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RAJESH KUMAR SINGH
Chairman and Managing Director
Bridge and Roof Company (India) Ltd

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Published by Tejasvi S Sharma on behalf of EPC World Media Pvt. Ltd., 301, Hilton Centre, Sector - 11, CBD Belapur, Navi Mumbai - 400614. Tel fax: 022 62714444. Email: marketing@epcworld.in and Printed at Siddhi Offset Pvt. Ltd. 5/12, Kamat Industrial Estate, 396, Veer Savarkar Marg, Prabhadevi, Mumbai - 400 025.

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Dear Readers,

Two significant events are poised to have a far-reaching impact on India. The first is the return of Donald Trump to power as President of the United States. During his first term, Trump shared a strong rapport with Prime Minister Narendra Modi, which reinvigorated the India-USA relationship, historically perceived as leaning toward Pakistan. Now with Trump reclaiming the presidency, this camaraderie is likely to persist, strengthening bilateral ties further. The second noteworthy event is the re-election of the incumbent coalition government in Maharashtra, which overcame significant anti-incumbency sentiment. Maharashtra, with Mumbai as its capital, holds immense importance as India's financial hub. The continuity of governance, with the same ruling party at both the state and central levels, sets the stage for synergized policy implementation and economic development. This alignment is expected to bring substantial advantages to the state, ensuring better infrastructure development, investment inflows, and governance.

These developments are expected to significantly bolster India's rapidly expanding infrastructure sector. Road and highway projects have consistently been a cornerstone of the government's agenda. The country is witnessing an unprecedented surge in infrastructure investments, with roads and bridges serving as pivotal elements in transforming connectivity, facilitating trade, and driving economic growth. The cover story delves into the future trajectory of these critical segments, exploring the opportunities, challenges, and strategies shaping their path forward. This Edition features an exclusive interview with the CMD of Bridge and Roof Company (India), where he highlights how advanced project management tools are transforming infrastructure projects by streamlining planning, execution, and monitoring processes for improved outcomes.

The need for sustainable construction equipment has become critical amidst challenges such as excessive resource consumption, environmental degradation, and significant carbon footprints. To address these issues, India's construction and commercial vehicle sectors are embracing eco-focused trends, driven by innovation and collaboration. Turn the pages to discover how innovative technologies, government initiatives, and industry partnerships are driving the transition toward sustainable construction equipment.

The rapidly expanding infrastructure sector has driven significant growth in the demand for concrete equipment. This surge is further propelled by the ongoing green revolution, as manufacturers adopt advanced technologies and sustainable practices to address modern construction needs. This feature delves into how efficiency, sustainability, policy support, and industry collaboration are shaping the future of concrete equipment.

India's office market is set for robust growth, driven by the expansion GCCs and strong contributions from flex operators, financial services, manufacturing, and tech outsourcing sectors. As the country aspires to secure a larger share of global manufacturing, this sector is expected to create substantial demand for office spaces. The feature article explores the factors propelling this growth, including evolving workspace trends and increased investment in real estate.

In addition, this edition features engaging articles on construction equipment, roads and highways, insightful case studies, exclusive interviews, and the latest updates from the construction, infrastructure, and EPC sectors.

Enjoy the read!

Tejasvi Sharma



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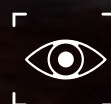
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As the world's fastest-growing major economy, the country is witnessing an unprecedented surge in infrastructure investment, with roads and bridges playing a transformative role in connecting regions, facilitating trade, and driving economic momentum. EPC world explores the segments way forward...

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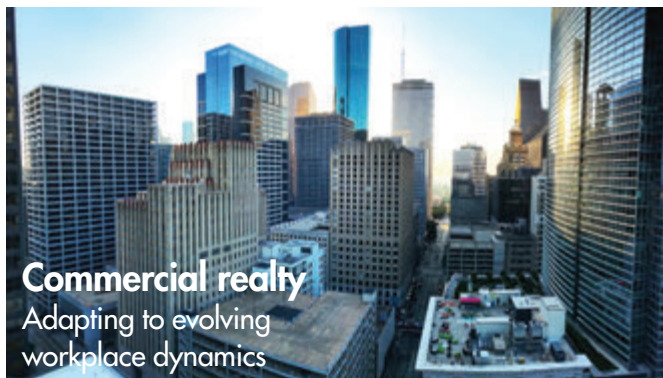
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TIL renews dealership agreement with Hyster-Yale

TIL has renewed its Dealer Sales and Service Agreement (DSSA) with Hyster-Yale Asia-Pacific. Under the renewed five-year agreement, TIL has exclusive distribution rights for certain Hyster® brand products in designated territories. Additionally, TIL takes on the responsibility for sales support and after-sales service to ensure optimal customer satisfaction. Leveraging Hyster-Yale's OEM expertise, TIL aims to enhance its customer support through improved maintenance and parts solutions. The agreement also emphasises continuous training and skill development for TIL's teams, ensuring they remain at the forefront of industry innovations.

This strategic renewal marks a significant milestone in TIL's 80-year legacy of excellence and innovation, further strengthening its position as a leader in the material handling sector. The renewal of its DSSA with Hyster-Yale Asia-Pacific further cinches its commitment to serving a diverse range of industries - from material handling and construction to mining, energy, and defence.

BKT Tires to showcase cutting-edge off-highway tire solutions at bauma CONEXPO INDIA 2024

BKT Tires, is all set to make a powerful presence at bauma CONEXPO INDIA 2024. As one of the most prominent players in the sector, BKT will showcase its extensive product portfolio under the banner of "Bharat Ka Tire"- a brand promise that reflects products "Built in Bharat; Built for Bharat and Building Bharat." This collection features cutting-edge tire solutions tailored to meet the diverse demands of India's industrial and construction sectors. BKT's display will feature a curated selection of high-performance tires specifically engineered to meet the diverse demands of India's industrial, and construction sectors. The lineup includes advanced models that emphasize durability, load capacity, and enhanced traction, underscoring BKT's focus on supporting India's critical infrastructure projects. From robust industrial tires like the EARTHMAX SR31, built for heavy-duty applications, to the AIROMAX AM27, ideal for high-speed mobile crane, each product on display reflects BKT's commitment to producing tires that enhance operational efficiency and withstand India's challenging terrains. Other showcased models, such as the XL GRIP ULTRA, MAGLIFT STD, and LIFTMAX LM81, further demonstrate BKT's versatility in catering to specialized industry needs with precision and performance.

Reflecting on the significance of bauma CONEXPO INDIA, Rajiv Poddar, Joint Managing Director, BKT, commented, "We proudly showcase tire solutions bauma CONEXPO INDIA 2024 that are not only built for the Indian market but also support the nation's development. We aim to strengthen our connection with Indian customers and reinforce our commitment to delivering innovative, reliable, and high-performance tires that drive productivity across industrial and construction sectors."

These tires represent BKT's commitment to innovation, quality, and sustainability, offering robust solutions for diverse applications. The BKT team is thrilled to engage with industry professionals, showcase its expertise, and exchange insights on enhancing operational efficiency and sustainability. Visitors can experience BKT's innovative tire solutions at the Stall O. G10 and witness first-hand the tire technology crafted to meet the evolving needs of the construction and industrial sectors.

Bhutani Infra acquires Logix City Center 32

Bhutani Infra has acquired the landmark Logix City Center in Noida and is now Bhutani City Center 32. This strategic acquisition strengthens Bhutani Infra's growth trajectory, cementing its footprint in high-potential markets and reshaping urban landscapes through premium, mixed-use developments. Positioned in the heart of Noida, Bhutani City Center 32 is already a premier hub for shopping, dining, entertainment, and business - an attraction for residents and visitors alike. The acquisition marks a significant addition to Bhutani Infra's expanding portfolio, bringing together prime retail, leisure, and entertainment spaces within a singular destination. Bhutani Infra plans to upgrade the mall to one of the best in India and provide a platform to luxury brands in the mall alongside a plush 5-star hotel to compliment the growing demands of the HNI's living in the immediate vicinity as the crème de la crème of Noida within a 2kms radius of the mall. Bhutani City Center 32 offers pre-leased spaces and diverse, high-value commercial and residential options designed to deliver immediate returns to investors.

Blue Energy Motors powers ahead in reducing emissions equivalent to 3 lakh trees

Blue Energy Motors, has crossed a significant sustainability milestone, saving 7,500 tonnes of CO₂ emissions since the deployment of its LNG-powered trucks. This achievement is equivalent to the carbon absorption capacity of 3 lakh mature trees over the course of one year, marking a major step towards decarbonizing India's commercial vehicle sector. This milestone aligns with the Government of India's LNG mission, which aims to increase the use of Liquefied Natural Gas (LNG) as a cleaner alternative fuel to reduce carbon emissions, particularly in the transport sector. Blue Energy Motors is a driving force in this mission, spearheading the adoption of LNG technology in commercial vehicles. By actively supporting the government's efforts to cut emissions from diesel-powered trucks, the company is playing a key role in the country's transition to sustainable mobility. LNG-powered trucks offer a cleaner alternative to traditional diesel-powered vehicles, emitting up to 30% less CO₂, and drastically cutting down on harmful particulate matter by up to 98% and sulphur oxides by up to 100%.



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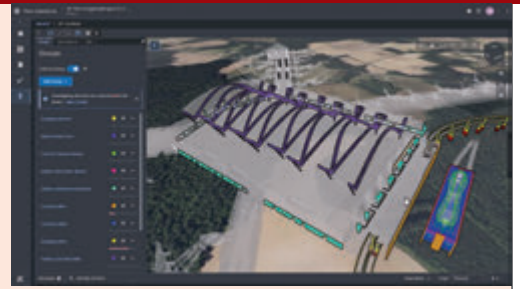
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Bentley Systems' new carbon analysis capabilities help reduce infrastructure's carbon footprint

Bentley Systems, Incorporated has announced the general availability of new Carbon Analysis capabilities in iTwin Experience to assess and reduce carbon impacts for more sustainable infrastructure. The new Carbon Analysis capabilities enable infrastructure engineers to simplify carbon reporting, easily visualize embodied carbon, and rapidly explore alternatives for better designs. Embodied carbon is the carbon footprint of an asset before it is built, encompassing the greenhouse gases emitted during the construction process. Bentley's new Carbon Analysis capabilities deliver a "cradle-to-gate" assessment of a design's carbon footprint, from raw material extraction until it leaves the factory's gate - which represent the largest contributors to embodied carbon. Bentley's new Carbon Analysis capabilities seamlessly integrate a user's design data with their chosen carbon assessment tool. This enables infrastructure professionals to link carbon footprints directly to their design choices and see those impacts dynamically change across design iterations.



Arvinder Singh Sahney takes over as Chairman of IndianOil

Arvinder Singh Sahney, an industry veteran with nearly three decades of experience, has taken charge as the Chairman of Indian Oil Corporation (IndianOil). A Chemical Engineer from HBTI, Kanpur, Sahney began his career with IndianOil in 1993. Over the years, he has held key positions across various functions, including Refinery Operations, Technical Services, Health, Safety, and Environment (HSE) and Petrochemicals. He played a crucial role in the commissioning of the 1.5 MMTPA Paradip Refinery, which has significantly bolstered India's refining capacity and energy security. Before assuming the role of Chairman, Sahney headed IndianOil's Petrochemical vertical. He was instrumental in conceptualizing several major petrochemical projects, including the upcoming mega Petrochemical Complex at Paradip, that is poised to significantly expand IndianOil's footprint in the sector.

Jasmino Corporation acquires two German firms

Jasmino Corporation has acquired two German companies, HAW Lining and GBT Buecolit. This strategic move positions Jasmino as the world's 3rd largest provider of comprehensive heavy-duty industrial anti-corrosion lining solutions.

Aligned with the company's vision to become a global leader and the preferred one-stop solution provider for critical equipment in chemical-based industries, this acquisition enhances Jasmino's reach to both domestic and international customers. HAW Lining, a pioneer in rubber linings, has been instrumental in industrial corrosion protection for over 125 years, offering critical solutions to global industrial powerhouses, while GBT Buecolit is one of Germany's leading companies in heavy-duty corrosion protection, specializing in coatings, plastic lining, and turnkey solutions.



JCB Inaugurates a new dealer branch in Hosur, Krishnagiri

JCB India has opened the newest branch of its Dealership, TRR Automotive in Hosur, Krishnagiri district. Offering JCB India's full Product Portfolio, the newly inaugurated state-of-the-art facility is set to provide technologically advanced Construction and Earthmoving equipment solutions to customers in the region. Spread across 13,500 sq ft, the new JCB TRR Automotive Dealership branch employs over 30 skilled personnel comprising Sales, Service and Parts teams. The facility has a 3-bay Integrated Workshop, one Workshop-On-Wheels Van and a Parts Van along with a LiveLink command centre to ensure unmatched customer experience. The new facility in Hosur has been made as per the JCB corporate identity guidelines and is equipped with JCB standardised systems and processes. The facility's state-of-the-art fully operational LiveLink command centre, will enable 24x7 fleet management support to the customers. JCB LiveLink, an advanced telematics technology, gives information on Service, Operations and Security of JCB machines. JCB TRR Automotive dealership is also part of the digital ecosystem which is built around SalesMaster where the customer sales journey is comprehensively reviewed.





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Girish Tanti being appointed as IWTMA Chairman

The new Executive Committee of The Indian Wind Turbine Manufacturers Association (IWTMA) unanimously elected Girish Tanti, Vice Chairman & founding member, Suzlon Energy, as Chairman, along with Dr. Saravanan Manickam (Country Head (VP India), Nordex) as Vice Chairman-cum-Secretary and K Bharathy (CEO, Windar Renewable Energy) as Treasurer at its Annual General Meeting at the Chennai Trade Centre. The newly appointed Executive Committee members include RPV Prasad (Managing Director - India, Envision Energy), Amit Kansal (CEO and Managing Director, Servion), Navin Dewaji (Head of Onshore AP India, SGRE), Siva Murali (General Manager - Sales and Marketing, ZF Wind Power), Dr. Venkataraman Balakrishnan (President, Aditya Birla Advanced Materials), and Pandu Chillakuru (Whole Time Director, Flender).

JSW Group & Korea's Posco Group to jointly develop an integrated steel plant in India

JSW Group (JSW) has signed a Memorandum of Understanding (MoU) with Korea's POSCO Group (POSCO), outlining a framework for collaboration in steel, battery materials, and renewable energy sectors in India. The MoU was signed at JSW Group's corporate headquarters in Mumbai, in the presence of JSW Group Chairman Sajjan Jindal, POSCO Chairman Chang In-hwa, and senior executives from both the business houses. The MoU sets the stage for the development of an integrated steel plant in India with an initial capacity of 5 million tonnes per annum. Beyond steel, the partnership aims to drive cooperation in battery materials and renewable energy. The collaboration between JSW Group and POSCO Group is expected to boost India's steel production capacity and advance sustainability efforts in both countries.



Godrej Enterprises Group supplies critical process equipment with specialized metallurgy to Mexico

The Process Equipment business of Godrej & Boyce, a part of Godrej Enterprises Group, has announced the successful manufacturing and dispatch of more than 20 critical equipment to two refineries in Mexico. In the last 3 years, Godrej & Boyce has substantially increased its market share in the Americas through supplies for various prestigious projects in the USA and Mexico. By successfully delivering critical process equipment to international markets, Godrej & Boyce demonstrates the excellence of Indian manufacturing on the global stage, embodying the spirit of "Make in India" for the world. These equipment are designed to support the refineries' objectives of contributing to the local economic growth and underscoring commitment to upgrading the country's refineries. This successful execution includes advanced high-pressure reactors and large columns, with reactor featuring specialized Chrome Moly Vanadium Steel construction. This advanced metallurgy provides exceptional strength, durability, and superior resistance to corrosion, heat, and wear - crucial characteristics for demanding refinery operations.

Advait Infratech announces name change to Advait Energy Transitions

Advait Infratech (AIL) has announced a significant milestone in its evolution as the company rebrands to Advait Energy Transitions (AETL), effective from the first week of November 2025. This rebranding comes after gaining unanimous approval at the Annual General Meeting (AGM) and subsequent formal filings with the Registrar of Companies (ROC). The decision to rename the company reflects a deliberate and strategic pivot towards deepening its commitment to the energy transition sector. The name change underscores the company's core focus on Power Transmission, Generation and Energy Transitions, embodying a comprehensive approach to facilitating the global shift towards cleaner, more efficient energy systems. The company's rebranding is accompanied by a new brand line for 2024-25: Harnessing Energy Transitions for a Sustainable Future.

L&T Energy CarbonLite gets LNTP from NTPC for setting up thermal power plants in MP and Bihar

L&T Energy CarbonLite Solutions has secured 'Limited Notice to Proceed' (LNTP) from NTPC for setting up thermal power plants in Madhya Pradesh and Bihar. The orders pertain to main plant packages of 2x800 MW Stage-II thermal power plant at Gadarwara in Madhya Pradesh and 3x800 MW Stage-II thermal power plant at Nabinagar in Bihar. The scope of work involves design, engineering, manufacturing, supply, erection and commissioning of boilers, turbines, electrostatic precipitators (ESP), auxiliaries, along with the related mechanical, electrical, instrumentation and civil works.

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Sterlite Power successfully commissions Goa-Tamnar Transmission Project

Sterlite Power has successfully completed the Goa-Tamnar Transmission Project, implemented through its Special Purpose Vehicle, Goa-Tamnar Transmission Project (GTTPL). The project strengthens Goa's power infrastructure with four vital elements, three of which have now been successfully commissioned and the final component, the Xeldem-Narendra transmission line, is set to commence soon. This project brings Goa's first 400 kV Gas-Insulated Substation (GIS) at Dharbandora live, providing a high-quality power supply that reaches South Goa at 400 kV for the first time. The new infrastructure will stabilize power delivery, minimizing outages, especially in South Goa, and will enable high-quality power supply across industrial, commercial, and residential segments. The enhanced transmission capacity will also provide a direct feed from the new Dharbandora substation to South Goa, reducing the load on existing substations and making the network more resilient against fluctuations.



Kirby Building Systems inaugurates 50,000 MT expansion at Gujarat facility

Kirby Building Systems India has inaugurated its 50,000 MT capacity expansion at Halol, Gujarat, doubling the business' Halol Pre-Engineered Steel Building (PEB) capacity to 100,000 MT per annum within a span of 15 months since the inauguration of this facility in February 2023. This milestone enables Kirby India to reach a total installed capacity of 300,000 MT per annum when paired with the two facilities at Hyderabad and Haridwar, each having 100,000 MT installed capacity. The three state-of-the-art facilities are strategically located at south, north and west with the newest plant at Halol having advanced fabrication technologies such as CNC Laser Cutting Machine, CNC Plasma Cutting Machine, CNC Drilling Machine, CNC Controlled Laser Guided Welding Machine and other equipment. These advanced machineries provide high quality products to all our customers, with faster deliveries that consistently deliver projects on schedule.



Inox Wind bags a repeat order from Continuum Green Energy for 87 MW

Inox Wind (IWL) has bagged an order for 87 MW from Continuum Green Energy (Continuum), a leading renewables C&I player. This repeat order from Continuum is for IWL's 3 MW Wind Turbine Generators (WTGs) and will be executed on an end-to-end turnkey basis. Additionally, IWL will provide post commissioning multi-year operations & maintenance (O&M) services. The project will be executed in the states of Gujarat and Rajasthan. The addition of this order takes the total cumulative orders from Continuum to ~700 MW, and IWL's orderbook to >3.4 GW, the highest ever in its history.



Ruturaj Govilkar joins Mott MacDonald as Managing Director of its South Asia business

Mott MacDonald has appointed Ruturaj Govilkar as Managing Director of its South Asia business. Ruturaj will be responsible for further strengthening the consultancy's capability in the delivery of strategic infrastructure and advisory projects for key clients. He succeeds Ashley Taylor, who will continue to lead Mott MacDonald's global design centre as Managing Director. Previously country manager and managing director for India at Black & Veatch, he brings a wealth of expertise to the position, with over 32 years of experience in the engineering and construction industry.

Adani acquires Orient Cement at INR 8,100 crore equity value

Ambuja Cements, the cement and building material company of Adani Cement and part of the diversified Adani Group, has announced the signing of a binding agreement for the acquisition of Orient Cement (OCL) at an equity value of ₹8,100 crore. Ambuja will acquire 46.8 percent shares of OCL from its current promoters and certain public shareholders. The acquisition will be fully funded through internal accruals. OCL has 5.6 MTPA clinker capacity and 8.5 MTPA cement capacity along with statutory clearance to increase the clinker capacity by another 6.0 MTPA and cement capacity by another 8.1 MTPA. In addition, OCL also has a limestone mining lease in Chittorgarh for setting up an Integrated Unit (IU) with clinker of 4 MTPA and a split Grinding Unit (GU) of 6 MTPA in North India. OCL has also secured a concession from MPPGCL, Madhya Pradesh for setting up a Grinding Unit within the premises of Satpura Thermal Power Plant. Both these complement the Adani Group's existing cement footprint. OCL has recently commissioned a WHRS in Chittapur IU and is in the final stage of commissioning 16 MW solar in Chittapur and 3.7 MW solar in Jalgaon.

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Tecnimont to develop biogas plant from waste as part of the CSR initiatives

Tecnimont (MAIRE's Integrated E&C Solutions) has announced that its Indian subsidiary Tecnimont Private Limited (TCMPL) has teamed up with Paradeep Municipality and National Institute of Technology, Karnataka – Surathkal (NITK) to develop a biogas plant from waste at Paradeep Municipality, Jagatsinghpur, Odisha, as part of the Corporate Social Responsibility initiatives that TCMPL is carrying out in India. The biogas plant enhances the deployment of circular solutions to efficiently manage organic waste. In particular, this initiative will help Paradeep Municipality to generate biogas by converting food and vegetable waste through anaerobic digestion; the biogas obtained from the recycling of organic waste will be then used by community kitchens.

REPLUS Engitech and Green Power Monitor signs MoU for AI-enabled Energy Management Systems

REPLUS Engitech has signed a Memorandum of Understanding (MoU) with Green Power Monitor (a DNV company) to collaborate on promoting advanced AI-enabled Energy Management Systems (EMS) and Power Plant Controllers (PPC) in India and other key markets. This partnership will support efforts to improve grid security, stability, and the integration of BESS and other renewable energy solutions. GPM PPC is a digital control system that manages active power, reactive power, frequency and voltage, power factor, ramp control and SVG or STATCOM controls in solar, wind, BESS and diesel-hybrid plants. REPLUS Engitech is a technology-driven manufacturing company, approved by the DPIIT, specializing in Deployment of MWh & GWh scale Battery Energy Storage Systems (BESS). This collaboration will strengthen REPLUS Engitech's capabilities as an EPC (Engineering, Procurement, and Construction) and System Integrator (SI) for Hybrid, BESS, and future grid applications, supporting utilities, customers, and communities.

UltraTech to deploy 100 more EV trucks in its logistics operations

UltraTech Cement is scaling up the use of Electric Vehicles (EV trucks) for movement of material and products in its logistics operations. The Company has signed a new transport service contract for deployment of about 100 electric vehicles (EV Trucks) for the transportation of 75,000 Metric Tonnes (MT) of clinker per month from its integrated cement manufacturing unit Dhar Cement Works, located in Madhya Pradesh, to its grinding unit Dhule Cement Works, located in Maharashtra, which is about 400 kms distance for a roundtrip. The transportation of clinker using these electric trucks in place of fossil-fuel based trucks is estimated to help reduce transport emissions by 17,000 MT of CO₂ annually. The scale up follows the successful pilot that commenced in January 2024, wherein UltraTech introduced five electric trucks for transport of clinker on this route. The pilot also included deployment of the charging infrastructure as well as imparting intensive training to the truck drivers. UltraTech is also evaluating additional routes for deployment of more EV trucks in its logistics operations. UltraTech proposes to conduct another pilot using a similar model for transport of clinker between two other manufacturing units of the Company.



Serentica Renewables to develop renewable energy projects in Andhra Pradesh

Serentica Renewables plans to establish renewable energy projects with a combined capacity of 10 gigawatts (GW) in Andhra Pradesh. This initiative

underscores the company's commitment to supporting India's clean energy goals and fostering sustainable growth in the region. Andhra Pradesh, with its target of achieving 72 GW of renewable energy capacity by 2030, is opening avenues for industry leaders like Serentica to contribute to the state's green vision. Through this 10 GW commitment, Serentica aims to establish a foundation for sustainable industrial growth in the region. Serentica Renewable's 10 GW renewable energy projects is set to be a cornerstone in Andhra Pradesh's renewable journey, driving regional development while contributing to India's national goal of achieving 500 GW of renewable energy carbon reductions by 2030.

KEC International wins new orders of ₹1,114 crores

KEC International has secured new orders of ₹1,114 crores across its various businesses. The Transmission & Distribution (T&D) business has secured orders for T&D projects in Middle East and Americas. The orders include 400 kV Transmission line in Oman and supply of towers, hardware and poles in Americas. The Civil business has secured orders in the industrial segment in India. And the Railways business has secured an order for Metro Overhead Electrification (OHE) works in the technologically enabled segment in India. The Cables business has secured orders for supply of various types of cables in India and overseas.





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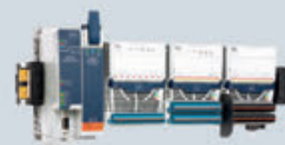
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Shyam Metalics commissions advanced blast furnace and sinter plant in West Bengal

Shyam Metalics and Energy (SMEL) has officially commissioned a new blast furnace and launched a sinter plant at its Jamuria facility. With an investment of ₹600 crores, this significant new development aims to expand production capabilities to meet the growing demand for high-quality steel products across various industries. The newly commissioned blast furnace has a capacity of 0.77 million tonnes per annum (MTPA), substantially increasing the plant's production capability. This blast furnace, with a volume of 550 cubic meters, is equipped with three top-fired stoves, modern coal dust injection technology, and a dry gas cleaning plant to optimize the steel-making process. This enhancement is anticipated to boost steel production by 0.77 MTPA and improve margins by approximately ₹700/MTPA. In addition to the blast furnace, the company also launched a sinter plant with a capacity of 1.11 MTPA, designed to process iron ore fines into a feedstock suitable for the blast furnace. This addition is expected to increase operating efficiency and reduce production costs.



Bonfiglioli inaugurates Global Technology and Innovation Centre

Bonfiglioli Transmissions has laid the foundation stone for its new Industry and Automation facility in Cheyyar, Tamil Nadu, and the inauguration of its Technology and Innovation Hub in Chennai. The 25-acre Cheyyar plant, scheduled to commence operations by 2025, reinforces Bonfiglioli's commitment to the 'Make in India' initiative and solidifies its position as one of India's largest gearbox manufacturers. The facility will feature state-of-the-art machinery, create 150-200 job opportunities, and cater to growing domestic demand for heavy-duty industrial gearboxes. Bonfiglioli's latest investment is a strategic continuation of its previous year's investment in Pune, expanding its manufacturing capabilities for light and medium duty industrial gear boxes. Bonfiglioli's new Global competence centre, The Bonfiglioli Technology Space in Chennai, represents another milestone in the global Bonfiglioli innovation ecosystem, housing 180 engineers with diverse expertise.

BHEL-Hitachi bags Khavda-Nagpur HVDC project from Power Grid

Power Grid Corporation of India (POWERGRID) has awarded the consortium of Hitachi Energy India and Bharat Heavy Electricals (BHEL) to design and execute the high voltage direct current (HVDC) link to transmit renewable energy from Khavda in Gujarat to the industrial center of Nagpur in Maharashtra. The ±800 kV, 6,000 MW bi-pole and bi-directional HVDC link is part of the transmission system to transfer power from the potential renewable energy zone in the Khavda area of Gujarat under Phase-V (8 GW): Part A, which was awarded to POWERGRID on tariff-based competitive bidding (TBCB) basis. This project crosses 1,200-kilometer (km) and feeds into the country's 500-gigawatt (GW) renewable evacuation and interstate transmission system. The scope of the project includes converter transformers, AC/DC control and protection, gas-insulated high-voltage switchgear, thyristor valves, 765kV/400kV substation and auxiliary systems to be delivered by Hitachi Energy India Ltd along with its consortium partner BHEL, a leading Indian public sector company.

Cabinet approves investment proposal for construction of 240 MW Heo Hydro Electric Project in Arunachal Pradesh

The government has approved investment of ₹1939 crore for construction of Heo Hydro Electric Project (HEP) in Shi Yomi District, Arunachal Pradesh. The estimated completion period for the project is 50 months. The project with an installed capacity of 240 MW (3 x 80 MW) would produce 1000 million units (MU) of energy. The Project will be implemented through a Joint Venture Company between North Eastern Electric Power Corporation and the Government of Arunachal Pradesh. Government of India shall extend ₹127.28 crore as budgetary support for construction of roads, bridges and associated transmission line under enabling infrastructure besides Central Financial Assistance of ₹130.43 crore towards equity share of the State. The state would be benefitted from 12 percent free power and another 1 percent towards Local Area Development Fund (LADF) besides significant infrastructure improvement and socio-economic development of the region.

TVS Eurogrip to showcase latest range of construction tyres at Bauma CONEXPO INDIA 2024

TVS Eurogrip will showcase its latest range of tyres for backhoe loaders, skid steer loaders, self-loading concrete mixers (SLCMs), motor graders, compactors, pneumatic tyre rollers, and forklifts. The company will introduce the 'EL 09 PLUS' range of earthmover tyres, which includes EL 09 PLUS E-3/L-3 (17.5-25, 20PR TT & TL), EL 09 PLUS E-3/L-3 (23.5-25, 20PR TT & TL) and EL 09 PLUS L-3 (17.5-25, 20PR TT & TL).



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Paving the Way

India's roads and bridges sector stands at a critical juncture of transformation, emerging as a pivotal driver of economic growth and national development. As the world's fastest-growing major economy, the country is witnessing an unprecedented surge in infrastructure investment, with roads and bridges playing a transformative role in connecting regions, facilitating trade, and driving economic momentum. EPC world explores the segments way forward.



India's transformative journey in road infrastructure represents a strategic national mission, blending technological innovation, economic vision, and social development. Over the past decade, the government has orchestrated a comprehensive approach to revolutionize the country's transportation network, marked by unprecedented expansion, technological integration, and sustainable development.

The National Highways Authority of India (NHAI) has been the cornerstone of this remarkable transformation, dramatically expanding the national highways network from 91,287 km in March 2014 to approximately 146,126 km by July 2024. This remarkable growth is not merely a statistical achievement but a profound testament to India's infrastructural ambition and economic potential.

The Bharatmala Pariyojana emerged as a flagship program driving this expansive vision, strategically addressing multiple dimensions of road connectivity. By focusing on economic corridors, international connectivity, and efficiency improvement, the program has successfully awarded 26,425 km and constructed 17,411 km of roads, with an investment of ₹4.59 lakh crore. Beyond infrastructure creation, this initiative has generated an estimated 45 crore direct employment days and 57 crore indirect employment days, underscoring the socio-economic multiplier effect of infrastructure development.

Particularly noteworthy is the government's nuanced approach to regional development. In the North-Eastern Region, a historically challenging terrain, 9,984 km of National Highways have been constructed with an expenditure of ₹1,07,504 crore. By dedicating 10% of the total budget to this region and implementing specialized schemes like PM-DevINE and NERSDS, the government has demonstrated a committed strategy of inclusive growth.

The rural connectivity landscape has been equally transformed through the Pradhan Mantri Gram Sadak Yojana (PMGSY). With 8,10,250 km of road length sanctioned and 7,65,601 km (94%) constructed, the scheme has been a game-changer for rural mobility. The recently announced Phase IV, targeting 25,000 rural habitations, promises to further democratize infrastructure access, bringing economic opportunities to the most remote corners of the country.

The road infrastructure narrative is not just about construction but about creating an ecosystem of innovation. The deployment of 5,293 EV charging stations, implementation of Global Navigation Satellite System (GNSS) for toll collection, and advanced traffic management systems reflect a forward-looking approach that integrates technology, sustainability, and efficiency.

Safety and environmental consciousness are equally paramount. The Green Highways Policy has facilitated the plantation of 402.28 lakh saplings, while comprehensive road safety strategies aim to reduce fatalities by 50% by 2030. These initiatives demonstrate that infrastructure development is not just about physical connectivity but about creating holistic, sustainable, and safe transportation networks.

This comprehensive transformation of India's road infrastructure represents more than a sectoral achievement—it is a powerful narrative of national aspiration, technological prowess, and inclusive development. By connecting remote regions, generating employment, promoting sustainable mobility, and leveraging cutting-edge technologies, India is crafting a robust foundation for future economic growth and social progress.



Current Landscape

The infrastructure landscape in India has undergone remarkable changes in recent years. The country's road network, which spans approximately 6.4 million kilometers, is the second-largest in the world. This extensive network carries about 65% of freight traffic and 80% of passenger traffic, underscoring its critical importance to the nation's economic and social fabric.

Project Opportunities

The National Highways Authority of India (NHAI) has been at the forefront of ambitious infrastructure development. The Bharatmala Pariyojana, a centrally-sponsored and funded road and highways project, aims to optimize efficiency of freight and passenger movement across the country. With an initial target of constructing 34,800 kilometers of highways, the project represents a massive opportunity for infrastructure developers, construction companies, and technology providers.

Key investment highlights include:

- Projected investment of ₹5.35 lakh crore (\$65 billion)
- Focused on connecting major economic and industrial corridors

- Emphasis on reducing logistics costs and improving connectivity

Bridge Infrastructure Development

Bridge construction has emerged as a critical sub-segment, particularly in challenging terrains like the Himalayan regions and northeastern states. The government has been prioritizing strategic bridge projects that enhance connectivity in border areas and remote regions.

Notable bridge projects include:

- The Chenab Bridge in Jammu and Kashmir, which will be the world's highest rail bridge
- Multiple bridge projects in the northeastern states to improve regional connectivity
- Strategic bridges along border regions to support military and economic infrastructure

In an unprecedented strategic initiative, the Indian government is set to revolutionize highway infrastructure by implementing a comprehensive bridge widening program that promises to redefine road safety and transportation standards. This ambitious undertaking addresses a critical infrastructure challenge—the persistent mismatch between highway expansiveness and the narrow bridges that interrupt their seamless flow.



The proposed intervention goes beyond mere structural modification; it represents a holistic approach to mitigating road safety risks and optimizing transportation efficiency. By standardizing bridge dimensions to align precisely with highway widths, the government aims to dramatically reduce vehicular accidents, particularly those involving parapets and crash barrier breaches. The initiative acknowledges the intricate relationship between infrastructure design and road safety, transforming potential vulnerabilities into strategic opportunities for improvement.

Recognizing the complex logistical landscape, the project demands unprecedented collaboration among government agencies, engineering experts, and infrastructure stakeholders. The implementation will necessitate navigating India's diverse topographical challenges, from mountainous terrains to expansive plains, requiring nuanced engineering solutions and adaptive design strategies.

Financial considerations form a crucial aspect of this transformative endeavor. While the upfront investment appears substantial, the long-term socio-economic benefits are projected to far outweigh the initial costs. The initiative is expected

to generate significant direct and indirect employment, stimulate local economic ecosystems, and enhance regional connectivity.

Beyond immediate safety improvements, the bridge widening program symbolizes a broader vision of infrastructure modernization. It reflects India's commitment to aligning national transportation networks with global best practices, signaling a progressive approach to infrastructure development. The strategy demonstrates a sophisticated understanding that quality infrastructure is not merely about physical construction but about creating enabling environments for economic growth and social progress.

The multifaceted impact of this initiative extends beyond engineering specifications. It represents a strategic investment in national mobility, economic resilience, and public welfare. By prioritizing safety, efficiency, and sustainable development, the government is laying the groundwork for a more connected, secure, and prosperous India.

As this ambitious project unfolds, it promises to be more than a infrastructural upgrade—it is a bold statement of national aspiration, technological capability, and commitment to continuous

improvement. The bridge widening program stands as a compelling narrative of India's transformative potential, where strategic vision meets robust implementation.

Technological Advancements

The roads and bridges sector in India is experiencing a technological revolution. Advanced technologies are transforming traditional construction methodologies, improving efficiency, safety, and sustainability.

Key technological innovations include:

- Geographic Information System (GIS) mapping for precise route planning
- Building Information Modeling (BIM) for comprehensive project visualization
- Drone surveying for accurate terrain assessment
- Advanced materials like geosynthetics and fiber-reinforced polymers
- Use of artificial intelligence and machine learning for predictive maintenance

Sustainable Construction Techniques

Environmental considerations are increasingly driving infrastructure development. Sustainable construction techniques are becoming mainstream, with a focus on reducing carbon footprints and minimizing ecological disruption.

Emerging sustainable practices:

- Use of recycled materials in road construction
- Solar-powered highway lighting systems
- Innovative drainage and water management solutions
- Eco-friendly bridge design minimizing environmental impact

Policy Initiatives: Enabling Ecosystem

The Indian government has introduced several progressive policies to catalyze infrastructure development and attract investments.

Key Policy Interventions

- **Infrastructure Investment Trusts (InvITs):** Providing innovative financing mechanisms for infrastructure projects
- **Hybrid Annuity Model:** Balancing public and private sector participation
- **Faster Approvals:** Streamlining clearance

processes for infrastructure projects

- **Foreign Direct Investment (FDI) Relaxation:**

Encouraging global participation in infrastructure development

Public-Private Partnership (PPP) Model

The PPP model has gained significant traction, offering risk-sharing and collaborative approaches to infrastructure development. This model has been instrumental in accelerating project completion and bringing in private sector efficiency.

Challenges and Opportunities

While the sector shows immense promise, several challenges persist:

- Land acquisition complexities
- Environmental clearances
- Funding constraints
- Skilled manpower shortage

However, these challenges also present opportunities for innovative solutions and technological interventions.

Future Outlook: A Transformative Decade Ahead

The next decade is expected to be transformative for India's roads and bridges sector. With projected investments, technological advancements, and supportive policy frameworks, the sector is poised for unprecedented growth.

Projected Growth Indicators:

- Expected infrastructure investment of \$1.4 trillion during 2020-25
- Potential to create millions of direct and indirect jobs
- Significant contribution to India's goal of becoming a \$5 trillion economy

India's roads and bridges sector represents more than just physical infrastructure. It symbolizes the nation's aspirations, connecting remote regions, facilitating economic growth, and creating opportunities for millions.

As technological innovation, policy support, and investment converge, the sector stands ready to script a remarkable story of infrastructure-led transformation. The journey ahead promises not just better roads and bridges, but a more connected, prosperous, and inclusive India.

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Steering Innovation, Sustainability, and Growth A Visionary Leadership Approach

*With over three decades of experience in the design, engineering, and construction of infrastructure and industrial projects on a transnational basis, **RAJESH KUMAR SINGH**, Chairman and Managing Director, has been steering Bridge and Roof Company (India) Ltd., one of India's leading players in the infrastructure sector. In an exclusive interaction with EPC World, he outlines how this century-old public sector company is leveraging IT innovations to streamline operations, exceed customer expectations, and drive sustained growth through strategic collaborations.*

What is your vision for the company during your tenure, and what are the core values that have guided the company's success over the years?

My vision for my company has been to create a sustainable and innovative organization that positively impacts society. This vision is built on principles such as customer-centricity, innovation, ethical leadership, employee empowerment, and social responsibility.

The core values that have driven successful companies throughout history include integrity, excellence, innovation, customer focus, teamwork, respect, and valuing diversity while treating everyone with dignity.

As CMD of Bridge and Roof Co. (India) Ltd., can you share the strategies you've implemented to enhance operational efficiency and improve customer satisfaction?

We have implemented several forward-looking strategies to drive our success. One of these is the use of an advanced project management tool that streamlines project planning, execution, and monitoring. This tool enables real-time tracking of progress, identification of potential bottlenecks, and data-driven decision-making.

Additionally, we have introduced a Digital Document Management process to digitize project documentation. This reduces paperwork, improves accessibility, and enhances collaboration across teams.

We are also focused on skilling our workforce through various initiatives, including:

- **Skill Enhancement Programs:** Investing in training and development to upskill our employees and ensure they are equipped to adapt to emerging technologies.
- **Performance Management Systems:** Implementing robust systems to identify high-potential employees and reward excellence.
- **Employee Engagement Initiatives:** Organizing team-building activities, wellness programs, and recognition initiatives to boost employee morale and productivity.

These strategies have significantly enhanced our operational efficiency and improved customer satisfaction.

What are the major challenges currently facing the company, how does your leadership style address them? Also, please comment on the digital transformation or IT initiatives undertaken within the organization?

As a leading construction company, Bridge and Roof Company (India) Ltd. faces several significant challenges:



- **Economic Volatility:** Fluctuations in both global and domestic economies can impact project timelines, budgets, and material costs.
- **Supply Chain Disruptions:** Global supply chain issues, particularly concerning steel and other raw materials, can result in delays and cost overruns.
- **Regulatory Compliance:** Adhering to increasingly stringent environmental, safety, and quality regulations can be complex and time-consuming.
- **Talent Acquisition and Retention:** Attracting and retaining skilled professionals in a competitive market is a constant challenge.
- **Technological Advancements:** Staying up to date with rapid advancements in construction technology and digitalization is crucial for staying competitive.

To address these challenges, we have implemented several strategies:

- **Risk Mitigation:** Implementing robust risk management processes to identify, assess, and mitigate potential risks.
- **Diversification:** Expanding into new markets and diversifying our project portfolio to reduce reliance on any single sector.
- **Strategic Partnerships:** Collaborating with suppliers, subcontractors, and technology providers to strengthen our supply chain and improve operational efficiency.
- **Talent Development:** Investing in employee training and development programs to build a skilled and adaptable workforce.
- **Digital Transformation:** Embracing digital technologies to streamline operations, enhance decision-making, and enhance the customer experience.

We have also undertaken several initiatives to leverage technology and drive innovation:

- **Building Information Modeling (BIM):** Implementing BIM to improve design coordination, reduce errors, and optimize construction processes.
- **Cloud Computing:** Adopting cloud-based solutions to enhance data security, accessibility, and collaboration.
- **Data Analytics:** Leveraging data analytics to derive valuable insights into project performance, customer behavior, and operational efficiency.

By embracing these digital initiatives, we aim to position Bridge and Roof Company as a technology-driven organization, staying ahead of the curve in the evolving construction industry.

AA I ENCOURAGE ASPIRING LEADERS TO EMBRACE TECHNOLOGICAL ADVANCEMENTS LIKE AI, IOT, AND BIM TO OPTIMIZE OPERATIONS, ENHANCE EFFICIENCY, AND REDUCE COSTS

Can you highlight some of the most challenging projects you've undertaken in recent years, and what do you see as the biggest challenges currently facing the infrastructure sector?

Before taking over as CMD of Bridge & Roof (B and R), I worked on the world's highest bridge, the Chenab Bridge, with countless challenges. I am proud to have successfully completed the project, overcoming numerous hurdles, and contributing to the connectivity of Srinagar with the rest of India through the railway network. So, delivering challenging projects is my forte. At B and R, we embrace such projects, having executed large-scale power plant projects involving intricate structural steelwork and boiler installations, often in remote locations with challenging logistical and environmental conditions. We have also successfully completed complex projects in the oil and gas sector, floating roof large diameter (66m) oil storage tanks for refineries & crude oil, which required specialized fabrication, installation, and maintenance of critical equipment.

The biggest challenges facing the infrastructure sector include the shortage of skilled labor, particularly in specialized mechanical and civil works construction. Another significant challenge is the availability of funds in the construction business.

How is Bridge and Roof Co. integrating sustainability into its operations, and how are environmental concerns addressed during project execution?

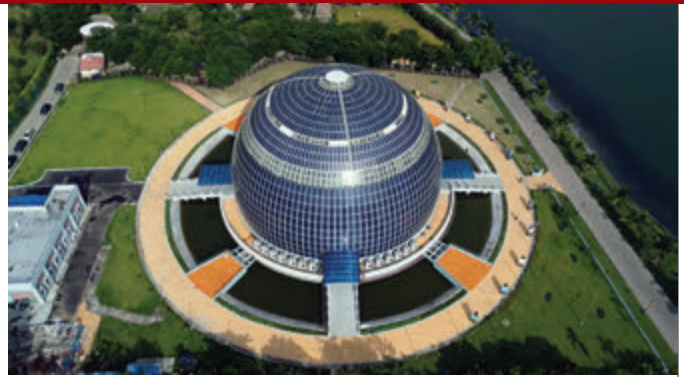
At B and R, we recognize the importance of environmental responsibility and social impact. We place a strong emphasis on sustainable site planning, energy efficiency, water conservation, waste management, green building practices, compliance with regulations, and collaboration with stakeholders. We are actively executing projects such as flue gas desulphurisation, floating solar power installations, and energy-efficient buildings, among others.

By integrating sustainability into our core business operations, Bridge and Roof Company aims to create a positive environmental and social impact while delivering high-quality infrastructure solutions.

What steps does the company take to ensure strong stakeholder engagement on major projects?

B and R prioritizes strong stakeholder engagement on its major projects. Here are some key steps they take to ensure this:

- **Transparent Communication:** Ensuring open and transparent communication with all stakeholders, including clients, government agencies, local communities, and employees.



- **Regular Updates:** Providing consistent updates on project progress, milestones, and any potential challenges or changes.
- **Multiple Channels:** Using various communication platforms, such as meetings, newsletters, emails, and social media, to reach a diverse range of stakeholders.
- **Community Outreach Programs:** Organizing outreach programs to keep local residents informed and involved in project activities.
- **Addressing Concerns:** Actively listening to and addressing concerns and suggestions from the community.
- **Social Impact Initiatives:** Implementing initiatives that benefit the local community, such as job creation, skill development, and infrastructure improvements.

By adopting these practices, B and R ensures effective stakeholder engagement while contributing to the welfare of local communities.

What advice would you give to aspiring leaders or entrepreneurs looking to enter the infrastructure sector today?

India is currently at the peak of its growth phase, offering immense opportunities for all. My advice to aspiring leaders is to embrace technological advancements such as AI, IoT, and BIM to streamline operations, enhance efficiency, and reduce costs. Utilize data analytics to make informed decisions and optimize resource allocation. Additionally, incorporating sustainable technologies into projects will not only reduce environmental impact but also ensure long-term viability.

Businesses must be responsible towards society and the environment. Therefore, it is essential to conduct proper Environmental Impact Assessments to identify and mitigate potential risks. Using sustainable materials and construction practices will help minimize the ecological footprint.

Maintaining open and honest communication with clients, investors, regulators, and local communities is crucial. Businesses should adhere to ethical principles and corporate social responsibility. It is equally important to embrace risk management and change management practices. A collaborative approach should be adopted, keeping up-to-date with regulatory changes to ensure compliance. Finally, building strong relationships with regulatory authorities to streamline the project approval process.

