

CONSTRUCTION **TIMES**

VOL. 9 ■ ISSUE: 09 ■ ENGLISH - MONTHLY ■ THANE ■ JANUARY 2023 ■ PAGES: 132 ■ PRICE: ₹ 100

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Dear Readers,

It's New Year once again, another year of hopes and expectations. After wading through unprecedented challenges in the past couple of years, the industry and economy are back on track. The Indian construction and infrastructure sector is gearing up with aggressive plans of infrastructure creation. Many mega projects are under execution and many are in the pipeline under the government's National Infrastructure Pipeline (NIP) programme powered by the PM GatiShakti Master Plan. After a temporary slowdown, the momentum has taken pace this year and is expected to surge ahead. According to reports, the roads & highways project execution faced some slowdown in the last couple of years. While the government has planned to construct a large number of highways and expressways in the coming years, it is imperative to speed up the construction. While the Railways and Metros segment is doing well, the Ports and Airports sectors look promising in the year ahead. Power sector is gaining pace with the new developments happening in renewable energy segment. Overall the industry sentiments are back with optimism. On this occasion, our Cover Story is on Infra Outlook. How will be the Year 2023 for Indian construction and infrastructure sector? What could be the trends to look for in the year ahead? What could be the key challenges and what will drive the growth? The Cover Story explores the market outlook of Indian infrastructure and construction sector with views from key industry stakeholders.

The bauma CONEXPO INDIA 2023 is here after a gap of almost four years. According to the organizers, this edition is bigger compared to the previous editions in terms of exhibitor participation and expected visitor footfalls. Definitely, the industry was eagerly waiting for this opportunity to meet physically on this platform which was prolonged due to the pandemic impact. The Feature on Construction Equipment presents the latest trends of the Indian CE industry and the market outlook, with a special focus on the bauma CONEXPO INDIA 2023.

Another Feature on Construction Chemicals explores the new products and technology trends with respect to the changing requirements of customers.

The Real Estate Feature presents the market scenario and outlook with industry captains sharing their views and expectations. We also have a Feature on Façade Systems that explores the design and application trends in the current scenario.

Before concluding, I would like to extend a warm invitation to each one of you to attend the Construction Times Awards 2023, which is being held on January 31, 2023 at Greater Noida, co-located with the bauma CONEXPO INDIA 2023.

Wishing all our readers a Happy and Fruitful Year ahead!

Best Regards

Ramamurthy Mayavan
Publisher and Editor-in-Chief

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As we enter another year of hopes and opportunities, how will be the year 2023 for Indian infrastructure and construction sector? What could be the trends to look for in the year ahead? What could be the key challenges and what will drive the growth? **Construction Times** explores the market trends with views from industry stakeholders.



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TRIAL RUN OF NAVI MUMBAI METRO SUCCESSFULLY CONDUCTED

The trial run of metro on line no. 1 of Navi Mumbai Metro Project of CIDCO was successfully conducted between Central Park and Belapur stations on 30 December 2022. Maha Metro has been appointed as an engineering assistance for the implementation of Metro line no. 1.

On this occasion, Dr. Sanjay Mukherjee, Vice Chairman and MD, CIDCO; Dr. Brijesh Dixit, Managing Director, Maha Metro; Dr K M Godbole, Chief Engineer (Navi Mumbai), CIDCO; Santosh Ombhase, Superintendent Engineer, (NAINA & Metro), CIDCO; Sunil Gujjelwar, Technical Advisor to VC & MD; Anoop Agrawal, Executive Director, Maha

Metro; and Ritesh Garg, Chief Project Manager, Maha Metro were present.

"Prior to this, the trial run of Metro was successfully conducted between Central Park and Pendhar stations under Phase I and the approval of CMRS has also been obtained for this stretch. Now, the trial run of metro has been conducted successfully between Central Park and Belapur stations. Therefore, very soon the dream of metro of citizens of Navi Mumbai will be fulfilled as the commercial operation on whole Metro line no. 1 will commence very soon," said Dr Mukherjee.

With an objective of strengthening the public transport system in Navi Mumbai, total four elevated metro corridors are being developed by CIDCO under Navi Mumbai Metro Project. The Line 1 from Belapur to Pendhar with 11 stations is of 11 km length. The work of viaduct on this line has been completed and very soon all 11 stations will be ready to be commissioned for commercial operation.



NTPC STARTS COMMERCIAL OPERATION OF PART OF ETTAYAPURAM SOLAR PV PROJECT

Consequent upon successful commissioning, first part capacity of 162.27 MW out of 230 MW Ettayapuram solar PV project at Tamil Nadu, is declared on commercial operation from 10 December 2022. With this, standalone installed and commercial capacity of NTPC has become 57,801.27 MW, while group installed and commercial capacity of NTPC has become 70,416.27 MW.

The remaining 67.73 MW of Ettayapuram is expected to be declared operational within the next week.



Naresh Anand, Regional Executive Director (South), NTPC, has congratulated the NTPC team on achieving the milestone and reiterated NTPC's commitment towards renewable energy. He stated that NTPC Southern Region was augmenting the renewable energy capacity with the addition of the first part of the 230 MW solar plant at Ettayapuram, Thoothukudi District in Tamil Nadu.

TATA PROJECTS, CSIR-IIP INK MOU FOR CLEAN ENERGY SOLUTIONS

TATA Projects inked a Memorandum of Understanding (MoU) with the Council of Scientific and Industrial Research-Indian Institute of Petroleum (CSIR-IIP) to collaborate and work together towards ensuring clean energy solutions.

As part of this endeavor, clean energy solutions such as room temperature bio-diesel produced from CSIR-IIP shall be used across some of Tata Projects' ongoing sites. Further, the partnership will also actively explore utilization of by-product Green Diesel from the existing DILSAAF™ (Drop-In Liquid Sustainable Aviation Fuel and Automotive Fuel) pilot plant at CSIR-IIP's campus in Dehradun and proposed commercial scale demonstration unit in Tata Projects' fleet.

Construction and infrastructure remains one of the largest industry sectors in India. Thousands of light and heavy vehicles, including various types of construction equipment – both small and large – are utilized during

project execution. If even a portion of these vehicles and equipment are migrated from diesel to a cleaner energy source, the shift will ensure lower emissions and a more sustainable future for the sector and the planet.



CSIR-IIP is located at Dehradun and dedicated to R&D in the hydrocarbon sector. Its charter is to provide competitive and sustainable technologies and products to meet the requirements of the ever-growing energy sector and develop capacity and capability in new energy areas such as bio-, hydrogen and solar energy and their innovative combinations.

HCC-MEGHA ENG JV WINS BID TO BUILD MAHSR BULLET TRAIN STATION IN BKC

The joint venture (JV) of Hindustan Construction Company (HCC) and Megha Engineering (MEIL) won the bid for the construction of the Bandra Kurla Complex (BKC) station on the Mumbai-Ahmedabad High-Speed Rail (MAHSR Bullet Train) project in Mumbai. The JV has emerged as the lowest bidder for the project at a cost of around Rs 3,700 crore, according to reports. The National High Speed Rail Corporation Limited (NHSRCL) opened the bids for the tender of the construction of the BKC bullet train station on November 4. The lowest bid for the tender was submitted by MEIL-HCC JV, according to the NHSRCL notification.



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CLEANMAX AND META PARTNER TO BRING 33.8 MW OF NEW RE PROJECTS TO INDIA

CleanMax Enviro Energy Solutions, Asia's leading C&I renewable energy company, has partnered with Meta to invest in 33.8 MW of new renewable energy projects in India. CleanMax will own and operate the projects, while Meta will purchase 100% of the environmental attributes from the projects for years to come.

The 33.8 MW of renewable energy project capacity is made up of 21.6 MW of wind and 12.2 MW of solar, which is in addition to 32 MW of wind energy jointly announced last year. This brings CleanMax and Meta's total investment to 65 MW of new renewable energy

that will be added to India's electrical grid. These projects are part of a larger wind-solar hybrid farm being developed by CleanMax. The overall capacity of the CleanMax wind-solar hybrid farm will stand at 364 MW; comprising 154 MW wind and 210 MWp solar once commissioned.

Solar-wind hybrid plants combine two of the fastest growing renewable energy technologies owing to their complementary nature. These hybrid power plants are highly efficient, provide reliability of continuous power supply and help effectively manage the consumption load.

MAIRE TECNIMONT GROUP, NTPC SIGN MOU TO DEVELOP GREEN METHANOL PROJECT IN INDIA

Tecnimont Private Limited, the Indian subsidiary of Maire Tecnimont Group, has signed a non-binding Memorandum of Understanding (MOU) with NTPC, India's largest power generation company. The objective of the MOU is to jointly evaluate and explore the possibility to develop commercial scale Green Methanol Production facilities at NTPC project in India.

The Green Methanol Project involves capturing carbon from NTPC power plants and converting it into green fuel. Green Methanol has a wide range of applications, including serving the chemical industry as a base material, being used as an energy carrier for storing electricity generated from renewable sources, and serving as a

transportation fuel. It is also considered as a substitute fuel for maritime fuel applications.

Alessandro Bernini, CEO, Maire Tecnimont Group and NextChem, commented: "This collaboration with a leading player such as NTPC represents another strategic milestone for Maire Tecnimont Group in its roadmap to consolidate its industrial footprint as technology provider and energy transition enabler for the Indian natural resource transformation market."



TURBULENCE-FREE OPERATIONS SUPPORTED HEALTHY RAMP UP IN AIR PASSENGER TRAFFIC: ICRA

Domestic passenger traffic grew by 3% on a month-on-month (MoM) basis (13% YoY) in November 2022, supported by resilient passenger demand and onset of the peak season. Domestic traffic stood at 23.4 million, 93% of pre-Covid levels (similar period in FY2020) in November 2022. Overall, the recovery in domestic passenger traffic has been strong since April 2022, supported by the easing of travel restrictions, resilient passenger demand, reopening of offices, and increase in business and leisure travel.

Giving more insights, Vinay Kumar G, Vice President, Corporate Ratings, ICRA, said: "Passenger traffic is expected to sustain the healthy growth momentum backed by the onset of the peak season along with the resumption of business travel. With a strong rebound and healthy momentum in domestic passenger traffic and the uptick in international passenger, the overall air passenger traffic is expected to grow by 71-73% and reach 324-327 million (95-96% of pre-Covid levels) in FY2023. ICRA expects overall domestic passenger traffic to reach 97-98% of pre-Covid levels (FY2020) in FY2023 and international traffic to reach 87-90% of pre-Covid levels by end-FY2023. Supported by passenger traffic, the aircraft traffic is likely to display a 45-47% YoY growth and reach pre-Covid levels during FY2023."

RS 9,000 CR DIVESTMENT OF HIGHWAY PROJECTS PORTFOLIO TO ACTIS FROM WELSPUN ENTERPRISES

Welspun Enterprises executed definitive agreements with Actis Highway Infra to exit from its operating road concessions portfolio, comprising five completed HAM assets (Welspun Delhi Meerut Expressway Private Limited, Welspun Road Infra Private Limited, MBL (CGRG) Road Limited, MBL (GSY) Road Limited, Chikhali Tarsod Highways Private Limited) and one operating BOT Toll asset (Welspun Infracol Private Limited).

In this regard, the company informed that they have complied with all necessary Conditions Precedents (CP)

and has obtained all necessary regulatory & statutory approvals for First Closing including National Highways Authority of India (NHAI), Public Works Department of Government of Maharashtra (PWD) and lenders for divestment of 100% stake in HAM assets and 49% stake in BOT-Toll asset (First Closing). Divestment of balance 51% stake in BOT-Toll asset shall be undertaken upon obtaining necessary regulatory and statutory approvals (Second Closing).

The Cumulative Enterprise Value (Enterprise Value) value for the entire transaction stands at Rs 5,853 crore

after considering the net current assets and other closing parameters. The Completed Highway Portfolio as on the date of First Closing has outstanding senior debt of Rs 3,544 crore including undisbursed debt of Rs 59 crore in BOT-Toll asset. It may be noted that the aforesaid EV excludes construction linked milestone/grant payments of approximately amounts equivalent to Rs 2,929 crore already received and an amount of Rs 267 crore further receivable from NHAI and PWD. Hence, the value of the completed highway portfolio stands at approximately Rs 9,049 crore.

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NEXTRACKER TO SUPPLY SOLAR TRACKERS FOR NTPC'S NOKH POWER PLANT

Nextracker signed a master supply agreement (MSA) with Amara Raja Power Systems to deliver its award-winning solar trackers for NTPC's Nokh Solar Project – soon to be one of India's largest solar parks. Amara Raja is executing this 306-MWp project, as a ground-mounted utility-scale power plant spread over 1,850 hectares (approximately the equivalent of 3,500 contiguous football fields) in Rajasthan.

The announcement follows the



upward trend for the deployment of solar trackers combined with bifacial module technology in India due to falling module prices and increased tracker design efficiencies. Nextracker's optimized bifacial tracker design has been proven to increase energy yield as validated by third-party test laboratories in this seminal bifacial and solar tracker white paper.

NTPC has increased its renewable energy investments in recent years and aims to achieve over 60 GW of renewable energy capacity by 2032 accounting for 50% of its overall generation capacity. Rajasthan has the highest installed renewable energy capacity (19.5 GW) among Indian states, having recently achieved its 14 GW target for 2022 in Dec. 2021.

KPTL RECEIVES NEW ORDERS OF RS 1,397 CR

Kalpataru Power Transmission Limited (KPTL) and its international subsidiaries have secured new orders /notification of awards of Rs 1,397 crores in India and overseas market in the T&D business.

Commenting on the new order announcements, Manish Mohnot, Managing Director & CEO, KPTL said, "We are pleased with the business outlook in our flagship T&D business with consistent order wins. These new orders in addition to the orders declared earlier during the year have significantly enhanced our T&D order book and provides good visibility for future growth. We are confident that our T&D business is poised for robust growth on back of strong business outlook and order visibility in our focused markets. With these new orders, our YTD FY23 order intake has reached Rs 15,784 crores at consolidated level. Additionally, we have a strong LI position. This provides us with confidence to achieve our targeted growth going forward."

SHYAM METALICS & ENERGY TO COMPLETE THIRD ACQUISITION

Shyam Metalics and Energy Limited (SMEL) has announced their third acquisition of Mittal Corp Limited with a foray into the Stainless Steel (SS)/Wire Rod & Bar Mill business. This inorganic growth will witness the establishment of manufacturing footprints in the state of Madhya Pradesh and add capacities of 150,000 tpa Stainless Steel (SS)/wire rod and bar mill. Ferro alloys, a key input material for Stainless Steel is extensively produced by our existing companies. The Government has mandated a minimum 20% use of stainless steel in Coastal Areas which ensures a very stable demand for these products.

With this development, Shyam Metalics has embarked on a 'diversification approach' in the metal space to chart the company's growth journey and has proposed to further invest Rs 7,500 crores over the next five years. In order to meet the growth plans with organic and inorganic expansion, SMEL's present Capex aims at growing to Rs 10,000 crores in the next five years. The current manufacturing plants in West Bengal and Odisha which employ more than 15,000 people will further see an addition of 10,000 jobs more to the entire workforce post expansions.

KEC INTERNATIONAL WINS NEW ORDERS OF RS 1,313 CR

KEC International has secured new orders of Rs 1,313 crores across its various businesses. The Transmission & Distribution (T&D) business has secured orders for T&D projects in India, East Asia Pacific and SAARC. These include 220 kV GIS substation for a refinery project in India, 500 kV transmission line in Thailand and 132 kV transmission line and associated substations in Nepal. The Solar business has secured a large order for a 500 MW solar PV project in India.

Vimal Kejriwal, MD & CEO, KEC International commented, "We are delighted with the new order wins, especially our largest order in solar business to build a 500 MW solar PV power plant in India. In line with the Government's thrust on green hydrogen and renewables such as solar, we are now refocusing on this business. With the substation order in T&D, we have now diversified our customer base to include non-utility clients, in addition to the current power utilities."

NORTON ABRASIVES INAUGURATES ITS PAPER MAKER PLANT IN BENGALURU

Grindwell Norton Ltd (GNO), the oldest and the largest abrasive manufacturer in India and part of the Saint-Gobain Group, commissioned its paper maker manufacturing plant in Bengaluru. Under Atmanirbhar Bharat, the paper maker plant's manufacturing capabilities present a huge opportunity to introduce 'Make in India' products that are innovative and have cutting edge technology.

Hari Singudasu, Vice President of Abrasives (Grindwell Norton Ltd), Saint-Gobain said, "This plant will cater to emerging high growth needs in

construction, furniture and automotive industries. The plant will enable us to provide solutions for high growth market in India, Middle East and ASEAN."

This state-of-the-art plant is equipped with IOT enabled control systems to ensure minimum wastage levels, reduce CO₂ emissions, by incorporating Regenerative Thermal Oxidizer and recover heat, improve fuel efficiency, and consistency. As a first, it employs women technicians in the operating team, trained in safety, quality, and operational excellence.

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provides for better operator comfort, **excellent all-round visibility**, increased reliability and efficient serviceability. Longer wheel base with shorter turning radius gives it good stability. **Hydraulic blade tip control** with scarifier attachment comes as standard.

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HINDUSTAN POWER EXCHANGE CROSSES 1 BN UNITS OF POWER TRADING SINCE LAUNCH

Hindustan Power Exchange Ltd (HPX), India's fastest power exchange promoted by PTC India Ltd, Bombay Stock Exchange, and ICICI Bank, has reached the milestone of one billion units of power traded within six months of its launch.

With more than 360 market participants, HPX has also raced to register participants comprising 80% buy volume of overall Day Ahead Market (DAM); 90% sell volume of Green DAM and 70% buy of Real Time Market (RTM).

HPX is now the number two exchange of the country in the Contingency segment, and the total settlement registered on its platform was Rs 1,250 crore. Though eastern

entities have contributed about 51% in this amount since commencement of operations of the exchange, the participation from southern entities have increased in last two months and they contributed 41% in the month of December. It is pertinent to note that all the southern states are registered on the exchange and the foreseen potential of these states basis their past record would be 28% buy side on DAM, 24% buy on RTM, 12% sell on DAM, 14% sell on RTM.

Backed by the latest technology and a series of innovative features, the fastest power exchange of India promises to offer speed, transparency, and better price discovery in the execution of trades.

NTPC, GE POWER INDIA SIGN MOU TO REDUCE CARBON INTENSITY FROM NTPC'S COAL FIRED UNITS

NTPC and GE Power India signed a Memorandum of Understanding (MoU) for feasibility to demonstrate technologies to reduce the carbon footprint of NTPC's existing coal fired power plants.

This first of a kind MOU aims at partnering on research, development and engineering of technologies that will enable NTPC to reduce the amount of coal fired in their units and gradually replace it by co-firing of 'alternate fuel' in boiler - both carboneous (methanol, carbon neutral fuel agri-waste, biomass, etc) and non-carboneous (such as ammonia). This will make use of huge existing infrastructure and less new investment will not be required as compared to other decarbonisation options. Further, as in India coal is the



only option for base load so it will help to reduce carbon footprint from source of reliable power, for decades in future.

As a primary goal, the collaboration is to support NTPC in co-firing of biomass pellets beyond 20% and up to 100%, as well as enabling the co-firing of methanol. It will also explore the possibility of introducing ammonia as a co-firing fuel, and also develop, test and demonstrate technologies that allow a total co-firing with lower carbon fuels in coal fired power plants.

JK LAKSHMI CEMENT FLAGS OFF BLUE ENERGY MOTORS LNG TRUCKS

India's first Liquefied Natural Gas (LNG) fueled green trucks by Blue Energy Motors have begun commercial operations for JK Lakshmi Cement. In a flag off ceremony held at JK Lakshmi Cement's Sirohi plant in Rajasthan, the first fleet of LNG trucks left for their clinker grinding unit at Surat. The flag-off ceremony was attended by the senior management representatives of both the companies and other important stakeholders. With this, JK Lakshmi Cement becomes the first cement company to deploy LNG trucks for long haul transportation of raw materials in the country.



The market entry of Blue Energy Motor's LNG-fueled trucks started with the introduction of BE5528 tractor as the first model. The trucks have been designed to deliver best-in-class TCO with unmatched reliability and next-generation telematics system for safe and comfortable long-haul drives. BE5528 uses FPT Industrial multipoint stoichiometric combustion engine to ensure best-in-class fuel consumption and lower noise than diesel engines. With 280hp power and 1000Nm torque, it is one of the most powerful natural gas trucks on the Indian market.

CNH INDUSTRIAL INDIA NAMED GREAT PLACE TO WORK® FOR THE FOURTH CONSECUTIVE YEAR

CNH Industrial India has been certified as a Great Place to Work® for 2022-2023. This marks the fourth time the company has been recognized. The Great Place to Work Institute's survey is the world's largest and most respected study of workplace excellence and people management practice. It relies upon employee feedback to assess their experience within an organization. This certification validates CNH Industrial

India's efforts to create a cohesive, safe, employee-friendly, and respectful working environment. The results of the survey show that employees feel a strong sense of belonging and take pride in working for CNH Industrial. Over the years, CNH Industrial India has taken many steps to improve employee engagement and their experience.

Sanjay Tripathi, India HR Head, CNH Industrial said, "Receiving the

Great Place to Work certification for four years in a row is a remarkable achievement for us at CNH Industrial India. We thank our employees for their significant participation in the survey and for sharing their feedback, which was very important for this ranking. It is an acknowledgment of their passion and commitment and proof of our collective efforts in making our company better for our employees."

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ARTIFICIAL INTELLIGENCE USED TO SORT PLASTIC WASTE IN GLOUCESTERSHIRE

ZenRobotics have recently had some coverage on the BBC News website. In this piece by the BBC the machine is described as ‘a high-speed robot for maximising material recovery’ and is made up of a conveyor belt and robotic arm, which collaborate to scan the waste, decide what to pick and deposit it down one of two chutes.

Supplied by Helsinki-based company, ZenRobotics, the ‘Fast Picker’ is developed with an ‘In-built brain’ which, with the appropriate training, becomes more advanced over time. Eventually, its AI memory will learn to pick and sort a variety of waste streams at a ‘human rate’.

Once proficient in identifying and separating plastics, Grundon will begin training the robot to pick steel or aluminium cans, paper, and cardboard.

The BBC article explains that Grundon hope that through implementing this technology, they can increase the volume of the recyclable materials they capture and aims to eventually have a fully autonomous sorting plant. This will allow them to benefit from lower operating costs and uninterrupted, reliable sorting.

Ed Fagan, Grundon's head of projects, said this to the BBC: “Both optical and robotic sorters can be



deployed alongside humans in our waste sorting facilities. We can really see robotic sorters making a difference in environments which are less well suited for humans, such as the sorting of contaminated waste or working in areas with high levels of noise and dust.”

From coverage such as this from the BBC and other industry publications, it is easy to see that the ‘Safe Sorting’ mantra of ZenRobotics is proving an important part of customers such as Grundon and others in waste management. The ability to continue doing the work that they do whilst keeping people out of harm way entirely is an opportunity that is too good to miss.

In their fleet of waste separation technology, ZenRobotics also supplies the ‘Heavy Picker’ robot, better suited to bulky materials, and their ZenBrain which boasts a highly advanced recognition ability and autonomous decision-making.

MANITOWOC IN CHINA LAUNCHES LARGEST POTAIN TOPLESS TOWER CRANE

Manitowoc has announced the launch of the Potain MCT 1005 M50, the largest topless tower crane to be manufactured at its Zhangjiagang facility in China. Designed for use in emerging markets and Southeast Asia, and boasting a huge 50 t capacity, the crane is available with a choice of three counterjib options that will further enhance its seamless integration into confined jobsites.



The MCT 1005 M50 allows for the handling 8 t at the end of its maximum 80 m jib, which is configured from 11 sections of either 5 m or 10 m in length. Only three sections are required to deliver its shortest configuration of 20 m, at which distance it can lift its full 50 t. The same maximum capacity is also available between 3.5-16.8 m when the jib is built to 80 m or from 3.5-25.2 m when the jib is 30 m in length. There is also option of configuring the crane with the 45 m jib, which delivers a hefty 24.8 t maximum capacity at the jib end. These heavy payloads are supported with counterjib options of 15 m for jib configurations of up to 45 m; 17.5 m for jib configurations of up to 55 m; and 20 m when working with jibs from 60 to 80 m.

MYCRANE MOMENTUM CONTINUES WITH USA LAUNCH

A milestone in MYCRANE's global expansion has been achieved with the launch of its own operation in the USA. Houston-based Scott Wilkes has been appointed as Director of Business Development, reporting directly to the senior management team in the United Arab Emirates. Reflecting the importance and size of the market, MYCRANE has elected to establish its own operations in the USA, rather than appoint a franchisee to roll out its services, as it has done in other locations.

The Dubai-based digital disruptor launched the world's first online crane rental platform in autumn 2021, and offers a suite of other innovative digital tools and services to help all those in the construction industry.



Pointing to encouraging recent legislation such as the CHIPS and Science Act of 2022 and the largest infrastructure bill for more than a decade, MYCRANE founder and CEO Andrei Geikalo said the time was right for MYCRANE's expansion into the USA.

“According to reports, the construction industry in the USA is expected to have expanded by 4.5% in real terms in 2022, supported by investments in transport, renewable energy, water, and housing projects. One of the biggest markets for construction spends and a leader in digitalization, the USA is a territory where MYCRANE simply has to be present. Against that backdrop, the timing of MYCRANE's launch is perfect to help all those working in cranes and construction. Whether you want to hire a crane, buy or sell equipment, find a new job or identify the right crane for your next lift, we do it all.” December's USA launch also marks the introduction of ‘MYCRANE Agents’, a flexible partnership programme for well-connected independent sales professionals, located anywhere in the world, who can contribute to MYCRANE's success.

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BENTLEY SYSTEMS ANNOUNCES NEW PROMOTIONS

Bentley Systems, Inc announced that Brock Ballard, previously vice president and regional executive, Americas, has been promoted to the role of Chief Revenue Officer, and that Eric Boyer has joined as Investor Relations Officer. Ballard succeeds newly retired Gus Bergsma who joined with Bentley Systems' acquisition of RAM International in 2005.



Prior to joining Bentley Systems in 2020, Ballard served in sales leadership positions with Dassault Systèmes, Autodesk, and Océ after earning a Bachelor of Arts in Communications and Information Sciences from the University of Alabama in 2001. He reports to Chief Operating Officer Nicholas Cumins.

Boyer brings over 20 years of experience in investor relations and

equity research, a deep knowledge of capital markets, and a strong network of relationships. During his tenure as senior vice president and head of investor relations at IHS Markit Ltd., which was a global information services leader, its market capitalization increased from \$8 billion to \$44 billion. He was also consistently recognized by Institutional Investor as a leading IR professional. Prior to Boyer's investor relations career, he spent more than a decade as a sell-side equity analyst at Wells Fargo and Deutsche Bank, where he covered various technology and related services sectors and was recognized by The Wall Street Journal's "Best on the Street" survey for his stock selections. He earned a Bachelor of Science in Business Logistics and International Business from Penn State University in 1999.

EINEDER USES LIEBHERR LTR 1060 TELESCOPIC CRAWLER CRANE IN SOLAR FARMS

Autodienst Eineder GmbH has been using an LTR 1060 since October. The Liebherr 60 tonne crane does most of its work in solar parks. The Bavarian company exploits the strengths of the telescopic crawler crane for the economical installation of transformer stations – off-road capability, manoeuvrability and the ability to travel with a full load mean less time and lower costs.

Managing Director Peter Eineder explains: "Its off-road capability and manoeuvrability makes the LTR 1060 ideal for jobs in solar parks. Its "pick & carry" mode is particularly good as it enables us to carry transformer stations weighing up to 20 tonnes straight from



the transport vehicle to the installation site." If the terrain means that the LTR 1060 cannot carry the load over it, Eineder uses a heavy duty transport

crawler to move the transformer stations to the solar parks.

Their design means that crawler cranes can travel on site with a full load on their hook. The crawler chassis also makes it easy to master difficult terrain. In addition to the 4.8 metre wide track, the Liebherr LTR 1060 can also work safely on a track width reduced to 3 metres using the crane control system. "That is a major benefit on constricted sites. We also appreciate the sensitive control of the LTR 1060 when things are tight", continues Eineder.

The Managing Director of the company based in Ingolstadt also praises how easy it is to transport the 60 tonne crane. The crawler travel gear can be retracted to a width of 3.0 m for transport. The low crane height of just 3.15 m ensures that economical standard semi low loaders can be used. The LTR 1060 weighs just 62.6 tonnes complete with turntable and central ballast. The axle loads for transport are less than 12 tonnes for a 3-axle tractor unit and a 5-axle low loader. By removing ballast, the transport weight can be reduced to the net weight of the basic 37.5 tonne machine.

NORWEGIAN PUBLIC ROADS ADMINISTRATION SELECTS TRIMBLE FOR ASSET LIFECYCLE MANAGEMENT

Trimble announced that Norwegian Public Roads Administration (NPRA) Operations and Maintenance has selected Trimble's AgileAssets® infrastructure enterprise asset management software to manage, maintain and operate the country's 10,600-km road network and associated transportation infrastructure.

The selected software complements Trimble's Quadri® software, a cloud-based Building Information Modeling (BIM) collaboration solution that NPRA already uses for construction projects.

As Norway's road network becomes increasingly complex, the powerful combination of Trimble's Quadri and AgileAssets will enable NPRA to meet growing demands by leveraging connected data to improve performance throughout the entire asset lifecycle, from design and construction to operations and maintenance.

NPRA's asset lifecycle management approach began with the requirement that all new projects use constructible models and a common data environment. NPRA began using Trimble's Quadri, which provides both constructible models and an object-based common data environment, to streamline the flow of real-time data across project stakeholders.

Extending that data to the maintenance and operations phase with Trimble's AgileAssets will give NPRA a holistic view of assets and a better understanding of road objects and conditions for easier diagnosis and faster resolution of maintenance issues.

The combination of Trimble's common data environment and asset management software will also improve the usefulness and fidelity of data throughout the asset lifecycle, driving greater predictability, sustainability and lower lifetime costs, as well as informing decisions about future expansions and improvements.



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As we enter another year of hopes and opportunities, how will be the year 2023 for Indian infrastructure and construction sector? What could be the trends to look for in the year ahead? What could be the key challenges and what will drive the growth? **Construction Times** explores the market trends with views from industry stakeholders.

The year 2022 was a period of total revival from the impacts of Covid as industry activities have almost returned to normal with meetings and industry exhibitions coming back to physical mode. There were challenges also in the form of growing fuel and raw material prices impacting the industry and the Russia-Ukraine war taking a toll on the global economy. At the same time, there were many forward-looking infrastructure creation plans being launched in 2022 which has created opportunities to the industry stakeholders. These opportunities are going to have a positive impact in 2023 and ahead as well. Here's a brief overview of the various infrastructure segments.

ROADS & HIGHWAYS

Road network is the prime mode of transport in India, both in terms of traffic share and contribution to the national economy. Apart from facilitating

the movement of goods and passengers, road transport plays a key role in promoting equitable socio-economic development across regions of the country.

The second-largest globally, India has about 63.73 lakh km of road network. This includes 144,634 km of national highways; 186,908 km of state highways; and 59,02,539 km of other roads.

According to provisional figures from the Ministry, MoRTH constructed 5,337 km of National Highways and awarded 6,318 km of National Highways till December 29, 2022. The execution of highways under Bharatmala Pariyojana saw a decline in 2021-22, which has slightly improved in 2022-23. However, the slower execution of projects in the past couple of years has delayed the projects by at least three years. Going ahead, the execution is expected to pick

up in 2023-24 and there could be a revival in the speed of highway construction in the next couple of years.

PORTS & LOGISTICS

The port infrastructure is an important part of India's logistics network for cargo transportation and exim trade. The development of port infrastructure is so critical for sustaining the country's economic growth. India has a total of 226 ports which comprise 12 Major ports. Post Covid, the port operations are back on track, much fitter and robust. Growth of the Indian economy and geo-political developments across globe is helping India to increase footprints much faster than expected. It helps the ports sector, which remain sound and good for the foreseeable future. With several key initiatives and policies such as PM GatiShakti and National Logistics Policy introduced, the Indian logistics sector would accelerate its journey towards becoming more efficient, productive, and globally competitive.

AIRPORTS

India has approximately 464 airports/airstrips, of which 125 airports are owned and controlled by Airports Authority of India (AAI). AAI-managed airports deal with close to 78% of the total domestic passenger traffic and 22% of international passenger traffic. To accelerate the development of airport infrastructure in the country, the government plans to invest US\$ 1.83 billion. The Civil Aviation Ministry is also pushing hard to remove inefficiencies in the delivery of services and to improve passenger experience. Plans are afoot to privatize 30-35 airports over the next five years.

To expand airport capacity at existing airports, NABH (NextGen Airports for Bharat) Nirman initiative has been introduced by the Ministry of Civil Aviation. Under this initiative, the government plans to work towards a five-fold expansion in airport capacity to handle a billion trips a year, in the next 10-15 years.

RAILWAYS & METROS

The Indian Railways moves 8.1 billion passengers and 1.2 billion ton of freight across the country on an annual basis. Indian railway network is amongst the largest rail networks in the world carrying around 1,418 million tonne of cargo in FY2022. Considering its importance, the government has launched and accelerated rail infrastructure initiatives to revamp the sector. Further, the Indian Railways' National Rail Plan – 2030 is a planned and integrated roadmap to building a future-ready rail system, focusing on capacity augmentation, creating world-class passenger facilities/infrastructure, increasing safety and efficiency, and reducing its carbon footprint.

Indian Railway has made station development as the main focus area to enhance customer satisfaction. Three stations viz. Rani Kamalapati station of West Central Railway, Gandhinagar Capital station of Western Railway and Sir M. Visveswaraya Terminal Station of South Western Railway have been developed and commissioned. Work on 48 railway stations is in progress; 19 railway stations are under different stages of tendering and planning.

In India, 15 cities have an operational Metro network of about 746 km (many of which are undertaking network expansion), while another seven cities of about 640 km have under-implementation Metro projects. This apart, 1,400 km of Metro Rail projects worth Rs. 2 trillion are in the approval/proposal stage of which a 352-km new Metro network has been approved, with the balance being in the proposal stage. The Metro Rail network is likely to witness 2.7 times expansion in the next five years.

WATER & WASTEWATER

The Government of India in partnership with states is implementing Jal Jeevan Mission (JJM) to make provision of tap water supply to every rural household by 2024. As on 21 December 2022, more than 10.76 crore (55.62%) of rural households are being provided with tap water connection in adequate quantity, of prescribed quality on regular basis. Indian water and wastewater industry will continue to thrive as a result of the government's aggressive implementation of the Jal Jeevan Mission and AMRUT 2.0 programme, which will lead to an increase in private investments and participation of new players in the segment.

RENEWABLE ENERGY

Indian renewable energy sector has made significant progress this year with acquiring major deals and getting good investments from across the globe. In line with Prime Minister's announcement at COP26, the Ministry of New and Renewable Energy is working towards achieving 500 GW of installed electricity capacity from non-fossil sources by 2030. So far, a total of 172.72 GW of capacity from non-fossil fuel sources has been installed in the country as on 31 October 2022. This includes 119.09 GW RE, 46.85 GW large hydro and 6.78 GW nuclear power capacity. This has a share of 42.26% of total installed generation capacity in the country, i.e. 408.71 GW as on 31 October 2022. Capacity additions in solar, wind, storage and hybrid systems are the biggest opportunities for meeting the net zero carbon emissions targets.

Going ahead, the government's emphasis on developing world-class infrastructure in the country promises continued growth in the coming years. 

INDUSTRY **views**

As we are entering another year of hopes and expectations, how do the trends look like and how does industry preparing to surge ahead in the New Year? Construction and infrastructure industry stalwarts share their thoughts, actions and expectations about the upcoming market and the way forward.



RIZWAN SOOMAR

CEO and MD, DP World Subcontinent

The year 2022 has set a perfect pavement for growth of the Indian logistics sector in 2023. With several key initiatives and policies such as PM GatiShakti and National Logistics Policy introduced, the logistics sector in India has accelerated its journey towards becoming more efficient, productive, and globally competitive. Furthermore, the increasing adoption of digital transformation and push for digitalization across logistics sector through platforms like ULIP and E-Logs will help Indian trade and economy to navigate through the potential roadblocks and challenges. Together, robust governance frameworks and industry's push towards modernization and multimodalism will play a critical role in reshaping and reimagining the logistics sector in 2023.



ARUN MAHESHWARI

Joint MD & CEO, JSW Infrastructure

India is on a roll. Post Covid, the ports sector is back on track, much fitter and robust. Growth of the Indian economy and geo-political developments across globe is helping India to increase footprints much faster than expected. It helps the ports sector, which remain sound and good for the foreseeable future.



NIKHIL AGARWAL

President, CJ Darcl Logistics

With the advent of technology, the industry has visualized the modern innovations and advancements in the logistics industry. Leading trends may focus on technology, digitization, infrastructure development and environment sustainability might be the key agenda for 2023. Paperless documentation can add-on to the digitization trend and multimodal connectivity can also save the environment better and can be cost-effective method in the logistics industry. The recently announced National Logistics Policy will be a game changer and it will be the focal point of many changes in 2023. CJ Darcl has redesigned its distribution channel for first and last mile deliveries and continuously enhancing its operations by adding on its new verticals like Air Cargo, Warehousing & Distribution, Railways, Coastal and Surface Express etc. With the evolution of this logistics industry, CJ Darcl has also started using automated material handling machines that makes its warehousing operations much more efficient and cost-effective. In the coming year, CJ Darcl ensures to build the wholesome satisfaction to its customers and aims to become the leading total logistics service provider by the year 2027.



VIKRAMJIET ROY

Managing Director, Maccaferri India

This year infrastructure sector has been a key driver of economic growth in India. The government's emphasis on developing world-class infrastructure in the country promises continued growth moving ahead. Government interventions and a few policy changes like a new public and government partnership model to meet environmental standards are expected. While the government is making a significant effort to overcome one of the major challenges of securing the funding, more investments and on-ground action for meeting India's infrastructure and sustainability goals are expected to develop robust infrastructure. With the government committing to becoming carbon neutral by 2070, the year 2023 must focus on making sustainability and climate-resilient infrastructure a necessity for all upcoming construction development projects.



SANDEEP CHANDA

Managing Director, India, Panattoni

The industrial and warehousing sector has evolved as a resilient asset class and is at an inflection point. With shifting consumer behaviours, there is a growing demand for e-commerce. To meet the consumer requisites, retailers and e-commerce players are increasing supply and expanding storage, thereby facilitating the warehouse boom. Along with e-commerce, 3PL, manufacturing, retail, and pharmaceutical sectors are also driving-up demand. Grade-A warehouses are thus expected to witness an uptick to fulfill the business requirements. Smart warehouses integrated with technology and automation are going to be a new trend. Moreover, initiatives like Make in India, Gati Shakti National Master Plan, and National Logistics Policy will continue propelling the growth. With immense growth potential, we believe that the industry will emerge as a sunrise sector of the national economy.



MAHESH MAKHIJA

Director- Business Development and Commercial (Renewables), Apraava Energy Pvt Ltd

Indian renewable energy sector has made significant progress this year with acquiring major deals and getting good investments from across the globe. Although there are challenges in terms of reliability and resilience, and security in the sector, the technology advancements and supportive government policies will help to gain momentum as the year ahead looks at the new growth paths for the sector. The government is also looking forward to promoting the participation of private players in the energy sector to enhance growth and meet the energy demand of the country. Capacity additions in solar, wind, storage and hybrid systems are the biggest opportunities for meeting the net zero carbon emissions targets.



PRADEEP MISRA

CMD, Rudrabhishek Enterprises Ltd (REPL)

Indian water and wastewater industry will continue to thrive as a result of the government's aggressive implementation of the Jal Jeevan Mission and AMRUT 2.0 programme, which will lead to an increase in private investments and participation of new players in the segment.

The demand for advanced water treatment and recycle-and-reuse systems is anticipated to be driven by water stress and the need for high-quality water. India's industrial growth is anticipated to soar as it concentrates on economic diversification to lessen its reliance on the service sector. As a result, there is a greater need for industrial effluent treatment and an increase in the demand for processed water.



PANKAJ KUMAR

Managing Director & CEO, GOCL Corporation Ltd

India is at an advantage with its current economic position in the global market. The domestic demand-driven economy has isolated the country from the economic turmoil that the world is witnessing currently. Internally, the government's focus on Infrastructure and manufacturing has resulted in a burgeoning demand from the mining and manufacturing sector. Coupled with the stable exchange growth rate, the domestic demand will continue to boost the economy.

We are already observing a huge demand for explosives and detonators with huge export potential in the African countries as they are looking to get value from the minerals that they own, and soon this is expected to double.

The pent-up demand for infrastructure development coupled with new avenues for exports, FY23 will end on a high and FY 24 looks much better.



BRIJ BHUSHAN AGARWAL

Vice Chairman and MD, Shyam Metals and Energy Ltd

Due to digitization and decarbonization, the metal sector is undergoing a significant shift, and the demand is anticipated to rise even higher in 2023. Production of steel and metals would increase, giving miners the chance to reposition themselves for the changing future. The industry will gain a lot from the reduction in export taxes. We anticipate 3-4% increase in exports next year, which would once again equalise the import-export matrix after India had exceeded imports at the start of the year as a result of imposition of duties. In 2023, the infrastructure, electricity, cement, and automotive industries will all develop, which will benefit the metal and mining sector.



DIMITROV KRISHNAN

President, ICEMA

There has been an upward trend in demand observed during 2022 which is likely to be continued during this year as well with many of the planned infrastructure projects expected to be implemented in 2023. A few such projects have already been launched in recent months. Besides these projects, the execution of several other projects planned under the National Infrastructure Pipeline over the next 2-3 years will help in boosting the demand for construction equipment in the country in the short to medium term. The industry is gearing up to ride the expected growth wave on the crest of cutting-edge technological developments, with CEVs powered by IoT, digitization and alternate fuels, which will also make future products more viable by promoting sustainability. Moreover, complete adoption of the new CEV-IV emission standards by the industry has made it possible for Indian CE manufacturers to access export markets in developed nations.



RAJIV PODDAR

Joint Managing Director, Balkrishna Industries

With the world moving towards a technology-driven mobility solution & ecosystem, we find that tire technology is also rapidly evolving. We can expect major investments going toward research for new tire development to withstand extreme conditions in mining operations. The demand for radial OTR tires has been seen to rise in recent times over bias tires, and this trend is expected to grow due to its benefits over bias. The future tires will need to provide reliability, better fuel economy, better performance, and durability at varied operating conditions. In fact, as India plans to invest \$1.4 trillion in several infrastructure projects by 2025 including projects related to ports, railways, roads, etc. we forecast rising demand for OTR tires. BKT is ready for future innovations in OTR machines of India, with its mobility solutions.

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143 years of Hamm



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 www.wirtgen-group.com/india



AVIATION sector to Fly High

A recently released World Bank report stated that our country needs to invest USD 840 billion over the next one-and-a-half decade into urban infrastructure to accommodate the burgeoning population. Infrastructure development is crucial if India is to achieve its USD 5 trillion economy target by 2025. In the last year, the Government has launched the National Infrastructure Pipeline (NIP) and other initiatives such as 'Make in India' and the production-linked incentives (PLI) scheme to boost the development of this sector.

The government further expanded the NIP to 9,335 projects in the later part of 2022. Around 217 projects worth Rs 1.10 lakh crore (USD 15.09 billion) were completed as of 2020. It further, also expanded the National Monetisation Pipeline, Bharatmala Pariyojana, changes in the Hybrid Annuity Model (HAM) and fast allotment of asset monetisation to catapult the road construction activities in the country.

From the airport infrastructure perspective, despite geopolitical tensions, the Covid 19 pandemic, rising fuel prices, etc, air traffic in India and around the world saw a marked surge. In the last few months, airports in India was chalk a block with passengers making the most of the holiday season, which can be attributed to the post pandemic pent-up travel demand. To

accommodate the growing numbers, many major airports are currently focusing on capacity expansions in 2023.

Additionally, this trend is not just confined to the airports located in the metro cities. Even tier-2 and tier-3 cities are contributing to the growth numbers, with the government subsidizing flights to underserved airports through its UDAN scheme. Airlines too are realising the growth possibilities of regional connectivity.

To aid airport infrastructure development, including upgrades as well as building new airports, the government and the private sector is planning to spend Rs 980 billion in the next few years. The government also indicated approval to 21 greenfield airports pan India and the Aviation Ministry is hoping to add nearly 80 more airports in the next five years.

The Indian air cargo sector is also among the world's leading marketplace for indigenous and international players. Growing cargo-handling infrastructure, demand for quick deliveries, growing commerce and increase in the number of flights are key contributors to the growth matrix.

Right from adopting new-age technologies such as AI, Block Chain, IoT and Data Science among others to e-commerce, flourishing in freighters, Greenfield airports and air freight

The Indian air cargo sector is also among the world's leading marketplace for indigenous and international players.

stations, sustainable business operations and paperless transactions, infrastructure development of facilities such as cold storages for transportation of perishables, and freighters, the air cargo sector has come a long way, even facing the odds of the pandemic over the last two years.

TECHNOLOGY DEVELOPMENTS

In terms of technology adoption, the Air Traffic Management industry, off late, has been seen embracing blockchain technology in a major way. Over the coming years, Air Navigation Service Providers (ANSPs), suppliers and IT, big data and tech companies will all join the ATM blockchain buzz.

The travel industry is essentially dynamic, networked and always on. As such, data sharing is absolutely crucial and hence, the industry is perfectly poised to leverage multiple capabilities that are offered by blockchain. The technology offers decentralisation, data integrity, security, traceability and collaborative decision-making. Going forward, the airline industry will increasingly use blockchain to optimise their loyalty programs, automate processes and reduce the use of paper based systems such as e-tickets, smart contracts, billing, optimize ground operations and augment tracking and safety measures.

Also, data obtained from satellites are used extensively in aviation and urban planning. Now, an ESA study titled, SUPER (Supporting UAM Planning with EO Resources) is aiming at using Satellite Earth Observation (SatEO) and Satellite Navigation (SatNav) technologies/data for UAM infrastructure planning and integration into public transport, as well as in the planning and monitoring aspects of UAM operations.

Air Traffic Management industry is also looking at delivering air traffic services remotely using

remote or digital towers. Even before COVID 19 that normalised remote working, Sweden's first airport relocated its air traffic controllers 150 km away, five years ago. Recently, they built an airport without a tower, using just a remote control.

India can learn from it as the construction and refurbishment of a digital tower centre is much easier to do than doing the same for a physical tower as it doesn't involve inefficient space needed by the shaft of a conventional tower. Besides, a digital tower centre requires 10-20% less CO2 emissions per sq m for construction, and also less floor space – as much as 50% less depending on what offices the building is housing and what efficiencies can be made.

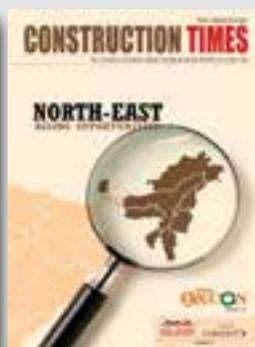
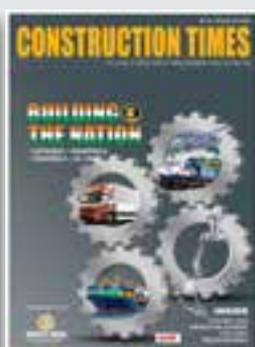
Besides, we also saw a direct correlation between remote working and carbon emissions. For instance, the national environment agency in France (ADEME) found in 2011 that transferring 1 GB of data produced 19 kg of CO2. This is much higher than similar figures calculated in the US, where 1 GB of data produced 3 kg of CO2. A more recent ADEME study revealed that one minute of videoconferencing would emit 1 g of CO2 (approximately 0.4 kg per GB).

It may be concluded that while many key innovations have already been introduced in the aviation industry, many new techs will be developed to simplify the process and increase the stability of the supply chain. Our future is about 'glocalization—an amalgamation of global with local and regional consideration. A global megatrend for the coming years is sustainability. There will be a surge in demand for eco-friendly products. Apart from this, systems and processes will be playing a significant role in the demand-supply model across verticals and industries.



Sandeep Gulati
Managing Director, Egis in India

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SMOOTH RUNWAY POST-PANDEMIC

In this report, CareEdge Ratings has assessed the state of air passenger traffic recovery, near term outlook of the sector and the financial performance of major Indian public-private partnership (PPP) airport players.

CareEdge Ratings expects air passenger traffic to reach 93% of pre-pandemic levels in FY23 and surpass the pre-Covid level in FY24 with 1.12 times pre-Covid air passenger traffic on account of full recovery in international traffic. The recurrence of Covid-19 and its impact on air travel shall be key monitorable.

India's GDP growth and its multiplier effect on air passenger traffic growth with favourable demographics of a rising working population augur well for Indian airport operators.

Improving the regulatory environment with the timely issuance of tariff orders will pave the way for timely revenue visibility for Indian airport operators.

Leverage indicators are likely to remain at elevated levels for FY23. However, air passenger traffic growth beyond pre-Covid levels and the issuance of new tariff orders in some of the PPP airports are likely to strengthen leverage indicators from FY24.

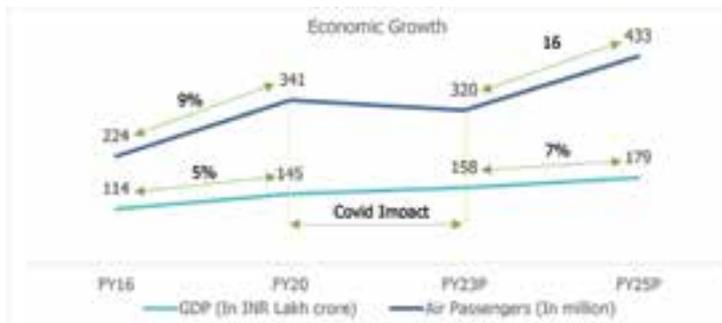
PASSENGER TRAFFIC TO GROW 1.12 X OF PRE-COVID LEVELS IN FY24

The resumption of international traffic w.e.f March 25, 2022, increased vaccination pace, and receding impact of Covid-19 led to a steady recovery for airport passenger traffic. After the third wave in Q4FY22, passenger traffic touched 90% of pre-Covid levels in Q1FY23 compared to Q1FY20. After witnessing a dip in passenger traffic recovery to 86% of pre-Covid levels in Q2FY23, it rebounded again in October 2022 to 93% of the pre-Covid level in October 2019. CareEdge Ratings expects passenger traffic to reach 93% of pre-Covid levels in FY23 with the onset of the festive season and growth in international traffic, marking V-shape recovery for the sector, indicating growth by 70% in FY23 on a YoY basis. CareEdge Ratings expects a full recovery in international traffic by early FY24 combined with steady domestic traffic growth. Thus, on an overall basis, passenger traffic is expected to surpass the pre-Covid level by 1.12 times in FY24.



KEY GROWTH PROPELLERS IN PASSENGER TRAFFIC

There is a multiplier effect between passenger growth rates and GDP growth rates. During FY16-FY20, the Compounded Annual Growth Rate (CAGR) of passenger traffic was 1.80 times GDP CAGR. Over FY23-FY25, CareEdge Ratings expects the air traffic growth rate to be at 2.25 times that of the GDP growth rate, primarily due to the low base in FY22. Moreover, India has favourable demographics with the largest working population, with 67% of the total population in the working age group of 15-64 years in 2020. The rising working population and widening middle-class demography will propel passenger growth. Declining the fare gap between rail and air, new fleet additions by major airlines shall also drive passenger growth. Thrust on green field and brown field expansion of airports is also a significant driver for passenger traffic growth.



IMPROVING REGULATORY ENVIRONMENT, ALBEIT CHALLENGES IN APPROVAL OF FIRST TARIFF ORDER

There is an evolution of a well-defined regulatory environment in India with a mature tariff-setting process. Over the years, there has been a significant reduction in delays in issuing tariff orders in existing PPP concessions. Tariff orders have been issued in two existing PPP concessions in FY22 with a marginal delay of around six months, thus bolstering investor confidence. Timely receipt of tariff orders for the upcoming control period renders strong revenue visibility and aids in recouping the loss in aero revenues. However, there have been delays in issuing the first tariff orders in some of the concessions mainly because of differences in capex estimation and proposed user development fees (UDF) between developers and authorities. CareEdge Ratings expects the regulatory environment to remain conducive for airport sector.

LEVERAGE TO REDUCE FROM FY24 DESPITE LARGE-SIZED CAPEX

CareEdge Ratings has assessed the aggregate financial position of nine PPP airports which represent 50% of total India's passenger traffic. The aggregate revenues of these airports are

estimated to grow by 50% from Rs. 6,450 crore during FY22 to Rs. 9,650 crore during FY23, mainly led by strong passenger growth of 70% on a y-o-y basis. Although healthy passenger traffic is positive for the sector, on-time issuance of tariff orders with an envisaged tariff rate hike for a few airports is critical.

During the Covid period, the AAI extended relief to airport operators by exempting claims on revenue share. Due to this, in FY22, PBILDT margins remained at a healthy level of 56%. However, with the resumption of revenue sharing with the AAI, PBILDT margins are likely to drop to 37% during FY23. From FY24, PBILDT margins are likely to stabilise at ~ 45%, mainly supported by the increased scale of operations.

The leverage marked by net debt/PBILDT at the end of FY23 is expected to remain at an elevated level of 7.16 times, considering the resumption of revenue sharing with authority.

The net debt/PBILDT should improve to comfortable levels of around five times from FY24 onwards despite significant debt-funded capex. Longer residual concessions of the airports also continue to impart financial flexibility to Indian airport operators.

CAREEDGE RATINGS' VIEW

"CareEdge Ratings expects air passenger traffic to reach 93% of pre-pandemic levels in FY23 and surpass the pre-Covid level in FY24 with 1.12 times of pre-Covid air passenger traffic on account of full recovery in international traffic. The recurrence of Covid-19 and its impact on air travel shall be key monitorable. Over FY23-FY25, CareEdge Ratings expects the air traffic growth rate to be at 2.25 times that of the GDP growth rate, primarily due to the low base in FY22. Key growth drivers include improved economic output, declining fare gap between rail & air and full resumption of international travel in the short term while India's favourable demographic profile with a rising working population and widening middle class hold good for long-term prospects. Timely receipt of tariff orders for the upcoming control period renders strong revenue visibility and aids in recouping the loss in aero revenues. However, there have been delays in issuing the first tariff orders in some of the concessions mainly because of differences in capex estimation and proposed user development fees (UDF) between developers and authority," said Maulesh Desai, Director, CareEdge Ratings. 

Article courtesy: CareEdge Ratings

BANKING on POLICY PUSH



The cargo volumes at Indian ports had witnessed healthy growth in the current fiscal till Oct 2022, with YoY growth of ~10% driven by sharp recovery in coal and POL volumes. Coal cargo, which accounts for ~20-25% of overall cargo handled at Indian ports, had witnessed a decline during FY20 and FY21 and witnessed only subdued recovery in FY22, however, during 7m FY2023 the volumes witnessed sharp growth of 31%, which was driven by improved demand for thermal, coking and other coal segments. Petroleum, oil and lubricants (POL), which accounts for 30-35% of cargo handled, also witnessed ~9% growth during the period, after witnessing subdued growth in the past few years and decline in FY2021.

Apart from these key segments, other segments like food grains, sugar and project cargo also witnessed healthy growth. However, the container segment, which accounts for ~17-20% of cargo, had witnessed subdued growth in the current fiscal, after witnessing healthy growth in the last few years. The overall growth was, however, offset by moderation in segments

like iron ore and fertilisers, due to factors like restriction on exports and high prices. While the sharp growth in segments like POL and coal was due to pent up demand, the growth in these segments is expected to be at more normalised level going forward and the overall cargo growth for FY2023 is expected to be in the range of 6-8%.

The overall growth trend was largely similar across major and non-major ports, with the share of non-major ports being at 45% in 7m FY2023. Among major ports - the Kandla, Paradip and JNPT ports account for ~42-45% cargo share, while the Gujarat Maritime Board accounts for 65-70% of cargo in the non-major port segment. Non-major ports managed to gain market share in the last decade due to better services and efficiency and flexibility in terms of pricing, based on market conditions. However, in recent years, with infrastructure and process improvements at the major ports and with the implementation of the Major Ports Act 2021, the competitiveness vis-à-vis non-major ports is expected to improve going forward.

The ports sector is also expected to witness significant capital expenditure over the next two decades as envisaged under the Sagarmala programme and subsequently, under the Maritime India Vision 2030 (MIV 2030). Under the MIV 2030, the projects planned over the next ten years include capacity additions at major ports of ~423 MTPA worth ~Rs 33,400 crore and three new mega port clusters of >300 MTPA capacity, including the Vadhavan Port and development of a trans-shipment hub in south India. The capacity expansion prioritisation at major ports will be based on the cargo potential and the current capacity utilisation levels. Apart from these, some of the other non-major ports which are planned or are under implementation include ports at Bhawanpadu, Machilipatnam, Ramayapatnam in Andhra Pradesh, the Subarnarekha Port in Odisha and the Tajpur Port in West Bengal.

The projects will be mainly implemented through the Public Private Partnership (PPP) mode. The major ports will transition to landlord port models and bring in more private sector participation to improve efficiency. To attract private capital and to make the major port sector more competitive, the Major Port Authorities Act, 2021 has been implemented, which aims to revamp the administration, in addition to control and manage the major ports. The role of the Tariff Authority for Major Ports (TAMP) for fixing the tariff has been done away with and the major ports are likely to be free to set their tariffs based on market forces, allowing PPP operators to also fix the tariffs based on market conditions, following notification by the Ports Authority.

While, bank funding will be a major source, the sector's ability to attract funds from infrastructure-focused international institutions, multilateral agencies and channelise long-term capital (like pension and insurance funds) into the port sector, will also be crucial to meet the funding requirements. The MIV 2030 also proposes to develop a Maritime Development Fund (MDF) to support the port and the maritime sector, with an estimated capital of Rs 25,000 crore (Rs 2,500 crore support from the Government of India over seven years). This will raise long-term funds in the domestic and international markets and lend it to the maritime sector at competitive rates.

In addition to the expected enhancement in port infrastructure, improvement in infrastructure related to logistics segment like CFS/ICD and container train operations will also complement the growth in the sector. Several port and port logistics players have been positioning themselves as integrated logistics companies with presence across multiple segments to be able to provide multimodal transportation solutions, as the same will improve their competitiveness and ability to attract customers. Moreover, as witnessed in recent years, the sector will also continue to witness some consolidation as stronger players may acquire standalone assets or projects where the sponsor has been facing financial issues.

While the medium to long term prospects for the ports sector remain favourable, there are several challenges to be addressed. The cargo growth at Indian ports is expected to be supported by the overall economic growth and growth in exim trade, increasing containerisation of cargo, and growth in coastal cargo movement. But, to sustain cargo growth at healthy levels in the medium to long term, other related projects like sufficient dredging, digitalisation of operations, improved connectivity, and port-led industrialisation with specific cargo-based clusters are to be implemented in a timely manner. Further, some of the cargo segments like thermal coal imports may witness moderation in the medium to long term. