government of Nepal. The last India-Nepal LoC Review Meeting took place in Kathmandu on 29 March 2022.

India's lines of credits have financed 44 road projects, another seven projects in hydropower and transmission lines, and several others in housing and reconstruction, which are spread all across Nepal. A large number of these projects are either completed or are nearing completion, including some iconic and major projects such as the Solu Corridor Transmission Line, Koshi Corridor Transmission Line, Muzzaffarpur-Dhalkebar Transmission line, Rahughat Hydroelectric project, Devighat hydroelectric project etc. Both sides are undertaking regular discussions to identify projects under the LoC amount of nearly $1 billion that currently remains unutilised.

IN THE SHADOW OF THE EVEREST

THE Federal Democratic Republic of Nepal is a landlocked country in South Asia, encircled by India and China. It is mainly situated in the Himalayas, but also includes parts of the Indo-Gangetic Plain. It borders the Tibet Autonomous Region of China to the north, and India in the south, east, and west, while it is narrowly separated from Bangladesh by the Siliguri Corridor, and from Bhutan by the Indian state of Sikkim. Nepal has a diverse geography, including fertile plains, subalpine forested hills, and eight of the world's ten tallest mountains, including Mount Everest, the highest point on Earth. Kathmandu is the nation's capital and the largest city. Nepal is a multi-ethnic, multi-lingual, multi-religious and multi-cultural state, with Nepali as the official language.

Evolutionary history

By 55,000 years ago, the first modern humans had arrived on the Indian subcontinent from Africa, where they had earlier evolved. The earliest known modern human remains in South Asia date to about

30,000 years ago. The oldest discovered archaeological evidence of human settlements in Nepal dates to around the same time.

After 6500 BCE, evidence for the domestication of food crops and animals, construction of permanent structures, and storage of agricultural surplus appeared in Mehrgarh and other sites in what is now Balochistan. These gradually developed into the Indus Valley civilisation, the first urban culture in South Asia. Prehistoric sites of palaeolithic, mesolithic and neolithic origins have been discovered in the Siwalik hills of Dang district. The earliest inhabitants of modern Nepal and adjoining areas are believed to be people from the Indus Valley civilisation. It is possible that the Dravidian people whose history predates the onset of the Bronze Age in the Indian subcontinent (around 6300 BCE) inhabited the area before the arrival of other ethnic groups like the Tibeto-Burmans and Indo-Aryans from across the border. By 4000 BCE, the Tibeto-Burmese people had reached Nepal either directly across the Himalayas from Tibet or via Myanmar and northeast India or both.

Nepal is of roughly trapezoidal shape, about 800 km long and 200 km wide, with an area of 147,516 km2. Nepal's defining geological processes began 75 million years ago when the Indian plate, then part of the southern supercontinent Gondwana, began a northeastward drift caused by seafloor spreading to its southwest, and later, south and southeast. Simultaneously, the vast Tethyn oceanic crust, to its northeast, began to subduct under the Eurasian plate. These dual processes, driven by convection in the Earth's mantle, both created the Indian Ocean and caused the Indian continental crust eventually to under-thrust Eurasia and to uplift the Himalayas. The rising barriers blocked the paths of rivers creating large lakes, which only broke through as late as 100,000 years ago, creating fertile valleys in the middle hills like the Kathmandu Valley. In the western region, rivers which were too strong to be hampered, cut some of the world's deepest gorges. Immediately south of the emerging Himalayas, plate movement created a vast trough that rapidly filled with river-borne sediment and now constitutes the Indo-Gangetic Plain. Nepal lies almost completely within this collision zone, occupying the central sector of the Himalayan arc, nearly one-third of the 2400 km-long Himalayas, with a small strip of southernmost Nepal stretching into the Indo-Gangetic plain and two districts in the northwest stretching up to the Tibetan plateau.

Nepal is divided into three principal physiographic belts known as Himal-Pahad-Terai.

Himal is the mountain region containing snow and situated in the Great Himalayan Range; it makes up the northern part of Nepal. It contains the highest elevations in the world including the 8848.86 m-high Mount Everest on the border with China. Seven other of the world's 'eight-thousanders' are in Nepal or on its border with Tibet: Lhotse, Makalu, Cho Oyu, Kangchenjunga, Dhaulagiri, Annapurna, and Manaslu.

Pahad is the mountain region that does not generally contain snow. The mountains vary from 800 m to 4000 m in altitude, with progression from subtropical climates below 1200 m to alpine climates above 3600 m. The Lower Himalayan Range, reaching 1500 m to 3000 m, is the southern limit of this region, with subtropical river valleys and 'hills' alternating to the north of this range. Population density is high in valleys but notably less above 2000 m and very low above 2500 m, where snowfall is occasionally in winter.

Terai, the southern lowland plains bordering India, is part of the northern rim of the Indo-Gangetic Plain. Terai is the lowland region containing some hill ranges. The plains were formed and are fed by three major Himalayan rivers: Koshi, Narayani, and Karnali, as well as smaller rivers rising below the permanent snowline. This region has a subtropical to tropical climate. The outermost range of the foothills called Sivalik Hills or Churia Range, cresting at 700 to 1000 m, marks the limits of the Gangetic Plain. Broad, low valleys called Inner Terai Valleys lie

north of these foothills in several places.

The Indian plate continues to move north relative to Asia at about 50 mm per year. This makes Nepal an earthquake-prone zone, and periodic earthquakes that have devastating consequences present a significant hurdle to development. Erosion of the Himalayas is a very important source of sediment, which flows to the Indian Ocean. Saptakoshi, in particular, carries a huge amount of silt out of Nepal but sees extreme drop in gradient in Bihar, causing severe floods and course changes, and is, therefore, known as the sorrow of Bihar.

Bountiful biodiversity

Nepal contains a disproportionately large diversity of plants and animals, relative to its size. Nepal, in its entirety, forms the western portion of the eastern Himalayan biodiversity hotspot, with notable biocultural diversity. The dramatic differences in elevation found in Nepal (60 m from sea level in the Terai plains, to 8848 m Mount Everest) result in a variety of biomes. The eastern half of Nepal is richer in biodiversity as it receives more rain, compared to western parts, where arctic desert-type conditions are more common at higher elevations. Nepal is a habitat for 4 percent of all mammal species, bird species (8.9), reptile species (1), amphibian species (2.5), fish species (1.9), butterfly species (3.7), moth species (0.5) and spider species (0.4) percent, respectively. In its 35 forest-types and 118 ecosystems, Nepal harbours 2 percent of the flowering plant species, 3 percent of pteridophytes and 6 percent of bryophytes.

Nepal's forest cover is 59,624 km2, 40.36 percent of the country's total land area, with an additional 4.38 percent of scrubland, for a total forested area of 44.74 percent, an increase of 5 percent since the turn of the millennium. The country had a 2019 Forest Landscape Integrity Index mean score of 7.23/10, ranking it 45th globally out of 172 countries. In the southern plains, Terai-Duar savanna and grasslands ecoregion contains some of the world's tallest grasses as well as sal forests, tropical evergreen forests and tropical riverine deciduous forests. In the lower hills (700-2000 m), subtropical and temperate deciduous mixed forests containing mostly sal (in the lower altitudes), chilaune and katus, as well as subtropical pine forest dominated by chir pine are common. The middle hills (2000-3000 m) are dominated by oak and rhododendron. Subalpine coniferous forests cover the 3000-3500 m range, dominated by oak (particularly in the west), Eastern Himalayan fir, Himalayan pine and Himalayan hemlock; rhododendron is common as well. Above 3500 m in the west and 4000 m in the east, coniferous trees give way to rhododendron-dominated alpine shrubs and meadows.