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Roads and Highways: Developments, trends, and insights



The pace of execution improved by ~20% in FY2024 to 12,349 km from 10,331 km in FY2023. However, the execution has marginally declined by 7% to 2,961 km in 5M FY2025 from 3,196 km in 5M FY2024 on account of the slowdown in construction activity due to the General Elections in Q1 FY2025

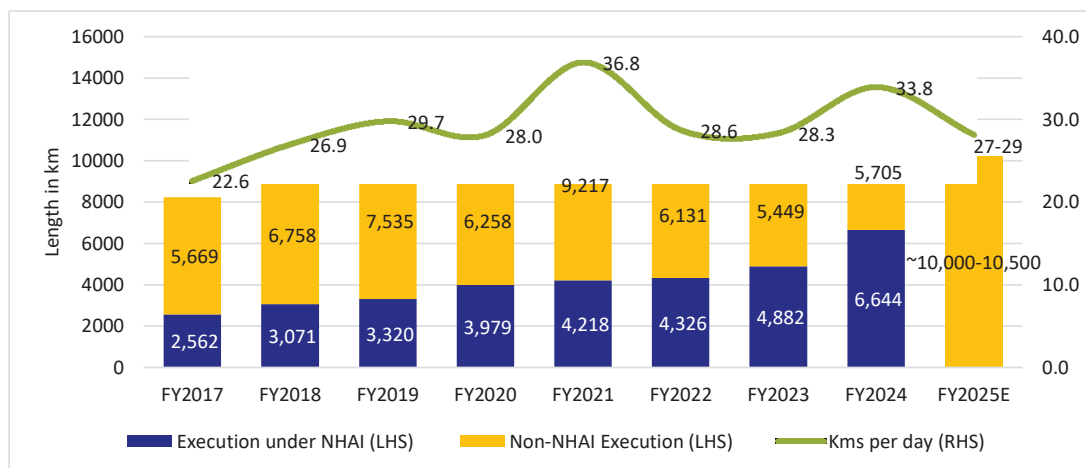
The Government of India (GoI) has set a target of increasing the length of the national highways to ~200,000 km by 2037 from 146,145 km in 2023, while simultaneously increasing the length of India's access-controlled highways by more than 12 times to 50,000 km from the current 4,000 km. The Central Government's focus on road development is also evident from significant increases in the capital spending of the Ministry of Road Transport and Highways (MoRTH) by more than eight times to ₹2.72 lakh crore in FY2025 BE from ₹0.31 lakh crore in FY2014 at a CAGR of 22%. From FY2015 to FY2024, the Ministry has constructed more than 96,000 km roads, a combination of both greenfield and brownfield expansions. In terms of lane km, the lengths of the national highways have increased by a higher proportion of 93% during the above period compared to 60% increase in the highway length in km.

Going forward, most greenfield highways are planned as 4-lane, 6-lane or 8-lane roads with land being acquired currently for future lane expansions. Further, MoRTH has taken several initiatives in the road sector, including project awards through the introduction of the Hybrid Annuity Model (HAM)

or higher share of engineering, procurement, construction (EPC) projects, healthy budgetary allocations, resolution of Right of Way (RoW) issues, and approvals for faster on-ground execution, among others.

Road execution to remain satisfactory in the near term

The pace of execution improved by ~20% in FY2024 to 12,349 km from 10,331 km in FY2023 owing to the Government's focus on execution and higher allocation to the road ministry. However, the execution has marginally declined by 7% to 2,961 km in 5M FY2025 from 3,196 km in 5M FY2024 on account of the slowdown in construction activity due to the General Elections in Q1 FY2025. Despite this, ICRA expects the road execution to pick up in the rest of the fiscal and settle in the range of 10,000-10,500 km (~27-29 km/day) in FY2025 (a marginal decline from FY2024) due to strong budgetary outlay and continued focus on execution. Despite the muted YoY trend for road construction in terms of km/day, the increasing share of 4-lanes, 6-lanes, and 8-lanes in project awards will result in healthy YoY growth in terms of lane-km.

Exhibit 1: Year-wise construction of roads and highways by MoRTH in the country

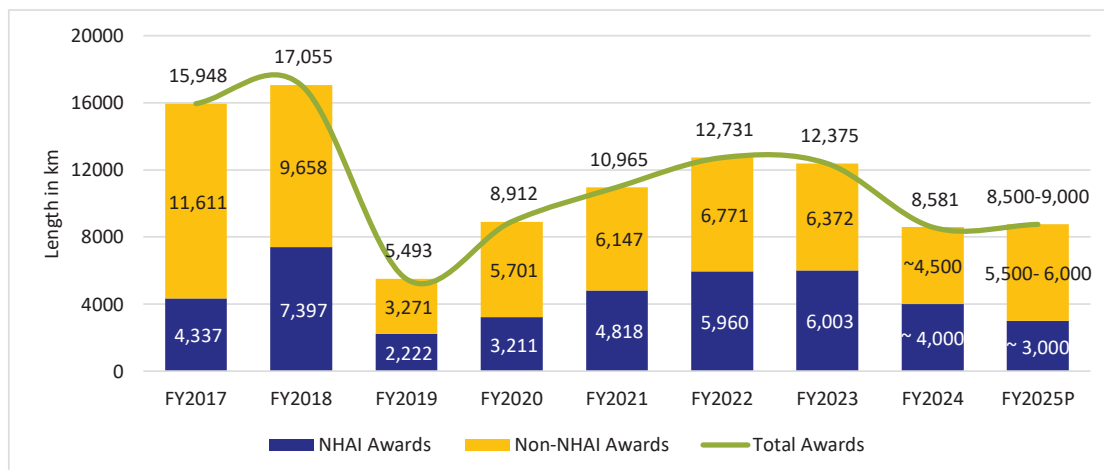
Source: ICRA Research, MoRTH, NHAI

...however, road awarding to remain muted in FY2025

Although the awarding of projects had improved over the years from a low of 5,493 km in FY2019 to 12,731 km in FY2022 and 12,375 km in FY2023, it declined by 31% to 8,581 km in FY2024 amid the delay in approval from the Cabinet for revised cost estimates of Bharatmala Pariyojana (BMP) Phase-1. Further, the awarding activity declined by 34% to 1,152 km in 5M FY2025 over 1,756 km in 5M FY2024, on account of the Model Code of Conduct, which ended on June 6, 2024, coupled with restrictions on project awards due to pending Cabinet approval. Nevertheless, with the Ministry's approval on project awards in August 2024, ICRA expects the same to pick up from H2, and estimates it will remain at 8,500–9,000 km in FY2025, similar to 8,581 km in FY2024.

Key challenges in the roads and highways sector

Land acquisition: Delays in land acquisition are one of the major factors affecting the timely implementation of highway projects in the country. Further, the cost of land acquisition had increased significantly, following amendments to the Land Acquisition Act in 2013. As per the Ministry, the average cost of acquiring land was about ₹80 lakh/hectare before January 1, 2015, which went up to about ₹3.60 crore/hectare as of December 2018 and going up further in recent years. Over the past 5 years (FY2019–FY2024), the National Highways Authority of India (NHAI) has spent ₹1.67 lakh crore on land acquisition over ₹0.81 lakh crore during FY2015–FY2018.

Exhibit 2: Year-wise award from MoRTH

Source: ICRA Research, MoRTH, NHAI

Intense competition: Competition in the roads sector has increased in the last three years with expansion of the qualification criterion and state government-focused contractors bidding for NHAI projects, which is reflected in several projects being awarded at a significant discount to the authority's base price. Hence, the contractors' ability to execute these projects within the budgeted time and cost remains critical. Further, their ability to bring in requisite equity and tie-up the debt for development projects under HAM remains crucial for their timely implementation.

Alternative routes and modes of transport for toll projects: The development of greenfield highways and expressways with focus on the shortest path between the origin and destination is transforming the road network in the country and is likely to compete with the old road network. Further, an alternative mode of transport, including a dedicated freight corridor (DFC) (under railways) and a regional rapid transport system (RRTS) are likely to pose threats to the existing road network in the country in the medium term.

Share of BOT (Build Operate Transfer) (toll) road projects to improve in the medium term

Of the total road awards, the EPC mode remained the preferred route and constituted more than 70%, whereas HAM projects accounted for around 25-30%, and BOT (toll) projects accounted for less than 2% in the last three years. While the EPC model is likely to remain the preferred route for road awards by MoRTH, the share of BOT projects is expected to improve to 45-50% in the medium term, given that projects over ₹500 crore are expected to be awarded in the BOT mode (including both HAM and toll), going forward.

Further, the Ministry is gradually shifting its focus to BOT (toll) projects, and the NHAI is targeting to award ~₹44,400 crore of BOT (toll) projects, covering about 937 km in FY2025. Recent changes in the model concession agreement in capacity augmentation for BOT (toll) projects is a right step in addressing some of the concerns of concessionaires and lenders. ICRA expects the share of BOT (toll) awards to increase to 5% in FY2025 (~450-500 km) compared to less than 2% of the awards in the last three years.

Healthy asset monetisation potential supported by large pipeline of completed projects

The NHAI has raised a total of ₹42,334 crore through monetisation of an aggregate length of 2,285 km via the TOT¹ model till date. Under the InvIT² mode, it has also realised ₹25,824 crore by monetising 1,525 km. In April 2024, the NHAI had released an indicative list of 33 road assets that it plans to monetise in FY2025 through the TOT/InvIT mix. ICRA estimates a monetisation potential of ₹53,000–60,000 crore from the sale of these road assets. While most of these assets are expected to be monetised in the current fiscal, some of them are likely to spillover to the next fiscal.

Further, the Indian road sector has witnessed strong M&A³ activity over the past three years, with most developers offloading their stake in BOT assets (toll as well as HAM/annuity), allowing them to churn their capital and re-invest in the development of new BOT assets. InvITs, along with infrastructure-focused funds, have emerged as the leading buyers of operational road assets in India given their ability to tap long-term capital at competitive rates. Of the total HAM projects awarded, around 115 projects became commercially operational by August 2024 and another ~110 projects involving Bid Project Cost (BPC) of more than ₹1.25 lakh crore are likely to become operational over the next two years. Further, there are more than 150 projects under various stages of implementation, which are expected to become operational after FY2026. ICRA has also seen refinancing activity gaining traction in operational HAM projects, wherein sponsors (parent entity) are also availing additional top-up funds in case of delays in monetisation. Funds raised through top-up are subsequently utilised towards providing liquidity cushion for incremental equity funding or working capital requirement for sponsors. Operational HAM projects have become ideal candidates for monetisation over the past three years, and ICRA expects M&A activity in the HAM space to remain healthy in the medium term.

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VINAY KUMAR G
*Vice President & Sector Head -
Corporate Ratings*
ICRA

¹ TOT: Toll -Operate - Transfer-Business model wherein private players are granted tolling rights by Government authorities (in this case, road stretches), along with maintenance obligations, for a specified period.

² InvIT: Infrastructure Investment Trust –These are investment vehicles that enable developers of infrastructure assets to monetise their assets by pooling cash flows under a single entity (trust structure).

³ Mergers and acquisitions



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“We are fully committed to bringing advanced technologies to India, striving to significantly contribute to the development of next-generation track systems.” says **PRADEEP KHAITAN**, Chairman & Managing Director of Rahee Infratech Limited, in an exclusive interview with EPC World



Can you share a brief overview of your company and core competencies?

Rahee Infratech has primarily focused on the railway sector, with a strong emphasis on the civil infrastructure and manufacturing operations. The company has experience of more than 76 years in manufacturing railway track products. Initially, we began by manufacturing fasteners and small track accessories. Over time, we expanded our services to include the operation of flash butt welding plants, offering welding services to railways on the tracks.

Around 2006, we took a significant step forward by expanding into railway infrastructure projects with a focus on bridge construction. Building on this momentum, we ventured into metro rail track installation in 2013, reinforcing our commitment to advancing India's transportation network. Our early

involvement in this area centered on the fabrication of structural components for bridges. From there, we progressed to installing these fabricated components on bridges and handling substructure work.

Today, Rahee Infratech is a turnkey contractor for railway infrastructure, offering complete solutions for bridge construction, substructures, and track laying. The company is primarily involved in civil and structural work within the railway segment, with a strong presence in the Indian market.

What key trends do you see shaping the railway sector in the next few years? How is your company adapting to changes in technology and infrastructure needs?

Our company has made significant advancements in both manufacturing technology and infrastructure



solutions for the railway sector, focusing on three key areas: component manufacturing, track systems, and infrastructure development.

In the manufacturing of railway components, we operate in two major segments: fastening systems and turnouts. Our manufacturing process has evolved through automation, with semi-automatic forging machines and precise quality control systems in place. This advancement has empowered us to manufacture components like fasteners, which play a vital role in significantly enhancing the performance and durability of critical railway parts.

As part of our technological upgrades, we are now supplying components to high-speed rail projects, including the Mumbai-Ahmedabad High Speed Rail corridor, as well as to Metro rail systems. Through our associate company, we have secured transfer of Japanese

technology, allowing us to supply high-quality fasteners for these projects which includes the renowned Shinkansen track systems.

We have also entered a joint venture with Pandrol, a part of the Delachaux Group, headquartered based in France, enabling us to supply modern, high-performance fasteners for the railway industry.

Our focus on advanced technology extends to turnouts, where we now manufacture Advanced components such as reinforced thick-web switches. These switches are specially rolled for turnout rails and require high-strength, reinforced components. We were among the first to set up in-house forging plants in Hyderabad and Kolkata, along with modern CNC machining lines. This technological uplift has allowed us to produce high-quality turnout components locally, reducing reliance on imports and ensuring superior precision.

On the infrastructure side, we have embraced modern methods for building bridges and ballast track systems.

One of our key introduction to the Ballastless track system to Indian Railways is Booted Block Sleeper technology. By pre-casting the concrete blocks and using these precast elements in ballastless track installation, we've significantly improved track quality and reduced construction timelines.

So, our ongoing commitment to technological advancements in manufacturing, rail systems, and infrastructure has positioned us as a key player in the Indian railway industry, enabling us to deliver high-quality, reliable solutions for both domestic and international projects.



What are the biggest challenges you face in executing railway projects in India?

There are several key challenges that need to be addressed in the current railway infrastructure development scenario, and while I appreciate the efforts of the Ministry and the Railway Board, I believe these issues must be tackled for sustained progress:

Approval Processes for EPC Contracts: As the industry shifts more toward EPC (Engineering, Procurement, and Construction) contracts, there is an increasing need for working capital. The challenge lies in the approval process for designs and drawings. While the industry is adapting to the fact that contractors are expected to produce their own designs under EPC contracts, the approval system needs to be more streamlined and robust. The agencies involved must align their processes to review and approve designs efficiently to avoid delays in project timelines.

Skilled Manpower Shortage: With the growing volume of business opportunities in the railway sector, there is a clear risk of a shortage in skilled and trained manpower. To address this, the industry must embrace more mechanization in installation and maintenance processes. Automation and advanced machinery can help bridge the skills gap and improve efficiency.

Clearance Delays: Land and forest clearances continue to be major bottlenecks. While the government has promised that projects will not be called without proper clearances, in reality, projects are often launched without these approvals in place. The clearance process must be streamlined and adhered to more rigorously to avoid unnecessary delays in project execution.

Prompt Decision-Making: Delays in decision-making at various levels of the project lifecycle are hindering progress. There is often a tendency to push projects toward arbitration over minor disputes, which is a slow and inefficient process. It's crucial that decision-making at every stage be more prompt and decisive to keep projects on track.

In conclusion, while there is significant potential for growth in the railway infrastructure sector, addressing these challenges will require a more collaborative approach between the government, industry stakeholders, and contractors. Streamlining approval processes, investing in training and mechanization, and ensuring financial sustainability through fair contract bidding will be crucial steps towards achieving long-term success.

What initiatives do you have in place to minimize the environmental impact of your projects?

When we look at the manufacturing sector, there are several areas where improvements can be made to align with environmental sustainability goals.

On the manufacturing side, companies can take significant steps toward environmental responsibility. This includes adopting green certifications, using renewable energy sources like green power, and ensuring proper waste disposal methods. Many companies are already moving in this direction, but these practices need to be more widely encouraged and supported.

From an institutional perspective, it's crucial that procurement policies prioritize companies that adhere to green manufacturing practices. Merely setting long-term goals, such as achieving "green" status by 2030 or 2050, will not lead to meaningful change unless there is active enforcement. If a company invests in environmentally friendly practices, its





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costs may increase temporarily. However, when procurement is based on L1 bids, these green initiatives are often overlooked. To truly drive sustainable manufacturing, procurement systems must recognize and incentivize companies that invest in green technologies and practices.

Another area that needs attention is the recognition of low-carbon components. Every component manufactured has a carbon footprint, but some products are designed to reduce CO2 emissions. Currently, there is little recognition or incentive for manufacturing components with a lower carbon footprint. For example, if a company produces a component that results in half the CO2 emissions compared to a standard component, this environmental benefit is not acknowledged in the procurement process. Specifications should reflect the environmental impact of components, with a willingness to



pay a small premium for environmentally sustainable products.

The railway industry, in particular, has set ambitious goals to go “green” by 2030, but these goals must be integrated into the procurement system and specifications. Environmental sustainability should not just be a long-term target—it needs to be embedded in the specifications and procurement criteria at every level of the supply chain. This ensures that environmentally conscious products are prioritized and that companies are rewarded for their sustainability efforts.

Hence, for the manufacturing sector to contribute meaningfully to sustainability, both companies and institutions must adopt and enforce policies that recognize and incentivize green manufacturing practices, low-carbon components, and sustainable procurement. Without this, the goal of a greener future will remain out of reach.

What are some of the key projects Rahee Infratech is currently working on?

If you talk for the bridge projects, we are doing several significant bridge projects across different regions. Some of the major ones include:

We are constructing a 5 -kilometer viaduct through a forest area, which is designed to minimize disruption to local habitats for East Coast railway. The project involves building the viaduct above the forest, rather than on the ground, ensuring minimal environmental impact. This is a well-thought-out and environmentally conscious project. We are also engaged in various bridge projects along the West Coast railway, East Central railway focused on enhancing connectivity in that region.

As part of the Chardham project, We have constructed several bridges for the Char Dham Rail Link project in Rishikesh Karna Prayag section which is being executed by RVNL for Northern Railways. We have installed about 62 kilometers of ballastless track for Udhampur-Srinagar Railway Line, including the one in longest tunnel in India, and on various types of substructures. for Indian railways.

We are involved in the development of the Sivok Rangpo new rail link, a key project aimed at improving connectivity in this mountainous region. We are also working on Kolkata and Surat metro rail projects. In addition to these, we are working on future infrastructure projects, further expanding our footprint in key railway and metro sectors across India.

Are there any partnerships or collaborations you are currently pursuing to enhance your offerings?

Rahee Infratech is focused on expanding into new markets and enhancing its capabilities through strategic partnerships. Notably, we have a joint venture with Pandrol, which allows us to implement advanced technologies in the metro and high-speed rail sectors.

We are also building a plan for manufacturing modern rail fastening systems and are actively participating in railway tenders to supply components suitable for the future of Indian Railways. These components are designed for enhancing performance and durability. As mechanization increases in track construction, we are positioning ourselves to meet future demands for innovative fastening solutions.

Another key focus is addressing noise and vibration in rail infrastructure, with growing demand from metro systems for solutions in this area. We are investing in related technologies and exploring partnerships with international companies to meet these evolving needs.

Additionally, Rahee has formed a technical collaboration with Tracktec GmbH (Poland) to manufacture railway turnouts, further enhancing our portfolio of products for modern rail infrastructure. We are committed to bringing cutting-edge technologies to India, positioning ourselves as a leader in the development of future track systems.

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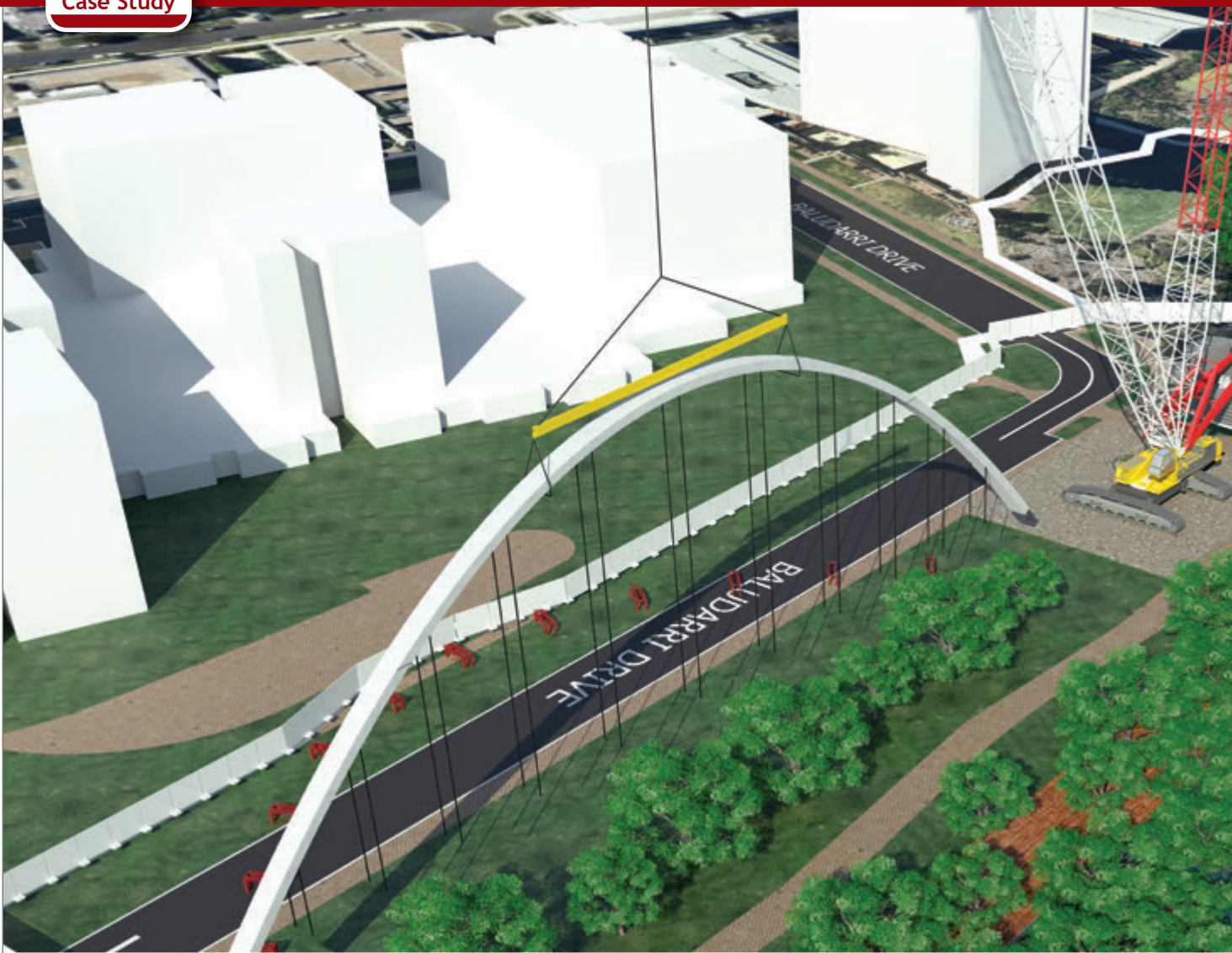
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Alfred Street Bridge is an iconic diagonal arch pedestrian bridge supporting eco-friendly city accessibility in Parramatta, New South Wales, Australia.

Solid Support delivers standout animation to help win tender for Australia's first diagonal arch bridge

Despite tight deadlines, SYNCHRO saves 50 percent in time executing animated tender submission

Driving eco-friendly infrastructure and city accessibility

Alfred Street Bridge is a new pedestrian and cyclist bridge over the Parramatta River in Parramatta, 24 kilometers west of Central Sydney. The AUD 19 million project is part of the revitalization of the area and is a key element in planned transport infrastructure improvements. The aim is to deliver an accessible connection over the river to the Parramatta Light Rail and to popular city locations, as well as around the waterfront area. The investment supports creating an eco-friendly, urban gateway. "More local residents will be able to walk, run, or ride to Parramatta Park, Parramatta CBD, Sydney Olympic Park, the wider M4 regional cycleway, and the Alfred Street cycleway once these works are completed," said Robert Stokes, New South Wales' recently retired minister for infrastructure,



Image courtesy of Solid Support

cities, and active transport.

At 4.5 meters wide and almost 200 meters long, Alfred Street Bridge will be the first true diagonal arch bridge in Australia. It will feature an 80-meter-long and 30-meter-high steel arch, which crosses the river at an oblique angle and supports a composite steel-concrete deck. Abergeldie Contractors, a civil engineering contractor based in Regents Park, New South Wales, bid for the work on this complicated project. To assist with their tender submission, Abergeldie chose construction planning consultant Solid Support to demonstrate the sequence of work in the clearest, cleanest way by creating a digital presentation that would clearly depict how the tender company would construct the bridge. The goal was to provide an accurate visual insight into the construction methodology. “The animation was done to assist the tendering company in demonstrating their methodology, highlighting site establishment, crane locations, temporary works, and management of the general public,” said Alexander Stojevski, a BIM manager at Solid Support.

Project Summary

Organization

Solid Support

Solution

Digital Construction

Location

Parramatta, New South Wales, Australia

Project Objectives

- To assist a construction company with tender presentation for a winning bid.
- To use 4D simulation technology to accurately depict bridge construction works on a short timeline.

Project Playbook

SYNCHRO 4D

Fast Facts

- Alfred Street Bridge is an iconic diagonal arch pedestrian bridge supporting eco-friendly city accessibility in Parramatta, New South Wales, Australia.
- Local construction company Abergeldie Contractors retained Solid Support to assist with their tender submission.
- Solid Support used SYNCHRO to create a 4D animation for the tender company to submit, digitally articulating their construction methodology.

ROI

- SYNCHRO enabled Solid Support to save 50% in time by generating an accurate digital representation of the bridge installation for their client.



Image courtesy of Solid Support

SYNCHRO enabled Solid Support to save 50% in time by generating an accurate digital representation of the bridge installation for their client.

SYNCHRO 4D for us is our go-to software for tenders.

Alexander Stojevski,
BIM Manager, Solid Support

Facing site, structural, and schedule challenges

Building this iconic bridge presented numerous site and structural challenges, requiring an innovative and precise construction methodology. Located along the riverfront, the team at Solid Support also needed to consider sedimentation and tree protection. They had to test different construction scenarios and mitigation strategies to minimize the impact of sedimentation to the environment, such as the type of sediment control measures needed.

Another challenge was to minimize environmental impact, as well as any impact to residents. Therefore, the contractors sought to build temporary pedestrian crossings and fabricate the arch and deck off site. Both sides of the river feature high-rise residential buildings, and the team could only deliver works during the day to minimize impacts on local roads and noise levels for residents. This plan required lifting the structural components into place, which left the team no room for error. Crane assembly and bridge installation were very complicated procedures, requiring meticulous coordination with various NSW government agencies and specialist skills from around the world. "It is the first true diagonal

arch bridge in Australia, requiring a massive crane to lift the whole 200-ton arch in one go," said Jim Gao, a BIM manager at Solid Support.

With this bridge being the first of its kind in Australia, it was critical that the tendering company demonstrate their vision for installation. "For this particular project, Abergeldie wanted to demonstrate the impact that temporary works would have on the riverway," said Stojevski.

To help their client present their tender submission and win the contract, Solid Support wanted to produce a 4D animation that would clearly define the bridge construction process from start to finish. The animation would help sequence equipment logistics and movement, showing what materials had to be moved to specific spots at specific times. They wanted to innovate traditional tender methods, using 4D modeling to create an accurate, visual plan for the construction team. However, they had to meet a very short delivery time frame. Previous experience using various simulation applications resulted in technical failures and rework that would not be sufficient or time efficient to meet their client's needs. "This meant we needed to deploy a reliable software to do the 4D animation to ensure on time delivery to our client," said Stojevski.

Leveraging SYNCHRO to demonstrate construction methodology

With time being of the essence, Solid Support selected Bentley's SYNCHRO 4D to deliver a digital visualization of the tender company's construction methodology, aware that the application was a leader in the industry. The software's reliability and ease of use were big factors in using the software from the very beginning. "We chose SYNCHRO for its reliability, as we had strict deadlines and couldn't afford any incidents or bugs," said Gao.

Using SYNCHRO, they linked the 3D model with the tender program of works to create a 4D simulation video. Solid Support relied on the software's 3D path feature to create detailed animations of the installation of the main bridge arch and crane, accurately showing how Abergeldie intended to install the bridge on site. "From the simulation that we produced using SYNCHRO, the shareholders can clearly see the boundaries of the construction site and the diverted pedestrian path," said Gao. Integrating Bentley's interoperable



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Image courtesy of Solid Support

SYNCHRO enabled the tender company to quickly submit their digital tender and win the contract.

construction simulation technology with third-party rendering technology elevated the basic views into a realistic representation of how the job will look before actual construction. The animation also showed that Sydney Ferries services could operate continuously on the river, except for a limited shutdown period of only two to three weeks while the prefabricated steel bridge is installed.

Upon completion of the video animation, the tender company could see potential clashes and what needed to be changed in their construction methodology. Solid Support then collaborated with Abergeldie to make the appropriate changes in the video and create multiple versions. The software provided complete freedom for animating equipment, crane movement, and lifting strategy. “We are mind blown at the freedom it gives you. The more information you put in, the more realistic you can make the animation,” said Gao.

4D simulation transforms construction tendering

Using SYNCHRO 4D, Solid Support got the job done with assurance of the deliverables. Rather than demonstrating how to construct the project with a paper tender submission or multiple drawings, the video was a perfect environmentally friendly way

to timely and accurately present the project. “SYNCHRO allows for a more immersive and interactive experience, as the client is able to visualize the construction process in a way that feels more realistic and engaging,” said Gao. Using Bentley’s application saved 50% in time creating the digital animation and enabled Abergeldie to win the contract. “The stability of SYNCHRO 4D means we can always rely on it to complete a job on time and in budget,” said Stojevski. Had Abergeldie used staging diagrams, it would have taken longer and required 20 to 30 drawings. Additionally, they would not have been able to timely demonstrate the efficiency of their construction methodology, which could have lost them the bid. “SYNCHRO’s user-friendly interface allows users to easily navigate through the simulation, making it simple to access and view different stages of the construction process,” said Gao. Working with Solid Support and SYNCHRO, the construction company quickly submitted the digital tender, demonstrating their advanced technical abilities on such a unique project.

Having used SYNCHRO successfully on over 200 projects, Solid Support relies on Bentley’s application as their go-to software for tenders. “SYNCHRO offers powerful analysis capabilities that enable us to identify potential issues and make adjustments to the construction plan in real time,” said Gao. “This can help to reduce costs and improve the overall efficiency of the planning process.” While 4D animations used to be very niche, they now are becoming more mainstream for construction tendering and contractors risk losing jobs without these simulations. Solid Support’s sales numbers on tenders have exploded and using SYNCHRO has put them ahead of the game. “Other software can create pretty pictures and designs, but the technology is less functional. SYNCHRO connects real-world outcomes to animations,” said Gao. By using SYNCHRO, Solid Support hopes to improve the way construction companies can communicate with their potential clients and win more work.

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Marion Bouillin is a Senior Product Marketing Manager at Bentley Systems. She leads marketing efforts for SYNCHRO Construction - Bentley’s digital infrastructure construction management platform. Marion is passionate about marketing digital solutions that automate and simplify teams’ workflows and processes throughout the project lifecycle.

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India continues to be a roads first economy



Integrating Intelligent Transportation technology and electrification infrastructure into road infrastructure is an emerging area that is quite complex and requires different skills and expertise, says

RAJU GOTTUMUKKALA V R,
Managing Director,
Transportation India,
AECOM

What are the key challenges facing India's road and bridge infrastructure today?

India has the second largest road infrastructure in the world, and it continues to grow. The national highways form just two percent of the total road network that India has but carry more than fifty percent of the traffic. In addition, with rapid urbanization, there are more vehicles getting added to the roads. This extra load on the roads due to increased traffic is adding to the challenge of capacity constraint and high maintenance requirements due to congestion in urban areas. Integrating the existing infrastructure with multimodal connectivity which is being developed – like the metro, inland waterways, Sub-urban rail and airports adds to the complexity of this challenge. Integrating Intelligent Transportation technology and electrification infrastructure into road infrastructure is an emerging area that is quite complex and requires different skills and expertise. Road infrastructure development is a highly specialized and dynamic field with a lot of advancements taking place around the world, in areas including planning, technology, materials and construction techniques. India can benefit from the

expertise of global companies who are able to leverage their international expertise to support projects worldwide.

How has the government's focus on infrastructure development impacted the country's economy?

India remains a popular investment destination and continues to attract a substantial share of FDI from around the world. These investments are coming to different parts of India and in many cases, the companies investing are establishing their offices in different locations to their manufacturing units. These companies rely on robust infrastructure development to operate smoothly and profitably. The government's commitment to infrastructure development sends a positive message to the world, which is attracting more investments. India is also investing in developing strong transportation connectivity and developing planned urbanisation, which is attracting a large population to migrate to towns and cities. This creates employment opportunities, adding to economic growth and a better per capita income, which would not have been possible without robust infrastructure. We see

that there is a very strong co-relation between infrastructure development and economic development. India's commitment to infrastructure development is having a huge impact on the country's economy. India's vision to be a developed nation by 2047 is only possible with accelerated investments in Infrastructure which can sustain higher GDP growth.

What is the role of public-private partnerships in financing and developing road and bridge projects?

According to a World Bank report economies with a strong policy on private public partnerships have received ~500 million USD of investments for infrastructure development. India evolved its own framework of PPP policies for implementing roads and bridge projects. The early projects in Bharatmala witnessed lot of interest in BOT model of financing, although project implementation was a mixed success. The Hybrid Annuity Model (HAM) has seen significant success. Monetisation of brown field assets to finance the green field assets is attracting lot of private sector interest in the form of Toll-Operate-Toll concessions.

How can technology be leveraged to improve the efficiency and sustainability of road and bridge maintenance?

Advanced technology in the form of Intelligent Transport Systems (ITS) is playing a significant role to improve the efficiency and sustainability of roads and bridges. The ubiquitous cameras in most nations today have reduced the risk of over speeding and accidents, which have immensely contributed to efficiencies. India has started to implement Open Road Tolling which is satellite based. Smart tags have made long lines at the toll plazas disappear and have increased fuel efficiency and resulted in time savings. There are tyre companies using microchips embedded in their products which can inform their condition remotely to enable preventive corrections and thereby reduce breakdowns. Drones are assisting in emergency mechanisms during road mishaps and

improving efficiency. In addition, the use of technology in traffic management, designing and planning of road infrastructure is helping reduce development times, aid project management and enable more collaborative real time participation across stakeholders to bring efficiencies to the decision-making process.

What are the future prospects for India's road and bridge network, and what measures can be taken to ensure its long-term viability?

India continues to be a roads first economy, with more than 50% of goods and people still transported via highways. Our roads remain the arteries of India's transport network and advanced technologies will play a key role in the sustainable development and management of these national assets in the longer term. As India advances other modes of transportation to boost connectivity both domestically and internationally, the highways will continue to play a role as integrators and aggregators, enabling the smooth movement of passengers and goods.

How can India address the challenges of land acquisition and environmental concerns associated with road and bridge construction?

India can benefit from the expertise of global consultancies to help mitigate the environmental impact of road and bridge construction. For example, there are technologies and techniques that help reduce the carbon footprint of construction activities, that can improve the climate-resilience of infrastructure and that enable the use of more sustainable materials.

Optimised alignments for road and bridge projects should aim to reduce land acquisition. Modern techniques of construction such as Ultra-high-performance concrete for bridges is also helping to reduce land acquisition for projects. Further, Transparency in Land acquisition brought in by the Land Acquisition Policy should result in speedier resolution of land issues in road and bridge projects.

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We are committed to supporting digital transformation



KAUSHIK

CHAKRABORTY,

Senior Vice President
for APAC at Bentley
Systems, states that the
challenge lies not only
in capturing data but
also in embedding it
into long-term
processes, in an
interaction with Tejasvi
Sharma, Chief Editor of
EPC World

As a leader in infrastructure engineering space, how is Bentley Systems supporting the government, PSUs, and private consultants with its software applications?

With substantial government investment in infrastructure projects, Bentley Systems plays a pivotal role in providing cutting-edge tools that empower our users to achieve exceptional project outcomes. We focus on key sectors such as transportation, water, and power, delivering solutions that support and streamline project delivery. In addition to serving private sector clients, we collaborate closely with government PSUs, including organizations like RITES, SAIL, and BHEL, which are instrumental in engineering work within India and abroad. Our goal is to ensure that our software applications integrate seamlessly into both public and private sector workflows, enabling projects to be completed with greater efficiency. Beyond offering software, we provide guidance on optimizing these tools to shorten project timelines and enhance operational efficiency. This includes process improvements and comprehensive training to help teams maximize productivity and achieve effective results.

Given India's push to modernize its infrastructure, what kind of investment do you think is necessary specifically for developing the software infrastructure needed to support these advancements? How can Bentley Systems contribute to this digital transformation?

When it comes to investing in software or technology for infrastructure projects, it's less about setting a specific budget and more about aligning technology with the unique needs of each project. Some sectors, such as construction, require significantly more technological support due to their complexity and demands. The level of investment often depends on factors like project complexity, scale, and duration. For instance, larger, long-term projects - such as metro systems with a lifespan of 50 years - naturally call for more advanced technology integration. In contrast, smaller projects, like roads with a 5 to 10-year lifespan, may require less. Ultimately, the investment varies based on project type and the vision of the project owner and funding body. India has made notable progress in this area over the past 5 to 10 years, with IT spending in infrastructure projects increasing, thanks in part to support from organizations



like NASSCOM and CII. While there is still room to grow, the current landscape is much improved. India's world-class IT industry is now in a strong position to bring its expertise home, contributing to the modernization of the nation's infrastructure. At Bentley Systems, we are committed to supporting this digital transformation, providing the tools and guidance needed to make these advancements possible.

Given the challenges of incomplete data and missing plans in many Indian cities, how feasible would it be to create a similar digital twin for an Indian city?

We don't directly execute digital twin projects ourselves; instead, we support our partners who lead these initiatives. In India, companies like Genesys International are at the forefront of such efforts. For instance, about five years ago, a collaborative research project with Cambridge University in Ahmedabad used drones to capture highly accurate 3D data, resulting in detailed city models. This project garnered significant attention in India, highlighting the potential of digital twin technology. However, the challenge lies not just in capturing data but in embedding this data into long-term processes. While pilot projects can demonstrate the value of new methodologies - such as advanced approaches to highway construction - the real test is in institutionalizing and standardizing these practices across future projects. Achieving this requires commitment from both the government and the organized private sector, alongside public agencies implementing these solutions. Companies like Genesys are making strides by creating 3D city models for multiple cities, yet adoption depends on both the availability of projects and demand for these models. The key challenge is ensuring effective use of available data. Just as oil companies build more petrol stations in response to demand, municipal authorities and city governments need to see the value in modernizing systems - such as taxation, water distribution, power monitoring, and revenue tracking. Building demand for 3D digital infrastructure is essential to engage industry

AA OUR RECENT ACQUISITION OF CESIUM, A 3D GEOSPATIAL COMPANY, ALIGNS PERFECTLY WITH BENTLEY'S 40TH ANNIVERSARY AND REINFORCES OUR COMMITMENT TO OPEN ARCHITECTURE AND OPEN SYSTEMS

stakeholders. The Indian industry is prepared for this transition, but fostering demand for modernized systems will be crucial to achieve widespread implementation.

Who would you say are the key facilitators driving this process forward?

The pace of change in India's infrastructure development over the last five years has been remarkable, marked by steady progress rather than rapid transformation. We're now seeing national organizations prioritize infrastructure improvements, with initiatives like Gati Shakti setting the stage for inter-ministerial coordination on major projects - a level of collaboration that wasn't previously achievable. India's strong democratic foundation has now enabled various government departments to work more effectively together, which is a significant milestone. The next step is to build on this momentum and drive further acceleration. This evolution mirrors the fintech revolution. Just as foundational steps led to the success of UPI, we hope to see similar advancements in infrastructure. Systems and processes are being established to streamline project delivery, though challenges remain, especially in densely populated areas like Delhi and Mumbai, where space constraints make expansion difficult. The government is addressing these issues by working on solutions to decongest cities and build new infrastructure. The growth of the National Capital Region (NCR) illustrates how urban expansion is being managed effectively, with areas like Gurgaon, Faridabad, and Noida developing as industrial hubs. The infrastructure and engineering sectors are undergoing a similar transformation, and the process is both exciting and ongoing.

Can you explain how digital twins can enhance infrastructure by streamlining project delivery, improving asset performance, and supporting sustainable development?

Digital twins are accurate digital replicas of physical assets, capturing every stage of a project from design through construction to operation. By providing detailed, real-time information, they enable stakeholders to track design decisions, construction modifications, and operational changes. The true value of digital twins emerges during an asset's operational phase, offering insights that aid in proactive maintenance and improved future designs. For instance, if a hotel built from 2D plans has HVAC issues years later, the owner may lack precise layout details. A digital twin, however, maintains 3D, real-time record, making maintenance easier and more efficient. Digital twins ensure that a project's 3D



data remains accurate and up-to-date throughout its lifecycle, supporting better asset performance, streamlined maintenance, and extended asset life. From a sustainability perspective, digital twins are transformative. Orange City Water in Nagpur, for example, uses one of India's first water-based digital twins to manage its water network comprehensively. Integrating SCADA and GIS data into a 3D model, they can minimize waste and optimize resource efficiency. This approach applies across sectors like water, transportation, and energy, gradually institutionalizing practices that create resilient and sustainable infrastructure. India has the talent and expertise to lead in this domain, and the opportunity now is to apply these practices within the country to build a future-ready infrastructure.

Could you provide some examples of how digital twins are transforming transportation projects - such as roads, rail, and metro - in India?

Digital twins are already making a transformative impact on metro projects in India, with the Nagpur and Pune metros as standout examples. These projects have utilized 5D BIM, integrating 3D modeling with cost and time data to enhance decision-making. For example, during the design, construction, and handover of the Nagpur Metro, every detail—from alignment choices to viaduct design and construction teams—was meticulously documented. This level of insight has proven invaluable for ongoing operations, minimizing unexpected issues and streamlining maintenance. In contrast, earlier projects like the Delhi Metro lacked this depth of digital insight a decade ago. However, the Delhi Metro Rail Corporation (DMRC) has since adopted full 3D modeling to plan and monitor projects, incorporating all engineering elements into comprehensive digital representations. The Chennai Metro has also embraced this digital approach, underscoring a broader shift across India toward digital twin technology in metro projects. A digital twin is more than a static model—it's a dynamic, adaptable resource that evolves with the project's physical reality. By using digital information throughout a project's lifecycle, digital twins ensure an accurate, up-to-date representation at each stage. Their real value lies in supporting informed decision-making with a real-time, comprehensive view of the infrastructure, enabling efficient project delivery, reduced maintenance challenges, and enhanced long-term asset performance.

Could you share some recent updates on Bentley Systems' latest acquisitions and takeovers? What strategic goals are driving these moves?

Our recent acquisition of Cesium, a 3D geospatial company, aligns perfectly with Bentley's 40th anniversary and reinforces our commitment to open architecture and open systems. Bentley has always prioritized interoperability, with open-source and freely accessible file formats. Much of our digital twin platform is open-source on GitHub, and the addition of Cesium strengthens our vision of open data and collaboration in infrastructure. The infrastructure industry depends on a range of technologies, from GIS to engineering applications, making openness essential. We aim to build a foundation where companies can collaborate, where data—not software—holds the true value. With Cesium, Bentley gains enhanced capabilities as a platform company, expanding our developer ecosystem and enabling seamless integration of 3D geospatial data into infrastructure applications. This acquisition empowers users to make more informed decisions with geo-coordinated 3D data, which has not yet become the industry norm. While Bentley has emphasized openness from the start, not all players have followed suit. Cesium allows us to drive 3D decision-making on a platform level in an accessible, open-source manner, and we're excited about the future possibilities this brings.

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Being Eco-Conscious

The Indian government has set a goal to reduce emissions intensity by 45 per cent by 2030. The country focuses to soon emerge as a net-zero carbon emitting nation. With the eco-focused approach gaining momentum, an eco-benefitting trend drives India's construction equipment and commercial vehicles market. EPC World News Bureau reports...



The construction industry is a significant contributor to global greenhouse gas emissions. Hence, adopting sustainable equipment is essential to achieving environmental and sustainability goals. The need for sustainable construction equipment is becoming increasingly urgent as the global construction industry faces significant environmental and social challenges. These challenges include high levels of resource consumption, environmental degradation, and large carbon footprints. Sustainable construction equipment is essential for mitigating these issues and contributing to a more eco-friendly, efficient, and socially responsible industry.

As countries increasingly focus on environmental sustainability, stricter regulations are being implemented for emission standards and waste management. Sustainable construction equipment helps companies comply with these regulations, avoiding penalties and contributing to long-term environmental goals. Also the focus is today more inclined towards green buildings and sustainable infrastructure projects. With green building certification systems, such as LEED (Leadership in Energy and Environmental Design) and GRIHA (Green Rating for Integrated Habitat Assessment) in place, the use of sustainable practices eco-friendly equipment is more emphasized. Sustainable machinery can help construction projects qualify for these certifications, adding value to the project.

Sector at a Glance

Valued at US\$ 7.91 billion in 2024, the Indian construction equipment market is set to reach US\$ 11.8 billion by 2029 and is anticipated to grow at a CAGR of 8.3 per cent during the period 2024-29. As per the recent findings released by the Indian Construction Equipment Manufacturers' Association, a 26 per cent rise was seen in the industry's sales figures – which stood at 1,35,650 units in FY23-24 fiscal as against 1,07,779 units sold during the same period a year ago. ICEMA credits the Government's infrastructure backed agenda as a key source of demand for the said period.

Earthmoving industry continues to post promising growth figures among the machinery sector. Increased Government spending on infrastructure and structural developments across the length and breadth of nation is being highlighted by the market analysts as the key factors in giving this impetus. The detailed sector report released by ICEMA points out a 21 per cent rise in the sales of earthmoving equipment which stood at 93,531 units in FY24 as against 77,164 units sold in FY23 – accounting to approximately 70 per cent of the total construction equipment sales in FY24.

While the Backhoe Loaders segment continues to drive the monopoly, Crawler Excavators follows the lead. A mammoth share of about 55 per cent is being held by the Backhoe Loader sector and 35 per cent by the Crawler Excavators as per the ICEMA findings.

“Material handling equipment, including pick and carry cranes and Tele-handlers, recorded 61 per cent growth in sales volume in FY24, and accounted for 14 per cent of total CE sales, as compared to 9 per cent in FY23. Concrete equipment such as concrete mixers, batching plants, concrete pumps, and boom pumps together recorded a 19 per cent year-on-year increase in FY24. Road construction equipment, which was the only segment with negative growth in FY23, made a spectacular recovery in FY24 by selling 6,571 equipment units -- a 40 per cent increase from 4,828 units sold in FY23,” added the ICEMA report.

A similar pull in demand also being seen towards the commercial vehicle segment supporting the infrastructure momentum. The sector is driven by factors such as increasing demand for logistics, e-commerce expansion, and infrastructure development. The segment includes light commercial vehicles (LCVs), medium and heavy commercial vehicles (MHCVs), and buses. The growth of e-commerce has led to an increasing need for small, fuel-efficient light commercial vehicles (LCVs) for last-mile delivery. The demand for medium and heavy-duty trucks is also increasing due to the expansion of logistics networks, road freight, and the government's push to improve transportation infrastructure.

