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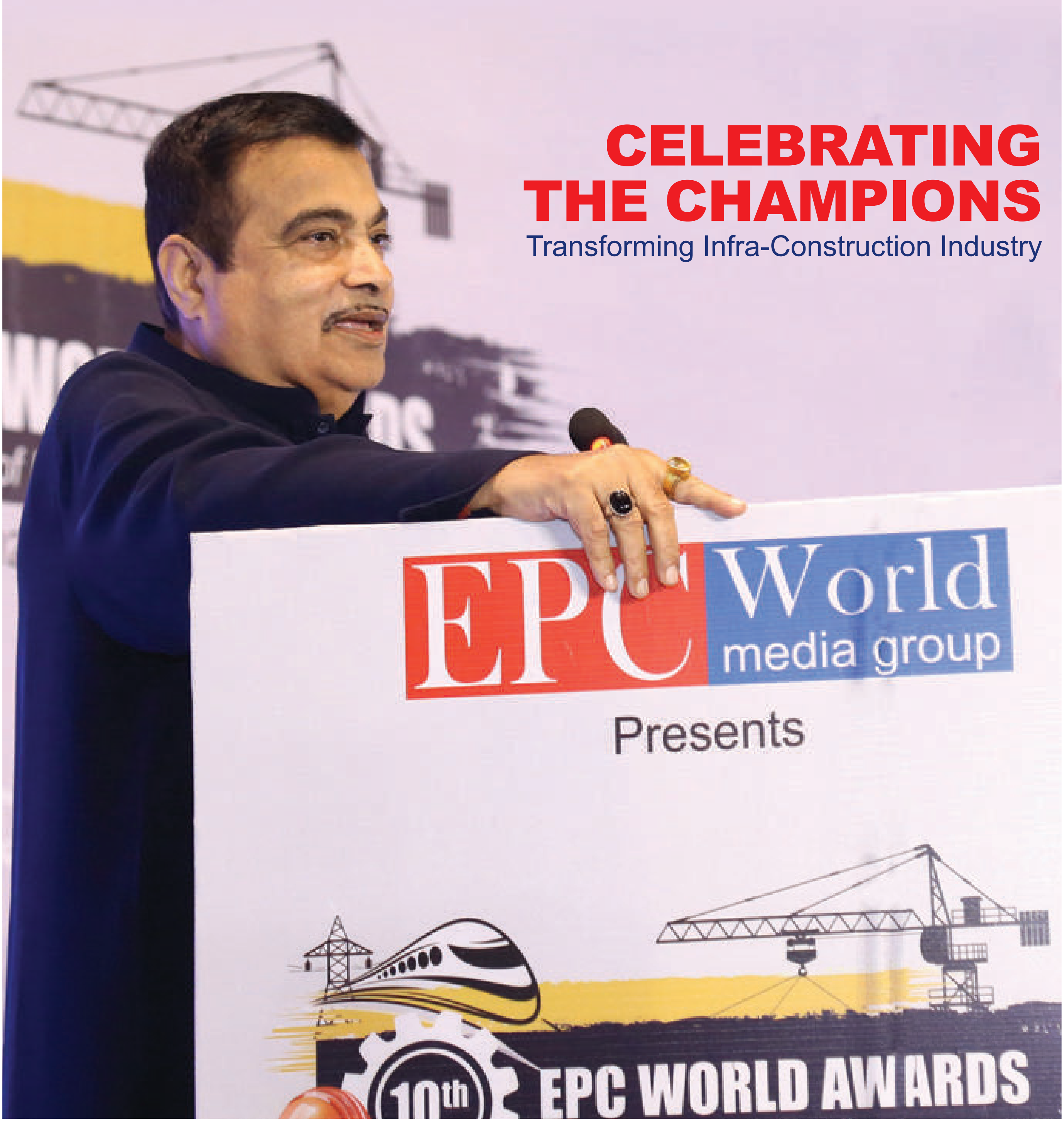
Transforming Infra-Construction Industry



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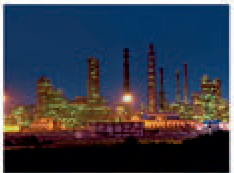
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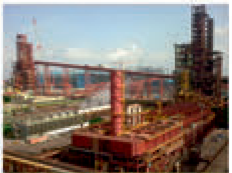
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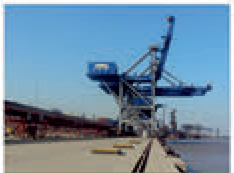
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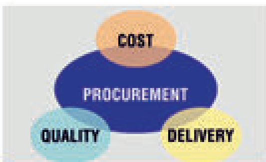

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THE CHIEF EDITOR'S TAKE

Dear Readers,

Last month on 24th July 2023 we made history. We successfully completed a decade in honoring the stalwarts redefining the industry benchmarks in the infra-construction and engineering sectors. We are thankful to Shri Nitin Gadkari, Hon'ble Minister for Road Transport & Highways, for gracing the Award ceremony and presenting the Awards to the trendsetters and frontrunners in leading the bacon of change in the infra-construction sector. The vivid description of the 10th EPC World Awards and the winners are detailed in this Edition.

In the magazine publication, we were one of the first to go digital. EPC World portal is now in its 14th years. We have furthered our digital initiatives and have introduced a new YouTube channel, EPC World News Hindi. We hope you subscribe to this channel to get more insight on skill development, technology, government policies, equipment updates, projects, infrastructure stocks analysis. This channel will also bring to you live coverage of interviews, panel discussions, events, technology & equipment reviews, plant and site visits, daily news and views of industry players.

In the last few years the aviation industry has gone through a transformation phase with a focus on seamless connectivity, cutting-edge technology and sustainability. This edition explores the opportunities that are leading the way toward a greener and more connected future. To substantiate the growth in the aviation industry we have included a report with facts and figures.

The last few months before the general election will see a flurry of activities to complete the infrastructure projects before the dates are announced. This bores well for the infra-construction sector, steel being the one. In this Edition, we have featured the steel sector. The feature highlights the ripple effect of booming infrastructure on the steel industry. Steel industry analysts and experts too have penned their report on the steel sector. Where will the sector be heading in 2024? Interesting read inside.

Apart from these, this edition has articles on roads and highways, cement industry, power transmission and distribution, artificial intelligence and automation, a know all article on REITs, and the latest happening from the infra, construction and EPC sectors.

Happy Reading!

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CONTENTS

Ambuja Cements acquires Sanghi Industries

Ambuja Cements (ACL), the cement and building material company of Adani Cement and part of the diversified Adani Group, has acquired Sanghi Industries (SIL) at an enterprise value of ₹5,000 crore. ACL will acquire 56.74% shares of SIL from its existing promoter group, Ravi Sanghi & family. The acquisition will be fully funded through internal accruals. SIL's integrated manufacturing unit at Sanghipuram in Gujarat's Kutch district is India's largest single-location cement and clinker unit by capacity. With 2,700 hectares of land, the integrated unit has two kilns with a clinker production capacity of 6.6 MTPA and a cement grinding unit with a capacity of 6.1 MTPA. It has a captive power plant of 130 MW and a Waste Heat Recovery System of 13 MW. The unit is also connected with a captive jetty at Sanghipuram. The acquisition of SIL will help ACL to strengthen its market leadership and increase its cement capacity to 73.6 MTPA from the current 67.5 MTPA. With the ongoing capex of 14 MTPA and with commissioning of 5.5 MTPA capacity at Dahej and Ametha by Q2 of FY24, the Adani Group's capacity will be 101 MTPA by 2025. SIL also has a bulk cement terminal each at Navlakhi Port in Gujarat and Dharamtar Port in Maharashtra. Most of the cement is transported through the sea route, which is environment-friendly and cost competitive. SIL has a network of 850 dealers, with market presence in Gujarat, Madhya Pradesh, Rajasthan, Maharashtra and Kerala.

ABB India inaugurates its largest Drives Service Workshop

ABB India's Motion Services division has opened its largest Drives Service Workshop in Vadodara, India. The state-of-the-art new workshop in Vadodara, is ABB's third and the largest service facility in India, following Bangalore and Faridabad. The workshop provides seamless drive restoration, repair, reconditioning, and drive exchanges allowing customers to access the latest drive technologies while avoiding premature scrapping and reducing waste.

Equipped with cutting-edge technology and an ESD-protected environment, this workshop houses testing infrastructure and provides a diverse array of services, ranging from spare part replacements to software upgrades. From spare part replacement to software upgrades, customers benefit from fast and cost-effective solutions that ensure optimized equipment performance and compatibility. As an industry first, the workshop features a workshop network with Air & Liquid cooled modules at a single location. All work is rigorously tested under full-load conditions and supported by a minimum one-year warranty, ensuring the highest quality standards. The workshop is well-positioned to serve industries such as oil & gas, petrochemical, heavy industries, wind, and marine sectors.

Brookfield signs MoU with Reliance Industries for RE equipment manufacturing in Australia

Brookfield Asset Management has signed a Memorandum of Understanding (MoU) with Reliance Industries to explore opportunities to manufacture renewable energy and decarbonization equipment in Australia. The MoU aims to both accelerate and de-risk Australia's energy transition by enabling it to locally produce clean energy equipment such as PV modules, long duration battery storage and components for wind energy. Under the terms of the MoU, Brookfield will work with Reliance to explore avenues of direct capital investment and development of skills, knowledge and expertise in the renewable energy sector of Australia to facilitate the nation's transition to a net zero future. Reliance and Brookfield will evaluate the establishment of advanced operations in Australia to make/or assemble equipment used in the construction of renewable energy projects supplying equipment to all players in the market including Origin Energy Markets.

ADB to lent $295 million loan to improve transport connectivity and safety in Bihar

The Asian Development Bank (ADB) has approved a $295 million loan to widen and upgrade around 265 kilometers of state highways, improving transport connectivity and safety in the state of Bihar in India. The highways will be upgraded with climate- and disaster-resilient design, road safety elements, and other features that will respond to the needs of the elderly, women, children, and people with disabilities. Initiatives to strengthen transport planning, safety, and sustainability within Bihar State Road Development Corporation Limited will be implemented. These include developing a road asset management system which includes climate change and disaster risk information, establishing research laboratories with training equipment in the Bihar Road Research Institute, conducting studies on congestion management and climate adaptation, and creating guidelines for gender-inclusive practices in road safety measures. The government is contributing $156.6 million to the project.

Dalmia Bharat commences operations at its cement grinding unit in Sattur, Tamil Nadu

Dalmia Bharat (DBL) has announced the commencement of commercial production at its new Greenfield Cement Grinding unit in Sattur, Tamil Nadu. This new unit adds 2.0 million tons of cement capacity to the company's overall installed capacity, bringing it to a total of 43.7 million tons. With an investment of ₹686 crores, the new cement grinding unit will produce cement, supported for the clinker requirements from the existing integrated plants in Tamil Nadu. This strategic move is part of the company's plan to strengthen its market presence in the South and to cater to the growing demand in the region. Dalmia Bharat's strong bond with the region is rooted in its legacy, as the company's first cement plant was established in Dalmiapuram, setting its foundation in the industry. The new cement grinding unit is equipped with the latest advancements in environmental-friendly technology for low carbon footprint. A 16 MW solar power capacity installation is in process to support its renewable energy initiative. With advanced automation and digitalization systems, the plant ensures higher operational efficiency and enhanced safety measures.

CASE India strengthens dealer network in western India with Bombay Infra inauguration

CASE Construction Equipment has expanded its presence in Maharashtra by appointing new dealer partner, Bombay Infra in Thane. Located at MIDC Khairane on Thane Belapur Road, Bombay Infra will assist with sales, service, and spares requirement for CASE India's customers. Along with Thane, the dealership will cater to nearby regions such as Mumbai, Raigad, Palghar, Ratnagiri, Sindhudurg, and Goa. Following the inauguration ceremony, the brand delivered four machines to the customers, symbolizing the commencement of operations. This state-of-the-art facility offers full range of CASE products and further promises an excellent customer experience complete with a customer lounge, workshop and training/conference room.

Kanv Garg joins Gensol Group as President and Chief Growth Officer

Gensol Group has appointed Kanv Garg as its President and Chief Growth Officer. In this role, Kanv will spearhead key expansion initiatives and lead the development and implementation of overall medium to long-term strategic plans for the Group. He will work closely with the founders and entity-level CXOs, fostering synergies across existing and new areas, thus contributing significantly to the sustainable growth of the organization. Prior to joining the Gensol Group, Kanv served as the Director of Corporate Strategy, New Mobility Business for the Petromin Corporation in the Kingdom of Saudi Arabia (KSA). Before that, he was the eMobility Energy Lead for EY Parthenon in the Middle East and also for EY in India. Kanv's career also includes impactful and market-creating stints in the solar sector with the World Bank Group, the Planning Commission of India, SunEdison, and Evalueserve. Kanv is an MBA from the Indian School of Business, Hyderabad and holds Bachelor of Engineering from Netaji Subhas Institute of Technology, New Delhi.

BHEL successfully synchronises 660 MW unit of Maitree Super Thermal Power Project in Bangladesh

Bharat Heavy Electricals (BHEL) has successfully synchronisation 660 MW Unit-2 of the 1,320 MW Maitree Super Thermal Power Project (STPP) in Bangladesh. The synchronisation of the unit has been done ahead of the commitment given at a high level G2G meeting, which was a very tough target even at the time it was given. The 2x660 Maitree STPP is located at Rampal, Mongla, Bagerhat, Bangladesh, and is being set up by BHEL for the Bangladesh-India Friendship Power Company (BIFPCL), a 50:50 joint venture between the Bangladesh Power Development Board (BPDB) and NTPC. The project uses state-of-the-art ultra supercritical technology for lower emissions and a number of further steps have been taken to mitigate environmental impacts including installation and compulsory usage of flue gas desulphurisation system to control SOx emission, installation of the tallest chimney in Bangladesh (275 mtr) for wider dispersion of emissions; electrostatic precipitator of efficiency above 99% to control ash particulate matter; covered coal shed and pipe conveyors to avoid coal particle pollution; closed cycle cooling water system and zero liquid discharge to minimise water consumption, among others.

GAIL, LanzaTech to explore biorecycling carbon waste into fuels and chemicals

GAIL (India) and LanzaTech Global, Inc, USA, an innovative carbon capture and utilization (CCU) company that converts waste carbon into products that people use in their daily lives, have entered a partnership to explore innovative technology solutions that advance GAIL's Net Zero 2040 goals and have the potential to support wider decarbonization applications globally. GAIL and LanzaTech will explore setting up a pilot scale CO2 capture and conversion project that has the potential to be a role model for converting CO2 into useful materials instead of emitting it to the atmosphere. Combining LanzaTech's carbon capture and utilization technology with GAIL's renewable H2 and CO2 gas streams, the project will enable resource utilization where the building blocks of everyday consumer goods, viz, Fuel, Packaging and Clothing can be made from biorecycled material instead of virgin fossil fuel. Through this collaboration, GAIL and LanzaTech aim to set new benchmarks in carbon utilization, providing a compelling model for utilization of CO2 gas streams that would otherwise be emitted as greenhouse gases.

Nuvoco launches InstaMix Superior Column Concrete

Nuvoco Vistas Corp has launched InstaMix Superior Column Concrete. This specialized concrete solution is designed for column construction, aiming to address the persistent challenges faced by developers and contractors. InstaMix Superior Column Concrete provides a remarkable advantage of early de-shuttering of cast columns. Unlike Ordinary Portland Cement (OPC) concrete with standard mix design, which often demands 7 to 14 days for de-shuttering of cast columns, InstaMix paves the way for early de-shuttering within just 12 to 16 hours, attaining a strength of up to 6MPa, depending on weather conditions. This ensures ease of pouring and sets a new standard for efficiency during construction.

Mahesh Girdhar appointed as MD and CEO of EverEnviro Resource Management

EverEnviro Resource Management has announced the appointment of Mahesh Girdhar as its new Managing Director (MD) and Chief Executive Officer (CEO). With an impressive background in the industry, Girdhar brings nearly three decades of global experience in business operation, strategy, and general management. Prior to joining EverEnviro, he held the position of President, Crop Nutrition Business at Deepak Fertilisers & Petrochemicals. Throughout his career, Girdhar has held key positions in renowned organizations such as Bayer CropScience and Monsanto, where he focused on asset strategy and operations in seed, crop protection and fertilizer businesses. EverEnviro, established by Eversource Capital in 2019, offers comprehensive environmental solutions, including the management of urban municipal waste (MSW), agro waste, hazardous and industrial waste.

KEC International bags ₹1,065 crores order across its various businesses

KEC International has secured new orders of ₹1,065 crores across its various businesses. The Transmission & Distribution (T&D) has secured orders for T&D projects in India, Africa and Americas. The orders include 400 kV Transmission line and GIS Substation in India, from a subsidiary of a reputed PSU in renewable power generation segment; 400/220 kV AIS Substation in India, from a leading private developer; supply of towers in Africa; and supply of towers, hardware and poles in Americas, secured by KEC's subsidiary, SAE Towers. The Cables business has secured orders for supply of various types of cables in India and overseas.

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NHAI launches 'Rajmargyatra' a unified mobile application for National Highway users

The National Highways Authority of India (NHAI) has launch 'Rajmargyatra,' a citizen-centric unified mobile application. This user-friendly app is available for download on both Google Play Store and iOS App Store, empowering travelers with comprehensive information on Indian National Highways while also offering an efficient complaint redressal system. The app is currently available in Hindi and English. The key features of this App are it serves as a one-stop repository of essential information for National Highway users. The user can get real-time weather conditions, timely broadcast notifications, and access to details about nearby toll plazas, petrol pumps, hospitals, hotels, and other essential services that ensure a seamless and safe journey on National Highways; he app comes equipped with an inbuilt complaint redressal and escalation mechanism. Users can easily report highway-related issues, attaching geo-tagged videos or photos for better clarity. The registered complaints will be handled in a time-bound manner, with system-generated escalations to higher authorities in case of any delays. Users can also track the status of their grievances for complete transparency; this App integrates its services with various bank portals, making it convenient for users to recharge their FASTags, avail monthly passes, and access other FASTag-related banking services – all within a single platform; the App also features over-speeding notifications and voice-assistance to encourage responsible and safe driving behavior.

Jyotiraditya Scindia unveils new logo of NMDC

NMDC, India's largest iron ore producer, has unveiled its new logo, showcasing CPSE's dedication to responsible mining. JyotiradityaScindia, Union Minister of Civil Aviation and Steel, Government of India, revealed the dynamic logo in presence of Nagendra Nath Sinha, Steel Secretary and Amitava Mukherjee, NMDC CMD (I/c). The new logo signifies the company's future scale and strength after achieving a record production of 40 million tonnes for two consecutive fiscals. With a robust digital roadmap for smart mining, NMDC is stepping into NMDC 2.0, reimagining its principal visual identity. The new NMDC logo encapsulates past achievements, present commitment, and future aspirations of NMDC. It represents the scale and strength of the company's future, driven by innovation and sustainability. NMDC is ready to embrace the challenges of tomorrow, and is committed to setting new benchmarks in the mining industry.

Nepal to supply hydropower to Bangladesh using India's transmission line

India, Nepal and Bangladesh are negotiating on a tripartite power trade agreement under which Nepal will be using India's transmission line to supply up to 500 megawatts (MW) of hydropower to Bangladesh. This move if fructified will boost cross-border electricity trading in South Asia. India already is looking forward to sell power to Sri Lanka and Myanmar. As per the negotiation underway, there are also plans to lay a dedicated transmission line connecting Nepal and Bangladesh via India. Nepal will supply hydropower using India's high-voltage transmission line to Bangladesh. Initially, 50 MW will be supplied to Bangladesh by Nepal using India's Baharampur-Bheramara cross-border transmission line. This 50 MW will be supplied from Nepal's 900 MW Upper Karnali hydropower project. In return, India expects Bangladesh to allow India to lay transmission lines for connecting its north eastern States. India is already supplying power to Bangladesh through the Baharampur-Bheramara transmission line, and around 150-160 MW through the Tripura-Comilla grid interconnection project. Bangladesh is also getting electricity from Adani's Godda (Jharkhand) thermal power plant.

Anant Maheshwari named Honeywell High Growth Region President and CEO

Honeywell has appointed Anant Maheshwari as the President and CEO of Honeywell's High Growth Region portfolio. He will succeed Ben Driggs, who will be taking another leadership role in the company. Maheshwari will be a Corporate Officer of the Company, reporting directly to Honeywell CEO Vimal Kapur and will be located in Dubai, United Arab Emirates. In his new role, Maheshwari will lead business growth across Honeywell's geographies in China, India, Southeast Asia, Central and Eastern Europe, the Middle East, Central Asia, Africa and Latin America. Maheshwari joins Honeywell from Microsoft, where he served as President and CEO of Microsoft India. Maheshwari earned an MBA from the Indian Institute of Management Ahmedabad, graduating as an industry scholar in 1998. He also graduated from the Birla Institute of Technology and Science, Pilani, with a Master of Science in Economics and a Bachelor of Engineering in Electrical and Electronics.

ONGC signs term contract for sale of crude oil

Oil and Natural Gas Corporation (ONGC) has entered into a term contract with Bharat Petroleum Corporation (BPCL) for the sale of crude oil from the Mumbai region, cementing the strong partnership between the two esteemed companies. The historic contract comes after the Government of India's decision to grant marketing and pricing freedom for domestic crude oil, replacing the previous allocation mechanism. ONGC has swiftly adapted to the new regime and successfully initiated the first-ever e-auction of Mumbai Offshore crude oil. The signing ceremony took place at ONGC NBP Green Heights, Mumbai, between ONGC ED-Chief Marketing Sanjay Kumar, and BPCL ED (IT) Manoj Heda, in the presence of ED-Western Offshore C Mathavan, Asset Managers of Mumbai region, Plant Manager- Uran and ED- Chief Commercial.

Siemens consortium to equip Mumbai Metro Line 2B with electrification technologies

Siemens, as part of a consortium along with Rail Vikas Nigam (RVNL), has secured an order from Mumbai Metropolitan Region Development Authority (MMRDA) for electrification of Mumbai Metro Line 2B. Siemens' share as part of the consortium is ₹228 crore and RVNL's share is ₹149 crore. Siemens will manufacture, install and commission rail electrification solutions and Supervisory Control and Data Acquisition (SCADA) systems, covering 20 stations and one depot. RVNL will be commissioning Receiving Substations (RSS) solutions.

Hindalco in joint venture with Texmaco Rail to manufacture aluminium rail wagons & coaches

Hindalco Industries and Texmaco Rail & Engineering have entered into a strategic alliance to develop and manufacture world-class aluminium rail wagons and coaches that will help Indian Railways achieve its emission goals and bolster operating efficiency. Indian Railways has launched "Mission 3000 MT" with a target of doubling freight capacity to reach 3,000 million tons by 2027 through augmentation of rolling stock, with the objective of achieving 45% market share in freight. To meet this ambitious target, the Railways is actively seeking to improve wagon design, and inviting wagon manufacturers to contribute their own designs to enhance overall capacity and the life of railway assets.

Recognizing these developments in the Railways, Hindalco and Texmaco have joined hands to explore opportunities, where Hindalco will provide profiles, sheets and plates of its unique aluminium alloys, along with fabrication and welding expertise. The company's in-house aluminium freight rake launched last year is 180 tons lighter and offers 19% higher payload to tare weight ratio, consumes less energy with relatively negligible wear and tear. Texmaco, being an expert in manufacturing freight cars for 80 years, will bring in technical expertise and be responsible for design, setting up the factory, production line and providing skilled workers

Jabil appoints BN Shukla as operations director for India

Jabil Inc has appointed BN Shukla as Operations Director for India. Shukla will lead the Electronics Manufacturing Services (EMS) operations, business and expansion opportunities in his new role. Shukla has been a senior management leader with a stellar track record, exemplifying strong leadership qualities and a passion for delivering results. Joining the company in 2004 as a plant quality engineering manager, his most recent role as Senior Business Unit Manager saw him managing the profit and loss (P&L) statement, overseeing business unit operations, and driving new business development initiatives. With a career spanning over 25 years, Shukla is an alumnus of the Jawaharlal Nehru Engineering College, Aurangabad, from where he holds an engineering degree along with a postgraduate in Operations Management from the Institute of Management Technology (IMT) Ghaziabad, India.

Serentica Renewables signs energy storage contract with Greenko

Serentica Renewables has signed a first-of-its-kind standalone energy storage capacity offtake contract with global energy storage developer, Greenko Group. As part of this contract, Serentica will leverage Greenko's unique energy storage capabilities to utilise a cumulative 1,500 MWhr capacity from its upcoming energy storage projects in Andhra Pradesh and Madhya Pradesh. This deal will augment Serentica's efforts to deliver round-the-clock, firm, and dispatchable renewable energy to its industrial customers with an annual assurance of >95% and a 15-min time-block assurance of >85%. It will uniquely position the company as one of the select few renewable generator IPPs in the country who can offer a true round-the-clock solution.

NTPC Group wins GW scale RE orders in TBCB mode in Q1-2023

NTPC Renewable Energy (NTPC REL) received the Letter of Award for 550 MW Solar Project at a tariff of ₹2.56/kWh, won in RECPDCL's 1250 MW ISTS-Connected solar tender published in Dec-2022. This power will be utilized under the GoI's Aug'2022 scheme for flexibility in Generation and scheduling of Thermal Power stations through bundling with RE capacity. The project is to be executed within a period of 18 months and will require capital investment of ₹2800 crore. With allotment of this 550 MW capacity, NTPC REL will have to execute more than 2 GW RE capacity to fulfill the capacity won in TBCB mode in Q1-2023 alone.

VE Commercial Vehicles inks MoU with IIT Indore for technology development and upskilling

VE Commercial Vehicles (VECV) has recently signed a Memorandum of Understanding (MoU) with IIT Indore (IITI) for a period of five years. This partnership will facilitate the exchange of scientific information between VECV and IIT Indore and shall open channels for the development of competencies required for the rapidly modernizing auto and its future talent. This partnership will also facilitate VECV employees to acquire MTech, MS(R), and Ph.D. degrees from IIT Indore. As part of the MTech program, VECV employees will be required to pursue online coursework in the first year. Project work in the second year will be conducted either at VECV's Pithampur and Bhopal Plants or at IIT Indore under the guidance of the assigned thesis supervisor(s) of IIT Indore.

L&T Construction awarded multiple orders for its Heavy Civil Infrastructure Business

The Heavy Civil Infrastructure business vertical of L&T construction has won multiple orders from prestigious clients. An order has been received from Rail Vikas Nigam (RVNL), for the Design and Construction of an Underground Metro Project in connection with Joka – Esplanade Metro Corridor in the city of Kolkata. The major scope of work for project comprises "Design and Construction of the Ramp and Underground Metro Railway Works from Mominpur (Excl.) to Esplanade, 5.05 Km (from chainage 9063.00m to 14113.00m) including four underground stations (viz. Khidderpore, Victoria, Park Street and Esplanade), tunnels by Tunnel Boring Machine and Cut & Cover methods, architectural finishing works, track works, etc".

Another order has been bagged from a reputable client in the Middle East for a mandate to rehabilitate structures for strategic purposes. This Package is the first of its kind for L&T in the Middle East market. The scope of work includes Feasibility study, Concept design, Detailed design, Construction, and installation of Special systems.


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Lighting the auspicious lamp

India is progressing rapidly in its phase of infra-transformation. The country is today witnessing path breaking constructions and global technologies transforming and uplifting the very face of India's structural outlook. Today, India is looked upon as one of the most progressive and smart economy well-embracing the evolving trends and technologies for the infrastructure, construction and engineering segments. Being actively involved in bringing the latest updates along with qualitative and well-researched unique news content, EPC World Awards completes its tenth year as the fourth eye for the sector.

The sector which is undergoing awe-inspiring transformation is backed by the experts from the field of engineering, construction, technology and research and development fields – actively setting new benchmarks. Sensing this pulse, since its inception EPC World Media Group has been honoring the trendsetters and frontrunners in leading the bacon of change for the infra-construction and engineering sectors.

In its decade edition, EPC World Media Group hosted the 10th edition of its annual Awards and meet-up. Hosted at Hotel The Ashok, New Delhi, on 24th July 2023. The event honored more than 30 award winners across the gamut of engineering, infrastructure and construction segments. Inaugurated by ***Shri Nitin Gadkari, Hon'ble Minister for Road Transport & Highways,*** the evening also had presence of **esteemed dignitaries.**

Speaking at the occasion Shri Gadkari shared, "Infrastructure development play a key role in making India a global superpower. Roadways are crucial elements in this phase of development. We are very confident on transforming Indian roads as equivalent to the US road networks by 2024." He also urged the stakeholders and industry experts to join hands in serving the sector qualitatively and in boosting the sector to its new heights.

An eminent industry expert ***S K Chaudhary, Former CMD, IRCON International & Jury Chairman*** appreciated the Government's staunch commitment towards infrastructure development and innovative policy initiatives during his speech at the event. He opined, "India has progressed commendably over the years in the infrastructure sector. The development has been enviously laudable especially in the last decade. The Government's thoughtful approach & growth nurturing policies has enabled the sector to pace progressively. Transportation sector connecting the country's nook and corner, metro services to high speed railways are today boosting the socio-economic activities. Urban infrastructure is also evolving rapidly with innovative waste management and water management practices. The country has today emerged as one amongst the prominent ones in effectively utilising conventional and renewable power resources." He also added that, "Though the sector is progressing rapidly it is still clouded with challenges like land acquisition concerns, ease in achieving funds etc. But the proactive infra-focused growth approach adopted by the Government is easing these hurdles. The country, with its current pace of development, will soon achieve an envious status with world class infra facilities."

The event packed with industry experts served as an ideal platform for companies across the gamut ranging from EPC and Construction to Technology and Innovations to display their thought leadership in the infrastructure sector. During the last decade, EPC World Awards has emerged as the most authentic & inspirational platform to showcase the Landmark Projects, magnificent companies along with awe-inspiring personalities of the Indian infrastructure and construction industry.

Expressing his views and gratitude ***Tejasvi Sharma, Editor-in-Chief and MD of EPC World Media Group*** shared, "We are extremely glad in hosting once again yet another successful edition of EPC World Awards. It's our honor and pleasure to accolade the industry bests who have nourished and contributed effectively towards the engineering, construction and infrastructure sectors. Since our inception, EPC World Media Group has committed itself to walk in pace with the industry dynamics and bring in stories and all the recent updates revolving around the infra-construction and engineering sectors. We stand firm to understand and function as per the pulse of the infra-construction sectors. This is the Decade edition of EPC World Awards, and we look forth to honor and highlight the works of trendsetters and game changers redefining the engineering, construction and infrastructure sectors. We are also very much thankful towards our esteemed Chief Guests, Jury, partners and delegates who trusted us throughout the initiative."

Key Awardees

The awards lauded four well-defined categories, who contributed towards redefining the infra-construction segments, through their strategic, thoughtful and innovative mode of operations. Infra giant Larsen & Toubro bagged the award for 'Global EPC Company of the Year'. Schon Sarkar, Jt. Executive Vice President, ITD Cementation India Ltd. was honored as the Infra Person of the year; K. P. Mahadeva Swamy, Director-Commercial, NBCC (India) Limited as the 'Realty Person of the Year'. For his thoughtful serving, expertise and dedication throughout his esteemed career K. Vijay, Chairman, AJAX Engineering was honored with the Lifetime Achievement Award. BPCL was honored for their 'Outstanding Contribution in Oil & Gas'.

Like in any field, the infrastructure, construction and engineering sectors have also seen active and innovative contributions from women over the years. Reflecting this pulse, EPC World Media Group awarded Mitu Mathur, Director, GPM Architects & Planners for the 'Women Contribution in Infrastructure'.

The other key achievers of the evening included – BEKEM Infra Projects – Outstanding Company in specialized construction; Afcons Infrastructure – Outstanding contribution in Roads & Highways; KEC International – Outstanding Contribution in Railway Project; JCB India – Sustainable & Innovative Construction Equipment Company of the Year; C J Darcl Logistics – Outstanding contribution in Logistics; Kalpataru Projects International- Outstanding Contribution in Urban Infrastructure; Kataline Infraproducts - Outstanding Company in Road Safety Marking Solutions.

The event was attended by a healthy base of over 250 delegates from the varied gamut of engineering, architectural, manufacturing, construction and infrastructure segments.

The EPC World Media Group continues its journey in serving with its utmost passion, honesty and dedication in reflecting the very pulse of the industry. Setting a new benchmark and taking a leap into the new-gen era, the EPC World Media Group has now also stepped into the field of online journalism through its YouTube News Channel – EPC World News Hindi. EPC World Media emphasises and stands firm to facilitate knowledge transfer to grassroots and strengthen their productivity and management capabilities for the benefit of society at large through its diverse media properties in print, web, and events space.

EPC CATEGORY

Outstanding Contribution in
Urban Infrastructure & Transport

ITD Cementation India Ltd.

Schon Sarkar, Jt. Executive Vice President,
Himadri Sen, Sr. General Manager,
Mrinmoy Joarder, Sr. General Manager,
Bindeshwar Prasad, Sr. DGM and
Sanjay Chaubey, Sr. DGM

Outstanding Company in
Specialized Construction

BEKEM Infra Projects Pvt. Ltd.

Colonel Rahul Dalal, CEO,
BEKEM Lodestar &
Dr. Kishore Nuthalapati, CFO

Outstanding Contribution in
Railway Project

KEC International Ltd.

Sumit Pandey, Chief Manager &
Ashish Panwar

Outstanding Contribution in

Roads & Highways (Very large Project)

Afcons Infrastructure Ltd.

Balbir Kumar Arora,
Vice President- Business Development

Outstanding Contribution in

Roads & Highways (Large Project)

Patel Infrastructure Limited

Krishna Mohan Dixit, President & COO
Pankaj Sachan, VP - Corporate Affairs

Outstanding Contribution in

Roads & Highways (Mid-size Project)

MKC Infrastructure Ltd.

Paras Bambhania, Director (Technical)
Jawaharlal Kaul, Executive Director
Dr. Pawan Saluja, COO

INFRA CATEGORY

Outstanding Contribution in

Urban Infrastructure (Sewerage Project)

Larsen & Toubro Limited

M.M. Jaiswal, Jt. General Manager & Head of Wastewater Business,
R. K. Jain, Head - Operation Support &
Shahnavaz Hasan

Outstanding Contribution in

Urban Infrastructure (Railway Project)

Kalpataru Projects International Ltd.

Rajnish Kumar, Sr. Vice President & Cluster Head - Railways,
Prakash Sinha, Sr. Vice President & HR Head- Railways

Outstanding Contribution in

Urban Infrastructure (Water Project)

Welspun Enterprises Ltd.

Yogen Lal, COO-Water &
Chandrakant Mandrupkar,
Asst. Vice President

Outstanding Contribution in
Oil & Gas

Bharat Petroleum Corporation Ltd.

Manoj K, CGM Biofuels & Major Projects, E&P-HQ,
Sunil Dhakate, Dy. General Manager- E&P,
Santanu Ghosal, Dy. General Manager, E&P- HQ,
Satish Gupta, Dy. General Manager, E&P- HQ,
Madhurya Daimari, Manager- E&P

Outstanding Contribution in
Roads & Highways (Very Large Project)

Udaipur Tollway Ltd.

(A SPV incorporated
by IRB Infrastructure Developers Ltd.)

Jitender K Chauhan, COO (North Zone)

Outstanding Contribution in
Roads & Highways (Large Project)

Ashoka Buildcon Limited

Ashish Kataria, Director &
Sunil Gomase

INFRA CATEGORY

Outstanding Contribution in

Roads & Highways (Large Project)

GR Infraprojects Limited

Sunil Agarwal, Executive Director &
R C Jain, Executive Director

Outstanding Contribution in

Urban Infrastructure (Water Project)

SPML Infra Limited

Tariq Siddiqui, Media Advisor

Outstanding Contribution in

Contract Management of Infrastructure Projects & Dispute Resolution Consultancy

Infrastructure Management And Project Consultants (IMAPC)

Shivani Chaudhary, Vice President (Legal) &
Basant Kumar, Executive Vice President

Outstanding Contribution in

Design & Project Consultancy

Asure Design Studio

Nagabandi Shravan Kumar, CEO & Principal Architect and **M. Leena Chowdary**, Director

Outstanding Contribution in

Logistics

CJ Darcl Logistics Limited

K.K. Agarwal, Chairman & Managing Director

Outstanding Company in

Warehousing

Avigna Private Limited

S. Rajasekaran, Managing Director & **R. Naveen Manimarran**, Director

SPECIAL ACHIEVEMENT

Infra Person of the Year

Schon Sarkar, Jt. Executive Vice President, ITD Cementation India Ltd.

EPC Person of the Year

Sanjay Agarwal, Whole-time Director & COO, IJM (India) Infrastructure Limited

CFO of the Year

Jitendra Mohananey,
Group Financial Controller,
Gujarat Fluorochemicals Ltd.
(An INOXGFL Group)

Lifetime Achievement Award

K. Vijay, Chairman,
AJAX Engineering Pvt. Ltd.

Women Contribution in Infrastructure

Mitu Mathur, Director,
GPM Architects & Planners

Outstanding Contribution in Quality Management

Deepak Gupta,
Project Leader-MSG,
Allied Boston Consultants India Pvt. Ltd.

SPECIAL ACHIEVEMENT

Global EPC Company of the Year

Larsen & Toubro Ltd.

(L&T Energy - Hydrocarbon)

Parthasarathi Chatterjee, Executive VP & Head Offshore
Nandakumar Kulkarni, Executive VP & Head Onshore,
Rajeev Jain, GM - International Operations &
Rajesh Gavali, Jt. General Manager - Offshore Projects

Construction Company of the Year

Sharp Tanks & Structurals Pvt. Ltd.

Prateek Sharma, Business Unit Head (O&G)

Emerging Infra Company of the Year

GA Infra Private Limited

Mayank Agarwal, Director
Aseem Goyal, Vice President

Innovation and Excellence in Quality

Larsen & Toubro Ltd. for MAHSR Package C6

(High Speed Rail Construction between Vadodara to Ahmedabad)

Parikshit Kumar Guha,
Head – Formations & Structures segment, L&T TIIC,
Mohan Ramesh,
TFL - Head, MAHSR Project C6,
Rajesh Srinivasan,
Head- Technical Services, MAHSR Project C6,
Deepak A Gaikwad,
Head of QAQC - MAHSR Project C6 &
Rabindra Kumar Asthana,
Manager QAQC - MAHSR Project C6

Award of Excellence: Legal Contribution in Infrastructure & Construction

UCOL Advocates & Consultants

Kaadambari Puri, Managing Director

CSR Contribution of the Year

Sandvik Mining and Rock Technology India Pvt. Ltd.

Ravi Arora, Head - Marketing & CSR,
Sheryl Shankar, CSR Specialist

CONSTRUCTION CATEGORY

Sustainable & Innovative Construction Equipment Company of the Year

JCB India Limited

Ramkishor Aggarwal,
Vice President - Operations &
Jasmeet Singh,
Associate Vice President- Corporate Relations

Outstanding Company in Road Construction Equipment

Mahindra & Mahindra Ltd.

(Mahindra CE)

Jalaj Gupta,
Business Head- Mahindra CE,
Trucks and Buses

Outstanding Company in Commercial Vehicles

Daimler India Commercial Vehicles Pvt. Ltd.

R. Mahaganesh,
Associate Vice President (R&D) &
Vinod Raman, Head of Product Management

Outstanding Company in **Road Safety Marking Solutions**

Kataline Infraproduct Pvt. Ltd

Amit Arvind Thatte, Managing Director & **Vidheya Rao**

Outstanding Company in **Material Handling Equipment**

KION India Pvt. Ltd.

Ashish Shankar, DGM & National Sales Head, **Abhishek Ganguly**, DGM & Head Sales (North & East Zone)

Outstanding Products for **OTR Application**

J K Tyre & Industries Ltd

Akshat Bhartiya, Manager & **Ujjwal K Jayswal**, Dy. Manager

Outstanding Contribution in
PEB & Roofing project

Interarch Building Products Pvt. Ltd.

Arvind Nanda, Managing Director,
Gautam Suri, Founder Director,
Manish Garg, CEO &
Ashwani Gaur, AVP

Outstanding Company in
Diaphragm Wall Construction & Piling

Heritage Infraspace (India) Pvt. Ltd.

Gagan Goswami, Managing Director

A warm welcome to the Chief Guest by Tejasvi Sharma

A presentation on Structural Steel Building Solutions by Mohit Kapoor, APL Apollo Tubes Ltd

India's Aviation Industry Soars towards Sustainability and Connectivity

The Indian aviation industry is experiencing a remarkable transformation, with a focus on seamless connectivity, cutting-edge technology, and sustainability. EPC World explores the opportunities that are leading the way toward a greener and more connected future.

A substantial stride towards sustainable aviation is taking place in India, with 86 airports across the country embracing green energy solutions. Remarkably, 55 of these airports have achieved a significant milestone by ensuring that all of their energy consumption is sourced from renewable sources, shared the Minister of State in the Ministry of Civil Aviation Gen. (Dr) V. K. Singh (Retd) in a written reply to a question in Lok Sabha.

However, the use of conventional energy sources remains the primary cause of carbon emissions at airports. Consequently, the Ministry of Civil Aviation (MoCA) has advised all operational airports with scheduled operations, as well as developers of upcoming Greenfield Airports, to prioritize achieving Carbon Neutrality & Net Zero. This includes a crucial focus on transitioning to green energy sources to reduce the airport's carbon footprint.

Airports worldwide are increasingly emphasizing the adoption of renewable and green energy solutions. Several prominent airports, such as Heathrow, Bristol, and London Gatwick in the United Kingdom, Amsterdam in the Netherlands, Athens in Greece, Oslo in Norway, Brussels in Belgium, Budapest in Hungary, Copenhagen in Denmark, San Diego in the United States, Vancouver in Canada, and Sharjah in the United Arab Emirates, have successfully achieved Carbon Neutrality through a series of measures, which prominently includes the utilization of green and renewable energy sources as part of their sustainability initiatives.