Among the notable trees, are the astringent *Azadirachta indica*, or neem, which is widely used in traditional herbal medicine, and the luxuriant *Ficus religiosa*, or peepal, which is displayed on the ancient seals of Mohenjo-daro, and under which Gautam Buddha is recorded in the Pali canon to have sought enlightenment.

Most of the subtropical evergreen broad-leaved forest of the lower Himalayan region is descended from the Tethyan Tertiary flora. As the Indian Plate collided with Eurasia forming and raising the Himalayas, the arid and semi-arid Mediterranean flora was pushed up and adapted to the more alpine climate over the next 40-50 million years. The Himalayan biodiversity hotspot was the site of mass exchange and intermingling of the Indian and Eurasian species in the neogene. One mammal species (Himalayan field mouse), two each of bird and reptile species, nine amphibia, eight fish and 29 butterfly species are endemic to Nepal.

Nepal contains 107 IUCN-designated threatened species, 88 of them animal species, 18 plant species and one species of 'fungi or protist' group. These include the endangered Bengal tiger, the red panda, the Asiatic elephant, the Himalayan musk deer, the wild water buffalo and the South Asian river dolphin, as well as the critically endangered gharial, the Bengal florican, and the white-rumped vulture, which has become nearly extinct by having ingested the carrion of diclofenac-treated cattle. Vulture restaurants coupled with a ban on veterinary usage of diclofenac has seen a rise in the number of white-rumped vultures.

Nepal has ten national parks, three wildlife reserves, one hunting reserve, three Conservation Areas and 11 buffer zones, covering a total area of 28,959.67 km2 or 19.67 percent of the total land area, while 10 wetlands are registered under the Ramsar Convention.

Diplomacy in defence

The Constitution of Nepal, adopted in 2015, affirms the country as a secular federal parliamentary republic divided into seven provinces. Nepal was admitted to the United Nations in 1955, and friendship treaties were signed with India in 1950 and China in 1960. Nepal hosts the permanent secretariat of the South Asian Association for Regional Cooperation (SAARC), of which it is a founding member. The Nepalese Armed Forces are the fifth-largest in South Asia; and are notable for their Gurkha history, particularly during the world wars, and has been a significant contributor to United Nations peacekeeping operations.

Nepal depends on diplomacy for national defence. It maintains a policy of neutrality between its neighbours, has amicable relations with other countries in the region, and has a policy of non-alignment at the global stage. Nepal is a member of SAARC, UN, WTO, BIMSTEC and ACD, among others. It has bilateral diplomatic relations with 167 countries and the EU, has embassies in 30 countries and six consulates, while 25 countries maintain embassies in Nepal, and more than 80 others maintain non-residential diplomatic missions.

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Unique flag

Nepal's flag is the only national flag in the world that is not rectangular in shape. The constitution contains instructions for a geometric construction of the double-pennant flag. According to its official description, the crimson in the flag stands for victory in war or courage, and is also the colour of the rhododendron. The flag's blue border signifies Nepali people's desire for peace. The moon on the flag is a symbol of the peaceful and calm nature of Nepalis, while the sun represents the aggressiveness of Nepali warriors.

The emblem of Nepal depicts the snowy Himalayas, the forested hills, and the fertile Terai, supported by a wreath of rhododendrons, with the national flag at the crest and in the foreground, a plain white – a map of Nepal below it, and a man's and woman's right hands joined to signify gender equality. At the bottom is the national motto, a Sanskrit quote of patriotism attributed in Nepali folklore to Lord Rama, written in Devanagari script – Mother and motherland are greater than heaven.'

Nepal is one of the major contributors to the UN peacekeeping missions, having contributed more than 119,000 personnel to 42 missions since 1958. Nepali people have a reputation for honesty, loyalty, and bravery, which has led to them serving as legendary Gurkha warriors in the Indian and British armies for the last 200 years, with service in both world wars, India-Pakistan wars, as well as Afghanistan and Iraq, though Nepal was not directly involved in any of those conflicts, and winning the highest military awards, including the Victoria Cross and the Param Vir Chakra.

Nepal pursues a policy of 'balanced relations' with the two giant immediate neighbours, India and China; the 1950 Treaty of Peace and Friendship with India provides for a much closer relationship. Nepal and India share an open border with free movement of people, religious, cultural and marital ties. India is Nepal's largest trading partner, which it depends upon for all of its oil and gas, and a number of essential goods. Nepalis can own property in India, while Indians are free to live and work in Nepal.

Nepal established diplomatic relations with the People's Republic of China on 1 August 1955, and signed the Treaty of Peace and Friendship in 1960; relations since have been based on the Five Principles of Peaceful Coexistence. Citizens of both countries can cross the border and travel as far as 30 km without a visa. China is viewed favourably in Nepal owing to the absence of any border disputes or serious interference in internal politics, coupled with its assistance in infrastructure development and aid during emergencies; favourability has increased since China helped Nepal during the 2015 economic blockade imposed by India. Subsequently, China granted Nepal access to its ports for third-country trade, and Nepal joined China's Belt and Road Initiative.

Nepal emphasises greater cooperation in South Asia and actively pushed for the establishment of SAARC, the permanent secretariat of which is hosted in Kathmandu. Nepal was one of the first countries to recognise an independent Bangladesh, and the two countries seek to enhance greater cooperation, on trade and water management; seaports in Bangladesh, being closer, are seen as viable alternatives to India's monopoly on Nepal's third-country trade. Nepal recognises the rights of the Palestinians, having voted in favour of its recognition at the UN and against the recognition of

Jerusalem as Israel's capital. Countries that Nepal maintains a close relationship with include the most generous donors and development partners – the United States, United Kingdom, Denmark, Japan, and Norway, among others.

Economy

The economy of Nepal is developing category and largely dependent on agriculture and remittances. Until the mid-20th century Nepal was an isolated pre-industrial society, which entered the modern era in 1951 without schools, hospitals, roads, telecommunications, electric power, industry, or civil service. The country has, however, made progress toward sustainable economic growth since the 1950s. The country was opened to economic liberalisation, leading to economic growth and improvement in living standards when compared to the past.

Agriculture remains Nepal's principal economic activity, employing about 65 percent of the population and providing 31.7 percent of GDP. Only about 20 percent of the total area is cultivable; another 40.7 percent is forested, i.e. covered by shrubs, pastureland and forest; and most of the rest is mountainous. Fruits and vegetables (apples, pears, tomatoes, various salad greens, peach, nectarine, potatoes), as well as rice and wheat are the main food crops. The lowland Terai region produces an agricultural surplus, part of which supplies the food-deficient hill areas.

Exports

GDP is heavily dependent on remittances (9.1 percent) of foreign workers. The export-oriented carpet and garment industries have grown rapidly in recent years. Together, they account for approximately 70 percent of the country's merchandise exports. Nepal's merchandise trade balance has improved somewhat since 2000 with the growth of the carpet and garment industries. Recently, the European Union has become the largest buyer of readymade garments; fruits and vegetables (mostly apples, pears, tomatoes, various salads, peach, nectarine, potatoes, rice) from Nepal. Exports to the EU accounted for 46.13 percent of the country's garment exports.

The European Union (46.13), the US (17.4), and Germany (7.1) percent respectively are Nepal's main export partners; they mainly buy Nepali readymade garments. Nepal's import partners include India (47.5), the United Arab Emirates (11.2), China (10.7), Saudi Arabia (4.9), and Singapore (4) percent, respectively.

Strong export performance, including earnings from tourism, and external aid has helped improve the overall balance

of payments and increase international reserves. Nepal receives substantial amounts of external assistance from the United Kingdom, the United States, Japan, Germany, and the Nordic countries. Several multilateral organisations such as the World Bank, the Asian Development Bank, and the UN Development Programme also provide assistance.

Tourism

Tourism is one of the largest and fastest-growing industries in Nepal, employing more than a million people and contributing 7.9 percent of the total GDP. The number of international visitors crossed one million in 2018 for the first time (not counting Indian tourists arriving by land). Nepal's share of visitors to South Asia is about 6 percent, and they spend much less on average, with Nepal sharing 1.7 percent of the earnings. Premier destinations include Pokhara, the Annapurna trekking circuit and the four UNESCO world heritage sites – Lumbini, Sagarmatha National Park (home to Mount Everest), seven sites in the Kathmandu Valley collectively listed as one, and Chitwan National Park. Most of Nepal's mountaineering earning comes from Mount Everest, which is more accessible from the Nepalese side.

Nepal, officially opened to westerners in 1951, became a popular destination at the end of the hippie trail, during the 1960s and 1970s. In 1956, air transportation was established and the Tribhuvan Highway, between Kathmandu and Raxaul (at India's border), was started. Separate organisations were created in Kathmandu to promote this activity; some of these include the Tourism Development Board, the Department of Tourism, and the Civil Aviation Department. Furthermore, Nepal became a member of several international tourist associations. Establishing diplomatic relations with other nations further accentuated this activity.

Transport

Road: The total length of roads in Nepal is recorded to be 17,182 km, as of 2003-04. This fairly large network has helped the economic development of the country, particularly in the fields of agriculture, horticulture, vegetable farming, industry and also tourism. In view of the hilly terrain, transportation in Kathmandu is mainly by road and air. Kathmandu is connected by the Tribhuvan Highway to the south connecting India, Prithvi Highway to the west and Araniko Highway to the north connecting China. The BP Highway connects Kathmandu to the eastern part of Nepal through Sindhuli. The fast-track is under construction

which will be the shortest route to connect Terai with the valley.

Sajha Yatayat provides regular bus services throughout Kathmandu and the surrounding valley. Other bus companies including micro-bus companies operate several unscheduled routes. Trolley busses used to operate on the route between Tripureshwor and Suryabinayak on a 13-km route.

Air: The main international airport serving Kathmandu valley is the Tribhuvan International Airport, about 6 km from Kathmandu city centre and is operated by the Civil Aviation Authority of Nepal. It has two terminals, one domestic and one international. At present, it connects 30 cities around the globe in Europe, Asia, and the Middle East such as Bangalore, Bangkok, Chengdu, Delhi, Dhaka, Guangzhou, Hong Kong, Istanbul, Kolkata, Kuala Lumpur, Lhasa, Mumbai, Paro, and Singapore.

Since 2013, Turkish Airlines has connected Istanbul to Kathmandu. Oman Air also connects Muscat to Kathmandu since 2010. Nepal Airlines started flying to Tokyo-Narita from 2 March 2020. Regionally, several Nepali airlines operate from the city, including Buddha Air, Nepal Airlines, Shree Airlines, and Yeti Airlines to other major towns across Nepal.

Ropeways: Ropeways are another important transportation means in hilly terrain. A ropeway operated between Kathmandu and Hetauda over a length of 43 km, which could carry 25 tonnes of goods per hour. It has since been discontinued due to poor carrying capacity and maintenance issues. During the Rana period, a ropeway was constructed between Mathatirtha in Kathmandu to Dhorsing in Makawanpur of over 22 km in length, which carried a cargo of 8 tonnes per hour. At present, a cable car service is operated in Kathmandu in Chandragiri Hills.

KATHMANDU

Kathmandu is the capital and most populous city of Nepal with 845,767 inhabitants living in 105,649 households and 2.9 million people in its urban agglomeration, as of the 2021 Nepal census. It is located in the Kathmandu Valley, a large valley in the high plateaus in central Nepal, at an altitude of 1400 metre.

The city is one of the oldest continuously inhabited places in the world, founded in the 2nd century CE. The valley was historically called the Nepal Mandala and has been the home of the Newar people, a cosmopolitan urban civilisation in the Himalayan foothills. The city was the royal capital of the Kingdom of Nepal and hosts palaces, mansions, and gardens built by the Nepali aristocracy. It has been home to the headquarters of the South Asian Association for Regional Cooperation (SAARC) since 1985. Today, it is the seat of government of the Federal Democratic Republic of Nepal, established in 2008, and is part of Bagmati Province.

Kathmandu is and has been for many years the centre of Nepal's history, art, culture, and economy. It has a multi-ethnic population within a Hindu and Buddhist majority. Religious and cultural festivities form a major part of the lives of people in Kathmandu. Tourism is an important part of the economy in the city.

In 2013, Kathmandu was ranked third among the top ten upcoming travel destinations in the world by Tripadvisor, and ranked first in Asia. The city is considered the gateway to the Nepal Himalayas and is home to several World Heritage Sites: the Durbar Square, Swayambhu Mahachaitya, Bouddha, and Pashupatinath. Kathmandu valley is growing at 4 percent per year, according to the World Bank in 2010, making it one of the fastest-growing metropolitan areas in South Asia, and the first region in Nepal to face the unprecedented challenges of rapid urbanisation and modernisation on a metropolitan scale. It is the largest metropolitan area located in the Himalayas.

Archaeological excavations in parts of Kathmandu have found evidence of ancient civilisations. The oldest of these findings is a statue found in Maligaon that was dated at 185 CE. The excavation of Dhando Chaitya uncovered a brick with an inscription in Brahmi script. Archaeologists believe that it is 2000 years old. Stone inscriptions are ubiquitous elements at heritage sites and are key sources for the history of Nepal.

The earliest western reference to Kathmandu appears in an account of Portuguese Jesuit Father Joao Cabral who passed through the Kathmandu Valley on his way from Tibet to India in the spring of 1628 and was received graciously by the king of that time. Father Cabral reported that they reached Cadmendu, the capital of Nepal kingdom.

The location and terrain of Kathmandu have played a significant role in the development of a stable economy which spans millennia. The city is in an ancient lake basin, with fertile soil and flat terrain. This geography helped form a society based on agriculture. This, combined with its location between India and China, helped establish Kathmandu as an important trading centre over the centuries. Kathmandu's trade is an ancient profession that flourished along an offshoot of the Silk Road which linked India and Tibet. From centuries past, Lhasa Newar merchants of Kathmandu have conducted trade across the Himalayas and contributed to spreading art styles and Buddhism across Central Asia. Other traditional occupations are farming, metal casting, woodcarving, painting, weaving,

and pottery.

Kathmandu is the most important industrial and commercial centre in Nepal. The Nepal Stock Exchange, the head office of the national bank, the chamber of commerce, as well as head offices of national and international banks, telecommunication companies, the electricity authority, and various other national and international organisations are in Kathmandu. The major economic hubs are the New Road, Durbar Marg, Ason, and Putalisadak.

The economic output of the metropolitan area of around NPR 550 billion per year alone is worth more than one-third of national GDP (nominal), while the per capita income of $2200 is approximately three times the national average. Kathmandu exports handicrafts, artworks, garments, carpets, pashmina, paper; trade accounts for 21 percent of its revenues. Manufacturing is also important and accounts for 19 percent of the revenue that Kathmandu generates. Garments and woollen carpets are the most notable manufactured products. Other economic sectors in Kathmandu include agriculture (9), education (6), transport (6), and hotels and restaurants (5) percent, respectively. Kathmandu is famous for lokta paper and pashmina shawls.

The Kathmandu Metropolitan City (KMC), in order to promote international relations, has established an International Relations Secretariat (IRC). KMC's first international relationship was established in 1975 with the city of Eugene, Oregon, United States. This activity has been further enhanced by establishing formal relationships with eight other cities: Matsumoto City (Nagano Prefecture, Japan), Rochester (New York State), Yangon (Myanmar), Xi'an (Shaanxi, China), Minsk (Belarus), and Pyongyang (North Korea). KMC's constant endeavour is to enhance its interaction with SAARC countries, other international agencies, and many other major cities of the world to achieve better urban management and developmental programmes for Kathmandu. Kathmandu is home to several international and regional organisations, including the SAARC Secretariat and the International Centre for Integrated Mountain Development (ICIMOD).

Tourists in Kathmandu

Hindu and Buddhist pilgrims from all over the world visit Kathmandu's religious sites such as Pashupatinath, Swayambhunath, Boudhanath, Changunarayan, and Budhanilkantha. The neighbourhood of Thamel is Kathmandu's primary 'traveller's ghetto,' packed with guest houses, restaurants, shops, and bookstores, catering to tourists. Another neighbourhood of growing popularity is Jhamel, a name for Jhamsikhel that was coined to rhyme with Thamel. Jhochhen Tol, also known as Freak Street, is Kathmandu's original traveller's haunt, made popular by the hippies of the 1960s and 70s; it remains a popular alternative to Thamel. Ason is a bazaar and ceremonial square on the old trade route to Tibet, and provides a fine example of a traditional neighbourhood.

The hotel industry, travel agencies, training of tourist guides, and targeted publicity campaigns are the chief reasons for the remarkable growth of this industry in Nepal, and in Kathmandu in particular. Tourism is a major source of income for most of the people in the city, with several hundred thousand visitors annually.

Festivals

Most of the fairs and festivals in Kathmandu originated in the Malla period or earlier. Traditionally, these festivals were celebrated by Newars. In recent years, these festivals have found wider participation from other Kathmandu residents as well.

As the capital of the Nepal, various national festivals are celebrated in Kathmandu. With mass migration to the city, the cultures of Khas from the west, Kirats from the east, Bon/Tibetan from the north, and Mithila from the south meet in the capital and mingle harmoniously. The festivities such as the Ghode (horse) Jatra, Indra Jatra, Dashain Durga Puja festivals, Shivratri and many more are observed by all Hindu and Buddhist communities of Kathmandu with devotional fervour and enthusiasm. Social regulation in the codes enacted incorporates Hindu traditions and ethics. These were followed by the Shah kings and previous kings, as devout Hindus and protectors of the Buddhist religion.

Music

Kathmandu is the centre of music and dance in Nepal, and these art forms are integral to understanding the city. Musical performances are organised in cultural venues. Music is a part of the traditional aspect of Kathmandu. Gunla is the traditional music festival according to Nepal Sambat. Newar music originated in Kathmandu. Furthermore, music from all over Nepal can be found in Kathmandu.

The hippies who visited Kathmandu during the 1970s introduced rock music and jazz to the city. Kathmandu is noted internationally for its jazz festival, popularly known as Jazzmandu. It is the only jazz festival in the Himalayan region and was established in March 2002. The festival attracts musicians from countries worldwide, such as Australia, Denmark, United States, Benin, and India.

The city has been referenced in numerous songs, including works by Cat Stevens – 'Katmandu,' Mona Bone Jakon, 1970; Bob Seger – 'Katmandu,' Beautiful Loser, 1975; Rush – 'A Passage to Bangkok, Pulling into Kathmandu; 2112, 1976; John Lennon – 'Nobody Told Me,' 1984, posthumous; Krematorij – 'Kathmandu,' Three Springs, 2000; Fito Páez – Tráficopor Katmandú – 'Traffic through Kathmandu'; and Cavalcade – 'Kathmandu Kid,' 2019.

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TECH FRONTIERS

Development of water soluble cores for investment casting

In investment casting for the production of complex castings still waxes are the suitable materials for making pattern by injecting the liquid wax in metal dies. The aim of this study is to describe the possibilities of using salt cores

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TRADITIONALLY undercuts, channels, or passages are formed by the cores in a casting. After production of the casting, the core is removed with the help of solvent, heating in a steam autoclave, or flash firing at very high temperature. These procedures make the casting parts more expensive but of low efficiency.[1-3] For many castings with complicated openings, undercuts, channels, or passages, the salt or ceramic cores are not needed, while the wax pattern can be used directly. The problem of making difficult wax patterns is eliminated with the water soluble cores.

These salt cores appeared in the foundry in the 1970s and their extensive expansion took place in the 1990s in the mass production of diesel engine pistons. The cores of simple forms like rings, holes, channels are made from cooking salt (NaCl) by high pressure compacting and they serve for blank casting with an advantage that complex design can be produced where castings are hardly accessible to mechanical cleaning.[4-6]. The salts

meet the requirements of the primary strength (cold strength) and hot strength (650-700°C) of cores.

The salt melt is cast in core boxes and to prevent moistening, the crystallised cores are stored in an oven (at minimum of 200°C) and cores are made by mildly moistened salt compacted under high pressure. Grains are conglomerated and recrystallisation along the grain boundaries takes place either under low pressures of 30-50 MPa and at the heating temperature of 500-750°C or under high compacting pressure of 136-362.8 MPa and low sintering temperature of 180-300°C, allowing a stress release. Another way of manufacturing cores is by shooting the mixture with inorganic binders like Na_2CO_3 and hardened either with the aid of CO2 or with thermal dehydration normally at 180-210°C. All these cores show a relatively low strength and they do not suit for high pressure castings.[7-9] Polyvinyl glycol (PVG) is a waxy material that can sufficiently be dissolved in water and can be leached away from the pattern waxes, which has low hygroscopic coefficient; as a result soluble cores may remain for longer time. It is nontoxic and currently available in market. PVG cores have a deficiency that it is supposed to be used under pasty conditions. When the core solidifies, it is easy to form cracks on the surface.[10-12] The research aimed at applying three variations of binders and checking the strength (bending) improvement, the influence of salt crystal shapes, granulometry, and above all the composite salts with additives as well as the hydration and kinetics during dissolution of the cores in water.[13-15]

Experimental details

The material used here is mica powder, sodium chloride, polyethylene glycol, and solvent to dissolve polyethylene. The amount of polyethylene glycol should be strictly controlled. Here plasticiser is mixed in the ratio of 0%, 5%, and 10% to make three different compositions. Firstly, the paraffin was heated to 90-100°C in water bath until it melt, the granular polyethylene was added into the liquid paraffin and the polyethylene was dissolved completely by stirring. Then the polyethylene glycol was added into the liquid and mixed uniformly by stirring. The samples of 6mm x 6mm x10mm are composed for various tests. Then bending strength test, compression strength test, hygroscopic property and solubility test are done on all the three samples. The compositions of the respective ingredients are given in **Table1**.

Table1: Component of soluble core material (wt %)

Sample no.	Polyethylene glycol	Mica powder	Sodium chloride	Plasticiser
1	45	30	25	0
2	43	28	24	5
3	40	27	23	10

The compressive strength of different samples was measured by using universal strength testing machine. The bend strength was measured by three-point bending fixture. For the solubility rate, the sample was put into water and the solubility rate calculated. Part of the sample is exposed in air at room temperature (relative humidity was 50-70%) for one month and the changes of the sample mass were measured to calculate the hygroscopic coefficient. The hygroscopic coefficient can be calculated by the equation of

$$H= [(W_t - W_0)/W_0] \times 100\%$$

where H represents the hygroscopic property of core materials, W_t is the mass of the sample exposed in air for one month, W_0 is the initial mass of sample.

The solubility rate can be calculated by the equation of

$$R=M/(S\times T)$$

where R represents the solubility rate of the sample; M, S, and T are the mass, the surface area and the solution time of the sample, respectively.

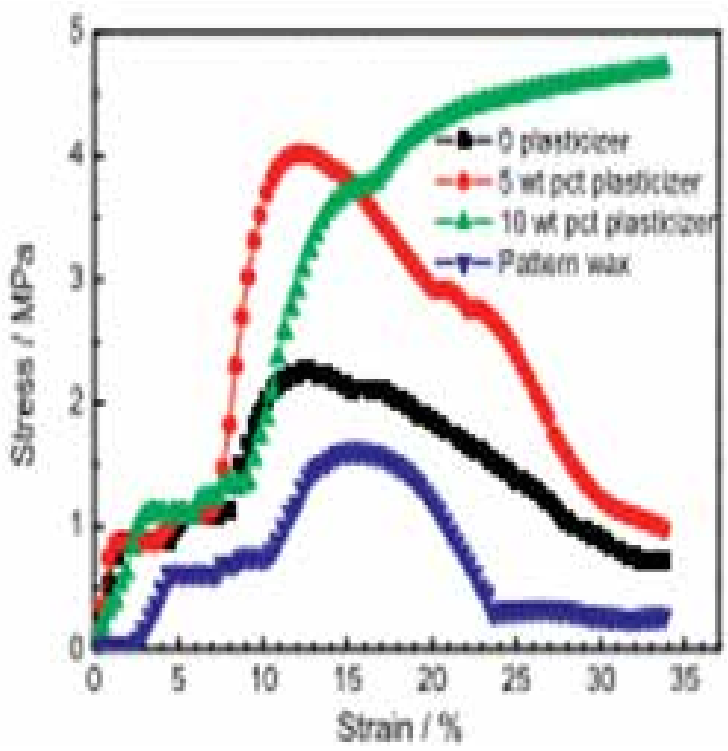
Results and discussion

A novel soluble core is successfully developed. The yield strength of the soluble core material may reach 1 MPa and the highest compressive strength may be 4 MPa (Figure1). The bending strength of the soluble core materials is 4.08 to 6.65 MPa (Table4). The hygroscopic coefficient is 0.06% to 0.22% per month (Table2) under ambient conditions. The solubility rate of core materials with zero plasticiser is 55.75 g/min-m2, with 5wt% plasticiser is 35.7 g/min-m2, which has a reducing trend with more plasticiser. Exposing the core for one hour, the surface of soluble core is loose without plasticiser (**Table3**). Mica is found to be a good substitute to provide strength, smoothness, etc. It is economic and eco-friendly. Polyethylene is ductile, it is nontoxic. It is found abundant in nature. The bond strength (**Figures 2, 3**) is due to fibrous nature of plasticiser; so with increase in plasticiser, the bond strength increases.

Though mica and polyethylene do not absorb moisture from the atmosphere, they are contributing to the stability of the water soluble cores. The compressive strength is shown in Figure1 for four different compositions of core with 0% plasticiser, 5% plasticiser, and 10% plasticiser, and pattern wax. While making it with wax it is found that wax pattern cannot sustain the stresses as with 10% plasticiser, whereas 5% plasticiser gives modified compressive strength, which shows its suitability for the production of cores.

Mica and polyethylene reduce the contact surface area between the core mate-

Figure1: Compressive stress and strain curves of wax and core material



rial and the moisture. Up to 5% weight of polyethylene glycol prevents formation of cracks, provides smooth surface and makes the core stable. Beyond 5% polyethylene glycol reduces the solubility rate of the core. A recommended mixture composed of 43% weight of polyethylene glycol, 30% weight of mica powder, 25% weight of sodium chloride powder, and 5 weight % of plasticiser give optimum strength. This kind of soluble core cannot be broken during the injection of composite pattern and it can be leached out at suitable time. Hardness plays an important role in preventing cracks. It is also found that increase in strength reduces the collapsibility of cores and thus needs more core removal – time .

Conclusion

- Production of dimensionally accurate and smooth castings without the use of protective coats.
- The cores though are soluble in water, the possibility of recyclability of the salts and water is there.
- The produced cores are environmentally friendly.
- The cores do have sufficient storage ability under common climatic condition.
- Mechanical properties are found to be improved.
- The drawback of salt cores is that a contraction and volume shrinkage occurs during solidification.
- Sometimes high density of these cores prevents the dissolution in the water and therefore the cast cores are difficult to remove.
- To eliminate shrinkage a mixture of salt and sand is recommended having melting point 820°C and production of core under pressure is recommended.

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Table2: Mass and hygroscopic coefficient of the core material

Plasticiser (wt%)	W_0 (g)	W_t (g)	$W_t - W_0$ (g)	H (%)
0	0.5313	0.5325	0.0012	0.22
5	0.5192	0.5199	0.0007	0.13
10	0.4975	0.4978	0.0003	0.06

Table3: Different sample mass, surface area, and soluble time

Plasticiser (wt%)	Initial wt (g)	Surface area (m^2)	Time (min)	Final wt (g)	Solubility rate (g/min-m^2)
0	0.5352	0.000320	30	0	55.75
5	0.5120	0.000310	30	0.1080	35.7
10	0.4970	0.000311	30	0.4800	1.82

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Figure2: Relationship between bend strength and the amount of plasticiser

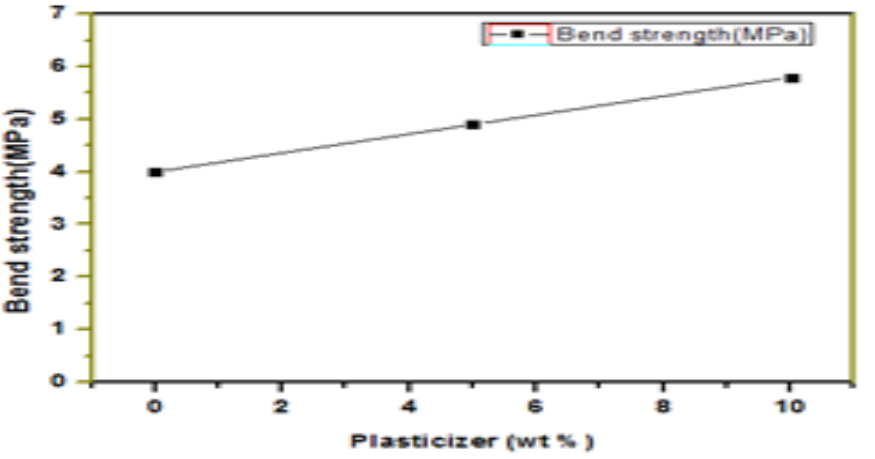

Figure3: Fracture surface micrograph of the soluble core material with plasticiser 0 (a) 5 wt pct, (b) 10 wt pct and (c) 15 wt pct

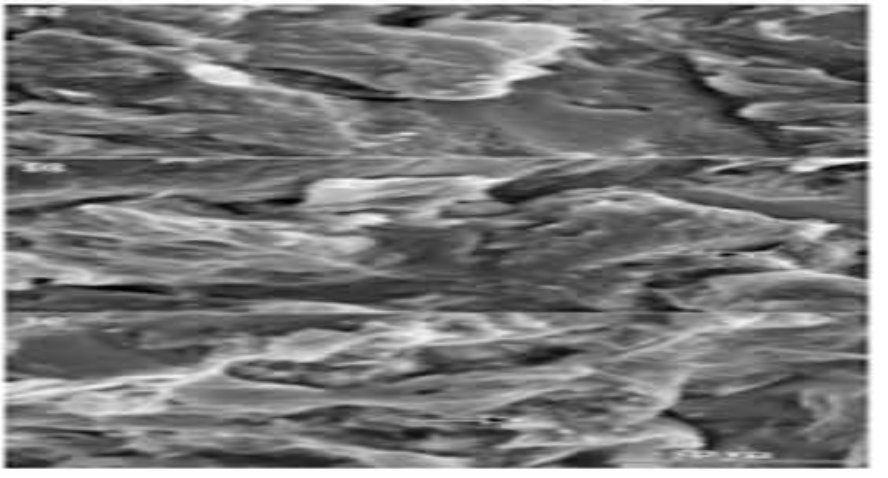

Table4: Bending strength

Plasticiser (wt%)	Bending strength (MPa)
0	4.08
5	4.80
10	6.65

15. S Sabau, Numerical Simulation of the Investment Casting Process, AFS Transactions 2005 © American Foundry Society, Schaumburg, Il, USA

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Meeting on Russia exports

(**1**) Mr Suranjan Gupta, Executive Director, and Mr Nishikant Jumde, Director (Exhibitions), EEPC India met Mr Aleksan Kagrimanyan, Dy Head of Export Support Industry Devt Centre Leningrad Oblast, Russia, in the EEPC India office in New Delhi to discuss trade and upcoming exhibitions.

Opportunities in new markets

(**1**) EEPC India (WR) and Rajkot Chamber of Commerce & Industry organised a Seminar on Opportunities in New Markets, in Rajkot. (**2**) Dr Rajat Srivastava, Regional Director (WR) & Director (Marketing & Sales), EEPC India, addressing the seminar. (**3**) The panellists: Mr Nautam Barasiya, Hony Secretary, RCCI; Mr Sudhakaran Nair, Sr Deputy Director, EEPC India; Mr VP Vaishnav, President, Rajkot Chamber of Commerce and Industry: and Dr Rajat Srivastava, Regional Director (WR) & Director (Marketing & Sales), and Mr Samir Patel, Convenor, Rajkot Chapter, EEPC India. (**4**) The participants.


EEPCINDIA
Seminar on
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Session on interest equalisation

EEPC India organised an Interactive Session on EDPMS & IDPMS; Interest Equalisation, in Bengaluru. (**5**) Mr Shashi K Lewis, Dy Regional Chairman, EEPC India (SR), welcoming the gathering. (**6**) Mr Premchandran Sk Nair, Dy DGFT, speaking on support provided by DGFT to exporters. (**7**) Ms Nisha Thakur, Asst General Manager, RBI, Bengaluru, addressing the gathering. (**8**) Mr Ankit Saharan, Manager, RBI, Bengaluru, making a detailed presentation on EDPMS & IDPMS, Interest Equalisation scheme. (9) A section of the participants.


Interactive Session on
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Interactive Session on
EDPMS & IDPMS In
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… Session on interest equalisation

(**10**) Ms Revathi, Asst General Manager (IB), SBI, Bengaluru, addressing the gathering.
(**11**) Mr Himanshu Srivastava, National Stock Exchange, speaking on IPO for SMEs.
(**12**) Mr JV Raja Gopal Rao, Joint Director, EEPC India, Bengaluru, making a presentation on promotional activities of EEPC India..

Export contracts for MSMEs

EEPC India organised a one-day training programme on Export Documentation and Payment Terms in Export Contracts for MSMEs, for the benefit of engineering manufacturers and exporters, in Cherlapally, Hyderabad.
(**13**) The speakers: Mr VC Ravish, Sr Asst Director, Hyderabad SRO, EEPC India; Mr Anirudh Doma Regional Head ETRG (Elite Trade Relations Group) & Wealth, ICICI Bank, Hyderabad; Mr K Govinda Reddy, President, Cherlapally Industries Association, Hyderabad Telangana; and Dr VBSS Koteswara Rao, CEO, Global Exim Institute, Hyderabad. (**14**) The participants.

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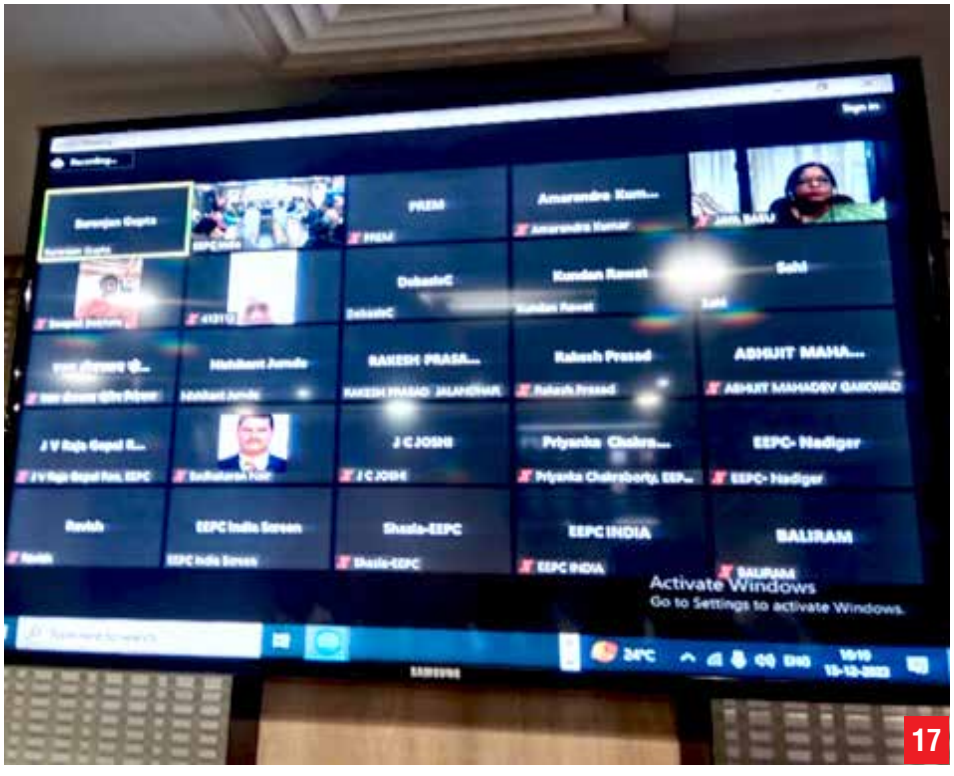

Sexual harassment of women at workplace

EEPC India held an Awareness Session on Sexual Harassment of Women at Workplace, in hybrid mode, the physical venue being Kolkata. (**15**) The speaker, Dr Kanchan Gaba – Transformational Life Coach, Entrepreneur, Philanthropist, Educationist and Author. She is the recipient of the National Role Model Award presented by President Pratibha Patil in 2011; International Olave Award, UK; and the President's Award from Dr Shankar Dayal Sharma in 1994. (**16**) Mr Adhip Mitra, AED & Secy, and Ms Anima Pandey, Regional Director (ER) & Director (Membership) & Presiding Officer of Internal Complaint Committee, EEPC India, listen as Dr Gaba, addresses the audience. (**17**) The participants in virtual mode. (**18**) Mr DJ Basu, Director (Personnel and Administration), EEPC India, addressing the session. (**19**) Theparticipants.

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Boosting exports through FTAs

EEPC India co-organised a Niriyat Bandhu Seminar on Identifying & Exploring New Export Markets for Engineering Products & Boosting Exports through Free Trade Agreements, in Bhopal. (**20**) Dr Rajat Srivastava, Regional Director (WR) and Director (Sales & Marketing), EEPC India, addressing the seminar. On his left, Mr Sanjay Neema, Asst Director, India Post, Bhopal; Mr P Narahari, Dept of MSME, MP; and Mr Surendra Soni, Branch Manager, ECGC, Bhopal. Mr Anil Singh Rawat, Sr Asst (WR), EEPC India, is on the far right. (**21**) The audience.

Opportunities from FTAs

EEPC India held a joint capacity building session with CII, SIAM, ACMA, SCMHRD, and AACSB, on Leveraging Rising Opportunities from Trade Agreements, in Pune. (**22**) Mr Prakash Tatia, Member, EEPC India WR Committee, and Advisor Welspun group, addressing the session. On his left, Mr Sumanta Chaudhuri, Principal Advisor, International Trade Policy Division, CII; Mr Sudhir Gurtoo, Managing Director, Leadec India; and Mr Prasad Bachhav, Dy Director & Head, CII, Pune. (**23**) Dr Rajat Srivastava, Regional Director (WR) and Director (Marketing & Sales), EEPC India, speaking in a Panel Discussion – Special Session on Auto Components & Engineering Sector. Other panellists: Mr Sandesh Salian, Director, Dali & Samir Engg; Mr RV Krishnan, Head, Tax & Customs, Fiat India Automobiles; Mr Sumanta Chaudhuri, CII; Ms Soma Ghosh, Chief Financial Officer, ZF India; and Mr Arunkumar Singh, Director–Finance, Engine Business Unit, Cummins India.


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Capacity Building Session
On
"Leverage Rising Opportunities from Trade Agreements"
December 2023
Pune
PRAKASH TATIA
SUMANTA CHAUDHURI
SUDHIR GURTOO
PRASAD SATHAYE

22


Capacity Building Session
On
"Leverage Rising Opportunities from Trade Agreements"
11 December 2023
Pune
SANDESH SALIAN
P V KRISHNA
SUMANTA CHAUDHURI
SOMA GHOSH
ARUNKUMAR SINGH
RAJAT SRIVASTAVA

23

India Pavilion at Big5

EEPC India managed the India Pavilion at Big5 2023, held in Dubai, UAE.

(**1**) Mr Satish Kumar Sivan, Consul-General of India in Dubai, inaugurating the India Pavilion at Big5 2023.

(**2**) Mr Atanu Hota, Sr Asst Director, EEPC India, welcoming Mr Satish Kumar Sivan, Consul-General of India in Dubai, in the EEPC India booth.

(**3**) The Consul-General being presented a memento by Mr JV Raja Gopal Rao, Joint Director, EEPC India.

(**4**) & (**5**) Mr Satish Kumar Sivan, Consul-General of India in Dubai on a VIP tour of the India Pavilion.


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AN EEPC INDIA
INITIATIVE

EEPC India Technology Centre

EEPC India, under Ministry of Commerce, Government of India, has setup in-house Technology Centres in Bengaluru and Kolkata, the first of its kind among Indian EPCs for the benefit of MSMEs and Member Exporters, to increase the awareness of advanced technologies and help them to upgrade from their existing technology, mainly on knowhow in Manufacturing, and Quality practices.

Technology Centre aims to guide and train MSMEs on product innovation, designing, process improvement, new product development, and quality practices; it acts as a library of information in the fields of technology, international standards, and industry 4.0 etc, and also facilitates member-industries to experiment and educate them in technical upgradation and quality for exports.

The main vision of EEPC India's Technology Centre is to focus on increasing India's share of hi-tech and value-added products to be exported to the global markets.

Objectives

a. To empower MSMEs with latest knowhow in the field of advanced manufacturing techniques and enable value addition of products.

b. To provide a platform to connect with engineering clusters in India and interact with leading R&D expert panels and R&D labs, academic institutes across India and utilise their expertise.

c. To implement strategies for narrowing the gap between technology development and its commercialisation and promotion in international markets by gathering market intelligence for technological development.

How the members would benefit

- Technology access to its members;
- Access to government schemes database, technology databank, R&D, academia, institutional databank, databank based on technical services, external links for IPR Databases;
- Help its members to leverage technologies to make products at par with international standards;
- Facilitate MSMEs in internationalising by upgrading level of technology;
- Help cluster for product development – preparation of DPR to Government funding;
- Pattern making for user industry at a concessional rate;
- Reverse engineering.
- Facilitating existing businesses in

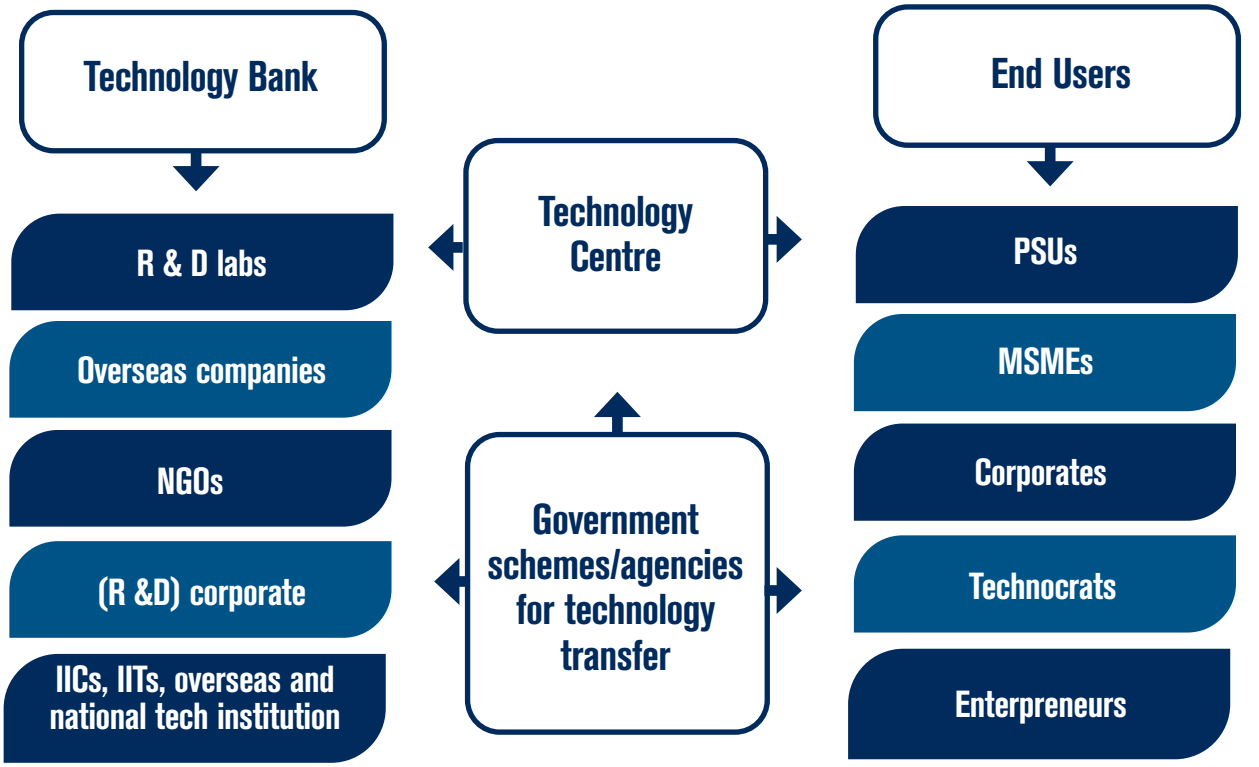
– identifying technology gaps
– reverse engineering, prototype development etc.
– connecting to scientists/experts;
– connecting to existing R&D labs, testing centres, accrediting bodies etc;
– adopting better industrial design.

Collaborations/associations

EEPC India Technology Centre has signed MoUs with several CSIR labs such as:

- Central Mechanical Engineering Research Institute (CSIR-CMERI, Durgapur)
- Advanced Materials and Processes Research Institute (CSIR-AMPRI, Bhopal)
- National Metallurgical Laboratory (CSIR-NML, Jamshedpur)

AN EEPC INDIA INITIATIVE



• National Institute for Interdisciplinary Science and Technology (CSIR-NIIST)

The Technology Centre has also signed MoUs with technology institutes – IIT-KGP, Indian Institute of Welding (IIW), International Institute of Waste Management (IIWM), National Institute of Design (NID), to name a few.

Offerings of EEPC India Technology Centre

Kolkata Tech Centre

Technology and design wing:

• Prototype development using Stratasys/F170 3D Plastic printer

• Reverse Engineering by Artec EVA lite 3D Scanner and

• CAD services with Autodesk Inventor Software (Inventor, Autocad, Inventor Nastran and CAM)

• The facility is equipped with High-end CAD workstations of 32GBand 64GB

Industrial connect wing: Meeting place of engineering industry and industrial research centres to discuss manufacturing, innovation with production and IPR support. The facility is also equipped with a library and an e-library housing technical books and journals.

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Bengaluru Technology Centre

- Availability of CAD/CAM/CAE Software for Design and NPD.
- Solidworks 2017 Professional (Modelling, Drafting, Assembly, Sheet Metal)
- Solidworks Simulation (Simulation + weldments + Tol Analyst + Mould Analysis)
- Solid CAM (2.5D, 3D HSR, 3DHSM, Turning, Multiaxis, iMachining)
- Creo Parametric 4.0 (Modelling, Drafting, Assembly, Sheet Metal, Simulation)
- Autodesk Inventor (Inventor, Autocad, Inventor Nastran and CAM)

We also undertake projects from MSMEs to support them in launching new products and sustenance engineering by providing consultancy services in implementing NPD methodologies, product benchmarking, product design guidance, design alternatives, drafting, cost reduction projects, quality practices and lean implementation projects in a cost effective approach.

Other offerings

- Access to list of government schemes and technologies from various CSIR labs, R&D Institutes available for commercialisation shall be shared through tech portal login.
- Technology Centre Members shall have an opportunity to share their innovations, novel technical articles which shall be published in EEPC India monthly magazine ie2 under 'Tech frontiers' column.
- Webinars – Technology Centre members shall enjoy free 3 webinars offered by Tech Centre in a year.

All the above services, facilities are offered to Member Exporters, MSMEs, Practitioners, Engineers, at a reasonable subscription charges.

To avail the facilities of EEPC India Technology Centre, enrol with us under following categories.

Membership type	Annual Subscription Fee	Benefits
Organisational Membership		
EEPC India members	Rs5000	All the above
Non-EEPC India members	Rs7500	All the above
Individual membership		
Technocrat		
(Minimum trade certificate from ITI)	Rs2500	
All the above		
Students/PhD scholars (Postgraduate onwards)	Rs1200	All the above + Industry connect for engineering projects + Publishing of Novel Technical Articles inour monthly magazine ie2 + Guest lecture offering via Webinars

(GST is applicable in addition)

To enrol, visit our webpage *Portal Link: https://tech.eepcindia.org/*

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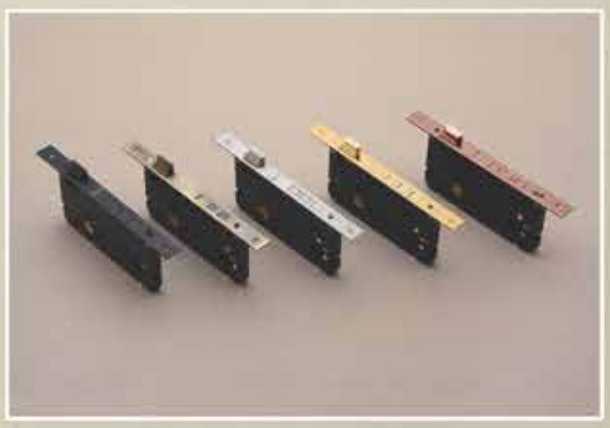
EEPC INDIA CALENDAR OF EVENTS

Name of the Event	City/Country	Date
ARAB HEALTH 2024	United Arab Emirates	29 January - 1 February 2024
NEPAL MEDICAL SHOW 2024	Nepal	29 February - 2 March 2024
ASIA PHARMA 2024	Bangladesh	29 February - 2 March 2024
International Hardware Show 2024	Germany	3 - 6 March 2024
MCE Mostra 2024	Italy	12- 15 March 2024
The Inspired Home Show	United States	17 - 19 March 2024
MIDEST 2024	Paris, France	25 - 28 March 2024
International Engineering Sourcing Show (IESS XI)	Coimbatore	4 - 6 March 2024

Proposed events for FY 2024-25

Middle East Energy	Dubai, UAE	16 - 18 April 2024
Hannover Messe	Hannover, Germany	22 - 26 April, 2024
FEIMEC	Sao Paulo, Brazil	07 - 11 May 2024
CWIEME	Berlin, Germany	14- 16 May 2024
Agritechnica Asia	Bangkok, Thailand	22 - 24 May 2024
JIMEX	Amman, Jordan	03 - 06 June 2024
ACHEMA	Frankfurt, Germany	10 - 14 June 2024
Eurobike	Frankfurt, Germany	03 - 07 July 2024
International Fastener Expo	Las Vegas, USA	09 - 11 September 2024

STYLE MEETS SECURITY



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