On a Green Curve

The Indian government is encouraging the adoption of sustainable construction practices through incentives, subsidies, and funding for projects that focus on eco-friendly construction. Programs like Pradhan Mantri Awas Yojana (PMAY) for affordable housing also emphasize energy-efficient homes, indirectly promoting the use of green building materials and equipment. As India continues to urbanize, sustainable construction methods and equipment become more critical for reducing the environmental impact of rapid infrastructure development.

A growing shift is seen towards electric and hybrid construction equipment to reduce carbon emissions and operating costs. Machines like electric excavators, backhoe loaders, and electric compactors are becoming more popular. The use of automated and robotic machinery is also on a rise. These machineries reduce the amount of energy consumed and waste generated. The demand is particularly popular towards the increased use of drones for surveying, automated brick-laying robots, and 3D printing for construction.

Hybrid construction equipment, combining both diesel and electric power sources, is gaining traction in India. These machines offer a balance between performance and sustainability, enabling construction projects to minimize fuel consumption and reduce emissions.

A change is also being evidently noticed among the construction equipment manufacturers in the recent years. Today, construction machinery manufacturers are increasingly offering products with better fuel efficiency and lower emissions, aligning with both global standards and India's environmental goals.



By 2030, the sustainable construction equipment market is anticipated to grow at a compound annual growth rate (CAGR) of around 7-10% in India, reflecting increasing investments in eco-friendly machinery. Companies like JCB, Volvo, and Caterpillar are increasingly introducing sustainable equipment to the Indian market, aiming to capitalize on this shift toward eco-friendly practices.

For instance, JCB India released the JCB 19C-1E, an all-electric excavator with four lithium-ion batteries that can power the machine for a full day. Volvo CE's H-Series Wheel Loaders are designed to be more fuel efficient and productive than previous models. A similar move was also seen by Kobelco Construction Machinery Co., Ltd., who launched the SK80 Excavator in Chennai in August 2024.

Another trend being observed is in incorporating advanced engines and emission control systems to meet India's evolving environmental regulations. The introduction of Euro V/VI engines in construction machinery is helping reduce particulate matter (PM), nitrogen oxide (NOx), and carbon dioxide (CO₂) emissions.

Exploring new growth scopes, manufacturers are also exploring the use of renewable energy resources in powering the machineries. Some construction companies are exploring the use of solar energy to power equipment such as lighting systems, small generators, and even mobile units on construction sites. Solar power reduces dependency



on diesel generators and helps improve the sustainability of construction operations.

An increased scale of opportunities is also being drawn towards machineries supporting recycling and waste management. This includes machines for crushing and processing construction and demolition waste, which helps reduce landfill waste and promotes the use of recycled materials in construction.

Similarly, the Indian commercial vehicle market is also witnessing a shift toward electric mobility. Driven by the Government's push for cleaner transportation through incentives and subsidies under programs like the FAME II (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) scheme. Electric buses and trucks are gaining traction, especially in urban areas. The use of telematics in commercial vehicles is on the rise, enabling fleet owners to track vehicle performance, fuel consumption, maintenance schedules, and routes, improving efficiency and reducing operational costs.

The Indian government's transition to BS-VI (Bharat Stage 6) emission norms has also significantly impacted the commercial vehicle sector. Manufacturers are increasingly investing in cleaner technologies to meet these stringent regulations, which has led to improved fuel efficiency and lower emissions. The Indian CV sector is also exploring the use of biofuels and other alternative fuels for commercial vehicles as part of its efforts to reduce dependency on conventional

fossil fuels. The industry is also seeing increased sales of electric CVs (e-CVs), with 7,071 e-CVs sold between January and August 2024, a 162 per cent increase from the same period in 2023.

However, despite its growing inclination and eco-conscious approach the Indian construction equipment and commercial vehicle segments faces few growth hiccups. Sustainable construction equipment often comes with a higher initial cost, which can deter smaller contractors or firms from adopting these technologies, despite the long-term savings on fuel and maintenance. While large construction firms may be aware of the benefits of sustainable equipment or HCVs, many smaller players are still learning about these technologies and their advantages. The lack of adequate charging stations or electric vehicle infrastructure in some regions also hinders the range of adoption across the Indian mainland. But, the industry stakeholders and Governing bodies are proactively functioning hand-in-hand towards bringing a positive change in resolving these hiccups at the earliest. Constant efforts in terms of policy provisions, increased assurance of benefits in using eco-friendly machineries, purchasing cost benefits like discounts etc. are being put forth to overcome the growth hiccups.

India's market for sustainable construction equipment is on an upward trajectory, driven by regulatory pressures, technological innovation, and a growing awareness of environmental sustainability in the construction sector. While challenges remain, the market is evolving rapidly, offering significant opportunities for both established and new players in the sector.

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Sustained focus on infrastructure development keeps industry's long-term prospects healthy

The Indian mining and construction equipment (MCE) industry is not only growing in volumes, but also simultaneously responding to the changing global demand and supply scenario and its shifting priorities. The shifting landscape has led to the emergence of several trends globally, and the Indian industry is at various stages of adoption in each of these areas.

In the last decade (FY2015-2024), the Indian mining and construction equipment (MCE) industry has witnessed a robust 12% compounded average growth rate (CAGR), overtaking Japan as the 3rd largest global MCE market (in volume terms). The industry set a new high for the 2nd consecutive year with 1.36 lakh units sold in FY2024 (a 26% YoY growth). As it derives over 90% of its sales volumes from the domestic market, of which ~70%

comes from various infrastructure projects, the phenomenal growth in the recent years has primarily been led by the infrastructure push in the Indian market. With its so-called 'multiplier effect' on economic growth, consistent and increasing investments in infrastructure development has been the focus area for the Government of India (GoI) over the past decade.

It has been working on several initiatives to attract investment and strengthen India's position as a



favoured global manufacturing hub, which requires availability of a world-class infrastructure. The capital expenditure of the public sector has increased to over three-fold to ₹11.1 trillion in FY2025 (as per the Budgetary Estimates) from FY2015. The improvement in the quality of spending is also reflected in the rise in the share of capex spending in the total expenditure to ~25% in FY2025 (as per the Budgetary estimates) from ~13% in FY2019. Sizeable budgetary allocations together with policy stability, financial sector reforms, taxation structure changes (like GST implementation) and simplified regulations, have resulted in a phenomenal pace of infrastructure development over the last decade, driving growth for the MCE industry.

Technology and production trends keeping pace with global standards

The Indian MCE industry is not only growing in volumes, but also simultaneously responding to the changing global demand and supply scenario and its shifting priorities – eg, technological advancements such as digital technologies, Internet of Things (IoT) and alternate fuel powertrains. The shifting landscape has led to the emergence of several trends globally, and the Indian industry is at various stages of adoption in each of these areas.

With forthcoming transition to commercial equipment vehicle (CEV) V norms w.e.f. January 1, 2025, the Indian MCEs (excluding non-roadable/ off-highway equipment) will come at par with European Union's (EU) Stage V norms. These will represent a significant upgrade in emission standards for non-road CEVs and will apply to a broader range of engines and impose stricter limits on hazardous emissions like particulate matter, nitrogen oxides, hydrocarbons, etc. Consequently, production of older vehicle models will cease, and new models will be introduced. In addition, safety features are also being mandated, which will also

add to the cost of select equipment categories.

ICRA expects that this will affect the prices (and hence the sale) of new equipment in the near term (major impact expected in FY2026). However, the transition will help boost Indian exports to more mature markets – like Europe and North America – in the medium term, as it would harmonise the production for domestic and export markets.

With increasing risk of global supply chain disruptions, focus on localising supply ecosystem is critical

Following the pandemic, the geo-political dynamics has been evolving rapidly. On the other hand, with sluggish domestic demand prospects in several developed markets, global OEMs are on the lookout to diversify their sales and supply chains outside China. This presents an opportunity for India. Coupled with the GoI's thrust on increasing local manufacturing, India could significantly increase its share in the global MCE manufacturing value chain, where it is currently a marginal player (<2%).

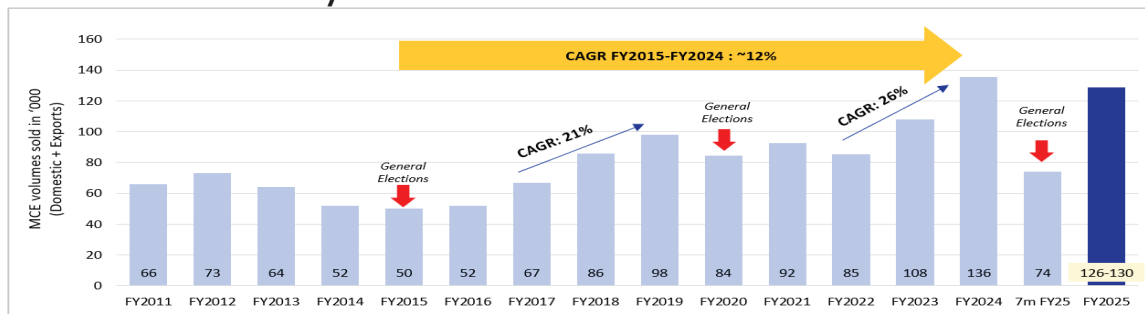
Nonetheless, a key challenge faced by the industry is its high import dependence for critical components (like undercarriage, precision hydraulics and electronics) and availability and cost-competitiveness of key raw materials (speciality steel and alloys). While the import content varies widely - from <10% in backhoe loaders to over 80% in complex/high-tonnage machinery (eg, piling rigs) - it exposes the OEMs to fluctuations in forex and international freight costs. It also elongates their working capital cycle, due to higher inventory maintenance requirement, thereby impacting their pricing competitiveness (especially for exports). With increasing domestic demand and export opportunities, addressing this persisting issue has become crucial to enable the Indian MCE industry to become a strong global player in the coming decade.

Exhibit: Prevailing trends in the MCE industry



Source: ICRA Research

Exhibit: Indian MCE industry – Volume trend



Source: ICEMA data, ICRA Research

Contracting financing environment represents a near-term challenge

With most MCE purchases in India (85-90%) relying on external funding, the financing environment plays an important role in supporting demand. In India, the MCE financing market is well established, represented both by banks as well as non-banking finance companies (NBFCs). Additionally, some OEMs also have captive finance companies. In recent quarters, several regulatory measures and tightening in the funding conditions in the domestic markets for banks and non-banking financial companies (NBFCs) has been observed. With limited (and/or higher cost) funds available with NBFCs to allocate across their portfolio, this could have repercussions – in the form of reduced loan disbursements, decrease in loan-to-value (LTVs) or increase in rejection rates – especially for first time buyers of MCE and could pose a challenge for industry demand in the near-term.

Intense competition continues to weigh-in on OEM profitability; benign steel prices provide some respite

Intense competition – with numerous domestic and international players – has kept competition high in the Indian MCE industry. This pressure leads to price undercutting (as witnessed in case of most Chinese players in past decade to gain market share) and reduced profit margins, making it difficult for manufacturers to maintain profitability while investing in innovation and quality. While higher leverage levels and deteriorating debt coverage metrics (mainly due to long-credit periods extended to customers) forced few of these OEMs to focus on margin improvement in recent years, overall industry margins continue to remain subdued. Moreover, geo-political developments (and trade measures from time-to-time) keep the commodity prices volatile, especially for key raw material – steel, which can have a material impact on an MCE OEM's profitability. Given favourable steel

prices, due to surplus availability (on account of cheaper imports from China, Vietnam) in YTD FY2025, the domestic MCE manufacturers are expected to benefit, as this will help offset some impact of expected decline in volumes.

Notwithstanding marginal dip in FY2025, medium term growth outlook remains strong

Like the trend seen in the past, the pre-election infrastructure push drove a phenomenal 26% CAGR over the last three years. However, despite modest YoY growth in H1, ICRA expects a YoY contraction in volumes in FY2025 given the slowdown in new project award activity (especially in Road sector, which drives 35-45% of overall MCE demand in India) and tightening financing environment. With CEV-V emission norms getting implemented w.e.f. January 2025, some pre-buying activity is expected in January-June 2025, however, in case the same is fag-ended (depending on project awarding momentum in H2 FY2025), the volume offtake in H2 FY2025 will be impacted.

Notwithstanding the usual industry cyclicality, the industry's healthy growth momentum is expected to continue over the medium to long term, led by a strong pipeline of infrastructure projects, both currently underway and targeted to commence in the coming years, increasing size of the projects (several mega projects coming up like high-speed rail, river linking projects, etc) and adoption of more mechanised techniques and technologically advanced equipment by construction companies to improve efficiency, reduce labour cost and ensure timely project implementation.

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RITU GOSWAMI
AVP and Sector Head,
Corporate Ratings
ICRA

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Wet Mix Macadam Plant
with CTAB System



Dry Mix Mortar Plant
(MDMP)



Concrete Block Making
Machine (MBM)



Vertical Casting Concrete
Pipe Making Plant



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Machine (MKM-351)



Concrete Kerbing
Machine (MKM-1200)



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In Sync with the Market Dynamics

The growing momentum towards infrastructure development has escalated the gravity for construction equipment market, ultimately increasing the scope of opportunities for the equipment financing sector.



Equipment financing is one of the crucial sectors backing the construction equipment sector. The increased inclination of Governing bodies towards fostering infrastructure has scaled up the demand for the construction equipment sector – thereby accelerating the growth scope for equipment financing segment. Over the years, the sector has been evolving with constant efforts directed towards being in sync with the changing market dynamics.

A notable shift is being witnessed towards preferring flexible financing options as against the traditional schemes. This enables the customer to opt for customized plans suiting their specific project requirements. Few options that are being increasingly preferred today, as per the market studies, are hiring purchasing agreements, equipment loans and deferred payment plans. These schemes have been relieving the customers to purchase machineries without straining upon their financial resources.

Global Insight

The equipment financing industry could be broadly analyzed on two categories – by the type of financing and the latter based on the equipment. A recent study by indicated, “Based on financing type, the market is divided into loans, leases and mortgage. The loans segment accounted for around 62% of the market share in 2023 and is expected to reach USD 85 billion by 2032. The loan segment is

growing as businesses prefer to own equipment outright, allowing them to build equity over time. Low-interest rates and attractive financing terms make loans appealing to borrowers. The increasing demand for construction equipment, driven by infrastructure projects and rising construction activities, further boosts the need for financing options. Additionally, favorable government policies and incentives support the expansion of the loan segment in the market.”

On the other hand, based on equipment, the construction equipment finance market was categorized into earthmoving & road building equipment, material handling & cranes, and concrete equipment in the study. Wherein, the earthmoving and road building equipment segment held around 55 per cent share in 2023. The segment is set to grow due to global urbanization and infrastructure projects, which are increasing the demand for earthmoving and road building machinery.

Technological advancements, such as better fuel efficiency and telematics integration, are attracting businesses to invest in newer, more efficient equipment. Additionally, flexible and customized financing options are enabling construction companies to upgrade their fleets without large upfront costs. These factors together are contributing to the growth and development of the earthmoving and road building equipment sector.

While looking onto the global performances, the Asia Pacific region, particularly India and



Growth Trends

The equipment financing industry has been on a constant and consistent pace of evolution by being in sync with the evolving customer preferences, market dynamics and economic viability. The increased scope of infra opportunities emerging from the tier-II and tier-III regions has specifically scaled up the demand for construction equipment among the smaller contractors and project executioners. This has boosted the demand for used machineries on a larger scale. Enabling financing options for the purchase of used machineries is an interesting trend on a rise today.

The other major shift is being seen by the pull towards sustainable and eco-friendly equipment. Many among the financiers today have developed and put forth financing plans and schemes particularly focused towards 'Green Machineries'. The Government's push towards adoption eco-friendly construction practices and technologies has further pushed the growth scope in this direction. A senior market analysts opined, "Companies availing of green financing options are finding themselves better positioned both ethically and economically, as they benefit from lower energy costs and improved public perception."

With Artificial Intelligence (AI) and real time technologies taking the leads in all wakes of human lives, a similar inclination is also being seen in the functioning of the equipment financing industry. The sector is steadily stepping towards digitization, wherein maximum focus is directed towards processing the formalities related to loan documentation and approvals are taken up on real time platforms. The financiers are increasingly utilizing AI tools and machine learning to mark credit scores and also in risk assessment processes. A notable move is witnessed in the adoption of block-chain technology – enabling ease and transparency in the financing procedures. The use of AI is being welcomed among the stakeholders and customers alike as it has fastened the operational processes, resulting in increased growth opportunities and efficient time and cost management.

China leads the market for equipment financing sector. The market held by the Asia Pacific region registered more than 41 per cent share of the total global market in 2023. And since then the growth has only been scaling up in the region. Increased infrastructure projects, growing urbanization, industrial expansions backed with proactive Government support has primarily garnered the growth for the equipment financing sector in the region. Flexible financing options and supportive government policies are encouraging businesses to invest in advanced machinery.

A study by the Business Research Company stated, "The market size for equipment financing industry was at \$54.39 billion in 2023 and is projected to reach \$59.38 billion in 2024, reflecting a compound annual growth rate (CAGR) of 9.2 per cent. Looking further ahead, the market is anticipated to grow to \$84.73 billion by 2028, with a CAGR of 9.3 percent.

"It will grow to \$2.03 trillion in 2028 at a compound annual growth rate (CAGR) of 11.2%. The forecasted growth period can be attributed to the rising demand for flexible financing options tailored to customer needs, the expansion of equipment leasing in emerging markets, increasing environmental and sustainability considerations influencing equipment choices, a shift toward sustainable and eco-friendly options, and the impact of geopolitical factors on global supply chains and equipment demand," pointed out a recent report by Research and Markets.



Enabling funds for customized equipment or machineries is the other notable factor driving the trend index. Owing to the increased complexities in projects and need to be niche has driven the demand for tailored or customized machineries today. Financiers are increasingly exploring this arena as a new growth scope. “In 2024, we are observing a shift towards more flexible payment structures and customized terms that consider the unique financial circumstances and operational cycles of businesses. This trend is particularly beneficial for industries with seasonal revenue streams or those undergoing rapid technological changes,” observed a senior market expert.

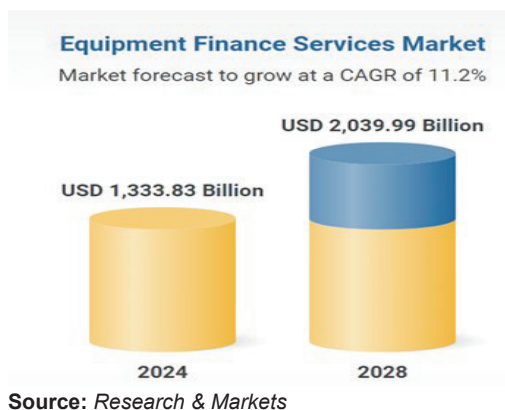
A novel concept of financing subscription based machineries is also being witnessed today. Wherein the customers instead of investing fully on purchasing the machinery pays on subscription basis for a preferred timeline. Other such approach being witnessed is from the financiers’ angle – where the focus is towards building and nourishing long-term relation with the customer. Financing

assistance is being lend to customers on a long term basis in place of the initial pull or demand – gradually building business for a long term.

Joining hands with the equipment manufacturers in easing the funding process is a move that has been adopted by the financiers in the recent past – and is steadily progressing. In June, Action Construction Equipment Ltd. (ACE), a construction equipment manufacturer, entered a MoU with Bank of Baroda to provide financing solutions for businesses in the construction equipment sector. Under this partnership, ACE customers across the country got access to financing options offered by Bank of Baroda. Earlier in February, Mahindra’s Construction Equipment Division (MEC) partnered with Bank of Maharashtra to offer specialized financing solutions for its range of construction equipment. This effort helps to offer customers tailored financial assistance for the purchase of the company’s construction equipment. In March 2023, Gibraltar Business Capital (GBC) announced its new equipment financing business, Gibraltar Equipment Finance (GEF). GEF offers term financing options that complement its asset-based lending products. The year 2023 also saw JCB India inking a deal with Manappuram Finance, a NBFC, to finance the latter’s range of equipment and engineering products.

Being on a same page with the evolving market dynamics is observed as the key towards growth by the equipment financiers today. With the infrastructure momentum steadily accelerating the future for the equipment financing industry holds a prospective image and an interesting growth index.

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We are committed to integrating electric solutions into our product lineup



By investing in sustainable solutions, we are not only meeting regulatory demands but also responding to the growing expectations of our customers and communities, says **DIMITROV KRISHNAN**, Managing Director, Volvo Construction Equipment India

With a growing emphasis on sustainable practices, green construction machinery has become essential. Can you share your thoughts on this shift and its importance?

At Volvo CE, we recognise the critical shift towards sustainable practices in the construction industry. The increasing emphasis on green construction machinery is not just a trend; it's a necessity for a sustainable future. This transition is vital for reducing carbon footprints, conserving resources, and promoting eco-friendly practices. Green machinery, equipped with advanced technologies, enhances efficiency while minimising environmental impact. By investing in sustainable solutions, we are not only meeting regulatory demands but also responding to the growing expectations of our customers and communities. This commitment to sustainability aligns with our vision of creating a better tomorrow, ensuring that our operations contribute positively to the environment. As we move forward, we are dedicated to leading the charge in innovation and sustainability within the construction sector.

How do you see the popularity and role of electric machines and vehicles in driving the green momentum?

Electric machines and vehicles are emerging as a vital promoter of green momentum, giving cleaner and greener alternatives compared to the more traditional or fossil-based machines. As we face pressing environmental challenges, electric machinery offers a sustainable alternative that significantly reduces emissions and noise pollution. These innovations not only enhance operational efficiency but also align with global efforts to combat climate change. The popularity of electric machines reflects a growing awareness among stakeholders about the importance of sustainable practices. At Volvo CE India, we are committed to integrating electric solutions into our product lineup, ensuring that our customers can contribute to a greener future. By embracing electric technology, we are not just responding to growing market demands; we are actively shaping a more sustainable construction landscape. This transition is essential for fostering a cleaner, healthier environment for future generations. Also, growing environmental awareness and the incentives from the government would lead to an increased adoption of electric equipment, thereby forming the cornerstones of sustainable construction practices.

What is your perspective on customer adaptability of green construction vehicles?

The adaptability of customers to green construction vehicles is increasing as most businesses realize long-term benefits and alignment with sustainability targets. As awareness of environmental issues grows, many customers are eager to embrace sustainable solutions. The benefits of reduced emissions, lower operating costs, and compliance with regulations make electric and hybrid machines attractive options. While initial investment may be a consideration, the long-term savings and environmental impact resonate well with forward-thinking companies. The introduction of electric machines under Volvo CE's Equipment-as-a-Service model with currently 21 electric machines being deployed is a testimony to the interest of customers in sustainable options. Additionally, the popularity of hybrid models as transitional solutions combines the ecofriendly benefits of electric systems with reliable performance addressing diverse operational needs.

How do green technologies compare to fuel-powered counterparts in terms of benefits and long-term value?

Green technologies offer significant advantages over fuel-powered counterparts, particularly in terms of environmental impact and long-term value. Electric and hybrid construction vehicles produce lower emissions, contributing to cleaner air and reduced carbon footprints. This aligns with global sustainability goals and enhances corporate responsibility. Volvo's electric machines feature zero emission, minimal maintenance thus having the best long-run value, meeting environmental requirements, cutting operational costs. Although the initial investment might look costly, the total lifecycle benefits may include compliance with new sustainability standards and increased efficiency: a forward-looking choice for construction businesses.

How are hybrid models bridging the gap between eco-friendliness and performance in the CE industry?

Hybrid models are transitional models, taking the best of traditional and green technologies. With these eco-friendly and high-performance machines, efficiency in fuel consumption is combined with reduced emissions. These models are key representations of industry adaptability in meeting sustainability goals while maintaining reliability and productivity, and bodes very well for transition to more widespread fully electric solutions in the near future. At Volvo CE we highlight electric and fuel-efficient technologies, along with innovation through equipment enabled by the Internet of Things.

What are the opportunities for green construction vehicles in the rental market? How do you see this evolving?

Massive opportunity exists in rental markets as more and more contractors are turning toward cost-effective, environmentally friendly options. It is a direct response to new demand initiated by us under the Volvo CE's "Equipment-as-a-Service". Volvo CE's "Equipment as a Service" (EaaS) is our direct response to this evolving trend, which redefines equipment usage by focusing on access rather than ownership. With Volvo CE retaining ownership, customers enjoy unmatched flexibility by linking invoicing to actual usage instead of fixed charges. EaaS ensures seamless operations with 24/7 support, including machine breakdown assistance and parts availability. Customers also gain access to the latest technology, benefiting from timely updates throughout their contract. Additionally, the model offers scalability, providing access to advanced construction equipment, round-the-clock fleet monitoring, and more at a fixed hourly rate.

What challenges have companies faced in adopting green CE technologies, and what strategies can be employed to overcome them?

The resistances that adaptation of green CE & CV technologies will meet include high initial cost, low infrastructures, and inefficiencies in supply chains. To overcome these challenges, companies can look at providing comprehensive training for staff on the benefits and operation of green technologies can enhance acceptance and utilization. Offering leasing or rental models, like Volvo CE's Equipment as a Service, can lower upfront costs and make green technologies more accessible. Collaborating with stakeholders to improve charging infrastructure and maintenance facilities can support the transition to electric and hybrid models. Also, leveraging government incentives and forming partnerships with other companies can help mitigate costs and share best practices.

How do current government policies support the transition to green machinery, and what additional measures would further encourage this shift?

The National Infrastructure Pipeline, the Production-Linked Incentive scheme, and "Make in India" are initiatives from the government that encourage the adoption of green machinery through local manufacturing incentives and by imposing stricter standards of emissions. These tend to make green technologies accessible in the construction equipment sector and align with the global environmental goals. Further solutions include tax exemptions for electric and hybrid machines, green machinery subsidies, and investments in EV charging infrastructure. Two important levers that will induce the added boost into this industry include one with streamlined regulatory approvals and funding R&D towards a cost-effective solution, driving the industry toward this greener future while fulfilling the demands for infrastructure.

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Availability of financing options remains limited



We are committed to advancing technology in every machine we produce, says

RAJIV CHATURVEDI,
Vice President, HD
Hyundai Construction
Equipment India

How do your cutting-edge innovations address challenges in large-scale infrastructure projects, and how do you stay ahead with new technologies?

At HD Hyundai, we're focused on engineering equipment that caters to the growing demands of large-scale infrastructure projects, including highways, metro rail systems, tunneling, mining, railways, and mega-industrial developments. Our product line is designed with an emphasis on safety, productivity, and sustainability, aligning with the construction industry's need for advanced, high-performance machinery. We are committed to advancing technology in every machine we produce. The HX520L Mining Excavator, for example, incorporates Intelligent Power Control (IPC), which offers three fuel-efficient modes, reducing fuel consumption while maintaining high power output, ensuring both performance and savings for our customers. Understanding the challenging conditions of large-scale infrastructure projects, we've designed our excavators with reinforced undercarriages and high-tensile steel, ensuring they are tough enough to withstand extreme environments and deliver longer service life. Our Hi-MATE and Hi-TRACK remote

management systems, equipped with AI-powered predictive maintenance, further minimize downtime. By proactively identifying potential issues before they cause delays, we help our customers maintain optimal machine performance and productivity.

We also place a strong emphasis on operator comfort and safety, as demonstrated in our HL930I and HL950I Wheel Loaders. Both models are designed with climate-controlled cabins and enhanced visibility, reducing operator fatigue and ensuring safer, more efficient operation. At HD Hyundai, sustainability is integral to our approach. The HX35Az Mini Excavator, which complies with Tier-4 emissions standards, is one example of our commitment to reducing our ecological footprint. Furthermore, by 2025, the HL930I and HL950I Wheel Loaders will be equipped with BS-V engines, enhancing our environmental performance in the construction sector.

What strategies does your company employ to differentiate its products and services on a global scale?

HD Hyundai has become the No. 1 exporter of crawler excavators from India,

shipping over 6,000 units to 45+ countries. The company's global success stems from its unique approach and core philosophy, "Advantage India", which drives strategic actions to differentiate its offerings. The key differentiation strategies are we tailor products to regional market needs and develop competitive strategies to stay ahead of local competitors, ensuring their products provide superior value.

will showcase innovations that align with India's vision of becoming a 'Viksit Bharat.' Through cutting-edge equipment, the company contributes to nation-building by enhancing infrastructure development across the country. Our products are equipped with cutting-edge technologies and we are utilizing BAUMA as a platform to launch new products and variants of existing models. Each of our products is

which are ideal for precision work in urban projects like metro systems and road construction and built for heavy-duty applications, our next-gen wheel loaders feature high performance and a focus on operator comfort, with BS-V engines to reduce emissions.

What are the challenges facing the industry? What are the steps you are taking to address these challenges?

The Indian construction equipment sector is experiencing rapid growth but faces several significant challenges. Notably, competition with global players and the issue of unauthorised exports present considerable obstacles for both manufacturers and dealers. Addressing these challenges will be crucial for maintaining a fair and competitive market environment. Additionally, the availability of financing options remains limited, with most customers still relying on ownership models. To accelerate growth, exploring alternative financing solutions such as leasing is essential. A well-structured and reliable leasing framework will enhance equipment accessibility and drive long-term industry development. The Indian construction equipment industry faces a significant challenge in attracting skilled professionals, as the sector is often not perceived as an aspirational career choice. This shortage of talent hampers innovation and limits the potential for growth and advancement. At Hyundai Construction Equipment, we are committed to changing this perception by showcasing how our advanced technologies contribute to India's infrastructure development. By positioning the construction equipment industry as an exciting and impactful field, we aim to inspire the next generation of professionals. Through this approach, we seek to build a pipeline of skilled talent, driving long-term success and ensuring the continued growth and innovation of the sector.

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We actively collaborate with global partners and dealers, strengthening relationships through factory showcases and live product demonstrations. Our sales and service teams maintain a strong field presence in key export markets, regularly visiting clients and gathering Voice of Customer (VOC) insights to continuously improve products and services.

What highlights can we expect from you at BC India 2024 this December?

At Bauma India 2024, HD Hyundai

designed on the company philosophy of "building a comfortable tomorrow" by bringing in innovations in our product. Our innovations that will be on displays are HX520L, HX380 & HX360 mining excavator which offers superior fuel efficiency and robust performance for large-scale mining applications. We will be displaying our highest-selling 8T to 20T infrastructure excavator range, which are creating new benchmarks in the infrastructure sector. We will be showcasing our compact, maneuverable mini excavators

Green MHE will need a multi-faceted approach for success in India



The next decade will see increased integration of automation, AI, and sustainable technologies in MHE, says **ALOK KUMAR TRIPATHI**, President, TIL

How is your company adapting to the shift toward sustainable material handling equipment, and what role do you see it playing in industries like logistics, manufacturing, and construction?

At TIL, sustainability has become a key area of focus since our recent transition to being a Gainwell Group enterprise. We are working towards integrating sustainability across our entire value chain, starting with our conscious choice to source recycled steel for manufacturing our material handling equipment. Our approach combines immediate environmental impact reduction through material choices with long-term sustainability through product longevity. We are working closely with our global OEM partners to introduce electric and hybrid solutions to the Indian market. One of our OEM partners has already built machines with hydrogen fuel cells and lithium-ion batteries that power the next generation of container-handling equipment. These increasingly capable electric options are in various stages of engineering, testing and pilot programs. Once they are ready, we will certainly offer them to our customers here and abroad. A more short-term pillar for our sustainability strategy is a comprehensive refurbishment and rebuild

program, which extends equipment lifespan (Even beyond the 30-40 years that TIL made machines known for their longevity already last), demonstrating our commitment to circular economy principles. Our focus is on manufacturing high-quality, reliable and tough machines that can perform their duties for longer. Our Kharagpur and Kamarhati facilities are certified to ISO 9001:2015 and maintain stringent quality testing protocols, ensuring that sustainability doesn't compromise performance. This holistic approach particularly benefits sectors like logistics, manufacturing, and construction, where continuous operations demand both environmental responsibility and operational reliability.

How is the rise of electric MHE driving green momentum, and how do they compare to fuel-powered options in benefits and long-term value?

The transition to electric MHE represents a significant shift in the global material handling sector, driven by growing environmental consciousness and long-term cost benefits. Through our partnerships with global leaders like Hyster-Yale and recent collaborations with Snorkel Europe, we're laying the foundation

for bringing electric solutions optimized for Indian operating conditions. Government support through various initiatives, coupled with increasing research demonstrating favourable total cost of ownership benefits of electric MHE – including reduced maintenance requirements, lower operating costs, and extended equipment life – continue to drive momentum in this transition. While initial investment costs remain a consideration, the combination of environmental benefits and operational efficiencies creates a compelling case for sustainable material handling solutions.

What is your perspective on customer adaptability of green MHE?

Our market experience indicates that Indian customers prioritise operational metrics and value-for-money propositions above all. Key considerations include metrics like containers moved per hour, total capacity, versatility, fuel economy, and total cost of ownership, regardless of the underlying technology. To address this, Green MHE will need a multi-faceted approach for success in India. OEMs will have to help customers experience green technologies with minimal initial commitment. Secondly, we will need to highlight and demonstrate tangible operational benefits through comprehensive performance data and real-world case studies to customers. Thirdly, a solid aftermarket support network would be crucial. This is one front where TIL strengthened by the Gainwell Group's expertise will be able to ensure maximum machine uptime and operational efficiency. Additionally, we can expect early adoption and interest from urban development projects where infrastructure supports MHE and environmental considerations align with operational requirements.

Which sectors do you see as the biggest adopters of advanced MHE technology in the coming years?

Key growth sectors include construction, logistics, mining, port

logistics, manufacturing, and defence. Our expanded product portfolio, featuring advanced mobile cranes, the Hyster-TIL Range, and Snorkel aerial platforms, addresses these sectors' evolving needs. Our Kharagpur facility's advanced testing capabilities, including India's only ReachStacker testing track and support rigorous quality assurance. The defence sector represents significant potential as well, with our specialised equipment solutions meeting strategic requirements of safeguarding our borders on all fronts. Our recent financial performance, the topline showing a remarkable increase of 1835.84% year-on-year (YoY) in Q1 24 and a strong 45.8% EBITDA growth in Q2 24, reflects strong market acceptance for TIL Limited across these sectors and marks a strong return.

What are the opportunities for green MHE in the rental market?

The rental market serves as a strategic gateway for green MHE adoption, addressing initial cost concerns while demonstrating operational benefits. A rental program will allow customers to experience electric and hybrid equipment without significant upfront investment. Our pan-India presence through regional offices in Kolkata, Chennai, Mumbai, Delhi, and Singrauli will be able to support comprehensive rental service delivery.

What safety features have you integrated into your equipment to enhance operator safety and reduce workplace accidents?

Our safety systems include all-glass cab designs for enhanced visibility, real-time payload monitoring, and ergonomic controls that reduce operator fatigue. High-quality materials in critical components ensure consistent safety performance. The Kharagpur facility's testing protocols verify safety feature reliability. Our focus on operator comfort includes adjustable seats and

optimised cab layouts. Our machines come with several features such as, Tilt Lock and Container Clamping System, ROPS/FOPS (Roll-Over Protective Structure / Falling Object Protective Structure), Automatic Load Sensing Hydraulic System, Hydraulic Safety Lock Valves and Emergency Stop System, Outrigger Safety System among many others. These features complement our stringent manufacturing standards certified by ISO 9001:2015.

How do current government policies support the transition to green machinery, and what additional measures would further encourage this shift?

Current policies, including the PLI scheme, provide foundation support for sustainable manufacturing. We advocate for expanded incentives specifically targeting electric MHE adoption, similar to automotive sector programs. Additional support could include R&D funding for sustainable technologies, benefits for manufacturers and customer adoption incentives.

How do you foresee the evolution of the MHE sector in the next 5 to 10 years, particularly with the rise of automation and artificial intelligence?

The next decade will see increased integration of automation, AI, and sustainable technologies in MHE. We anticipate growth in electric and hybrid solutions, supported by advanced telematics and predictive maintenance. Our strategic partnerships and manufacturing capabilities position us for this evolution. The focus remains on durability and sustainability, with enhanced digital features improving operational efficiency. Our current initiatives in electric technology and IoT integration align with these future trends, supported by our ₹214 crores order book demonstrating market confidence in our direction.

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The rental market represents a huge opportunity for green CV



We believe the true value of green technology lies in its ability to deliver exceptional performance, all while contributing to a healthier environment, says **MANISH MATHUR**, CEO – Cranes, Action Construction Equipment

With a growing emphasis on sustainable practices, green construction machinery has become essential. Can you share your thoughts on this shift and its importance?

The shift toward green construction machinery is a vital transformation for our industry, aligning with India's ambitious goal of achieving net-zero carbon emissions. We recognise that sustainable machinery isn't just a fleeting trend - it represents a fundamental change in how we think about construction. By incorporating eco-friendly materials, renewable energy sources, and energy-efficient designs, green construction machinery offers the dual benefit of lower operating costs and reduced environmental impact. This transition is significant not only because it helps address climate change, but also because it supports our customers in building projects that meet new, more stringent environmental standards. It's a momentous shift that signifies a commitment from all players in our industry to actively reduce emissions and foster a healthier environment for future generations.

How do you see the popularity and role of electric machines and vehicles in driving the green momentum?

Electric machines and vehicles are quickly

gaining popularity, and for good reason. They're silent, emission-free, and offer remarkable operational cost savings over their lifespan. As urbanization increases and environmental regulations become more stringent, electric construction equipment provides a viable solution for meeting these demands without compromising on performance. The role of electric machinery goes beyond just reducing emissions; it's about setting a new standard in construction that prioritizes efficiency, sustainability, and future-ready practices. We believe that the adoption of electric equipment not only advances the industry but also aligns with the broader vision of a green economy, allowing our clients to operate with both social responsibility and operational efficiency.

What is your perspective on customer adaptability of green construction vehicles?

Customer adaptability to green construction vehicles has shown steady improvement, driven by the long-term benefits and increasing awareness of environmental impact. Initially, many clients approached green machinery with caution, given the perception of higher upfront costs and unfamiliar technology. However, as they've

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seen the advantages - such as reduced fuel costs, compliance with new environmental regulations, and lower maintenance - more customers are now willing to adopt sustainable equipment. This growing adaptability speaks volumes about how businesses are aligning their operational strategies with environmental considerations. We're committed to supporting this transition by offering a range of efficient, reliable green solutions and helping our clients understand the value they bring, both economically and environmentally.

How do green technologies compare to fuel-powered counterparts in terms of benefits and long-term value?

Green technologies offer numerous benefits over traditional fuel-powered machinery, particularly when it comes to long-term operational value. While the initial investment in green equipment can be higher, the reduced fuel consumption, lower emissions, and decreased maintenance costs contribute to a faster return on investment. Over time, these savings add up, making green technology not only a smart economic choice but also a sustainable one. Additionally, green technology offers indirect advantages, such as improving air quality and reducing carbon footprints, which are increasingly important considerations for many of our clients. We believe the true value of green technology lies in its ability to deliver exceptional performance, all while contributing to a healthier environment for communities around us.

How are hybrid models bridging the gap between eco-friendliness and performance in the CE & CV industry?

Hybrid models have emerged as an effective way to bridge eco-friendliness and high performance in construction equipment. They provide flexibility by combining traditional fuel engines with electric power, optimizing fuel efficiency, and significantly reducing emissions. Hybrid machinery is especially beneficial

in projects that require extended hours of operation and high power output, as it offers the performance our clients need while supporting their sustainability goals. We see hybrid models as an ideal choice for customers who want to reduce their environmental impact but aren't quite ready to make the leap to full-electric machinery. Hybrid technology allows them to experience the benefits of green machinery while maintaining the power and durability they rely on, making it a practical yet progressive choice.

What are the opportunities for green construction vehicles in the rental market? How do you see this evolving?

The rental market represents a huge opportunity for green construction vehicles. As sustainability becomes a priority, more companies are looking to access green technology without the heavy capital investment. Renting eco-friendly equipment allows contractors to meet project-specific needs and adhere to environmental regulations, particularly for urban projects that require lower emissions. This approach also supports industry-wide adoption of green technology, as more firms can experiment with green machinery, understand its benefits, and potentially adopt it long-term. We see this trend evolving into a standard practice in the rental market, with green options eventually becoming the norm rather than the exception. We're optimistic about this evolution and are committed to working closely with rental companies to expand their green offerings and make sustainable construction equipment accessible to a broader audience.

What challenges have companies faced in adopting green CE & CV technologies, and what strategies can be employed to overcome them?

Adopting green technologies presents several challenges, particularly in terms of higher initial costs, infrastructure requirements, and sometimes limited awareness about long-term benefits. For

many companies, transitioning to green equipment requires an initial investment that can be daunting. Additionally, the infrastructure for supporting electric and hybrid machinery, such as charging stations, is still developing in many regions. We've found that fostering awareness about the benefits of green technology and offering flexible financing options can make a significant difference. Our strategy focuses on educating clients about the long-term savings and environmental impact, partnering with financial institutions to provide accessible financing, and collaborating with regulatory bodies to streamline adoption. By creating a support system around green technology, we can help our clients make sustainable choices that align with both their business goals and environmental standards.

How do current government policies support the transition to green machinery, and what additional measures would further encourage this shift?

Government policies have made significant strides in supporting green machinery, with initiatives like the FAME scheme encouraging electric vehicle production and adoption. These policies are vital, providing both the framework and incentives needed to accelerate the shift towards sustainable technology. However, there's still room for more targeted policies, especially those that support infrastructure development for green technology, such as charging networks and incentives for manufacturers and buyers alike. Additional subsidies or tax benefits for eco-friendly machinery would further incentivize companies to adopt green technology. We're hopeful that as the demand for sustainable equipment grows, more supportive policies will be implemented, making green technology more accessible and affordable across the construction industry. A combined effort from both the government and industry players will be key in fostering a robust, sustainable construction ecosystem for the future.

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Tech-enabled green innovation to dominate

Demand for concrete equipment has surged recently, driven by the growing infrastructure sector. This rise is further fueled by the ongoing green revolution, with manufacturers embracing technology and sustainability to meet modern construction needs. With more infrastructure and real estate projects in the pipeline, the market for concrete equipment is poised for substantial growth...



Concrete equipment plays a vital role in modern construction, serving as the backbone of efficient, high-quality, and sustainable building practices. From mixing and pouring to finishing and curing, specialised machinery ensures that concrete is prepared and handled to meet the precise demands of contemporary infrastructure projects. This equipment not only enhances productivity and reduces labour costs but also improves accuracy, durability, and safety on construction sites. As construction scales new heights with innovative designs and rapid urbanization, advanced concrete equipment has become indispensable for delivering projects on time and to the highest standards. The concrete equipment market is witnessing robust growth, fueled by the expansion of the concrete construction sector and a rising demand for precast concrete in non-residential projects. This surge can be attributed to the advantages precast concrete offers, including quicker construction timelines, enhanced durability, and a lower environmental footprint, thanks to the adoption of low-carbon concrete solutions. The market for concrete equipment has grown substantially in recent years, driven by the rapid expansion in infrastructure and real estate projects in India. In a media release by Indian

Construction Equipment Manufacturers' Association (ICEMA), during the April-June quarter of 2024-25, the sales of concrete equipment has increased by 11 percent compare to the same quarter last year. Concrete equipment sold during the quarter stood at 3,199 units.

According to TechSciResearch, India Concrete Equipment Market has valued at USD 939.81 million in 2023 and is anticipated to project robust growth in the forecast period with a CAGR of 11.48 percent through 2029. Government initiatives like "Make in India," "Smart Cities," and "Bharatmala" are driving the need for high-quality and efficient concrete equipment to meet the construction requirements of these projects. This includes equipment such as concrete mixers, concrete pumps, and batching plants. The concrete equipment market is experiencing a technological revolution, driven by the integration of advanced innovations like IoT, AI, and automation into construction workflows. These cutting-edge technologies are redefining the industry by boosting efficiency, improving quality, and reducing costs. At the heart of this transformation is the accelerating trend of digitalisation. "We are developing digitally enabled construction equipment and after-market solutions to help our customers get the most out of our equipment. Our



smart solutions (for example, EOC on Putzmeister boom pumps) offer the highest fuel efficiency in the industry, says Kanjanabha Bhattacharyya, Managing Director, Putzmeister India. With the implementation of data-driven management systems and advanced analytics, modern concrete production is becoming more intelligent and efficient. These solutions enable real-time monitoring, optimize production processes, and ensure consistent quality while minimizing waste, establishing new standards for sustainability and precision in construction. “The concrete equipment industry is currently driven by several key trends, including digitalization, automation, and sustainability. The rise of smart technology and IoT integration in concrete equipment enables real-time monitoring, predictive maintenance, and overall operational efficiency. Additionally, sustainability has become a priority, leading to a focus on green concrete machinery that reduces emissions and energy consumption,” says V G Sakthikumar, Chairman & Managing Director, SCHWING Stetter India.

Evolution of concrete mixing equipment

Over time, concrete mixing has evolved from manual methods to advanced machinery, transforming efficiency and precision in

construction. Today, various types of concrete mixers cater to diverse project needs, each offering unique advantages. Common types include batch mixers, drum mixers, pan mixers, tilting and non-tilting drum mixers, reversing drum mixers, self-loading mixers, and continuous mixers. Batch mixers are ideal for small to medium-sized projects, while drum mixers excel in handling large-scale construction. Tilting drum mixers, suitable for both small and large projects, are easy to operate, whereas non-tilting drum mixers are perfect for producing highly homogeneous concrete mixes. Reversing drum mixers, capable of mixing materials in both directions, and pan mixers, known for their versatility, are excellent for medium-sized projects. Self-loading mixers automate the production and transport of concrete directly on-site, enhancing productivity. Rotary mixers, though non-tilting, utilize drum rotation along the horizontal axis for efficient discharging. Forced mixers, designed for hard concrete, lightweight aggregates, and liquid concrete, are integral to batching plants, ensuring consistent and even blending of gravel and resin. These advancements in concrete equipment have streamlined construction processes, significantly improving speed, quality, and flexibility. “IoT and data analytics are revolutionizing the way concrete batching plants operate. IoT-enabled systems provide real-time data on plant performance, helping operators monitor key metrics, prevent breakdowns, and optimize efficiency,” says V G Sakthikumar.

Infrastructure thrust fueling growth

Government initiatives and schemes have played a crucial role in shaping the growth of the concrete equipment sector, providing a significant boost to manufacturers and suppliers. “The demand for concrete equipment is surging due to large-scale infrastructure projects like highways, metro systems, and urban development initiatives. Factors driving the adoption of advanced concrete machinery include the need for faster project completion, higher quality, and improved operational efficiency. Equipment that offers precision, speed, and sustainability is highly sought after, as these projects require reliable, high-performance machinery,” says V G Sakthikumar. Government initiatives such as PM Gati Shakti, aimed at improving multimodal connectivity and infrastructure across the country, have created immense demand for high-quality concrete

equipment to support large-scale transportation projects such as highways, railways, and ports. Similarly, the Smart Cities Mission, which focuses on the development of sustainable and technologically advanced urban spaces, has driven the need for efficient concrete machinery to build smart infrastructure, including roads, buildings, and public amenities. The Pradhan Mantri Awas Yojana (PMAY), an affordable housing initiative, has significantly increased the demand for concrete in residential construction, prompting the use of advanced mixers, batching plants, and other concrete equipment. Large-scale infrastructure initiatives like Bharatmala Pariyojana (for highway expansion) and Sagarmala (for port development) have further accelerated the need for concrete equipment capable of handling high volumes and maintaining strict quality standards. In addition to boosting demand,



these government schemes also encourage the adoption of sustainable practices. The government's emphasis on reducing carbon footprints and promoting green technologies has led to incentives for the adoption of low-carbon concrete and eco-friendly equipment, creating an environment conducive to the development of advanced, energy-efficient concrete machinery. These schemes not only help manufacturers stay competitive in a rapidly evolving market but also foster innovation, making concrete equipment more efficient, sustainable, and suited to modern construction needs. This supportive policy landscape has thus become a key driver of growth and technological advancement within the concrete equipment sector.

Manufacturers' initiatives and launches

Putzmeister has introduced 30m and 40m class Sany Truck Mounted Boom Pump including SY37

Gold and SY43. Supported by the Putzmeister service network, these boom pumps offer customers higher performance and value. The company's Transit Mixers P7 +, P8 PTO, P9 PTO and P10 PTO offer customers' higher carrying capacity to help maximize fuel efficiency and their Batching Plants MT 1.5 and 2.0 are characterized by longer mixer life and higher productivity. "We are in the process of introducing iONTRON to customers in India. We are field testing a CNG-powered Mobile Line Pump for the Indian market," says Kanjanabha Bhattacharyya. Schwing Stetter India has launched an all-women service centre in Chennai. The service centre will be staffed by a team of 17 skilled women technicians, all aged between 20 and 25. Their expertise spans servicing and overhauling a diverse range of concrete pumps and mixers, encompassing everything from troubleshooting component malfunctions and carrying out preventive maintenance to providing comprehensive machine servicing. AJAX Engineering has launched Concrete GPT, an AI-driven platform designed specifically for India's construction and concreting industry which aims to serve constructions and concrete specialists by offering a vast repository of expert-validated technical information on market insights, innovations, and regulatory updates.

Hiccups & Challenges

The concrete equipment industry faces several challenges, with one of the primary concerns being the inadequate awareness and weak regulations surrounding the quality of concrete used in large infrastructure and housing projects. "Concrete machinery manufacturers are currently facing challenges such as fluctuating raw material prices, stricter environmental regulations, and a shortage of skilled labour. To meet regulatory requirements, we are committed to sustainable practices, including the use of eco-friendly materials and technologies that reduce emissions. Our R&D efforts focus on cost-effective, environmentally compliant solutions that ensure high-quality products at competitive prices," says V G Sakthikumar. For world-class construction, adherence to the highest quality standards is crucial - not only in the equipment and processes but also in the materials used, such as concrete. The lack of stringent quality control and oversight has led to incidents like bridge collapses and other structural failures, highlighting the risks associated with substandard materials. Increasing awareness through



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targeted education campaigns, along with implementing stricter regulations and quality checks, will be essential in preventing such disasters and ensuring the safety and longevity of infrastructure projects. “Increasing awareness through education and stricter regulations will help prevent disasters like the spate of bridge collapses that have recently made the news,” says Kanjanabha.

Another significant challenge is the lack of clear guidelines regarding the adoption of green energy and electric vehicles within the construction sector. As the global focus shifts towards sustainability, concrete equipment manufacturers are under pressure to align their operations with the government’s initiatives for carbon reduction and green construction. However, without a clearer direction from policymakers and regulatory bodies,



companies struggle to develop solutions that meet both industry needs and sustainability goals. Establishing clear frameworks and incentives for green energy integration and electric vehicles in concrete equipment would not only streamline the adoption of environmentally friendly technologies but also position the industry as a key player in the nation’s efforts to reduce its carbon footprint. Addressing these challenges through improved regulations and guidelines would pave the way for a safer, more sustainable, and technologically advanced concrete equipment sector.

To the rescue

The availability of loans and financial schemes plays a crucial role in enabling the acquisition of concrete equipment, particularly for small and medium-scale contractors. Financial tie-ups are equally important for purchasers of concrete machinery, as

they provide access to affordable financing options to acquire high-quality concrete machinery. Through strategic financial partnerships with banks, equipment leasing firms, or manufacturers offering financing plans, purchasers can secure the necessary funding to acquire the latest equipment without compromising cash flow. “SCHWING Stetter India provides flexible financial services through our partnerships with leading financial institutions, offering attractive leasing, rental, and financing options to make our products more accessible to a broader customer base. This commitment to after-sales service and financial flexibility has contributed significantly to our customer satisfaction and long-term partnerships” says V G Sakthikumar.

After-sales services play a critical role in customer retention and brand growth. Timely maintenance, technical support, and quality service ensure client satisfaction, fostering long-term relationships and strengthening the company’s reputation in a competitive market. “We offer comprehensive after-sales services, including preventive maintenance, remote diagnostics, and 24/7 customer support to ensure maximum uptime for our clients. Our extensive service network across India allows us to provide prompt assistance whenever and wherever needed,” says V G Sakthikumar. Putzmeister has opened new service centres in Hyderabad, Bengaluru, Mumbai and NCR. “We enhanced our parts availability, and support customers through 5 service centres, 45 service locations, and 23+ parts warehouses,” says Kanjanabha.

Embracing technology and sustainability

Concrete equipment has become indispensable for modern construction, offering solutions that blend efficiency with sustainability. As the industry evolves with cutting-edge technologies like IoT and AI, manufacturers are empowering contractors with tools to meet stringent project deadlines while promoting eco-friendly practices. As infrastructure projects continue to expand, the demand for concrete equipment is set to grow. To remain competitive, Indian concrete equipment manufacturers must prioritise innovation by adopting advanced technologies such as artificial intelligence (AI), the Internet of Things (IoT), and smart sensors. These technologies can transform machinery by enabling real-time data collection, predictive maintenance, and enhanced operational efficiency, helping manufacturers stay ahead in this competitive market.

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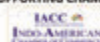
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Shift toward green concrete machinery is crucial for the industry's future



Our mixers are engineered for efficient mixing with minimal downtime, even for complex concrete formulations,

V G SAKTHIKUMAR,
Chairman & Managing
Director, SCHWING
Stetter India

What are the current trends shaping the concrete equipment industry?

The concrete equipment industry is currently driven by several key trends, including digitalization, automation, and sustainability. The rise of smart technology and IoT integration in concrete equipment enables real-time monitoring, predictive maintenance, and overall operational efficiency. Additionally, sustainability has become a priority, leading to a focus on green concrete machinery that reduces emissions and energy consumption. At SCHWING, we are at the forefront of these advancements, ensuring our equipment not only meets industry standards but also aligns with the growing demand for eco-friendly solutions in the construction sector.

How is the demand for concrete equipment evolving in infrastructure and urban construction projects? What factors are driving the adoption of advanced concrete machinery?

The demand for concrete equipment is surging due to large-scale infrastructure projects like highways, metro systems, and urban development initiatives. Factors driving the

adoption of advanced concrete machinery include the need for faster project completion, higher quality, and improved operational efficiency. Equipment that offers precision, speed, and sustainability is highly sought after, as these projects require reliable, high-performance machinery. SCHWING's equipment is designed to meet these needs, with innovations that enhance productivity, reduce costs, and minimize the environmental impact, making it ideal for complex, large-scale infrastructure projects.

Can you explain the role of IoT and data analytics in optimizing concrete batching plants?

IoT and data analytics are revolutionizing the way concrete batching plants operate. IoT-enabled systems provide real-time data on plant performance, helping operators monitor key metrics, prevent breakdowns, and optimize efficiency. SCHWING's batching plants utilize advanced IoT features to offer predictive maintenance alerts, optimize mix accuracy, and ensure consistent quality. By leveraging data analytics, we enable operators to make informed decisions that increase productivity and reduce

waste, making the entire operation more cost-effective and sustainable.

How have the advancements in concrete pumps or mixers significantly increased productivity?

Recent advancements in concrete pumps and mixers have led to substantial productivity gains. SCHWING's innovative pumping technology delivers higher pressure and flow rates, enabling faster concrete placement and reduced project timelines. Our mixers are engineered for efficient mixing with minimal downtime, even for complex concrete formulations. This enhanced capability allows contractors to complete projects with fewer delays and increased precision, ultimately saving time and costs. The result is greater output with less fuel consumption, contributing to both productivity and sustainability.

industry's commitment to environmental responsibility, supporting our clients in meeting sustainability targets.

How do you see the popularity and role of electric concrete in driving the green momentum?

Electric concrete machinery is gaining popularity as a cleaner, quieter alternative that reduces reliance on fossil fuels. While still in the early stages, electric technology has the potential to significantly lower emissions in urban areas and sensitive environments. SCHWING is actively exploring electric and hybrid options as part of our green innovation roadmap. We believe electric machinery will play an essential role in achieving net-zero goals and driving the industry's green momentum, particularly as advancements in battery technology and charging infrastructure improve.

including the use of eco-friendly materials and technologies that reduce emissions. Our R&D efforts focus on cost-effective, environmentally compliant solutions that ensure high-quality products at competitive prices.

How do you see the role of concrete equipment changing as the construction industry embraces digitalization and sustainability?

As digitalization and sustainability become central to construction, concrete equipment is evolving to be more integrated, intelligent, and environmentally friendly. SCHWING is committed to leading this transformation by incorporating IoT, AI, and telematics in our machinery. This shift not only enhances operational efficiency but also supports remote management and eco-conscious operations, making our equipment adaptable to the digital and green demands of modern infrastructure projects. This evolution ensures that concrete equipment remains an enabler of sustainable, high-tech construction practices.

How do current government policies support the transition to green concrete machinery, and what additional measures would further encourage this shift?

Current government policies promoting green energy and sustainable construction practices are beneficial for the transition to green concrete machinery. Subsidies, tax incentives, and support for R&D initiatives in eco-friendly technology have been instrumental in accelerating this shift. However, further measures, such as stricter emissions regulations and incentives for electric or hybrid equipment, would further encourage industry-wide adoption. SCHWING supports initiatives that enhance sustainability, and we believe a collaborative approach between industry and government will drive meaningful progress toward a greener construction future.

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With a growing emphasis on sustainable practices, green concrete machinery has become essential. Can you share your thoughts on this shift and its importance?

The shift toward green concrete machinery is crucial for the industry's future, as sustainability becomes a central focus in construction. Reducing emissions, conserving resources, and minimizing environmental impact are now non-negotiable aspects of equipment design. SCHWING has been a pioneer in this transition, integrating eco-friendly features across our range. From energy-efficient engines to emissions-reducing technologies, our green machinery aligns with the

What are the challenges facing concrete machinery manufacturers, and how are you navigating these challenges, especially the raw material price hikes, environmental regulations, and skilled labour shortages?

Concrete machinery manufacturers are currently facing challenges such as fluctuating raw material prices, stricter environmental regulations, and a shortage of skilled labour. SCHWING addresses these by implementing a lean manufacturing approach to minimize material costs and by investing in training programs to build a skilled workforce. To meet regulatory requirements, we are committed to sustainable practices,

MB Crusher to showcase Advanced Crushing and Screening solutions at Bauma Conexpo India 2024



The company will give live demo of BF90.3 Crusher Bucket and MB-S18 screening bucket to demonstrate efficiency and sustainability in construction

MB Crusher, a global leader in crushing and screening solutions, will be participating in Bauma Conexpo India 2024 at the India Expo Centre in Greater Noida, Delhi NCR. From December 11 to 14, 2024, MB Crusher will be hosting a live demonstration of two of its flagship products, the BF90.3 crusher bucket and the MB-S18 screening bucket, at stall O.F10. This event will showcase MB Crusher's commitment to enhancing productivity, reducing waste, and promoting sustainable practices in construction and demolition.

We're thrilled to be part of Bauma Conexpo India 2024, with India's rapidly growing construction sector, this event provides an excellent opportunity to demonstrate the capabilities of our BF90.3 and MB-S18 machines. Our live demo will allow visitors to see firsthand how MB Crusher's solutions can help companies save on costs and boost project efficiency.

Bringing industry-leading solutions to India's growing construction market

The BF90.3 crusher bucket is one of MB Crusher's most popular models, engineered to crush a wide range of materials including concrete, granite, stone, and demolition debris. This machine allows companies to recycle materials on-site, significantly cutting down on transportation and disposal costs. Known for its durability, the BF90.3 is suited for demolition, road construction, and mining projects where sustainability and cost savings are top priorities.

The MB-S18 screening bucket is designed for versatility, with the ability to sort and separate materials such as soil, gravel, and rubble. This model helps improve productivity across multiple applications, from landscaping to waste recycling, allowing project managers to maximize efficiency and reduce operational expenses.

Demonstrating innovation and efficiency at Bauma Conexpo India 2024

MB Crusher's live demo at Bauma Conexpo India 2024 will give attendees an immersive experience with the BF90.3 and MB-S18, highlighting their cutting-edge features and operational advantages. The event is expected to draw thousands of industry professionals looking for innovative solutions in construction and mining, and MB Crusher is prepared to showcase how its machinery can improve worksite operations.

In addition to the demo, MB Crusher experts will be available throughout the event to discuss custom solutions and answer questions on how its technology can meet the unique needs of diverse projects. Attendees will have the chance to learn about the environmental benefits of on-site crushing and screening, which reduces waste and creates sustainable, reusable aggregate.

Key benefits of MB Crusher's machinery

Cost savings: Reduce transportation and disposal expenses by processing materials on-site

Enhanced efficiency: Boost productivity with fast, on-demand crushing and screening

Eco-friendly operations: Promote sustainable construction by turning waste into reusable materials

Join MB Crusher at Bauma Conexpo India 2024 – Stall O.F10

MB Crusher invites all industry professionals, project managers, and enthusiasts to visit its stall O.F10 from December 11 to 14, 2024, to experience the future of crushing and screening technology. Don't miss this chance to learn how MB Crusher's machines can help you achieve greater efficiency, profitability, and sustainability on your projects.

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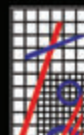
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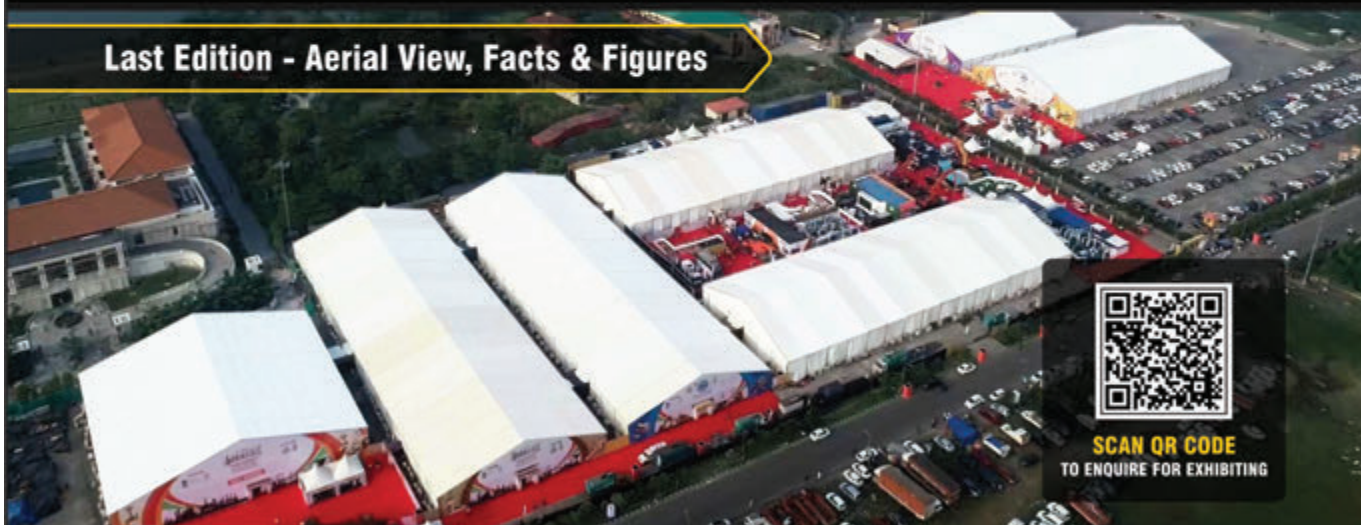
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Strengthening India's Foundations



GAGAN GOSWAMI
Managing Director,
Heritage Infraspaces India

Gagan Goswami's journey from a humble upbringing in a small village Gandhi sagar in Madhya Pradesh to becoming a paramount force in India's infrastructural development is nothing short of inspiring. As a civil engineer, Gagan Goswami is not just architecting modern and safe foundations of city landscapes; he is laying the groundwork for the nation's growth and progress. His work symbolises the transformative power of infrastructure in nation-building, turning visions of development into a solid reality that represents the longevity to the ongoing growth of Indian infrastructure.

Gagan Goswami demonstrated his capability to manage and execute complex projects by contribution to India's infrastructure development as a project engineer during the construction of the Delhi Metro - an iconic project now integral to the daily lives of millions. In 2011, he channeled this expertise into founding Heritage Infraspaces India. By 2024, his company was instrumental in constructing the new CCS Parliament Building and further expanding the Delhi Metro, both critical to the nation's growth. His vision reflects the foundation for a more connected and advanced urban India.

Heritage Infraspaces India, under the dynamic leadership of Gagan Goswami, has set a new standard in the construction industry with its innovative adoption of Diaphragm Wall technology. As the pioneers of this technique in India, the company has expanded its reach across 35 cities in 15 states, offering a game-changing solution for constructing robust and safe basements. This technology not only enhances construction speed and cost efficiency but also drastically reduces the risk of accidents associated with traditional methods. Heritage Infraspaces' mastery of Diaphragm Wall construction addresses complex challenges such as precise excavation in confined spaces, safeguarding adjacent properties while ensuring the stability of the entire structure. Their innovation has

positioned them as market leaders, trusted by developers to deliver superior, secure foundations that redefine the future of infrastructure in India.

Gagan Goswami's unwavering commitment to excellence and his ability to overcome challenges have propelled Heritage Infraspaces India to the forefront of the construction industry. Starting from humble beginnings, where the company rented machinery from Italy, Gagan Goswami has transformed Heritage Infraspaces into a powerhouse, now owning the largest fleet of machinery in India and completing over 450 projects. With Ahmedabad as its corporate base, the company has executed landmark projects, including a 900-meter Diaphragm Wall at Sardar Vallabhbhai Patel International Airport and a 550-meter Diaphragm Wall for the iconic Trogon commercial tower on SG Highway. Heritage Infraspaces has also played a pivotal role in national infrastructure, constructing seven basements for a major DLF project in Gurgaon and contributing to the Kanpur Metro Rail by building Diaphragm Walls for three stations. Expanding their expertise beyond India, Gagan Goswami has alliance a strategic joint venture with Associated Builders Corporation Limited (ABC) in Bangladesh, marking a significant step into international territory with large-scale infrastructure projects, including Metro Rail systems. His work not only sets new benchmarks in construction but also showcases the far-reaching impact of Heritage Infraspaces under his leadership.

In the land of boulder rocks, Gagan Goswami's strong ethics and visionary mindset have driven him to reshape the construction landscape with innovative Diaphragm Wall technology. His dedication to continually advancing this field has established new industry benchmarks. Alongside his team, Goswami remains committed to exploring uncharted territories, ensuring that Heritage Infraspaces not only leads in innovation but also contributes meaningfully to societal progress and infrastructure development. EPCWorld

One word
to describe
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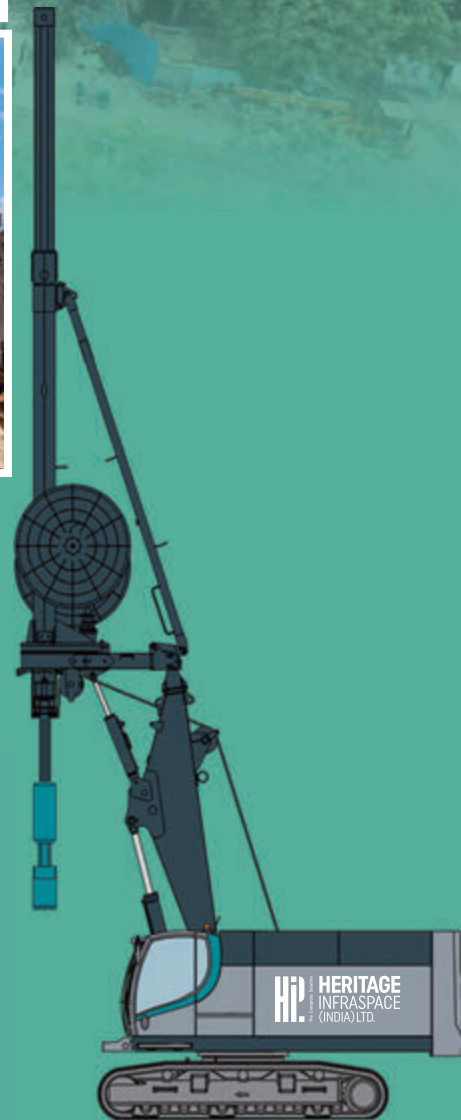
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Columbia Machine

Pioneering innovation in concrete production

The company is revolutionising the Indian market with advanced solutions like concrete block machines and wet press technology. By addressing industry challenges and driving innovation, the company is empowering infrastructure growth with high-quality, durable concrete products tailored to evolving market demand

Columbia Machine, a global leader in concrete production technology, is driving innovation in the Indian market. We specialize in concrete block machines and concrete wet press solutions, catering to the growing demand for high-quality concrete products.

Key trends shaping the industry

- **Demand for superior quality:** Customers seek high-strength, dimensionally accurate concrete products with superior finishes. Our patented Vertical Mold Vibration Technology delivers exceptional results.
- **Automation for efficiency:** To address rising labor costs, automation solutions for green product stacking and finished product cubing are in high demand.
- **Expanding product range:** There is an increase in demand for Concrete Wet Press products like kerb stones, saucer drains, RCC drain covers, and paving slabs.

Leading the way in concrete production technology

Columbia Machine, through its acquisition of Wil El Mil in October 2022, has strengthened its position as a global leader in Concrete Wet Press technology. We're proud to bring this cutting-edge technology to India, manufacturing state-of-the-art Single Station Wet Press machines at our advanced facility in Vadodara, Gujarat.

Addressing industry challenges

A segment of customers favours Columbia Machine's reliable, high-quality solutions over low-cost, delicate alternatives. Our focus on premium products and exceptional customer service has earned us a loyal customer base, including top producers in India.

Additionally, certain Indian manufacturers



DILIP R. SHARMA
President,
Columbia Machine

have started replicating European plant designs and offering them at reduced prices. While these lower-cost alternatives may appeal to price-sensitive buyers, they often lead to "dead" investments, as the initial savings quickly turn into long-term losses due to subpar performance and durability. Those with sufficient resources often return to us after experiencing such disaster, but unfortunately, many are unable to withstand the financial repercussions of such investments. This cycle of low-cost attraction and the ensuing financial strain continues to be a significant challenge in our industry.

Driving infrastructure development

India's rapidly expanding road network presents significant opportunities. Our patented Vertical Mold Vibration Technology enables the production of high-quality segmental retaining wall blocks, ideal for constructing durable flyovers. Additionally, our high-strength, single-layer pavers are being used in major infrastructure projects like the Pradhan Mantri Gramin Sadak Yojana (PMGSY).

Fuelling growth and expansion

Record sales in FY24 have fuelled our commitment to growth. We've significantly increased our manufacturing capacity and office space by another 100% to meet the rising demand for our products. Our global expansion efforts have also gained momentum, with exports to four continents.

A comprehensive solution provider

As a comprehensive equipment manufacturer, we offer a wide range of solutions, from batching and mixing plants to handling systems and molds. This unique capability sets us apart in the industry and contributes to our sustained growth. EPCWorld



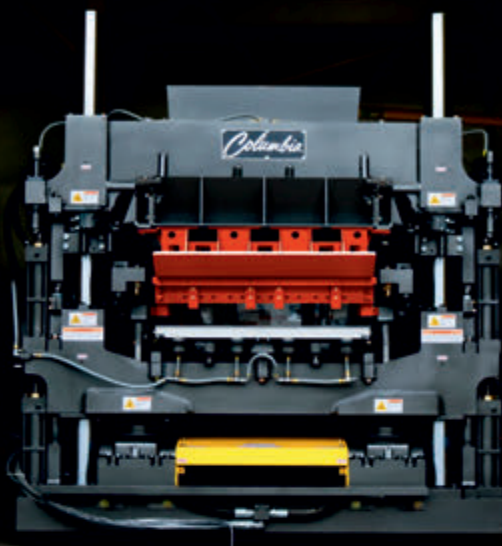
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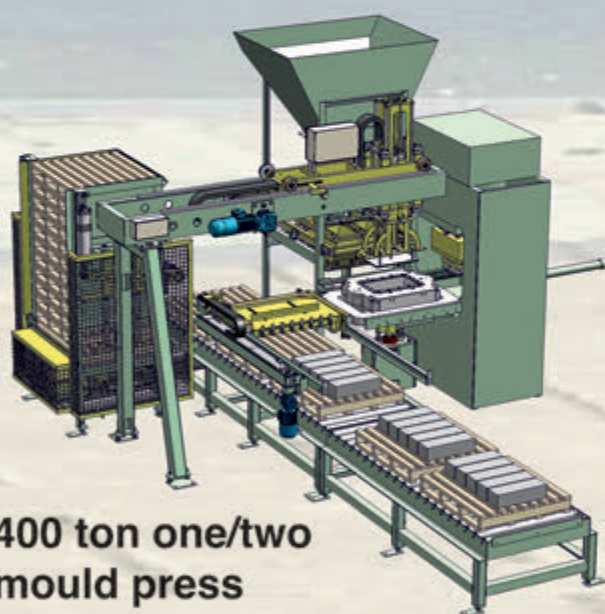
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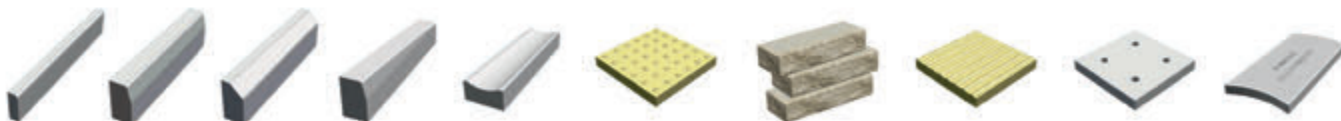
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GKV Infrastructure

Pioneering excellence in Foundation Work



VIJAY VANZARA
Managing Director,
GKV Infrastructure

GKV Infrastructure is an ISO 9001:2015 certified renowned geotechnical solutions and construction business company operating from Gandhinagar (Gujarat) India since 2015. With tons of successful projects & ingenious construction marvels, the company has built an enviable position by engaging in all the facets of Geotechnical Construction Projects. GKV Infrastructure has been raising the construction market with their uncompromising strategies and approach. Their dynamic professional team has several years of experience in delivering Piling Work, Sheet Piling Services, HDD work and Soil anchoring services. Every member of GKV Infrastructure is like a family and they take appropriate measures to safeguard them from on-site risks. They have developed trust relations with their past and present clients through their innovative geotechnical solutions and scheduled delivery.

Our services

Diaphragm wall construction services

GKV Infrastructure is one amongst leading foundation work providers. One of their fine construction services is Diaphragm wall (D-Wall) construction service. Diaphragm walls, also known as Slurry walls, are an important structure to accelerate certain construction activities.

Soil/Rock anchoring

Rock & Soil Anchoring task plays a vital role when it comes to slope stability. Anchors are the earth retention devices that are used to pass the force to the soil. Anchoring retain the structure from collapsing giving it a better life.



Piling work service

GKV Infrastructure is a glorified high grade Piling work service provider. Piling work belongs to complex construction areas where precision speaks. Foundation is the most important section of the whole construction and if the laid foundation is weak the structure won't last long. Piling is a technique that helps in laying strong foundation.

Top down construction

GKV Infrastructure has been flourishing civil engineering sector by undertaking big projects and completing them successfully. The company has their own service list and one of them is Top Down construction services in India. Alike other construction methods this is a reverse approach where upper section is built prior to the lower. It may sound strange and impossible but this is the level the company has reached with their consistent efforts.

The company also proves earth moving equipment for trading, rental & job work. EPCWorld



INDIA'S LEADING DIAPHRAGM WALL COMPANY

OUR SERVICES



**Diaphragm Wall
Construction Services**



Soil/Rock Anchoring



Piling Work Service



AAC Block Provider



**Earth Moving Equipment Providing
For Trading, Rental & Job Work**



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The future of modular construction

Efficiency meets innovation



In an industry often seen as traditional and resistant to change, modular construction is today widely seen as a modern solution for a variety of housing projects across size and scale. Embracing this shift will not only help build more dynamic and sustainable cities but will also pave the way for a resurgent India

As urban settlements and housing demand grows and construction technology continues to advance, the construction industry has found new methods and techniques that can build homes faster, more efficiently, and with less impact on the environment. Modular construction is today widely seen as a modern solution for a variety of housing projects across size and scale. This approach offers the flexibility and speed that traditional methods struggle to match, making it a vital part of the future of construction.

Modular construction is a process where parts or "modules" of a building are constructed off-site in a factory and then assembled at the building location. This method contrasts with traditional construction, which is done entirely on-site and is often slowed by weather, site conditions, and other factors.

In India, where rapid urbanization has led to a need for affordable housing and quick infrastructure development, modular construction can be a game-changer. By producing building components in a controlled environment, developers can deliver projects

faster and with higher quality standards.

One of the main advantages of modular construction is its efficiency. Since parts are built in a factory, external factors like weather and site conditions do not affect the project timeline as much. This can reduce construction time by up to 50% compared to traditional methods, which means new buildings can be ready for use in half the time.

Also, given that construction is a major contributor of economic growth and job creation, this efficiency not only speeds up nation-building but also helps create more job opportunities. Faster project completion further means quicker returns for investors and earlier benefits for communities, which is especially valuable in rapidly growing cities.

Technology is essential to the success of modular construction, enabling it to reach high levels of quality, precision and efficiency. Building Information Modeling (BIM) is one of the foundational technologies enabling modular construction. BIM allows creation of advanced digital 3D models that detail every part of the build. These models help avoid mistakes, reduce waste, and plan every step with accuracy.

Companies like Trimble Solutions are leading providers of powerful BIM software that can bring highly accurate structural design to modular projects. Combining BIM with automation and other advanced tools makes modular construction even more innovative, allowing teams to build complex structures with greater speed and quality. As this technology continues to evolve, modular construction becomes an even more attractive option for building residential projects in India and around the world.

Sustainability is another area where modular construction has a significant edge. Traditional construction often leads to a large amount of material waste as on-site projects are more challenging to control. In contrast, building in a factory setting reduces waste by standardising materials and minimising errors. In some cases, modular construction can reduce waste by as much as 80 percent.

Beyond reducing waste, modular components can also be disassembled and repurposed for new projects. This aligns well with sustainable development goals and makes modular construction an environmentally friendly choice. For India, where environmental pollution and resource scarcity are major concerns, this sustainable approach can support the country's goals for cleaner, greener infrastructure.

As India plans for futuristic and sustainable cities with affordable housing and sustainable infrastructure, modular construction stands out both as a practical solution and a powerful enabler. With its ability to deliver high-quality buildings faster, modular construction can be key in achieving India's urbanization and development goals.

What next for modular construction

Looking ahead, integrating modular construction with smart technologies like the Internet of Things (IoT) and Artificial Intelligence (AI) is likely to unlock even more productivity and efficiency gains. For instance, IoT devices can monitor all aspects of factory operations including the construction progress in real time and ensure

optimal quality and efficiency. Powered by this data, AI algorithms can help predict maintenance needs and manage resources both in factory and onsite. Such advancements mean modular construction won't just be fast and efficient - it could be intelligent as well.

Despite its benefits, modular construction still faces challenges that need to be addressed. One major hurdle is the high initial cost of setting up modular factories and facilities. Also, there may be concerns from builders and developers about how well modular components meet local building codes and quality standards.

However, these challenges will likely diminish as the technology becomes more widely understood and as industry leaders like Trimble Solutions continue to develop and promote it. Collaboration among government, private companies, and technology providers will also play a role in making modular construction a common choice across India.

Ultimately, modular construction represents a promising future for the construction industry. With its potential to speed up building processes, minimize waste, and support sustainable development, this approach could help India meet its urban infrastructure goals faster and more efficiently. By integrating smart technologies, modular construction could also provide a smarter way to build, ensuring quality and adaptability for years to come.

In an industry often seen as traditional and resistant to change, modular construction is a beacon of innovation and progress. Embracing this shift will not only help build more dynamic and sustainable cities but will also pave the way for a resurgent India. The future of construction is here, and it is modular.

EPCWorld



HARSH PAREEK
*Regional Sales Director,
India and SAARC
Trimble Solutions*

India's office market is set for robust growth, driven by the expansion of Global Capability Centres and strong contributions from flex operators, financial services, manufacturing, and tech outsourcing sectors. With the country aiming for a larger share of global manufacturing, the office market is well-positioned to capitalize on the opportunities and scale new heights...

Adapting to evolving workplace dynamics



Commercial real estate is experiencing a significant shift, with growing demand and increasing investment driving the market forward. According to a report “Leading the Charge: Crafting the Skylines of Tomorrow” released jointly by Confederation Indian Industries (CII) and CBRE, equity investments in Indian real estate may rise 49 percent to USD 11 billion this calendar year amid strong demand for properties. The report further states investment activity in India’s real estate market scaled a new peak in the first nine months of 2024 due to resurgence in capital deployment in the July to September quarter. Equity capital inflows touched USD 8.9

billion between January and September, registering a 46% Y-o-Y growth. The average deal size also increased to nearly USD 45 million in the first nine months of 2024 from about USD 36 million in 2023. Mid-sized deals, ranging between USD 10-50 million, represented 56 percent of the total investment inflows during this period. In 2023, the equity investments in real estate stood at \$7.4 billion. Debt financing also hit a record high, exceeding \$4.7 billion from January to September 2024, registering more than twofold increase YoY. The report points out, Gateway cities such as Delhi-NCR, Mumbai, and Bengaluru remained the preferred markets with a cumulative share of over 63 percent in investment inflows in January-September 2024; Delhi-NCR witnessed the highest share of ~26% in capital inflows (amounting to ~USD 2.3 billion). Equity capital inflows into tier-II and III cities also reached nearly USD 0.6 billion, with Ludhiana, Mohali, Tuticorin, Hubli, Coimbatore, and Indore collectively accounting for ~76 percent of these inflows. Domestic investors (predominantly developers) invested nearly USD 6 billion during the first nine months of the year, dominating the overall capital inflows with an almost 65% share. In comparison, foreign investors contributed about USD 3.1 billion during the same timeframe. Notably, North American and Singaporean investors were the significant contributors, representing approximately 85 percent of all foreign capital inflows.

Upward momentum in office space demand continues

According to CBRE, the office sector witnessed a resurgence of inflows during January-September 2024, with a nearly 50 percent YoY growth. Land / development sites and the office sector cumulatively attracted more than 70 percent of the investment flows during this period. According to a report by Colliers, strong leasing activity in the first three quarters of 2024 has pushed Grade A office space demand to 46.7 million sq ft across the top six cities of the country. Building on the momentum in first half of the year, Q3 2024 saw space take-up to the tune of 17.3 million sq ft, a 31 percent YoY growth. Bengaluru and Hyderabad accounted for over half of the leasing activity during this period. Bengaluru registered its highest ever leasing in any quarter at 6.3 million sq ft, continuing its dominance in the



office market. “Office space demand in Bengaluru, Hyderabad and Mumbai have reached close to or surpassed 2023 demand levels in the first three quarters of 2024. Occupier confidence is reflected in continued higher uptake of large-sized deals of more than 1 lakh sq ft, accounting for 65 percent of total leasing in Q3 2024. Bengaluru saw 81 percent of its leasing through large-sized deals, while Pune followed closely with 71 percent, driven by the Tech and BFSI sectors,” says Arpit Mehrotra, Managing Director, Office services, India, Colliers. The report further states, technology sector drove around one-fourth of the overall office space demand during the quarter, followed by BFSI occupiers and Flex space operators. Interestingly, Bengaluru and Pune surpassed Mumbai in BFSI leasing, and accounted for 39 percent and 25 percent share respectively in overall BFSI leasing during the quarter. Flex spaces too saw significant leasing of 3.4 million sq ft in Q3 2024 and accounted for almost 20 percent share in overall leasing.



According to a report by JLL India, office space leasing activity continues to show tremendous momentum with the Q3 (July-September 2024) numbers at 19.89 million sq ft, the second highest ever quarterly gross leasing volumes. For the nine-month period January-September 2024, gross leasing volumes now stand at 53.43 million sq ft. “India’s office market has seen flex emerge as a powerhouse occupier segment. Flex operators have claimed an unprecedented 22 percent of Q3 leasing activity, surpassing traditional frontrunners like Tech and BFSI. With a record-breaking 4.38 million sq. ft leased in Q3 alone, and 10.23 million sq. ft in the first nine months of 2024, the flex segment is on track to shatter its previous annual record set at 10.4 million sq. ft in the year 2019,” says Dr Samantak Das, Chief Economist and Head of Research and REIS, India, JLL.

According to a report by Knight Frank India, office transaction volumes have grown by 18% YoY and scaled a record high of 1.77 mn sq m (19 mn sq ft) in Q3 2024. In YTD terms, transaction volumes are 27% higher than the comparable period in 2023 and the market is firmly on course to breach a fresh annual high in 2024. The report further mentions the Bengaluru office market saw the maximum growth in transaction volumes in Q3 2024 at 158%YoY and was by far the largest contributor to the overall tally. The momentum in this market has built up steadily over the past four quarters to a near record high of 0.5 mn sq m (5.3 mn sq ft) during this period. NCR and Chennai grew at 26% and 35% YoY respectively in Q3 2024, being the other prominent markets which saw significant growth. 1.07 mn sq m (11.5 mn sq ft) of office space attained completion during Q3 2024. Hyderabad, with 0.4 mn sq m (4.2 mn sq ft), accounted for 39% of the office space delivered during the quarter. Bengaluru and Pune were the only other markets that saw significant deliveries during the quarter at 0.2 mn sq m (2.5 mn sq ft) and 0.3 mn sq m (2.7 mn sq ft) respectively. The overall vacancy levels have dropped significantly to 14.9% in Q3 2024 compared to 16.4% previously (Q3 2023) as development activity has lagged transactions consistently since the beginning of 2023.

Flex space, which gained prominence during the pandemic, has emerged as a transformative solution in the commercial real estate sector. With businesses embracing hybrid work models and prioritizing cost-efficiency, the demand for flexible office spaces has soared. These spaces provide scalability, reduced capital expenditure, and adaptability to fluctuating workforce needs, making them an attractive option for startups, SMEs, and even large enterprises. Moreover, the rise of remote work has driven the need for satellite offices closer to employees’ homes, further boosting the flex space market. This trend is reshaping urban office landscapes. According to Knight Frank India, in Q3 2024. Rental levels in the larger office markets of NCR, Mumbai and Pune grew by 3% YoY, while Bengaluru and Chennai rents grew by 7% and 10% YoY respectively. According to a report by Colliers, about 45% and 35% of mid and large sized companies respectively are carrying out their core business operations in flex spaces. Notably, with increasing technology adeptness in flex spaces, about 40% of the technology sector occupiers are using flex spaces for core business operations.



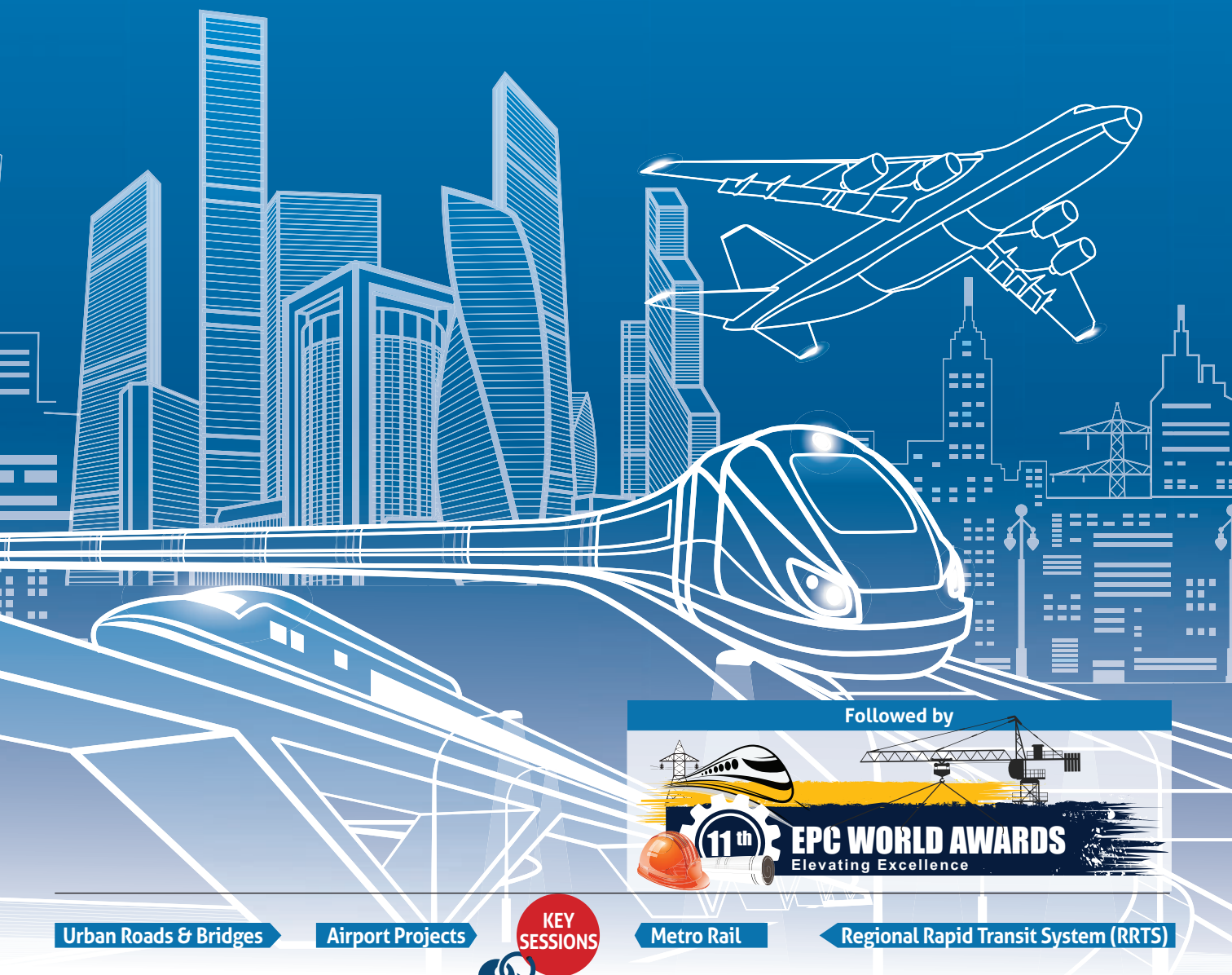
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GCC takes centre stage

According to JLL India, Global Capability Centres (GCCs) now occupy more than 240 million sq. ft of Grade A office space across the country's top seven cities (Mumbai, Delhi NCR, Kolkata, Bengaluru, Chennai, Bengaluru and Pune). Bengaluru leads the pack, accounting for approximately 42% of the total space occupied by GCCs. According to a report by Knight Frank India, the absorption of office space taken up by GCCs at a pan India level is estimated to reach around 26 mn sq ft by the year 2027 which itself will be a ground-breaking figure for the GCC market in India, as the global economy is in turmoil with tight monetary policies. India has a good support system with political stability, a healthy consumption based economy and a diligent regulatory system for the financial sector. One of the major drivers of the GCCs to reach an absorption of 26 mn sq ft is software exports which remains an important part of India's service exports with offshoring services seeing continued growth. Other important drivers for growth include a skilled workforce especially in the technology sector, expansion into Tier 2 cities as satellite centres, favourable government policies and improved infrastructure. Overall, a positive momentum in growth for GCCs in India is expected with all the economic, demographic and social factors favouring India.

Uptick in industrial & warehousing demand

India's industrial and logistics sector has witnessed substantial growth in recent years, driven by its critical role in supporting industries such as manufacturing, agriculture, and e-commerce. This growth is essential for the nation to achieve its ambitious economic targets, including a projected GDP of USD 5.5 trillion by 2027. While the sector faces numerous challenges, it also presents significant opportunities to enhance efficiency, drive innovation, and strengthen India's economic foundation. According to a report, "Unravelling the trends shaping India's real estate market in 2024" by CBRE Research, pan-India industrial and logistics (I&L) leasing activity reached 27.5 million sq ft. in the first nine months of 2024, witnessing a moderation on an annualised basis. Delhi-NCR, Kolkata, and Bengaluru dominated the absorption, cumulatively accounting for almost 61 percent of the total space take-up. In terms of tenant sectors, third-party logistics (3PL) players dominated the leasing activity with a share of about 39 percent, as occupiers continued to outsource their storage and delivery capabilities to minimise lead times and optimise costs. This was followed by engineering & manufacturing (E&M) and retail firms, which together accounted for about 30 percent of the total space take-up.

According to a report by Knight Frank India "India Warehousing Market Report – Q3 2024" warehouse transactions across eight key Indian markets reached 14.65 mn sq ft in Q3 2024 (July–September). Notably, 41 percent of these transactions involved Grade A spaces. The manufacturing sector outperformed the 3PL sector in leasing volume, marking a significant shift, as 3PL has traditionally dominated the Indian warehousing market. Manufacturing industries accounted for 37 percent of total transactions, leasing 14 mn sq ft from January–September 2024. Pune emerged as the most expensive warehousing rental market among the eight cities analysed in the country, with an average rent of ₹26.9/sq ft/month. Kolkata, Chennai, and Mumbai followed at ₹23.9/sq ft/month each. Healthy rental growth across markets has been driven by limited supply in recent times. Pune also led in value appreciation, recording nearly 4 percent YoY rental growth in Q3 2024, while Ahmedabad ranked second with a YoY growth of 3.50 percent during the same period. According to a report by Vestain, industrial & warehousing sector recorded a single deal valued at USD 95 mn, with its share declining to 10% in Q3 2024 from 28% in the same quarter of the previous year. In value terms, investments during the third quarter of 2024 reduced by 50% on year and 94% on quarter. Government is targeting to reduce logistics cost to 5-6% of the GDP the current 8-9% currently, which may boost industrial and warehousing sector, further attracting investments.

Reshaping skylines

India's commercial real estate sector is undergoing a dynamic transformation driven by robust investment activity, increasing demand across office, industrial, and logistics spaces, and the rise of flex and Grade A facilities. Key trends such as the growing prominence of flex spaces, the expansion of Global Capability Centres (GCCs), and the significant uptake in warehousing and industrial demand underline the sector's resilience and adaptability. Additionally, the substantial equity and debt inflows highlight investor confidence in the market's long-term potential, supported by government initiatives and favorable economic conditions. The sector's continued growth is a testament to India's evolving real estate landscape, which is not only meeting domestic requirements but also positioning itself as a global leader in innovation and infrastructure. As the market continues to diversify and mature, it is poised to play a pivotal role in shaping the country's economic trajectory, reaffirming its status as a cornerstone of India's urban and industrial development.

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