The Indian civil aviation sector appears to be at a turning point with two consecutive major aircraft acquisition deals occurring within a four-month period. These deals reaffirm India's status as the world's fastest-growing aviation market and the third-largest domestic traffic market globally. In a historic move on Monday, budget carrier IndiGo finalized a deal with Airbus consortium from Europe to acquire 500 aircraft, setting a new record for the highest number of aircraft ever purchased by a single airline. This achievement surpasses the previous record established in February when Air India procured a total of 470 aircraft from both Airbus and Boeing, based in Seattle.

Collectively, these two deals propel India into the second position on the list of carriers with the largest aircraft order books, trailing only behind the United States. Indigo's acquisition of its single-aisle aircraft, combined with Air India's orders, reflects the high level of optimism that both entities have regarding the potential of India's aviation market. This optimism is underscored by the remarkable performance of the market, as demonstrated by the record-breaking domestic passenger traffic of 13.2 million travellers in May, surpassing the levels seen before the pandemic.

In another significant move, the Government of India has granted "In-Principle" approval for the establishment of 21 new Greenfield Airports across the country. These airports are set to be located in various states, including Goa, Maharashtra, Karnataka, Madhya Pradesh, Uttar Pradesh, Gujarat, Puducherry, Andhra Pradesh, West Bengal, Sikkim, Kerala, and Arunachal Pradesh. Notably, 11 of these Greenfield airports, such as Durgapur, Shirdi, Kannur, Pakyong, Kalaburagi, Orvakal (Kurnool), Sindhudurg, Kushinagar, Itanagar, Mopa, and Shivamogga, have already commenced operations.

In addition to the Greenfield airports, the Ministry of Civil Aviation launched the Regional Connectivity Scheme (RCS) - UDAN (UdeDeshkaAamNagrik) in 2016, aiming to enhance regional air connectivity and make air travel more affordable for the masses. As part of the UDAN Scheme, 74 airports (including heliports, water aerodromes, and Greenfield airports) have been operationalized across the country to date.

Out of the 21 Greenfield Airports mentioned earlier, the Government has given "in-principle" approval for seven airports to be developed as international airports. These airports are Mopa in Goa, Navi Mumbai in Maharashtra, Karaikal in Puducherry, Jewar (Noida) in Uttar Pradesh, Dholera and Hirasar in Gujarat, and Bhogapuram in Andhra Pradesh. While the Airports Authority of India (AAI) is handling the development of Hirasar and Dholera, the financing of the other Greenfield airport projects is the responsibility of the respective airport developers. However, the timeline for completion of these projects may vary depending on factors such as land acquisition, clearances, and financial closure.

To encourage private investment in airport infrastructure, the Ministry of Civil Aviation has allowed 100% Foreign Direct Investment (FDI) in both Greenfield and Brownfield airport projects. Several State Governments have also received "in-principle" approval for Greenfield airport development under Public Private Partnership (PPP) mode, attracting private investments for airports in Kerala, West Bengal, Goa, Maharashtra,

Andhra Pradesh, and Uttar Pradesh. These initiatives are set to enhance India's aviation infrastructure, facilitating better connectivity and bolstering the nation's position in the global aviation landscape. Over the past three years, India's civil aviation industry has witnessed rapid growth, positioning itself as one of the fastest-growing sectors in the country. The industry can be broadly categorized into scheduled air transport services, encompassing both domestic and international airlines, non-scheduled air transport services, which include charter and air taxi operators, and air cargo services, focused on transporting cargo and mail.

Notably, domestic traffic accounts for approximately 69% of the total airline traffic in South Asia, underlining the significance of the Indian market. With India's airport capacity projected to accommodate a staggering 1 billion trips annually by 2023, the industry's potential for further expansion is evident.

Despite the challenges posed by the COVID-19 pandemic, the Indian aviation industry has showcased remarkable resilience. Air traffic movement has displayed a robust recovery, with figures for FY23 reaching 327.28 million, a substantial increase from 188.89 million recorded in FY22. This remarkable rebound is a testament to the industry's adaptability and determination to overcome adversity.

As India's aviation sector continues to soar, it remains a pivotal driver of economic growth, connectivity, and trade, playing a vital role in shaping the nation's overall development and global engagement.

As reported by the credit rating agency ICRA recently, there is a projected notable decrease in net losses for Indian airlines in the current fiscal year. This decrease is estimated to be in the range of ₹5,000-7,000 crore. This positive outlook is attributed to the strong growth in passenger traffic and improved revenue streams.

This anticipated reduction in net losses stands in sharp contrast to the substantial losses of ₹11,000-13,000 crore that the aviation industry is believed to have faced in the previous fiscal year, 2022-23. These losses were primarily caused by the elevated prices of aviation turbine fuel (ATF) and the devaluation of the Indian rupee in comparison to the US dollar. The aviation industry's outlook, as assessed by the rating agency, remains stable due to the swift recovery observed in the preceding fiscal year. This positive trend is expected to continue into the year 2023-24.

ICRA pointed out that the losses incurred in the previous fiscal year were significantly lower than the net loss of ₹23,500 crore documented in 2021-22, as well as ICRA's earlier projection of a net loss ranging between ₹15,000-17,000 crore for 2022-2023. This improvement was credited to the airlines' enhanced ability to increase yields without negatively impacting demand.

The groundbreaking research and development by National Aerospace Laboratories (NAL) have led to the successful maiden test flight of the indigenous electric aircraft, "Pragati." This achievement has captured the nation's attention and the interest of global aviation players, who are seeking greener solutions.

Forward-thinking airlines are recognizing the importance of investing in sustainable practices and eco-friendly solutions. They are now collaborating with biofuel manufacturers to conduct test flights with biofuel blends, demonstrating their commitment to reducing carbon emissions and optimizing fuel consumption. This is opening up promising B2B opportunities for biofuel producers, paving the way for sustainable partnerships that will transform the aviation industry.

As India's airports strive to reduce their carbon footprint, there is a growing demand for smart technologies and energy-efficient solutions. The "Smart Skies" project, driven by collaborative efforts between government agencies and private enterprises, has created an exciting B2B ecosystem ripe for innovation. Air traffic management solutions providers actively engage with Indian aviation authorities to integrate advanced AI-powered systems and data analytics, optimizing air traffic flow and increasing operational efficiency.

The growth of start-ups focusing on urban air mobility, eVTOL aircraft, and autonomous drones is presenting a fertile ground for B2B partnerships. Venture capitalists and established aviation players are recognizing the potential of these disruptive technologies and seeking opportunities for collaboration. As a result, B2B stakeholders are actively engaging with these pioneering start-ups to harness their innovative solutions and co-create the future of Indian aviation.

The drive towards sustainability is not only reshaping the aviation industry within India but also positioning the country as a global leader in sustainable aviation practices. Major international airlines are keenly observing these developments and seeking partnerships with Indian carriers to access cutting-edge technologies, sustainable practices, and a vast and growing market.

In conclusion, the Indian aviation industry is proactively driving change toward a future that is both sustainable and technologically advanced. B2B collaborations are an essential part of this transformation, creating an unparalleled opportunity for businesses to be part of a thriving and interconnected aviation ecosystem. This is the perfect time to join hands with the trailblazers in the Indian aviation industry, catalyzing innovation and propelling the nation towards a greener and more connected future. EPC World

Clear skies embracing the Indian aviation industry

Passenger traffic to recover to pre-Covid levels in the current fiscal

The domestic aviation industry faced heightened challenges due to the onset of the Covid-19 pandemic in FY2021, with its ripple effect in FY2022. The domestic air passenger traffic in India grew at a healthy CAGR of ~11% between FY2011 and FY2020 to reach ~141 million passengers in FY2020. In FY2021, due to the impact of the pandemic and related restrictions, it declined by ~62% to ~53 million and recovered to ~85 million in FY2022 and further to ~136 million in FY2023. The recovery continues in the current fiscal, with domestic air passenger traffic in 4M FY2024 (April-July 2023) at ~51 million, a YoY growth of 20% over 4MFY2023 (April-July 2022) and ~8% higher than pre-Covid levels (ie, April-July 2019). ICRA expects the domestic air passenger traffic to reach 150-155 million in FY2024, thereby surpassing the pre-Covid levels. The international passenger traffic for Indian carriers has also grown at a healthy CAGR of 6.7% between FY2011 and FY2020, post which the scheduled international operations were suspended for around two years till March 27, 2022, because of the pandemic. However, during this period, the Ministry of Civil Aviation (MoCA) permitted international operations under the Vande Bharat Mission (VBM) and the Air Transport Bubbles (ATB). Post the lifting of restrictions, the international passenger traffic for Indian carriers stood at ~23.9 million in FY2023, improving from the pre-Covid (FY2020) levels of ~22.7 million, although 8% lower than the peak levels of ~25.9 million in FY2019. ICRA expects the international passenger traffic for Indian carriers at 25-27 million in FY2024, thereby reaching the previous peak.

Despite a healthy recovery in air passenger traffic, the domestic aviation industry continues to face challenges on account of elevated aviation turbine fuel (ATF) prices and depreciation of the INR vis-à-vis the US$, both of which have a major bearing on the airlines' cost structure. The average ATF price stood at ₹121,013/KL in FY2023 and ₹95,906/KL in 5M FY2024, compared to ₹64,715/ KL in FY2020. Fuel cost accounts for ~30-40% of the airlines' expenses, while ~35-50% of the airlines' operating expenses – including aircraft lease payments, fuel expenses, and a significant portion of aircraft and engine maintenance expenses – are denominated in US$ terms. Further, some airlines have foreign currency debt. While domestic airlines have a partial natural hedge to the extent of earnings from their international operations, overall, their net payables are in foreign currency. Given the rise in ATF prices, the yield for the airlines, measured in revenue per available seat kilometer (RASK), has also gone up compared to the pre-Covid levels. However, the impact of the movement in ATF prices on the earnings of any airline primarily depends on the RASK-CASK (cost per available seat kilometer) spread. While the ATF prices have

witnessed a Y-O-Y decline since April 2023, they remain at elevated levels as compared to the pre-Covid era. The airlines' efforts to ensure fare hikes, proportionate to their input cost increases, will be the key to expanding their profitability margins.

In addition, supply-chain challenges being faced by airlines, which include the availability of spare parts and engine issues, have recently plagued the sector, resulting in the grounding of certain aircraft for some airlines, thus impacting their overall capacities. This also negatively impacts the cash flow generation of the airlines, given the high fixed-cost nature of the business. In ICRA's view, capacity addition in FY2023 was limited to around 10% of the FY2022 fleet of airlines, which was close to around ~700 aircraft. There are large aircraft purchase orders announced by various airlines. As per the indicative numbers, the total fleet deliveries pending were close to ~1,100 as of FY2023 end, ~1.5x of the fleet under operationthen. However, these deliveries are spread over the medium to long term, and a large part of these will be towards the replacement of old aircraft with new fuel-efficient ones. Further, supply-chain challenges being faced by aircraft manufacturers are also likely to constrain their production schedules. Accordingly, ICRA believes that capacity addition for the industry will only be gradual.

The pace of recovery in industry earnings is also expected to be gradual owing to the high fixed-cost nature of the business. The industry is estimated to have reported a net loss of ~₹110-130 billion in FY2023 due to elevated ATF prices twined with the depreciation of the INR against the US$. However, it is much lower than the net loss of ~₹235 billion in FY2022, driven by the improved ability of the airlines to shore up their yields without impacting demand. The net loss is further expected to reduce significantly in FY2024 as airlines continue to witness healthy passenger traffic growth and improve their RASK-CASK spread through better pricing discipline coupled with the Y-o-Y decline in ATF prices since April 2023 and the relatively stable foreign exchange rates. While some airlines have adequate liquidity and/or financial support from a strong parent, which can help them sustain over the near term, the credit metrics and liquidity profile of the others will remain under stress over the near term, though better than the last few years.

ICRA has a Stable outlook on the Indian aviation industry on the back of the fast-paced recovery in domestic passenger traffic in FY2023 and expectations of the trend continuing in FY2024. Given the lower penetration levels of air travel in India at around ~10% in CY2022 compared to other developed economies, the potential for the Indian aviation industry remains largely untapped. The growth in air travel will be supported by improving affordability and rising aspiration levels to travel by air, besides growing demand for tourism. Likewise, on the supply-side, favourable government policies, which have resulted in improved connectivity levels between cities through the development of new airports and modernisation of existing airports, have also contributed to growth in the industry. Accordingly, the bulk of the incremental growth in air travel has been emanating from improved connectivity between a) metros and tier-2/3 cities and b) between tier-2 and tier-3 cities. The government's plan under the Ude Desh ka Aam Nagrik (UDAN) policy has also provided requisite impetus to encourage regional connectivity, to enhance air travel access to tier-2 and tier-3 cities. EPC World

SUPRIO BANERJEE
Vice President & Sector Head - Corporate Ratings
ICRA Limited

Titanium machining for the aerospace industry

Choice of the right tools helps in overcoming challenges associated with complex machining of titanium, a preferred material in aircraft manufacturing

The technologies deployed in the aerospace industry have undergone a radical transformation through the decades, resulting in aircrafts becoming compact, lighter, and more efficient. One of the major factors that has influenced the performance of airborne vehicles is the evolving dynamics of material science; yielding changing composition of metals used. Titanium, also known as a strategic material, is being used in increasing proportions today, accounting to almost 15% of the structure of these vehicles. Owing to its lighter weight and higher strength characteristics compared to other metals, impressive properties of corrosion and oxidation resistance, and easier availability overall, it is a preferred material for manufacturing critical parts. Yet, its poor machinability is recognized as an industry-wide challenge. Over the past few years, Kennametal has invested heavily in Research & Development to understand how to better machine titanium, and some of these findings, based on understanding its metallurgical properties are presented below.

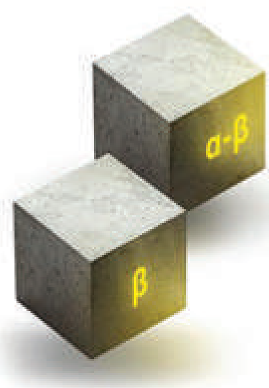
Titanium undergoes various phases, from α to ß and depending on these phases, titanium alloys are classified into four main groups:

- Unalloyed/untreated titanium – excellent corrosion resistance, but lower strength properties
- Alpha structure (α alloys) – great creep resistance, and low to medium strength
- Beta structure (β alloys) – high strength and high density, but the most difficult to machine
- Alpha beta structure (α-β alloys) – medium to high strength, and include alpha and beta stabilizer elements

The commercially viable alloys are ß and (α-ß).Beta (ß) Alloys Beta (ß) alloys contain transition metals, such as V, Nb, Ta, and Mo, that stabilize the ß-phase. Examples of commercial ß alloys include Ti11.5Mo6Zr4.5Sn, Ti15V3Cr3Al3Sn, and Ti5553. Beta alloys are readily heat-treatable, generally weldable, and have high strength. Excellent formability can be expected in the solution treated condition. However, ß alloys are prone to ductile-brittle transition and thus are unsuitable for cryogenic applications. Beta alloys have a good combination or properties for sheet, heavy sections, fasteners, and spring applications

In comparison, α-ß alloys contain both α and ß stabilizers. The simplest and most popular alloy in this group is Ti6Al4V, which is primarily used in the aerospace industry. Alloys in this category are easily formable and exhibit high room-temperature strength and moderate high-temperature strength. The properties of these alloys can be altered through heat treatment.

Titanium is typically produced in the shape of plates and bars, as well as forgings and castings. The Buy-to-Fly (BTF) ratio is typically between 10 and 16, meaning a raw material of 10kg titanium ends up being a finished part with the weight of 1kg. The BTF ratio requires efficient removal of the excess material achieved through titanium roughing applications, which causes the cutting edge to be exposed to extremely high temperatures for a long time.



Some challenges associated with machining comprise high-chemical reactivity of titanium alloys, which causes the chip to weld to the tool, leading to cratering and premature tool failure. In addition, the chip-tool contact area is relatively small, resulting in large stress concentration due to these higher cutting forces and temperatures, resulting in premature failure of the cutting tool.

The machining of flight critical components (engine rotatives) at optimal production rates requires reliable, high precision tooling for semi-finishing and finishing turning operations. The entire process needs to be secured to avoid any damage to the part that requires advanced chip breaker technologies.

Requirements:

- Tool stiffness/stability
- Heat management
- Coolant flow
- Grade toughness (chipping resistance)
- Heat resistant coating
- Chemical wear resistance
- Micro geometry that promotes low cutting forces
- Stable machines and conditions that promote higher Metal Removal Rates (MRR)

Typically, titanium machining is carried out in three stages - pre-machining, roughing, and finishing, as illustrated in the diagram below:

Raw Titanium Plate Opening Cavities Roughing Finishing

Flat bottom drilling is ideal for pre-machining of high-temperature alloy airframe structural parts. Quickly removing large amounts of material remains a challenge for these types of components. Traditionally, the first step of the process is to enter the material by using ramping techniques, which is time-consuming and leads to low metal removal rates.

Speeding up the machining process requires combining the advantages of a flat bottom drill and a Z-axis plunge mill. The flat bottom design eliminates radial forces, while four effective cutting edges provide increased feed and speed rates, leading up to 200 percent higher metal removal rates than traditional ramping techniques and freeing up capacity for aerospace manufacturers.

Once the drill has shaped the basic structure of the component, it progresses for the roughing and finishing steps.

A recommended roughing solution for a large structural part is helical shoulder milling that addresses the high metal removal needs in aerospace machining. To achieve lowest possible cost per edge, tool makers have come with upto 8 cutting edges per insert in Helical Milling Cutters. Such designs are proven to reduce power consumption upto 50% and can deliver the highest MRR, especially in high-temperature alloys.

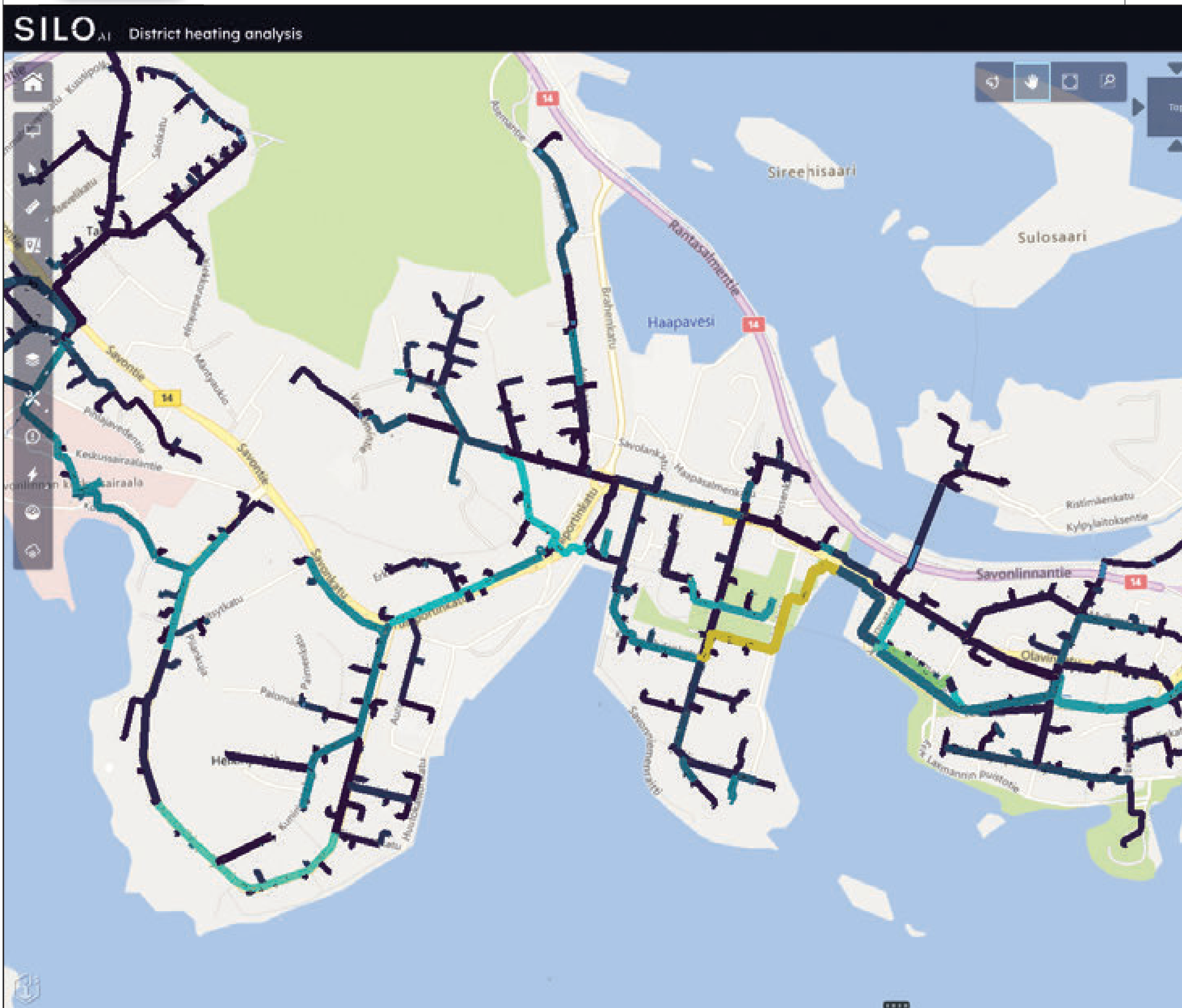
If the work holding is weak and tool overhang is high, another technique that can be used is High Feed Milling (HFM). With low entering angles, these cutters provide optimum cutting forces with maximum stability. Also, in materials like titanium which has extremely low thermal conductivity (thermal conductivity of Ti6Al4V is ~ 7.2 W/m K), it is prudent to work with higher feeds than speeds.

An array of new generation PVD coatings with alloyed substrates are available, which provide resistance to thermal cracks, least co-efficient of friction and prevent chip welding in roughing applications. The cutter body should be constructed of a higher-quality steel for improved stiffness and rigidity to withstand the high cutting forces. The variable helix design helps to break the harmonics that lead to chatter, further improving tool life, part quality, and throughput. Positive cutting action reduces vibration, minimizing the cutting zone temperature and prevents work hardening tendencies.

Finishing operations are mostly performed with solid endmills. Some unique design features include unequal flute spacing, variable helix configuration to minimize chatter and vibration, eccentric reliefs, twisted endface for increased stability and ramping along with the most optimized geometry, and flute design for titanium machining. In some advanced designs, endmills come with positive clamping technologies (safe lock) which prevent tool pull-out and ensure high process security. High performance endmills will also have features like chip gashers for smooth chip evacuation and lower cutting forces.

Comprising high strength to weight ratio, corrosion resistance, fatigue resistance, and capability to work in high temperature zones - titanium is usually the primary material for aerospace structures, frames, and engines. Titanium's low modulus of elasticity, poor thermal conductivity, high chemical reactivity, and hardening properties, together, make it one of the toughest materials to machine. Therefore, an appropriate selection of cutting tool design and machining strategies is extremely important for machining titanium and its alloys along with proper machine, coolant and work holding capabilities, in order to maximize productivity and optimize costs.

Contributed by Kennametal



Silo AI developed a smart, data-driven asset optimization solution for city pipeline operators.

Silo AI develops intelligent digital optimization service for Finland's water and district heating system operators

Using the Bentley iTwin platform results in record project delivery times and improves energy efficiency

Optimizing aging city pipeline networks

Finland maintains over 16,000 kilometers of district heating pipelines and approximately 3,000 kilometers of water and sewerage lines in the Helsinki metropolitan area alone. A significant portion of these networks are aging and expiring, resulting in water leaks, higher costs, and unreliable service for pipeline network customers. The inefficient network performance and leakages increase fuel consumption and wasted water,

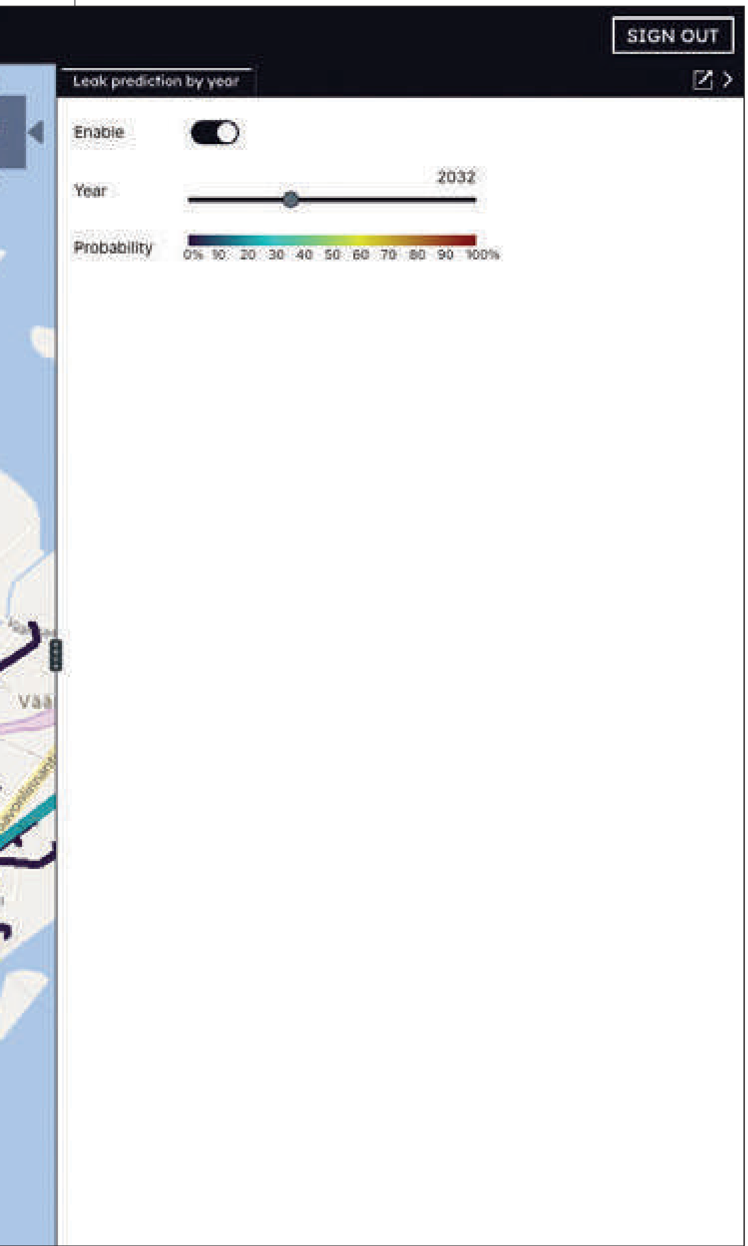


Image courtesy of Silo AI.

which is not only detrimental from a business perspective, but also environmentally. To improve performance, reliability, and energy efficiency of Finland's water and district heating networks, Silo AI initiated a project to develop a smart, data-driven asset optimization service for city pipeline operators.

As the largest private artificial intelligence (AI) lab in the Nordics, Silo AI develops customizable, AI-driven solutions and products to enable intelligent monitoring and forecasting in city infrastructure, energy, and logistics. The company set out to pilot their digital pipeline optimization solution in cooperation with Helsinki Environmental Services Authority HSY and Suur-Savon Sähkö Oy, one of the largest grid operators in Finland. The goal was to enable these system operators to offer more sustainable energy services, optimizing performance of district heating assets and eliminating pipeline leakages. Known as Silo Flow, the system optimization service

Project Summary

Organization

Silo AI

Solution

Water and Wastewater

Location

Helsinki, Uusimnaa, Finland

Project Objectives

- To combine a digital twin with AI, creating a prediction model for proactive network maintenance.
- To ensure efficient, reliable, and sustainable network water and district heating services throughout Finland.

Project Playbook

iTwin

Fast Facts

- Silo AI developed a smart, data-driven asset optimization solution for city pipeline operators.
- Known as Silo Flow, the service predicts pipeline leakages and identifies the potential cooling upside of district heating systems.
- Leveraging iTwin facilitated data integration and provides a holistic visualization of the pipeline network.

ROI

- Bentley's flexible and user-friendly application cut visualization efforts by 50%.
- Silo AI decreased their customer's district heating network supply temperature by 3 degrees, improving energy efficiency and fuel consumption.

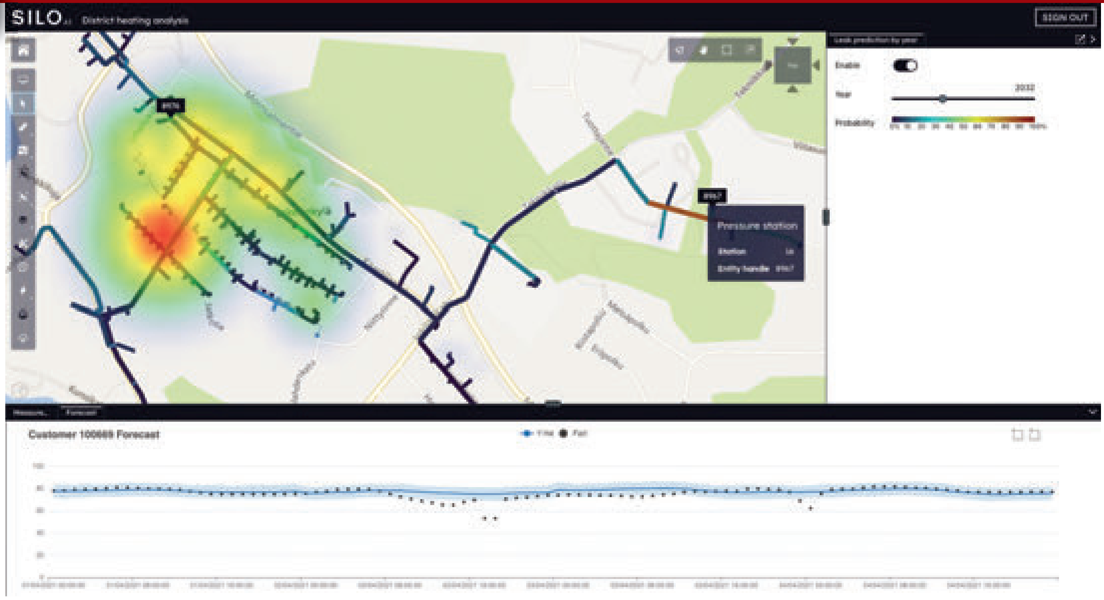


Image courtesy of Silo AI.

Bentley's iTwin Platform enabled Silo AI to deliver their system optimization service in record time.

> *Silo AI developed the whole system, including several other data sources, AI models, and a visual analytics user interface utilizing the iTwin Platform*
>
> **- Harri Kaukovalta,**
> *Business Development Executive, Silo AI*

will help predict network failures and prioritize proactive asset maintenance to avoid costly repairs and potential network shutdowns, ensuring efficient and reliable service while minimizing environmental impact. "Silo AI's service will increase energy efficiency, performance, and productivity of [our] customers' network systems by several percentages," said Harri Kaukovalta, business development executive at Silo AI.

Dispersed data sources and manual workflows

System operators have been trying to localize leakages by different methods. However, these methods take place only after the leaks have occurred, requiring extensive repair and often resulting in service interruption. Silo AI sought a proactive solution to optimize pipeline operations, using AI and data analytics to pinpoint areas prone to leakage and prioritize pipeline maintenance renovations. They wanted to develop a digital twin model to identify and predict network failures before leakages occur. However, previous workflows required a combination of numerous data sources in various data formats, resulting in partial and inaccurate representations of the network. "Today, scattered data sources make it difficult to have a holistic overview of the pipeline network health, and manually driven investment planning takes only a very limited amount of data sources into account," said Kaukovalta.

The multisourced, disparate data and manual workflows prevented operators from accurately identifying potential risks and proactively addressing them before they become costly, environmentally damaging problems, leading to shutdowns and interrupted service. Operators had to aggregate the data and visualize their network in its entirety to predict and prioritize pipeline maintenance. "This is where Silo Flow can provide an answer where you can optimize your network assets by investing in the right locations, at the right time while guaranteeing a high level of services for your customers," said Kaukovalta. However, to execute their solution, Silo AI needed a user-friendly, web-based interface. They sought to integrate the multiple pipeline data sources and perform advanced data analysis in a digital platform, providing operators a visual, comprehensive overview of asset health, systematically identifying and addressing leakages before they occur.

Developing a digital prediction model

To predict pipeline maintenance needs and optimize network management, Silo AI developed its smart Silo Flow prediction model based on the Bentley iTwin Platform. The solution combines Silo AI's advanced data analytics with Bentley's digital, cloud-based interface for easy, accessible visualization of the pipeline data and assets. "Bentley's iTwin framework offered a simple and straightforward way to visualize data and data analysis results," said Kaukovalta. Combining advanced data science with cutting-edge visualizations, district heating and water network operators can pinpoint assets in need of maintenance prior to leakages or asset failure. They can optimize their network to timely invest in the right locations, ensuring safe and reliable service while promoting energy efficiency and carbon neutrality.

As the foundation for Silo Flow, Silo AI used the Bentley iTwin Platform to integrate the multisourced data into a living digital twin and aligned it with reality data, sensors, and AI without any additional equipment needed by the network operators. The combined solution can consolidate and analyze data into an understandable, valuable format facilitating data-driven decisions. "We built a solution for city pipeline infrastructure owners to predict pipeline failures and increase operation efficiency of district heating by several percent," said Ville Hulkko, cofounder of Silo AI.

Working within a fully accessible visual interface, operators can achieve comprehensive insight into asset health, and analyze and predict where better cooling can bring savings and more efficient productivity, optimizing heat balance in district heating as well as water flows throughout the network.

Smart solutions drive savings and sustainability

The Bentley iTwin Platform was easy for Silo AI to use. It allowed them to integrate data and visualize the new data analysis capabilities that they implemented. The flexibility and interoperability of Bentley's application shortened the project time, and any needed additions were easy to make to the digital platform. Using iTwin reduced visualization efforts by 50% and significantly reduced delivery time for the digital AI leakage prediction and flow optimization solution. "The project was delivered in a record time just because [the Bentley iTwin Platform] was so easy to use and make great visualizations real," said Kaukovalta.

Having easy accessibility to the data and visually analyzed results, network operators can improve pipeline operations. The iTwin-based smart solution offers a holistic view of pipeline network health, where maintenance needs and potential risk areas are clearly identified and visualized. It predicts and prioritizes pipeline maintenance to ensure customer satisfaction and sustainability, avoiding unwanted shutdowns of the grid, environmental damage, and waste from leakages. The successful project decreased the client's district heating network supply temperature by 3 degrees, improving energy efficiency while decreasing fuel consumption."Silo Flow adds predictability and restores control over your system. It also helps you to optimize energy production," said Kaukovalta.

With one degree cooling improvement providing a 1% to 1.5% increase in the network energy performance, system operators can deliver more sustainable service and increase ROI through pipeline system optimization, preventing leakages, eliminating lost resources, and budgeting future maintenance and network investments. By combining progressive data science with advanced visualizations in a digital twin platform, Silo AI is simplifying decision-making for network operators, enabling straightforward conclusions to support reliable heating and water access crucial to quality of life."The solution is currently being scaled up for multiple customers and pipeline types," said Hulkko. EPC World

Sandra DiMatteo is the Industry Marketing Director, Water Infrastructure at Bentley Systems. She has more than 25 years of experience in reliability and asset performance management software, asset lifecycle information management, and is an expert in digital twin cloud solutions in the water and wastewater, energy and process industries.

Healthy uptick in demand

The general election being a few months' away completion of infrastructure projects will be a priority for the government. With plenty of infrastructure, rail and metro projects in the execution stage, the steel industry is all set to gain

The steel industry plays an important role in the economic development of the country. The economic development of the country largely depends on its infrastructure development. India is the fastest developing economy in the world and has laid out concrete plans to be a USD 5 trillion economy by 2025. In the last Union budget, the government has allocated ₹10 lakh crore (up 33 per cent from last year), for infrastructure development. To develop infrastructure steel is the vital construction material. Steel is used in almost all the infrastructure projects be it bridges, tunnels, rail tracks, metros, ports, airports, power & electricity, water and wastewater projects, real estate construction and development. The steel industry contributes about 2% to India's GDP and employs close to 6 lakh people directly and 20 lakh people indirectly. India is the second largest producer of crude steel and second largest consumer of finished steel in the world.

Production, consumption and export

According to the latest report by World Steel Association, India has registered a 4.1 per cent growth in its crude steel production at 11.2 MT amid 5.1 per cent downfall in the global output at 161.6 MT in May 2023. India produced 11.2 MT crude steel, up 4.1 per cent over May 2022. According to a report by the Ministry of Steel, during fiscal year 2022-23 (FY23), the production of crude steel at 125.32 million tonnes (MT), finished steel at 121.29 MT and consumption of finished steel at 119.17 MT has exceeded their respective levels achieved over the corresponding period of not only Covid affected last two years but also pre Covid years as well. The production and consumption of steel has rebounded in March'23 over its level in February'23. The report further states the production of crude steel in March'23 stood at 11.34 MT, an increase of 0.6% over the corresponding period last year (CPLY) and 11.34% by month on month (M-o-M). Production of finished steel in March'23 stood at 10.81 MT, an increase of 2.0% over CPLY and 6.7% by M-o-M. Consumption of finished steel in March'23 at 10.99 MT increased by 13.3% over CPLY and 7.1% by M-o-M. The Inventories of the finished steel with the steel producing companies at 9.41 MT at the end of March'23 decreased by 5.6% M-o-M but increased by 17.9% over CPLY. Among the steel producing Central Public Sector Undertakings (CPSEs), SAIL registered an all-time high level of production of steel (hot metal, crude steel and saleable steel) in FY'23. SAIL also recorded its highest ever monthly production of steel during March, 2023. RINL registered a decrease in production of liquid steel, hot metal, crude steel and saleable steel in FY'23 over FY'22. The production by SAIL during the FY'23 for Hot Metal at 194.09 lakh metric tonnes. (LMT), Crude Steel at 182.91 LMT and Saleable Steel at 172.46 LMT registered an improvement of 3.6%, 5.3% and 2.1% respectively, over FY'22. The production of iron ore by SAIL during FY'23 at 337.76 LMT was 1.1% lower than FY'22. During FY'23, RINL's production of Liquid Steel at 43.20 LMT, Hot Metal at 44.07 LMT, Crude Steel at 41.37 LMT and Saleable Steel at 39.60 LMT registered a decline of 21.7%, 23.7%, 21.5% and 22.9% respectively over FY'22. The CAPEX by Steel CPSEs in March'23 at ₹1,980.53 crore was 77.5% higher over the previous month (M-o-M) and 10.8% higher than CAPEX in CPLY. Total CAPEX by steel CPSEs for the FY'23 was ₹10,343.99 crore.

During the fiscal year 2022-23, exports of finished steel from India at 6.7 MT was lower by 50.2% as compared to exports during FY'22, whereas imports at 6.02 MT during FY'23 was higher by 29.0% over FY'22. In March'23, India was a net exporter of finished steel. Export of finished steel was 8.12 LMT in March'23, which increased by 41.2% M-o-M but was lower by 32.1% over March'22. Imports of finished steel was 4.29 LMT in March'23, showing a decrease of 27.7% M-o-M, but an increase of 22.2% over March'22.

According to India Brand Equity Foundation, in FY23 (until January 2023), the exports of finished steel stood at 5.33 MT, while the imports stood at 5 MT. In FY22, exports and imports of finished steel stood at 13.49 MT and 4.67 MT, respectively. In FY22, India's export rose by 25.1% YoY, compared with 2021. In FY21, India exported 9.49 MT of finished steel. In December 2022 exports of finished steel stood at 4.42 lakh tonnes.

Tata Steel India recorded its highest-ever annual crude steel output of 19.9 MT, with a rise of 4% YoY, by debottling bottlenecks across sites and ramping up Neelachal Ispat Nigam. Production of crude steel rose by 3% quarter-on-quarter (QoQ) and reached 5.15 million tonnes in 4QFY23. According to provisional statistics released by the company, Tata Steel's output volume in India grew by 5.1 percent YoY to 5.15 million tonnes in the fourth quarter of the fiscal year 2022–23. Production on the Indian market totalled 4.90 metric tonnes at the same time last year. In FY23, Jindal Steel and Power (JSPL) production was down to 7.89 MT as against 8.01 MT in FY22. Total sales (including pig iron) stood at 7.68 MT compared to 7.64 MT in FY22.

Q4FY23: gains and loses

JSW Steel reported 13% increase in consolidated net profit to ₹3,664 crore for the quarter ended March 2023. The company reported a net profit of ₹3,234 crore in the corresponding quarter last fiscal. The company's revenue from operations increased by 0.14 per cent to ₹46,962 crore for the March 2023 quarter from ₹46,895 crore in the year ago period. Net sales for the March 2023 quarter grew 0.14% year-on-year to ₹46,962 crore from ₹46,895 crore in the corresponding quarter last year. During the quarter the total combined crude steel production of JSW Steel was 6.77 million tonnes, higher by 8 percent sequentially mainly due to the ongoing ramp-up of the 5 million tonne per annum Dolvi plant expansion.

In Q4FY23, **Tata Steel**'s consolidated net profit plunged 84.1% year-on-year to ₹1,566.2 crore. The company posted a net profit of ₹9,835 crore in the corresponding quarter last year. In the March 2023 quarter, total revenue stood at ₹62,961.5 crore, down 9.2 % against ₹69,323 crore in the corresponding period of the preceding fiscal. EBITDA of the company declined 52% to ₹7,219.2 crore in Q4FY23 over ₹15,030 crore in the corresponding period in the previous fiscal.

Steel Authority of India (SAIL) posted over 50 per cent fall in its consolidated net profit to ₹1,159.21 crore for the quarter ended March 31. The company reported a net profit of ₹2,478.82 crore in the same quarter of the preceding financial year. The company also reported a sharp fall in its total income to ₹29,416.39 crore, from ₹31,175.25 crore in the year-ago quarter. The company's sales were down at 4.68 MT, as against 4.71 MT in the same quarter last year.

Jindal Steel and Power (JSPL) reported 69.3% fall in net profit to ₹462.5 crore for Q4FY23. The company reported a net profit of ₹1,511 crore in the corresponding quarter last fiscal. The company's Revenue from operations declined 4% to ₹13,691 crore in Q42023 compared with ₹14,339 crore in the same quarter last year. Its EBITDA for the March 2023 quarter stood at ₹2,240 crore.

Jindal Stainless reported 12.8% YoY decline in consolidated net profit at ₹765.8 crore for Q4FY23, due to higher expenses. The company posted a net profit of ₹878 crore in the corresponding quarter last year. The company's total revenue increased 0.4% to ₹9,765 crore in Q4FY23. In the corresponding period of the preceding fiscal, the company's total revenue was ₹9,726 crore. At the operating level, EBITDA jumped 19% to ₹1,144 crore in Q4 FY23 as against ₹1,412.2 crore in Q4 FY22.

A helping hand – Policies and initiatives

The government is investing huge amount in infrastructure sector and steel being one of key construction materials, the government is making all out efforts to increase steel production and consumption in India. Recently, the government introduced Production Linked Incentive (PLI) Scheme for specialty steel. Under the scheme the government has allocated a budgetary outlay of ₹6322 crores. The scheme is expected to bring in investment of approximately ₹40,000 crores and capacity addition of 25 MT for speciality steel. The PLI scheme has enlisted interest of 27 companies with whom 57 memorandum of understanding (MoUs') has been signed.

The worldwide per capita steel consumption is around 233 kg. However, the per capita consumption of steel in India is around 77.2 kg. To increase steel production and consumption in India and to contribute to in building a $5 trillion economy, the Ministry of Steel has defined its Vision in order to shape and drive the Indian steel sector. To ensure the Vision incorporates India's growth imperatives and addresses the aspirations of all stakeholders of the Indian steel ecosystem, the ministry has taken key initiatives such as increase steel usage intensity to boost demand generation; improve trade balance for the steel sector; enable supply through best-in-class Greenfield capacity addition; set-up value addition focused steel clusters; increase raw material production (by leveraging digitization in mining); promote domestic manufacturing and procurement of capital goods for steel; promote a shift to an environmentally friendly steel sector; promote R&D for the Indian steel sector; promote safety and workforce welfare for the Indian steel sector; facilitate development of skilled manpower and ensure sufficient infrastructure and logistics capacity for the steel sector.

To facilitate domestic steel industry, Steel Import Monitoring System (SIMS) had been put in place which requires the importer to submit advance information regarding intended imports to ensure granular data like end-use, grade & other technical specifications, etc, of steel items being imported under Chapter 72,73, and 86 of ITC (HS).

To take the steel industry to the next level in digitalization, the government has taken various initiatives such as identification of the finished product till the end customer through introduction of Quick Response (QR) code based traceable tags where quality and genealogy can be tracked; Centralized Yard Management for all finished products to reduce rake retention time and improved identification and handling of the material with wireless Hand Held Terminal (HHT); Steel Ladle Management System to automatically track the steel ladle through various shops like Laddle Preparation Bay, Converter, secondary metallurgy, caster and back. It is used to monitor ladle circulation time and effective heat loss in empty ladle. This system facilitates regulating the steel bath tapping temperature at LD to get optimum casting temperature at caster using Level-1 and Level-2 automation; SMS Grade Prediction System to predict Final (Tundish) Composition and Final Grade based on Converter Analysis and Ladle Furnace Additions using Machine Learning Algorithm; Optimisation of Coke, Pellet & Sinter quality to improve the yield & throughput of the Blast Furnaces; Modeling of iron making process inside a Blast Furnace to reduce coke consumption and further enhance the yield; Optimisation of casting speed in the Continuous Casting process to arrive at the target properties at the lowest cost and time; Operation Research based models to optimize logistics cost and improving yield by efficient production planning; and

adoption of Industry 4.0 technology in the steel sector for improving manufacturing processes, material usage, energy efficiency, plant & worker productivity, supply-chain and product life-cycle.

Since, Steel is a material most conducive for circular economy as it can be used, reused and recycled infinitely, the Ministry of Steel has come up with Steel Scrap Recycling Policy. The Steel Scrap Recycling Policy aims to promote a formal and scientific collection, dismantling and processing activities for end of life products that are sources of recyclable (ferrous, non- ferrous and other non-metallic) scraps which will lead to resource conservation and energy savings and setting up of an environmentally sound management system for handling ferrous scrap.

Road Ahead

The general election being few months away, the government will make all out efforts to complete infrastructure projects before the election dates are announced. Ratings agencies have predicted a healthy growth for the steel sector. According to India Ratings and Research, India's steel demand is set for a 7% to 9% surge in the 2024 fiscal year, driven by government infrastructure spending and robust domestic consumption. The report further states the government's removal of a 15% export duty in November 2022 is likely to stimulate export demand, making Indian steel more globally competitive and widening market access for the domestic steel producers. According to Crisil Ratings, the domestic stainless steel demand is expected to grow at a compound annual growth rate (CAGR) of 9% till 2024-25 financial year. According to Indian Steel Association, steel consumption is expected to grow by 7.5% in 2023-24.

The government's strong focus on infrastructure-led growth in the country, with investments centered on core sectors like railways, metros, aviations, roadways, housing, urban infrastructure, and energy, will pave the ways for huge demand for steel. EPC World

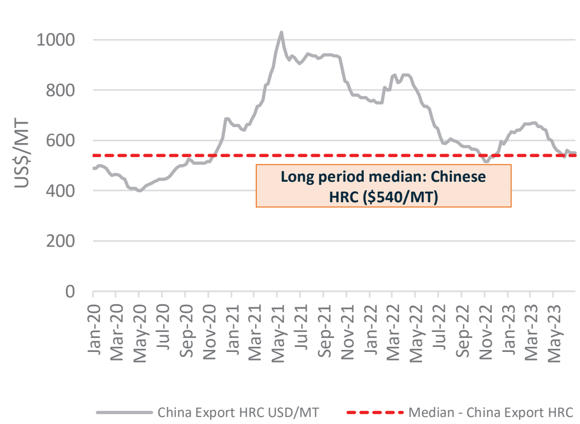
Sub-par demand recovery in China and prospects of rising steel imports keep the domestic steel market on tenterhooks

Warning signs emerging from China as the economy appears to be recovering slower than anticipated

CY2023 started on a positive note for the steel industry, as unlocking of the Chinese economy raised hopes for a meaningful recovery in steel demand in the world's largest producing and consuming block. While pent-up demand initially helped lift Chinese hot-rolled coil (HRC) export offers to a 9-month high of $695/MT[1] by end-March 2023 (refer Exhibit 1), the demand momentum appears to have lost steam thereafter. Chinese steel production trends reveal that the year-on-year (YoY) growth in monthly production was in the positive territory between January and March 2023, but slipped to a negative territory thereafter from April 2023 as the initial demand surge gradually waned. The Chinese manufacturing purchasing manager's index (PMI) remained below 50 for three consecutive months between April and June 2023, reflecting a contraction in manufacturing output. This created a domestic oversupply, leading to Chinese HRC export offers hovering at $560/MT[2] in the second week of July 2023, a sharp 19% correction in FY2024 so far[3].

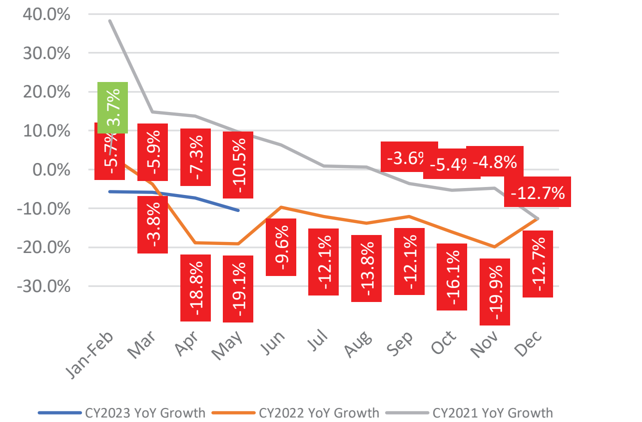
The property market in China accounts for around 30% of its domestic steel demand.The distress in the Chinese housing market following the implementation of the 'Three red lines' policy in August 2020 to curtail developer leverage and the subsequent wave of developer defaults starting with Evergrande adversely impacted the demand for steel from this key end-user segment.In the last 19 consecutive months, between September 2021 (when Evergrande defaulted) and May 2023 (refer Exhibit 2), investment in the Chinese real estate sector contracted for 18 months. This reflects the deep-entrenched stress still prevailing, despite the Government's various relief measures to rescue this struggling sector. With China's property sector accounting for an estimated 15% of the global steel demand, an improvement in the health of the Chinese property market remains crucial for a durable recovery of the global steel market from hereon.

Exhibit 1: Trend in Chinese HRC export offers (FoB China)



Source: Bloomberg, ICRA Research

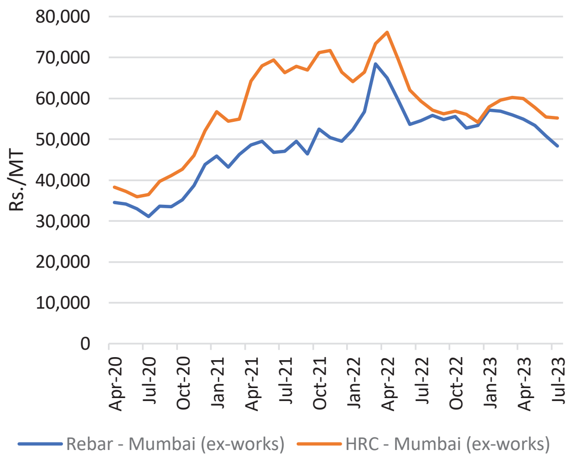
Exhibit 2: Trend in investment growth in Chinese real estate sector



Source: National Bureau of Statistics, China, ICRA Research

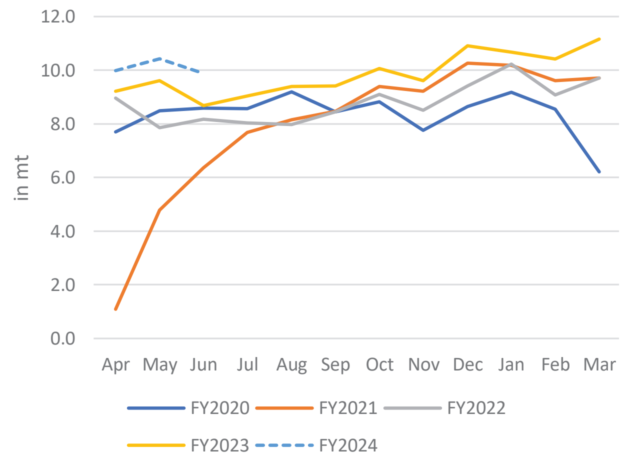
[1] Metric tonne
[2] Free on board (FoB) China
[3] Chinese HRC export offers stood at $695/MT in end-March 2023

Exhibit 3: Exhibit: Trend in domestic steel prices



Source: Steelmint, ICRA Research

Exhibit 4: Trend in monthly domestic steel consumption



Source: JPC, ICRA Research

The aftershocks in domestic steel market

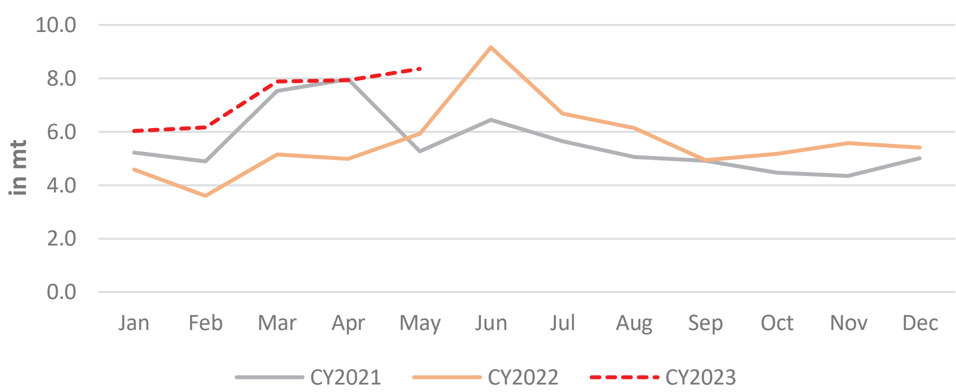
Notwithstanding the external headwinds, domestic steel demand remained resilient and grew by 10.2% in Q1 FY2024 (refer Exhibit 4), supported by the Government's infrastructure-oriented growth model. However, domestic steel prices have been declining since the start of FY2024 as falling Chinese export offers pulled down domestic HRC prices by 8-9% in the current fiscal so far (refer Exhibit 3). Following a similar trend, domestic rebar prices also corrected by a steep13-14% during the same period. Any meaningful price recovery looks unlikely in the near term, given the external headwinds associated with elevated inflation, and the prospects of sub-par economic growth in CY2023 for most leading global steelmaking hubs.

The looming threat of cheap steel imports

Given the weak domestic demand, Chinese steel exports have been steadily increasing since March 2023. Between March and May of 2023, the average monthly Chinese steel exports were over 8 million tonnes (mt) (refer Exhibit 5). This run-rate was last witnessed in CY2015/CY2016 at the peak of the metals meltdown.

Given these sharp corrections in Chinese HRC export offers, ICRA's analysis suggests that domestic HRC prices are currently trading at a premium of $10/MT over Chinese imports. While Japanese HRC export offers are higher at $590/MT[4] (against $560/MT for Chinese offers), given its duty-free access to the Indian market, domestic HRC prices are also trading at a premium of $14/MT over Japanese imports. Any further correction in Chinese HRC prices opens up the possibility of a steeper-than-expected rise in steel imports in FY2024, as trade flows get diverted to high-growth markets like India. Therefore, unless the domestic premium reduces meaningfully from the prevailing highs, steel imports to India could climb, which can potentially make India a net steel importer in FY2024 after a gap of five years.

Exhibit 5: Trend in Chinese monthly steel exports



Source: China customs, ICRA Research

[4]FoB Japan

Exhibit: Landed cost comparison between domestic HRC prices and landed cost of imports

Particulars	Unit	China	Japan
HRC Export Offers (FOB) (as in second week of Jul 2023)	US$/MT	560	590
Ocean Freight + Import Duty + Social Welfare Cess	US$/MT	102	68
Landed Cost of Imports	US$/MT	662	658
Foreign Exchange Rate	Rs/US$	82	82
Landed Cost of Imports (as in second week of Sep 2023)	Rs/MT	54,399	54,030
Domestic HRC Price (as in second week of Jul 2023)	Rs/MT	55,200	55,200
Domestic Discount/(premium)	Rs/MT	-801	-1,170
Domestic Discount/(premium)	US$/MT	-10	-14

Source: Steelmint, ICRA Research

The input cost relief

Steelmakers are, however, expected to get a relief from the moderation in input costs in FY2024. The spot price of seaborne prime hard coking coal offers from Australia, which accounts for around 40% of the overall steelmaking cost for a blast furnace operator, is expected to average at $255-260/MT[5] in FY2024, lower by 20-25% over FY2023 on account of improving supplies from Australia. Thermal coal prices also moderated, with domestic e-auction premium from Coal India falling to 78% in May 2023 (against an average of 265% in FY2023), and RB1 grade imported thermal coal spot prices currently trading at a much lower level of $111/MT[6] (against an average of $253/MT in FY2023).

Apart from coal, input cost relief is also expected from the correction in domestic iron ore prices, which are expected to trend lower by 5-6% YoY in FY2024 amid a softening in seaborne iron ore prices. Therefore, the moderation in input costs is expected to partly cushion the impact of steel price corrections seen in the current fiscal so far, helping to keep the industry's operating profit margins at 12-13% in FY2024, in line with the FY2023 levels.While these subdued margin levels were last witnessed during the downcycle years of FY2017, what has given the industry more resilience to withstand further downturns is the aggressive deleveraging during the last upcycle of FY2021/FY2022. This has brought down the industry's bank borrowings to $178/MT of the installed capacity in March 2023, a decline of 52% over March 2017, when it stood much higher at $371/MT.

Conclusion

Fresh steel capacities accumulating to ~37 million tonnes per annum are lined up for commissioning by FY2026. The Government's capex drive and the resultant push to domestic steel consumption are expected to keep the industry's capacity utilisation rate at around 80% in FY2024. That said, with the industry's earnings moderating from the high watermark of FY2022, the dependence on external financing to meet committed expansion plans is likely to increase going forward. Early signs of this trend can be observed in the 22% increase in the steel industry's bank borrowings in FY2023. Consequently, the industry's[7] leverage (as reflected by the ratio of total debt to operating profits) is expected to deteriorate to an estimated 2.5-3.0 times in FY2024 against 1.1 times in FY2022. However, with the industry's EBITDA[8]/MT being expected to average at ~$110-115/MT in FY2024 (within the range of $100-150/MT for a Stable outlook), the sector's outlook has been retained as Stable by ICRA. EPC World

JAYANTA ROY
Senior Vice-President and Group Head
ICRA

RITABRATA GHOSH
Vice-President and Sector Head
ICRA

[5]FoB Australia
[6]FoB Richards Bay, South Africa
[7]Industry sample set comprises of 19 listed steel companies accounting for ~55% of the domestic installed steel capacity
[8]Earnings before interest, tax, depreciation, and amortisation

Industry dignitaries and leaders converge at the maiden Indian Stainless Steel Expo 2023

The consumption of stainless steel in India has grown by nearly 10% over the past financial year to reach 4 million tonnes, according to the Indian Stainless Steel Development Association (ISSDA). India's per capita consumption of stainless steel improved from 2.5 kg to 2.8 kg on the back of an increased demand for the green metal in sectors, such as railways, process industries and Architecture, Building and Construction (ABC). The figures come at a time when globally, the stainless steel production has fallen by 5.2% from 58.2 million tonnes in 2021 to 55.2 million tonnes in 2022 (CY).

The latest data was released by the industry association on the inaugural day of its maiden India Stainless Steel Expo (ISSE) 2023 held in Greater Noida from 3rd August to 5th August, 2023. Secretary, Ministry of Steel, Government of India, Nagendra Nath Sinha; President, ISSDA, Rajamani Krishnamurti; Managing Director, Jindal Stainless, Abhyuday Jindal; Secretary General, World Stainless, Tim Collins; and Managing Director, SMR GmbH Markus Moll, were present on the occasion. Faggan Singh Kulaste, Minister of State for Steel, addressed the gathering virtually.

According to ISSDA, new areas of development, such as alternative energy, ethanol, hydrogen production, water storage and distribution, will further push the demand for stainless steel in the coming years. The released data also showed that import for flat products during the financial year 2022-2023 was recorded at 1 million tonnes, meaning more than one-third of the demand for stainless steel in India was met through imports.

Kulaste, while addressing the gathering, noted that stainless steel "plays an important role in the development of the country. Stainless steel's recyclability is a key factor in its sustainability and environmental benefits. With the help of stainless steel, we can conserve natural resources, reduce energy consumption, minimize waste, and contribute to a more sustainable and eco-friendly future."

Commenting on the event, Sinha said, "ISSE 2023 is a comprehensive conference which has brought all stakeholders together on one platform. The government has laid thrust on infrastructural development which will prove a potential market for the stainless steel industry. Architecture, Building and Construction, railway coach manufacturing have increased the demand of steel." He also pointed out that new area of development encompassing alternative energy, ethanol etc will further increase the demand of stainless steel in coming years.

Sharing his views, Managing Director, SMR GmbH, Markus Moll, said, "Decarbonisation is the biggest driver for the growth of stainless steel industry. In terms of minimizing greenhouse gas emissions, stainless steel beats aluminium."

Tim Collins, Secretary General, World Stainless, said, "Stainless steel industry has a massive opportunity in the building and infrastructure sector. The building and infrastructure industry often discounts the use of stainless steel. The environment impact of Stainless Steel is hugely positive.

Speaking on the occasion, ISSDA President Rajamani Krishnamurti said: "We have organized ISSE for the first time to bring the entire stainless steel value chain under one roof to exchange ideas and forge collaborations to take the industry to new heights. ISSDA appeals to the government to articulate well on export-import regulations to boost the stainless steel industry in India."

Addressing the inaugural session at the expo, Managing Director, Jindal Stainless, Abhyuday Jindal, said, "I want to assure our all MSME partners that a stainless steel boom is expected in the near future and I invite all of you to be a part of this growth." EPC World

Is technology a powerful aid in building affordable mass housing in times of inflation

According to estimates from civil society groups, 378 million people in metropolitan India - at least 1% of the total population - are homeless and experts warn that more people will enter homelessness as housing costs increase. The Home Purchase Affordability Index suggests that Mumbai saw an 8% drop in affordability in 2022, Delhi NCR took a greater hit at 10% year-on-year and in Bangalore, affordability has fallen by over 9% in 2022. This trend is expected to continue in 2023 and beyond.

Effective planning and housing provision is no easy feat in a highly diverse country that has perhaps already surpassed China as the world's most populous nation. Despite the introduction of a spate of housing schemes and policy initiatives geared towards the mission of housing for all, securing affordable housing for all in the country remains a pressing and visible matter.

Given the circumstances, the Central Government's flagship initiative - Prime Minister Awas Yojana (PMAY) was seen as manna from heaven. Of the 401 lakh houses sanctioned during the mission period, which has been extended till Dec 2024, about 277 lakh houses have been constructed and delivered to beneficiaries. To expedite the construction of houses sanctioned under this and some other state-run schemes, The Building Materials and Technology Promotion Council (BMTC) under the Ministry of Housing and Urban Affairs (MoHUA) has been promoting innovative construction technologies like modular tunnel form, rapid panels, light gauge steel framed structures (LGSFS), and Waffle-Crete building systems. This step signifies a paradigm change and is a huge upgrade from the cast-in-situ framed structures currently popular in India.

However, these technologies cover only a tiny sliver of all that is available and feasible in the construction landscape. Other cutting-edge solutions and processes like Building Information Modeling (BIM), additive manufacturing; industrial internet of things; cloud based construction, big data analytics, autonomous robots as well as virtual, augmented, and mixed reality, if deployed, have the potential to catalyze the biggest disruption in the construction industry. Deeper integration of technology solutions in construction can have tremendous impact on helping to reduce the cost and facilitate further development. This is crucial because while PMAY is plugging an important gap in India on the affordable housing front, a developing economy like India must be cognizant of other solutions for reforming the housing market and address the deep-rooted issues associated with the housing market in the country.

The construction industry needs to undertake large-scale rapid digitalization to answer the challenges of cost overruns, waste generation, project delays and low profitability. The shortfall in new affordable homes will not bode well for those in desperate need of housing. Putting things in order may not be easy but it is not impossible either. Many large construction companies have adopted technology solutions and have proved the efficacy of deploying the right solutions to bring down project costs. Digitalization offers a wealth of untapped cost-saving opportunities that can be used to solve our country's persistent housing shortage, which currently numbers 10 million units in urban India alone. Modern construction technologies like Tekla Structures offer advanced constructible BIM models, tools for cloud-based collaboration and project management that prompt waste reduction, less rework, increased machine productivity and fuel savings, thus leading to lower building costs, ultimately allowing for affordable homebuilding. EPC World

PAUL WALLETT
Regional Director
Trimble Middle-East and India Region

INDIA @ 75 | 75 Azadi Ka Amrit Mahotsav

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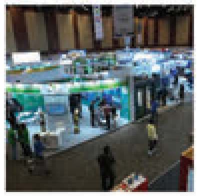

Theme: 'Advancing Net Zero through Decarbonisation'

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KEY HIGHLIGHTS

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- Exclusive sessions on Green Homes; Green Products & Materials; Green Cities
- IGBC Members Meet Session
- IGBC Student Chapters Annual Meet
- IGBC Performance Challenge for Green Built Environment Awards 2023
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Smart Grids and ERS

Pioneering the future of power restoration

The ongoing lifestyle of humankind thrives on consuming energy, making it an unavoidable necessity. Moreover, the increasing population has skyrocketed the overall energy demand across the nation. A majority of these energy demands are conventionally met with the help of traditional energy sources. However, it is important to understand that these conventional energy sources are continually depleting while generating major environmental concerns. To even enhance the existing challenge, the ongoing power infrastructure in the nation is unsustainable, aging, and inefficient.

The present electricity grid across the nation is prone to blackouts and burnouts and also experiences increased transmission losses, supply of inadequate energy, reduced power quality, while also discouraging the integration of distributed sources of energy. Mitigation of existing challenges in the energy sector will require comprehensive overhauling of the entire power delivery infrastructure.

The advent of smart grid

Smart Grid, representing the modernization of the conventional electric grid, is regarded as the rising combination of different cutting-edge technologies aimed at bringing about a major change in the electrical power industry. A Smart Grid is an extensive electricity network that leverages digital along with other advanced technologies like ERS (Emergency Restoration System) to monitor as well as manage the transmission of electricity from the source. The aim of modernizing the electricity sector of the country is to fulfill the varying electricity needs and demands of end users.

Smart Grids help in coordinating the needs as well as capabilities of all grid operators, electricity generators, electricity market shareholders, and even end users to operate all consecutive components of the system quite efficiently. In turn, this helps in minimizing the overall costs and environmental concerns while also maximizing the resilience, reliability, stability, and flexibility of the system.

ERS – A core technology for ensuring quick power restoration

In addition to Smart Grid in the power sector, other revolutionary technology solutions like Emergency Restoration System (ERS) can accelerate the progress of the otherwise outdated power system of the entire nation. ERS serves to be a great solution to commence the process of electricity transmission within the shortest span possible. It is made possible with the creation of a temporary bypass system.

The indigenous ERS technology has been developed by CSIR-SERC, Chennai in collaboration with Advait Infratech. The cutting-edge technology boasts immense potential to help the power transmission & distribution sector of India in multiple ways. ERS technology for rapid power transmission and distribution is unique. The entire system features lightweight modules connected with an advanced connection system. These units are supported with the help of gimbal joints. Moreover, these are relatively easy to construct in the foundation system.

The indigenous ERS technology by CSIR-SERC was recently handed over to Advait Infratech in Ahmedabad. The company has set up a dedicated ERS manufacturing plant to accelerate the generation and distribution of the revolutionary ERS technology to the entire Indian power transmission sector. It is a high-end patented technology in the energy sector and is made available for ensuring technology transfer across all players of the globe.

Conclusion

Modern industry and life depends significantly on round-the-clock electricity supply. With the overall population reaching its record high, it points towards the need for a continuous and ever-rising consumption of electricity. With the presence of existing unreliable and insufficient infrastructure, it is high time technological advancements take over conventional, outdated systems.

The advent of ground-breaking technologies like Smart Grids and ERS can aid the modernization and transformation of the energy sector of the country. As electricity serves to be a fundamental requirement of ensuring economic growth, transformation of outdated dumb electricity grids to the latest Smart Grid should be considered significantly. EPC World

SHALIN SHETH
Founder & Managing Director
Advait Infratech

Roads and highways

Pathway to economic development

Roads and highways development has been one of the major focus areas of the Central Government over the past few years. The Central Government's strong impetus on the road sector is visible from the capital spending of the Ministry of Road Transportation and Highways (MoRTH), which has increased by more than eight times to ₹2.59 lakh crore in FY2024 (budgetary estimate [BE]) from ₹0.31 lakh crore in FY2014, a CAGR of 23%. Further, the budgetary grant for the ministry has increased by a healthy 25% to ₹2.59 crore in FY2024 BE from ₹2.06 lakh crore in FY2023.

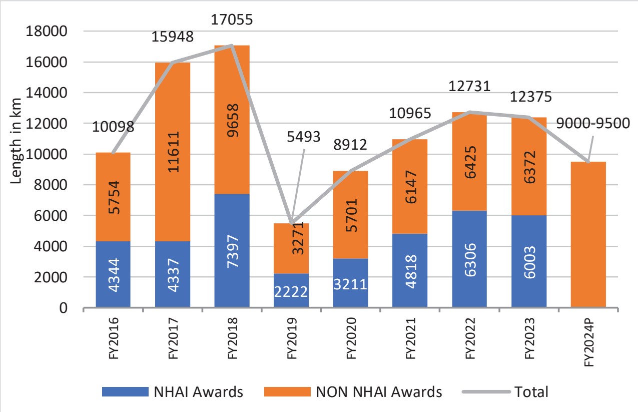
In line with this, MoRTH awards have significantly increased over the last nine years from around 3,600 km in FY2014 to 12,375 km in FY2023, at a CAGR of 15%. These contracts are majorly awarded by MoRTH, National Highways Authority of India (NHAI) and National Highways & Infrastructure Development Corporation (NHIDCL). Further, NHAI accounted for a large portion of MoRTH awards at more than 40% in the last nine years, which increased further to around 48% over the last three years.

NHAI awards, over the past three years, have been dominated by the Hybrid Annuity Model (HAM) with a share of around 55%, and the Engineering Procurement and Construction (EPC) mode accounting for the rest.NHAI awards via the BOT-Toll mode have been low (sub 5% of total awards by NHAI) in the recent years and accounted for only 2.5% in FY2023.

ICRA expects that with the model code of conduct in place in Q4 FY2024 (Q4 accounts for 50-60% of awards in a year), ahead of the General Elections, the awarding activity is likely to be impacted in FY2024 and the overall awards are likely to decline to 9,000-9,500 km from 12,375 km in FY2023. A decline in order inflows during the election period is in line with the past trend, though the extent of the decline in order inflow is expected to be lower than FY2019 because of the strong impetus of the Central Government on the roads sector. The EPC mode will continue to remain the mainstay of awarding, accounting for 70-75% of awards in FY2024, with the HAM mode constituting the remaining 25-30%. The BOT-Toll awards accounted for less than 5% of the orders in the last five years, and its share is expected to remain at a similar level in FY2024.

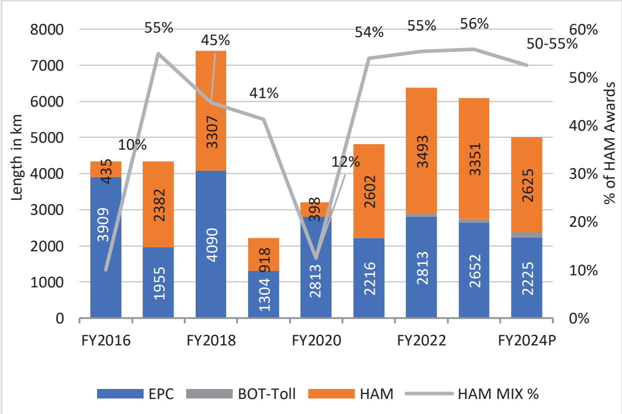
MoRTH execution has also significantly increased over the last nine years, which drove a

Exhibit 1: MoRTH Yearly Awards



Source: ICRA Research, MoRTH

Exhibit 2: NHAI Yearly Awards



Source: ICRA Research, MoRTH

58.8% growth in the length of the National Highways in India from 91,287 km at the end of FY2014 to 1,44,955 km at the end of FY2023. MoRTH execution has increased from 4,260 km (11.7 km/day) in FY2014 to 13,435 km (36.8 km/day) in FY2021, with a CAGR of 17.8% (FY2014-FY2021). Execution in FY2021 was strong owing to benign commodity prices and lower traffic restriction during the Covid-19 pandemic.The same has moderated over the last two years to 10,457 km (28.6 km/day) in FY2022 and 10,331 km (28.3 km/day) in FY2023 on account of high cost of raw materials, extended monsoon in certain geographies and increased traffic vis-à-vis the pandemic period. ICRA expects MoRTH execution to increase to 12,000-12,500 km in FY2024 from 10,331 km in FY2023 on the back of increased Budget outlay of 25% in FY2024 and the Government's plans to complete major projects before the General Elections, which are due in May 2024.

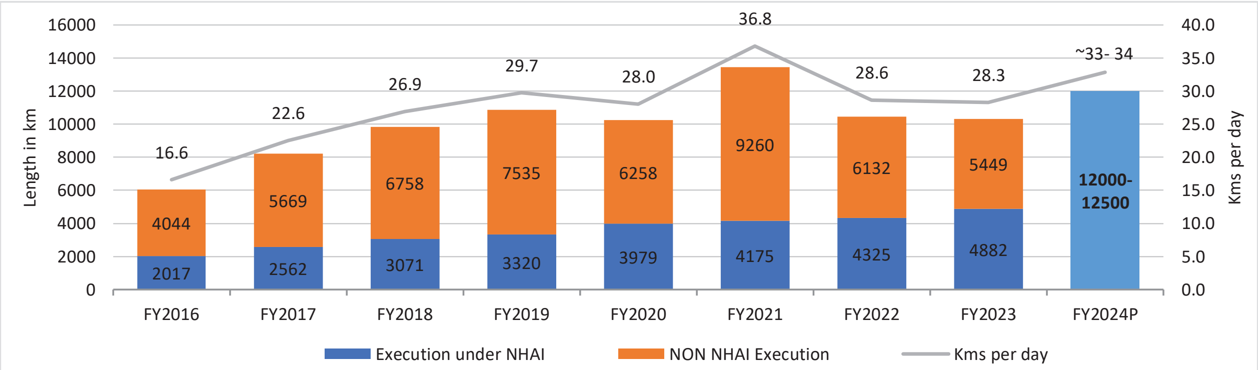
EPC players have been the major beneficiaries of the increased road awards and execution over the past few years.Increased awards and timely payments from the ministry have supported the credit profiles of road EPC players. Additionally, the Central Government agencies (NHAI/ MoRTH) have provided relaxations to EPC players during Covid-19, including monthly payments to contractors, removal of earnest money deposit (EMD) requirement, lower retention money requirement, and relaxation in technical and financial qualification of bidders. These have helped the road EPC players to improve their cash flow cycle and thereby road execution.

However, these measures have increased the competitive intensity in the sector, as witnessed in significant discounts and the number of players participating in the bids floated by NHAI/ MoRTH. Around 93% of EPC bids floated by NHAI/ MoRTH during January 2021 to May 2023 was won at a discount, with discounts touching as high as 30-40% in some instances. While competition remained high for EPC projects, the trend caught up with the HAM projects as well. The median premium for HAM projects declined from upwards of 20% between FY2019 and FY2021 to 15% in FY2022 and -1% in FY2023. There were no discounted bids in FY2020 and FY2021, however, nearly 56% of the bids in FY2023 was at a discount to the authority bid price for HAM projects.

Although NHAI/MoRTH has withdrawn certain relaxations provided to road developers during Covid-19 including the reinstatement of EMDs and requirement of additional performance security, the competitive intensity is expected to remain high owing to less opportunities in state and private sector capex and timely receipt of payments from NHAI/MoRTH. NHAI has also stipulated a minimum credit rating of BBB for bidders in HAM and BOT-Toll projects. However, the same is expected to have a limited impact on the competitive intensity of the sector as less than 10% of the projects is awarded to bidders with rating below BBB.

The National Infrastructure Pipeline (NIP) programme involves an outlay of around ₹20.3 lakh crore in the road sector between FY2020 and FY2025 with 39% of the outlay expected from the private sector. The state governments are expected

Exhibit 3: MoRTH Annual Execution



to contribute around 36% to the outlay followed by the Central Government at 25%. Against this, the private investments in the road sector were relatively modest in the past four years. Given this, the Central Government has significantly increased the allocation to the Road Ministry to ₹2.59 lakh crore in BE FY2024 from ₹2.06 lakh crore in the revised estimate (RE) FY2023 and ₹1.21 lakh crore in REFY2022. The incremental borrowing program for NHAI has been maintained at nil in FY2023 and FY2024, given the elevated levels of debt at NHAI (due to increased borrowing between FY2017 and FY2022) to ₹3.48 lakh crore as of March 31, 2022 from ₹0.75 lakh crore as on March 31, 2017.

Apart from the budgetary allocation, the ministry has raised capital for the development of roads via monetisation of existing road assets via Toll Operate Transfer (TOT) and sale of assets to NHAI InvIT. Till March 2023, the ministry has raised around ₹36,500 crore through TOT and InvIT modes. Additionally, the ministry is planning to raise funds through project-based financing by securitising the future toll collections of the projects. NHAI has already raised funds via this route for the Delhi-Mumbai Expressway (DME) and is likely to raise another ₹15,000 crore in FY2024. Further, on the lines of project-based financing of DME, the NHAI is planning to raise around ₹60,000 crore via securitisation of toll collections for the economic corridors being developed under Bharatmala Pariyojana Phase I, including the Delhi-Amritsar-Katra Expressway, the Raipur Vishakhapatnam Economic Corridor, the Bengaluru-Chennai Expressway and the Amritsar-Bhatinda-Jamnagar corridor over the next three years.

The ministry is expected to fund the future growth of roads and highways via the budgetary support from the government, given their strong impetus on the sector, toll collections from the existing projects, monetisation of assets via TOT and InvIT modes and project-based financing via securitisation of future toll collections. However, given the ambitious NIP plans, all of these could not be sufficient and private sector participation would be required. The EPC developers, InvIT and private equity players, along with increased funding from the banking system, are likely to hold keys in this endeavor.

Under the National Monetisation Program (NMP), a total length of 26,700 km of assets have been considered for monetisation between FY2022 and FY2025 and the total indicative monetisation value of these assets has been estimated at ₹1.6 lakh crore. However, the progress in asset monetisation has been lower than estimated with NHAI raising around ₹20,000 crore in the past two years against the target of ₹53,000 crore. A major part of this fund raising has happened through TOT awards and sale of assets to NHAI INVIT. Significant step-up in asset monetisation is required, given the sizeable funding requirements of the ambitious NIP programme.Given the ambitious monetisation target set by National Monetisation Pipeline (NMP), monetisation via TOT and InvIT modes is likely to increase, going forward. EPC World

VINAY KUMAR G
Vice President & Sector Head – Corporate Ratings
ICRA

Entering moderation lane

Revenue of road EPC developers to grow in double digits, but on the back of rising debt

The road sector is one of the leading drivers of infrastructure capital expenditure (capex) in India. This is evident in the increase in awarding of national highway (NH) projects by the Ministry of Road Transport and Highways (MoRTH) to 12,731 kilometres (km) in fiscal 2022 from 5,470 km in fiscal 2019.

That said, awarding was muted in the first three quarters of fiscal 2023, and picked up only in the fourth, with the total for the fiscal remaining flat at 12,375 km, though in line with the ministry target. Awarding of NH projects is expected to remain slack over the medium term as the focus has shifted to faster execution of already awarded projects. Still, awarding in value terms will continue to grow at a healthy double-digit rate, supported by high-value expressways under Bharatmala and the National Infrastructure Pipeline, which typically involve higher capex per kilometre of road constructed.

Engineering, procurement, and construction (EPC) projects will continue to dominate, accounting for 75-80% of total awarding by MoRTH, while the share of hybrid annuity model (HAM) is expected to remain stable at 18-22%. The split will be more balanced for National Highways Authority of India (NHAI) projects, with half of awarding likely to be through HAM, which typically requires 12-15% of the project cost to be funded through equity. Coming to project execution, high commodity prices and heavy rains put the brakes in the first half of fiscal 2023, with NH construction slowing to 19.4 km per day. Sharp pick-up in construction in the fourth quarter pushed the number for the full fiscal to 28.3 km per day.

This was not just a tad lower than the 28.6 km per day achieved in the previous fiscal, but also fell short of the ministry target of 40 km per day. While stagnant awarding will limit any substantial increase in the pace of highway construction, it is expected to reach 34-36 km per day by fiscal 2025.

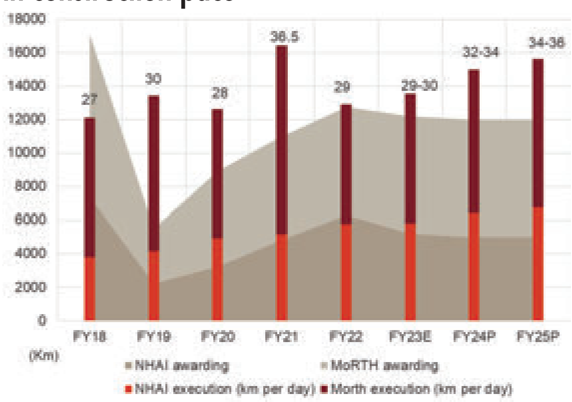
Despite the moderation in the road sector, EPC companies will maintain healthy revenue growth of 10-12% over fiscals 2024 and 2025, backed by robust order books due to healthy awarding in the past.

To be sure, profitability for the CRISIL Ratings sample set fell ~250 basis points (bps) over the past two fiscals to a decadal low of 11.5-12.5% in fiscal 2023, due to significant increase in input prices. Intensifying competition, reflected in a higher number of bidders and dwindling bid premiums, also weighed on margins.

Relaxation in the bidder eligibility criteria in HAM projects since fiscal 2021 has doubled the average number of bidders to 10-15 in the past two fiscals from 4-8 in fiscal 2016. Consequently, the average bid premium has plunged to 3-5% from 10-20% and the share of midsize developers has surged in the past two fiscals. On the other hand, equity commitment in under-construction HAM projects is expected to more than double in the next two fiscals.

Profitability will remain under pressure, as the current order books of EPC players, which will bring in revenue over the medium term, comprises competitively bid orders. Any moderation in input prices will improve profitability only marginally. Incremental working capital requirement, in line with the revenue growth, coupled with rising equity commitments, will increase the debt burden of road EPC contractors over the

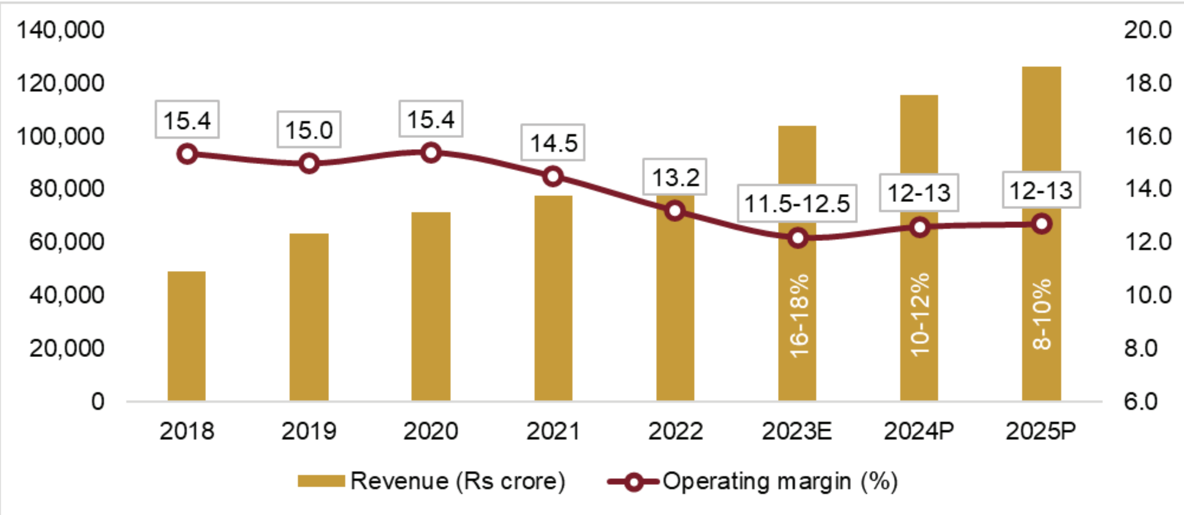
Chart 1: Healthy past awarding to support rise in construction pace



Source: NHAI, MoRTH, CRISIL Research
Note: NH numbers include MoRTH, NHAI and NHIDCL

[1]Sample of 130 road EPC developers (large, midsize and small) rated by CRISIL Ratings. Large developers are those with an annual turnover of over Rs 1,500 crore

Chart 2: Strong order books will ensure healthy revenue growth for EPC players, but aggressive bids will weigh on profitability



Source: CRISIL Ratings

medium term. Debt of the sample set of companies is expected to almost double to over ₹36,000 crore by March 2025 from ~₹18,500 crore in March 2022.

That said, healthy balance sheets and low leverage provide headroom to borrow without materially impacting credit risk profiles. Moreover, various measures under the Atmanirbhar Bharat package to mitigate the impact of the pandemic, valid till March 31, 2024, should curb any significant rise in working capital intensity.

Total outside liabilities to tangible networth (TOL/TNW) ratio was comfortable at 0.9 time as on March 31, 2023, and is expected to remain stable at ~1 time even after factoring in the higher debt. This is supported by the strong track record of deleveraging through asset monetisation and equity raise, which helped improve the TOL/TNW ratio from ~1.4 times before the pandemic.

In fact, asset monetisation has played a crucial role in keeping the sector's credit risk profile healthy, with a substantial portion of investments by players in public private partnership (PPP) projects funded through equity raise or asset monetisation. Timely monetisation will remain key to rein in debt.

To be sure, MoRTH has taken note of the perils of aggressive bidding, which can jeopardise the lifecycle cost of projects. The ministry has brought in measures, such as removal of operations and maintenance (O&M) bids from the bidding criteria for HAM projects and rooting out instances of EPC players bidding at abysmally low O&M costs to achieve the lowest bid price (a summation of net present value of bid project cost and O&M cost).

The ministry has also reinstated the earnest money deposit requirement and increased the performance security requirement for bids that are more than 20% below the estimated project cost as per the tender. These measures should keep out non-serious bidders, thereby limiting competition.

The latest April 2023 measure sets a minimum credit rating requirement of 'BBB' for bidders of HAM projects. Players with a credit rating below this threshold will have to provide a comfort letter from lenders guaranteeing credit facilities to be eligible for bidding. This is likely to minimise implementation-related challenges arising from the weak financial health of EPC players.

While the impact of these measures on competitive intensity remains to be seen, rationalisation in bidding strategies by players will be critical for sustaining profitability as well as maintaining quality. A disciplined approach to growth, focus on efficient execution to improve profitability, and timely asset monetisation will be key drivers for the roads sector in the path ahead. EPC World

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SAINA KATHAWALA
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India's potholes dialogue

COVID ON ROAD

With the onset of monsoon every year we enjoy the rains with chilly / onion pakora's and hot chai and read newspapers with news columns splashing details of lost lives due to potholes on roads every day, reminding us of the previous year's articles of the same time. There is also the familiar case of huge attention, pledges by Government top decision makers, outpouring of citizens' anger, smattering of PIL's by vigilante citizens, court interventions, etc, only to die down with the receding monsoon, and to be repeated again and again.

It is a strange contrast that railway tracks built upon soils and aggregates that carry heavy railway wagons with tonnes of goods and people across the country do not sink or have potholes despite pouring rains, while roads which have bitumen layers to protect, sink routinely.

Of the reported accidents as per MORTH in 2021, 4,12,432 road accidents, of which 1,28,825 on National Highways & Expressways, 96,382 on State Highways and 1,87,225, there would be so many more unreported ones as well. Over 1.5 lac people (mostly < 45 years age) lose lives annually on roads.

What's forgotten in this process is the angst, livelihoods and forever broken homes amidst the statistics discussed by the officialdom and the % reductions.

The annual cost to the economy on account of road accidents is estimated between 0.5 - 1% of GDP. If India is envisioned to grow from $ 3.7 trillion to $ 30 trillion, it is imperative to prevent the daily tragedy occurring on roads, cumulatively equivalent to a Balasore like train tragedy.

Major causes of accidents pertain to human error – over speeding, wrong lane overtaking etc, road condition / environment, vehicular condition, issues of non-valid driving license and non-use of helmets & seat belts are all in the realm of enforceability with an iron hand.

While the efforts made by Government of India are to be appreciated there is a need for a broader movement. This requires a newer approach of community buy-in and dissemination through brand ambassadors @ Government of India,

> "POTHOLES ARE TO ROADS, WHAT A HEART ATTACK IS TO HUMANS. THEY INCAPACITATE THE FUNCTIONING OF THE ECONOMY AS A HEART ATTACK DOES TO AN INDIVIDUAL". –
>
> Himanshu Agarwal, COO, Zydex Industries.

Community & Corporate leaders, Common Citizen's etc.

The country deserves to have Structurally Safe, Good Riding Quality Roads to be constructed or re-constructed. The onus is on the asset owners to ensure road surfaces which have good riding quality 365 days of the year. The contractors must offer this as a 'TRUST' for citizens to drive without encountering any potholes.

The key to achieving structurally safe and good riding quality roads:

- Develop 'Vision Zero' by 2030 'Fatality & Accident Free India' with Zero fatalities and Zero Accidents. Involve 1.4 billion Indians to want their kin back home every day
- Educate 100 % of the people and issue license only if people pass the standard with full understanding of the traffic regulations, stringent mandatory compliances and withdrawal in case of repeated violations (RTA Dubai).
- Give massive thrust to last mile transportation – fully air-conditioned buses at low cost to wean away the individual vehicle owners, two wheelers from roads. This will not only reduce accidents, but also de-congest roads and requires innovative financial engineering.
- Ensure structural integrity of all Highway / City road networks. Make contractor's leadership certify that road constructed by them passes the standards. In case of any pre-mature deterioration, on related fatalities / accidents, they will be liable for punitive and financial damages. Simultaneously in order to propel best in class practices, offer incentives for best in class roads with extended life.
- Asset managers in Governance should strive to have roads networks built under their tutelage of the highest standards.

While we cannot undo the past, lets all work in mission mode to prevent the 1 million people fatalities in the next 7 years (basis past trends). We all owe it to the children. EPC World

HIMANSHU AGARWAL
COO
Zydex Industries

Construction Equipment sales recorded **18% YoY growth in Q1 FY24**

Construction Equipment sales grew by 18% in Q1 of FY 2023-24, as compared to Q1 of the last fiscal year, as the total equipment sales increased to 27,244 units against 23,037 equipment sold in the first quarter of FY 2022-23. Of this, 24,806 were sold domestically while 2,438 were exported.

"The industry has maintained its growth momentum in the first quarter of the current fiscal year and have recorded a high growth mainly due to the accelerated pace at which the infrastructure projects are being implemented", said V Vivekanand, Incoming President, ICEMA and Managing Director, Caterpillar (I) "Many infrastructure projects are in the pipeline, and new projects are also expected to be floated at a rapid pace in the near future, which will help drive the future growth of the industry" added Dimitrov Krishnan."

The growth in sales during the first quarter of the current fiscal comes on the back of positive growth in three of the CE industry's major equipment segments, viz, Earthmoving Equipment by 19%, Road Construction Equipment by 38% and Material Handling Equipment by 57%. The other two major equipment segments – Material Processing Equipment and Concrete Equipment – registered minor drop in sales, of 10% and 11% respectively. On a month-on-month basis, overall CE sales in June 2023 at 8,781 units were 2% lower than 8,986 units sold in May 2023.

Earthmoving Equipment, which accounts for around 70% to total CE sales, sold 18,831 units in Q1 of FY 24, of which the bulk was comprised of increased sales of backhoe loaders (10,161 numbers) and crawler excavators (6,866 numbers). The substantive growth of 57% in sales of Material Handling Equipment comes on the back of spurt in sales of 2,966 pick and carry cranes.

"We welcome the sales growth in Q1 and expect the positive trend to continue," said V G Sakthikumar, Convener, ICEMA Industry Analysis and Insights Panel and Managing Director, Schwing Stetter India. "The higher budgetary allocation to the infrastructure sector are showing results in the form of pickup in the pace of infrastructure projects, and this is expected to gather pace in the coming months which is expected to create higher demand construction equipment, going forward. The industry expects the next two quarters to see a boost in demand on the back of the directive of the government to spend 80% of the budget allocation for the infrastructure sector by December 2023," he explained.

Dimitrov Krishnan, outgoing President ICEMA and MD, Volvo CE India said, "the current fiscal being an election year, the projects in the pipeline, as well as those that start shortly, are expected to be completed well in time. We would urge the government to ensure a steady pace of execution of projects, which is critical for sustained demand creation and hence the growth of the Construction Equipment industry."

The ICEMA Panel on Industry Analysis and Insights provides robust and credible market intelligence by collating, generating, and analysing industry data. The value-added quarterly CE Industry Report is among the several industry reports collated based on data shared by its member companies which represent about 95% of the OEMs operating in the Indian Construction Equipment industry. EPC World

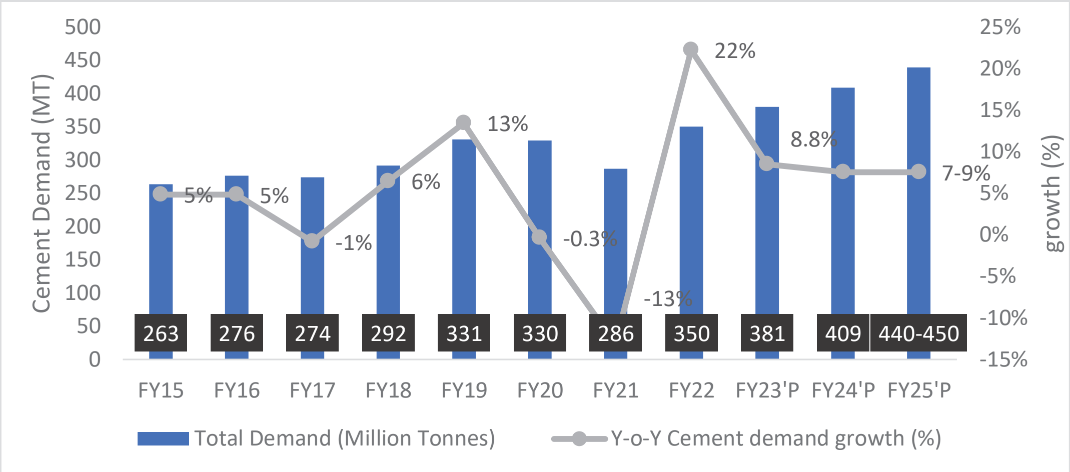
Strong demand outlook, pricing environment remains a monitorable

Consistent rise in demand in past eight quarters

Following a period of negative growth, the demand for cement experienced a significant rebound in FY22, and since then, it has consistently demonstrated growth for the past eight quarters on a year-on-year basis. In line with the upcoming 2024 general elections, the central government remains committed to stimulating growth by increasing its capital expenditure outlay. The budget estimate for 2023-24 sets the capital expenditure at ₹10 lakh crore, nearly three times the expenditure recorded in FY2019-20. This heightened focus on capital expenditure aligns with the government's objective of fostering inclusive growth, as investments in infrastructure and productive capacity yield a multiplier effect.

The public sector's capital expenditure has primarily targeted enhancing internal connectivity, resulting in a notable increase in the allocation for highways and railways. The allocation for these sectors has surged from 35% in FY18 to 43% in FY23, indicating the government's prioritisation of infrastructure development. Furthermore, the Union Budget 2024 has further increased the outlay for railways and unveiled plans for the construction of 50 new airports.

Chart 1: Demand to stay strong



Source: CareEdge Ratings, Industry, CMIE

- The macros of the cement industry remain stable in the long term, driven by demand from the housing sector, upcoming infrastructure projects as well as generous rural demand. The capex spree by the government on infrastructure and housing spending in the wake of 2024 general election paints an encouraging picture of cement demand. The private capex is also expected to pick up gradually lending further support on the demand front.
- The cement players have also responded enthusiastically by announcing huge capacity addition over FY23-FY25. With several companies looking to commission capacities in the next 2 years, the industry's pricing may come under some pressure.
- The cement price hikes implemented by industry players in March and early April 2023 have proven to be unsustainable. In FY23 the players walked on a tightrope, and they were not able to offset the higher input costs through hikes in cement prices given the unprecedented levels of input prices with cement prices already being at their peak. Though price hikes and absorption of the same were imminent for the sector's profitability, players were unable to take meaningful hikes.
- The outlook for cement prices appears unlikely to improve in FY24 due to intensifying competition to acquire market share and ongoing capacity additions in the sector. Hence, Operating leverage driven by strong volume uptake and continuous focus of the players to improve cost efficiency is expected to aid margin in the medium term for the sector.

On the real estate front to provide housing for all, the government has launched the smart city project and increased the allocation to the PM Awas Yojana budget allocation for FY24 by 66%. The private capex is expected to pick up in the coming years with the support of ₹1.94 lakh crore allocated towards 13 manufacturing sectors under the PLI scheme and rising domestic demand.

The combined effect of increasing infrastructure spending, real estate upcycle, low per capita consumption and the expected increase in private sector capex well supports the demand growth for cement in FY24-FY25. CareEdge expects the sales volume for the cement industry to grow to 440-450 MT by FY25 year-end with Central and eastern regions witnessing more lucrative demand. Given the demand is expected to remain robust in upcoming years, the cement players have also announced additional capacity to keep up with the growth pace.

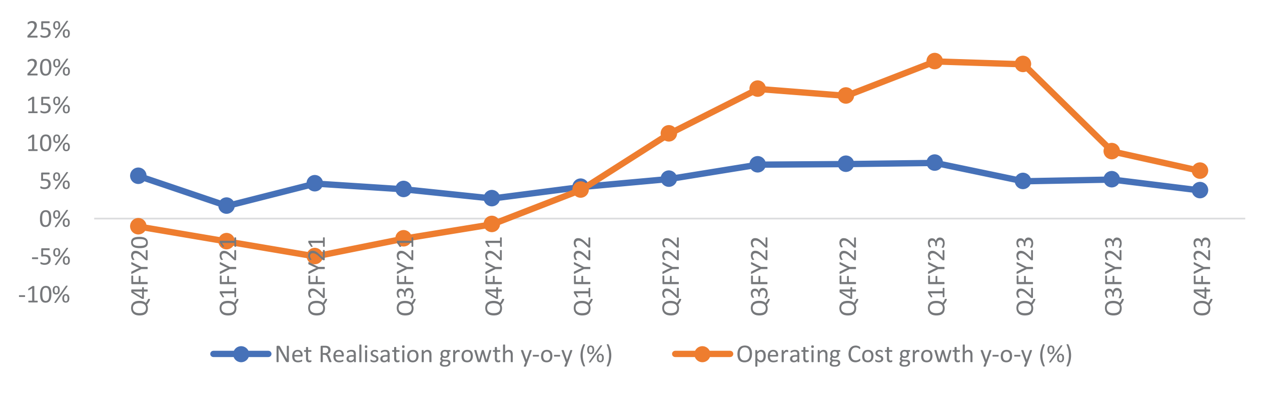
Players on expansion spree will keep utilisations under check

Given the strong demand visibility for the cement sector as a whole, the cement players have shown enthusiasm to announce capacity additions over the next three years. The cement players are expected to add 85-100 MT of additional capacity till the FY25 end.

The robust capacity addition plans by players for FY23-FY25 are leading to additional capacity to be at 1-1.1x of the expected incremental demand of 90 MT during the same period. This is expected to keep the industry's capacity utilization (grinding) under check, and they are unlikely to improve beyond 67-69% despite a better demand outlook. However, going forward any variation in the demand drivers amid the upcoming capacity expansion will remain a key monitorable.

The cement industry is concentrated with the top 10 players having more than 68% of the installed capacity share. Going forward as well the capacity expansion during FY23-FY25 is expected to be predominantly undertaken by the top players and hence the consolidated nature of the sector is likely to continue. The sector may also witness the acquisition of mid or smaller-sized players by the top players amid the prolonged margin pressure that the sector is witnessing. This will lead to further consolidation in the sector and better pricing discipline amongst remaining players.

Chart 2: Operating cost vis-à-vis Net realisation growth



Source: Industry Data, Exchange filings for a sample set of listed Players, CareEdge

Price scenario: Key monitorable

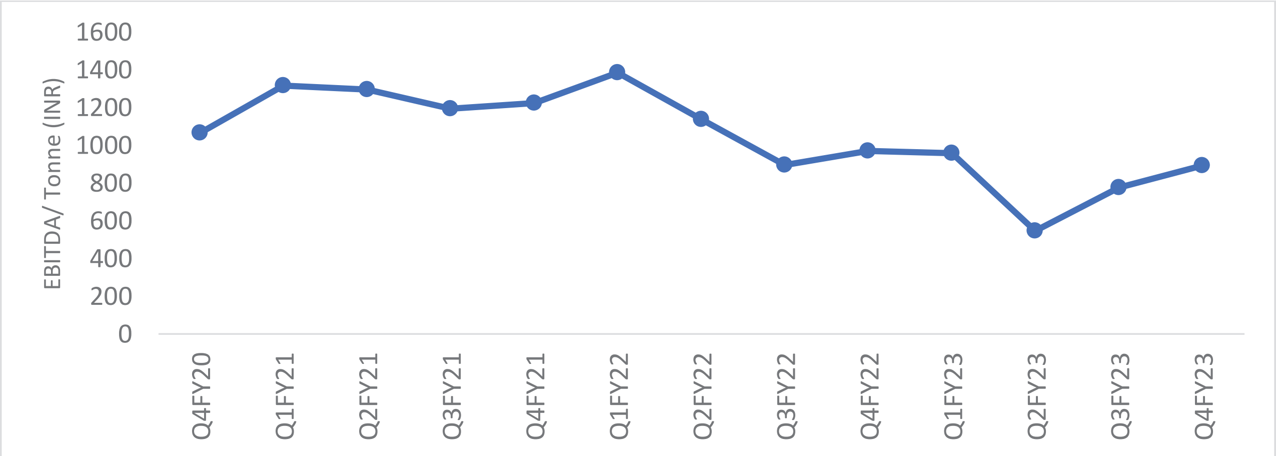
Following healthy performance in FY21, the cement industry experienced volume growth in FY22. However, average margins declined by 430 basis points as the price hikes implemented during the year failed to fully offset the increased input costs. In FY23, the industry maintained a robust demand environment, with volume witnessing a growth of 8.8%. Despite this strong demand, cement prices remained relatively stagnant, averaging around ₹370 - ₹390 per 50 kg bag at the pan-India level. While a few players attempted price hikes in Q3FY23, they were unable to sustain them and subsequently rolled back the increases. Similarly, prices remained flat in Q4FY23, with certain regions even experiencing price declines as cement players prioritized volume growth. It is worth noting that the growth in net realization for some players in recent quarters has been primarily driven by changes in product and market mix, rather than price hikes.

Historically, cement players tend to implement price hikes in Q1, as it is a strong quarter in terms of volume and demand. However, Q1FY24 has been relatively quiet, with no price hikes, in fact, few regions registered a marginal decline as players aggressively pursue market share capture. Additionally, Q2FY24 may witness a more pronounced decline in prices as demand slumps during the monsoon season, and players are cautious about losing market share to competitors. The competition is expected to intensify further as cement players aim to add a significant portion of capacity in the next two years to meet their capacity targets and look to enter new markets either by acquiring existing capacities or setting up split grinding units. Cement price trend in the upcoming quarters in FY24 hence remains crucial.

Operating profitability coming back to life

After witnessing deterioration in operating profitability for the first three quarters of FY23, in Q4FY23 players reported some recovery in the EBITDA per tonne owing to a fall in coal and pet coke prices. EBITDA per tonne for a sample set of listed players recovered to ₹800-850 per tonne on average in Q4FY23 from ₹500-550 per tonne in Q2FY23 and ₹650-700 per tonne in Q3FY23.

Chart 3: Quarterly trends in operating profitability



Source: Industry Data, Exchange filings for a sample set of listed Players, CareEdge

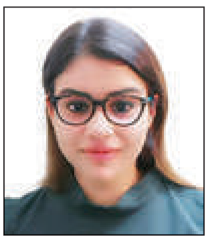
With the prices of coal and pet coke having cooled off by 50%-55% on a y-o-y basis, the benefit of low-cost inventory is expected to cushion the operating profitability of the players in the upcoming quarters. For FY24, the margin expansion will receive support from the falling/ stable input cost but with intensifying competition, the price side is not expected to aid the margins.

CareEdge view

Higher government spending on infrastructure and low-cost housing as well as the government's focus on the upcoming elections would spur demand for cement as we progress in FY24. Keeping these factors in view despite a large base last year, CareEdge Ratings expects volume to grow by 8-9% YoY in FY24 with demand to GDP growth multiplier to average at 1.4x-1.5x from 1.3x for FY23.The robust capacity addition plans by players for FY23-FY25 in anticipation of demand growth and market share gains are expected to keep the industry's capacity utilization (grinding) under check, and they are unlikely to improve beyond 67-69% at the Pan-India level despite a better demand outlook.

CareEdge Ratings does not estimate any significant price hike-led realization growth coming throughfor the players that they were scouting for in the last fiscal.Few players will register growth in net realization which will be supported by a change in their product mix as was the case in FY23 as well. CareEdge Ratings expects EBITDA per tonne to recover to ₹900-1,000 per tonne in FY24 from the levels of ₹750-800 per tonne in FY23 on the back of softening power and fuel costs. However, any rebound in fuel pricesremains a key monitorable and may impact operating profitability.Prices may largely remain stable or even fall by 2-3% y-o-y in the FY24 horizon due to intensifying competition to gain market share and run for the capacity additions amongst players and hence remains a key monitorable. EPC World

PS BHAGAVATH
Senior Director
CareEdge Ratings



RAVLEEN SETHI
Associate Director
CareEdge Ratings

Artificial Intelligence A game changer

Technological advancements have made deep inroads in every sphere of our lives. With each passing day, new technologies are bobbing its head, further simplifying the way we live and work. A classic example is the ubiquitous computer. There was a time when computer meant a bulky machine sitting on a desk. Thanks to technology – today we are talking about palm sized gadgets. Who knows, there might come a time, when technology will shrink this further to a finger-sized gizmo.

Talking about technology, the global buzzword today is artificial intelligence (AI), machine learning, robotics, augmented reality, big data, datafication.....just to name a few. Among a laundry list of such technologies, christened "new-age technologies" that is transforming the way businesses operate, Artificial Intelligence, Machine Learning, Robotics and to some extent Augmented Reality, occupy the top slots.

Sectors like healthcare, logistics & transportation, entertainment, retail & e-commerce, travel, banking & financial services, manufacturing, food tech, real estate are some of the visible sectors that are harnessing AI, ML to make informed business decisions. It provides valuable insights that are faster, more accurate, data-driven, and analyze massive amounts of data. Chatbots enabled by AI can give quicker customer service, answering queries and providing information round the clock. This saves precious time and helps in giving better service to their clients. For instance in the financial sector, the technology can help in detecting fraudulent activities such as identity theft, money laundering, phishing and other sorts of scams. This can help merchants to zero-in on fraudsters, accurately.

Talking about the real estate sector, these new-age technologies are opening up new opportunities for agents, brokers and also clients.

Real estate professionals can use AI to analyse market conditions, property prices and other factors to arrive at property value, market trends and investment opportunities. Property management is a difficult task. There is a lot that goes into the process, such as rental applications and transactions, leasing agreements, and disclosure statements. It can aid property management in a variety of ways like automatic document creation, allowing realtors to focus on other duties. AI may also be used to scan property paperwork for errors such as blank fields, missing signatures, and so on. AI assistants and Chatbots can help landlords, renters, and property managers communicate more effectively. AI-powered Chatbots can answer common questions from renters and can even send utility bills and notices automatically. Validation of property documents has been made easier using AI. And can even make language translations of documents lot more easier.

Furthermore, real estate sector can use AI to create immersive virtual tours that allow potential buyers to examine properties from anywhere in the world. For instance, prospective buyers can experience 3D views of houses without leaving their homes thanks to AI-powered technologies. It has zoom-in spoken notes and panorama view capabilities. When a buyer is looking for a home,

they consider several factors, including location, price, square footage, and the number of bedrooms. AI can provide quick and accurate answers. Customers can rely on AI systems to deliver faster search results, resulting in higher conversions. This can save time and money while also allowing agents to reach a larger audience base.

Voice AI has simplified the process of automating calling interactions. AI email tagging is supplementing customer service. Having AI-powered programs scan emails, categorize them, and directing them to the appropriate offices, reduces time required to read every customer communication. This saves service representatives' time enabling them to focus on more complex activities that require human interaction. AI is capable of proactively identifying client requirements and addressing them..

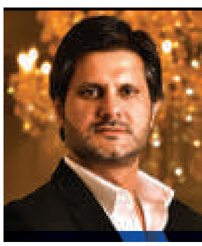
Furthermore, AI can identify possible dangers and make recommendations to mitigate such risks, resulting in a more successful and sustainable investment strategy. AI technologies are those that learn from experience. They can adjust based on the information they acquire from numerous sources. It could also include information gleaned by the technology from the web or its contacts with people. AI technologies have lessened the possibility of human errors disrupting a project. A machine does not get tired and does not overlook important information. An AI will always get things right if it is properly trained. Customers can rely on AI algorithm to deliver faster search results, resulting in higher conversions. AI enables more effective engagement and time management.

Most minor activities can be handled by AI on their own, freeing up your staff's time for more important responsibilities. As a result, agents can focus on more complicated support issues while still ensuring that all customers are taken care of.

It dramatically accelerates the process, which is critical to these businesses in a fast-moving and ultra-competitive market, AI can help real estate companies make sense of the massive amounts of consumer data that they have access to, allowing them to make more informed decisions across the board, from project development and planning to sales and marketing. AI can assist in predicting the real estate market. It can mine massive information to forecast the trajectory of the property market. It can also provide data on a local, national, and international scale.

By analyzing large volumes of data and understanding individual preferences, AI enables professionals to personalize interactions with clients. This result in customized advice, personalized marketing efforts, and personalized communication, all of which improve the overall client experience. AI has transformed many industries by improving consumer experiences and enabling professionals to provide the best services possible. AI has shown to be a game changer in delivering excellent customer experiences, from personalized suggestions to fast problem-solving. AI systems are capable of analyzing massive volumes of customer data and discovering patterns and trends. This enables experts to anticipate client demands, forecast prospective challenges, and give applicable solutions proactively. Professionals can give a more proactive service by employing predictive analytics.

While artificial intelligence is still in its early stages of adoption in the real estate sector, it has the potential to change the way real estate agents work. Real estate professionals can stay ahead of the competition and give better service to their clients by utilizing these technologies to optimize marketing efforts, improve customer experience, and make more informed decisions. EPC World



ASHOK JAUNPURIA
Managing Director
SS Group

Vollert India expands production capacity

With the expansion of production capacity in Sikandrabad near Greater Noida, the German Precast equipment specialist Vollert showed its long-term commitment for India to meet the greater demand from India's growing infrastructure sector. The Head of India Operations Krishan Mohan Sharma invited Hans-Jörg Vollert, Group CEO, Vollert Anlagenbau GmbH, to grace the occasion. Present at the event were the esteemed customers, representatives from the media, channel partners, suppliers, VDMA and the amazing Vollert team.

Speaking on the occasion, Hans-Jörg Vollert said, "It is a great honor for me to inaugurate our newly expanded plant with increased production capacity and competence to offer better products and services to the Indian and global market."

Hans-Jörg Vollert
Chief Executive Officer
Vollert Anlagenbau GmbH

Krishan Mohan Sharma
Head of India Operations
Vollert India

Inauguration of Factory Expansion at Sikandrabad, Near Greater Noida, Uttar Pradesh, India

As the Government's continuous focus is on infrastructure development and its acceptance of precast construction, Vollert is now eyeing the nation's growing infrastructure sector like metros, high-speed rails, roads, commercial complexes etc. The Indian construction industry is evolving and adopting new technologies like the well-proven precast, for speedier and better- quality construction. The newly expanded plant is equipped with advanced machinery and cutting-edge technology, which improve efficiency and reduce production time and carbon emission. It will also create employment opportunities for the local community.

initiatives for its employees, aiming to equip them with the essential expertise and knowledge required to meet the job's requirements.

Sharma provided information about the company's HR practices, stating that they implement a quarterly training program with a comprehensive Training Need Identification (TNI) process. Key members receive their initial training and onboarding in Germany. Furthermore, the company ensures that both vendors and employees receive training through different means, including regular video conferencing sessions.

The Vollert plant expansion plays an important role for the nation's infrastructure

On this occasion Hans-Jörg Vollert thanked Krishan Mohan Sharma and his team for his dedication and continuous efforts in making the Vollert brand name a success in India. "The greatest thank is for our customers as without them this would not have been possible, and also to our suppliers, friends, and partners who have been supporting us through the past years", he said. Krishan Mohan Sharma, Head of India Operations, emphasized to achieve the timely execution of projects with adoption of available worldclass latest technologies, and skill development of the local workforce.

Nevertheless, despite the positive prospects for precast construction in India, Vollert encounters the hurdle of finding skilled manpower experienced in this construction method. Consequently, the company is prioritizing extensive training and upskilling

building. Having previously focused primarily on serving residential sector in India, Vollert is now turning its attention to the country's infrastructure sector, such as roads and high-speed rails. This shift is driven by the Indian Government's emphasis on infrastructure development and its endorsement of precast construction methods. As the Indian construction industry undergoes changes, it is embracing innovative construction technologies like precast construction, which is renowned for its ability to accelerate construction timelines while ensuring enhanced quality. The company aims to expand its market share and strengthen its position in the industry and support make in India movement. Vollert India is committed to the best practices in terms of compliances, QHSE and ESG. EPC World

Real Estate Investment Trusts (REITs) Performance, Potential and Challenges

Both small and large investors can invest in REITs, and with the public market active for REITs in India, the access to smaller investors have become simpler. The underlying assets comprise of a portfolio of rent yielding real estate assets, wherein the rental income generated from such assets is proportionately distributed among the investors.

What are trusts, how do they differ from other investments?

A Real Estate Investment Trust (REIT) is primarily a company that develops, owns, and operates income-generating real estate assets which includes asset classes such as office, retail, hospitality, warehousing, healthcare, education, data centers, etc. Managing high-value real estate portfolios, they offer investors the opportunity to own real estate. On behalf of the investors, these companies lease properties and generate income, distributing the profits among shareholders as dividend returns. This way, investors can utilise the opportunity not only to grow their capital but also to generate income from it.

A REIT investment is largely different from other investments; income of REIT generated from pool of income generating assets typically offer regular fixed income. The income is received from multiple and diversified tenants to whom the assets have been leased out, backed by long-term contracts. Other asset classes such as Mutual Funds may be more prone to market fluctuations. Mandated to distribute 90% of its income, REITS provide stable quarterly yields to the investors. As listed companies, REITs offer liquidity and are less capital intensive.

How have REITs performed in India over the last 4 years?

REITs have been established as a promising alternate investment platform to raise funds in the real estate sector. The REIT market in India is still at a nascent stage compared to other global markets. Originally comprising office assets, REIT players are now moving towards other asset classes. Only recently, Blackstone-backed Nexus Select Trust REIT became the first retail REIT to be launched in India. REITs are gradually becoming an integral part of investors' real estate portfolio, given its consistent income-generating facet. So far, the listed REITs in India have successfully provided an annualized distribution yield return of 6-7%. The overall returns have been in the range of 13-15% annually, considering cash yields and capital appreciation.

As the Indian REIT market continues to mature, it has the potential to attract more domestic and international investors, diversify its asset classes, increase market liquidity, and provide stable returns to investors not only in terms of yields but capital appreciation as well.

The first REIT was launched in March 2019 in India co-sponsored by Bengaluru-based Embassy Group and global equity investor, Blackstone. Currently there are three listed Office REITs in India namely, Embassy REIT, Mindspace REIT and Brookfield REIT having total assets under management admeasuring 74.4 mn sq ft of completed assets along with an additional ~18 mn sq ft under various stages of development. Additionally, the first retail REIT was launched in India with total assets under management admeasuring 9.8 mn sq ft spread across 17 Grade-A urban retail centres over 14 cities.

Potential – In India, Global benchmarking

The total operational assets currently owned and managed by REITs account for only ~11% of the total Grade A office stock within the top metro cities of India. Additionally, ~305 mn sq ft, ~46% of the total Grade A stock have the potential to be acquired by REITs in the near future, primarily located within cities such as Hyderabad and Pune wherein ~90% of the total Grade A office inventory is REIT-worthy stock.

Industrial growth, especially in the technology sector, coupled with evolution of modern office models such as flex spaces has driven demand beyond tier-1 metro cities. With organizations returning to working from office and the rising impetus on quality of office space, ESG compliance, etc, there is additional focus on development of higher quality assets of global standards, resulting in rise of REIT worthy stock across the country.

Despite unstable global economic headwinds, operational parameters for REITs remain buoyant. The average occupancy witnessed is higher than 86% within office assets under REITs having an in-place rent appreciation of ~4%. The weighted average lease expiry is as high as 6-8 years with overall gross leasing in FY23 having witnessed 30-70% rise across markets. Currently there is ~22 mn sq ft of under construction offices spaces being developed by the three existing REITS across the major metro cities of India.

Real estate asset classes like commercial, industrial, data centers, retail, hospitality, etc, are offering competitive advantage to Global Occupiers. Considering the availability of quality assets, attractive returns and overall improvement in the industry standards of compliance, governance, etc, the demand is expected to remain strong. REITs offer a natural exit to the Developers and early-stage Investors and hence portfolios of existing REITs likely to grow and newer REITs may also be formed. Also, alternative asset classes such as co-living, life sciences, retirement homes, cold storage warehouses, etc, are expected to be further consolidated and listed within REITs in the next 3-5 years.

In order to attract investments in REIT's, the government has been continuously implementing structural reforms and updating taxation norms over the past few years. In terms of entry barriers, the minimum investment in a REIT has been reduced from ₹50,000 requiring a lot size of 200 units to ₹10,000- 15,000 with a lot size of 1 allowing higher participation of retail investors. Also, 'Foreign Portfolio Investors' can now invest in debt securities issued by REITs which encourage global fund participation in India's office growth story. These reforms in REITs, such as reduced investment requirements, tax benefits, minimum capital requirements, etc, is expected to improve investor sentiments towards the REIT platforms and attract higher domestic as well as foreign capital.

Challenges

As per the current SEBI regulations, REIT's need to have a minimum asset size of ₹500 crore with a minimum offer size of ₹250 crore which is one of the hurdles for listing of smaller sized quality rent yielding assets as REIT's. In order to address this issue, SEBI is in the process of formulating a structure to bring smaller 'Fractional Ownership' platforms under a common umbrella, to be labelled as 'Micro, Small and Medium REIT'.

Further, REITs in India is a relatively new concept having been listed in 2019, resulting in lower awareness about the investment rationale, returns and risks involved. Comparatively, developed markets such as USA, UK, Singapore and Japan have explored such investment models since 1960 and thereby have better market penetration and established REITs across multiple asset classes.

Also, being in the nascent stage of evolution, updation in the tax regime affecting income from investing at the hands of investors leads to ambiguity, serving as a hurdle while attracting retail investors. Consistency in tax regime is an important element for fixed income like investment products, and hence, the Government is also moving towards a stable regime of Taxation for REITs.

Conclusion

Indian REITs offers access to wide range of Investors both domestic and global, making them attractive investment avenues. Coupled with high quality supply, attractiveness for global occupiers, and growing Investor demand for real estate assets, India offers great potential for future growth in terms of investments in REITs in the near future.

EPC World

PIYUSH GUPTA
Managing Director, Capital Markets & Investment Services
Colliers India

The future of cobots in manufacturing

Automation is rapidly and undeniably taking all over the manufacturing industries. Industrial automation is no longer just a choice or a distant possibility for advanced processes, it is quickly becoming a requirement for businesses moving forward to maintain a competitive edge.

Manufacturing cobots or collaborative robots are ideal to fit in the advanced era of automation. With the help of collaborative robots, both large corporations and small businesses can expand and automate processes in their factories, warehouses, and research facilities. Collaborative robots, in particular, can perform repetitive, hazardous, or precise tasks alongside human workers.

Let us look more closely at how cobots in manufacturing are becoming increasingly popular and will undoubtedly play an important role towards the sector's development in the coming years.

Cobots, or collaborative robots, are relatively a new area of industrial robotics, because they are simpler, easier, and more flexible. Cobots are designed to be a reliable partner that can work hand-in-hand with humans and increase the work efficiency and productivity. They pose no risk, require little to no programming, and simplify connectivity. Because of these benefits, cobots are a game changer for a variety of applications. Cobots are a low-cost, easy-to-use solution which increases the productivity while posing few risks and provide numerous benefits.

What are the distinctions between industrial robots and cobots?

In the manufacturing industry, the distinction between cobots and robots is based on their intended use and, as a result, the type of task assigned to them. Both collaborative robots and industrial robots are used to increase the productivity and efficiency by providing more force, energy, accuracy, and data. However, reprogramming industrial robots is a complex process which requires a skilled engineer or a developer. Cobots on the other hand, are easier to program and quickly learn new skills as they are a fusion of a human and machine which is the most efficient and reliable combination.

Following are the main distinction between industrial robots and collaborative robots

- **Partnership with humans**

A cobot can double up as an assistant to a human operator. It is designed to work in partnership with humans. Traditional robots, on the other hand, are programmed to finish an automated task with very little or no human interaction.

- **Programming**

When compared to industrial robots, cobots are easier to program. In fact, one of the most marketed features of collaborative robots is the ease of programming. They are made in such a way that they are extremely easy-to-use as well.

• **Safety**

Cobots are designed to work alongside people. This means that they are safe enough to function around humans and hence do not need the safety infrastructure that industrial robots require.

• **Heavy manufacturing**

Industrial robots are capable of handling larger, heavier materials like the ones used in auto manufacturing. Hence, they are well-suited for heavy manufacturing. Cobots, on the other hand, aren't designed for heavy manufacturing owing to their size and their requirement of working in proximity to human employees.

• **Functionality**

Traditional industrial robots are usually fixed equipment created for extremely high-precision, high-volume, and high-speed production. As far as cobots are concerned, they are well suited for manufacturers with low volume, high-mix production or those who want to safely automate processes alongside workers. As compared to conventional robots, cobots can easily be moved and used in various areas of production. A majority of them can easily be mounted on any surface. Moreover, they are often lightweight enough to be carried by a single person.

The benefits of cobots in manufacturing

Collaborative robots, when trained can help businesses scale up and automate various production processes, which can lead to consistent working even in the absence of a human for a particular task. The bottom line is that cobots in manufacturing can improve quality control, increase effectiveness, and intensifies the output.

They improve security of workers by taking control of less desirable tasks. Cobots are generally beneficial to SMEs because they can assist humans efficiently and can prove to be economical for a variety of processes in the long run.

The shortcomings of cobots in the manufacturing industry

The main disadvantages of cobots in manufacturing are not related to their functionality, but rather to the question of whether a particular business should use them or not. For example, as previously stated, cobots are not designed for heavy manufacturing and cannot perform heavy lifting. They're not entirely automated and are always dependent on a human to operate them which can prove to be an advantage as well as a disadvantage depending on its usage.

However, there are still some constraints for collaborative robots in terms of cognitive and skilled tasks. Nonetheless, as technology advances, cobots - or, more precisely, their engineers and developers - will most likely overcome these disadvantages.

In manufacturing, we can use cobots to perform a variety of routine tasks, such as:

- Picking and placing
- Bin-picking
- Palletizing
- Packaging
- Machine maintenance and supervision
- Testing and quality control
- Screwing, gluing, and sealing
- Tasks related to the process, such as soldering and welding
- Sanding, polishing, deburring, and grinding

Cobots are used in a variety of fields and industries due to their adaptability, such as the production of goods for the electronics, aerospace, automotive, furniture, and plastic modeling industries, to name a few. They also work in agriculture (picking and placing), labs, research, security (monitoring), food services and food production (precision tasks, repetitive tasks), healthcare, and pharmaceuticals, among other fields.

Growth prospects and advancement

Expectations as per the various reports state that cobot market might show a massive growth in the near future. Cobots are quickly becoming a significant component of manufacturing automation as the technology proves to be reliable and more businesses are willing to use it.

Cobots will become more advanced and adaptable over the next few years. Precision and cognitive tasks performed by cobots will improve in sync with AI's capabilities. Furthermore, with IIoT, cobots can already connect to other machines, gadgets, network databases. In future cobots will be able to improve a variety of factory workflows and even offer useful data analytics.

Mitsubishi Electric under its factory automation advancements created the collaborative robot - ASSISTA. ASSISTA is an advanced collaborative robot and assures security which can work alongside humans. It is simple, easier, and more flexible. Furthermore, ASSISTA requires no robot programming expertise, offers immense ease of operation, and allows hassle-free connectivity with a wide range of components. Operating buttons on the robot's arm allow for simple control and operation. ASSISTA epitomizes versatility, providing a wide range of components such as Vision, Fingers, Grippers, and other peripherals which are developed by MELFA Robot Partners. These tools allow for easy setup and can easily be configured for specific applications. As a result, automation is better implemented and is a lot more efficient. Flexibility is another key trait of ASSISTA, which is why it can be configured to move freely either as a mobile robot or as a part of an AGV/AMR. With its adaptable design and simple operation, ASSISTA presents a compelling case as a Collaborative Workspace Partner. As a result, the operators can easily adjust the robot arm's position and set waypoints. The 6-color LED ring mounted around the robot's forearm constantly displays the operational state and fault diagnostics is also notable. ASSISTA, as a collaborative workspace partner, has a lot to offer: a flexible design, simple programming, easy use, and the ability to connect and work with a variety of components which is perfect to increase the productivity and efficiency of a human. EPC World

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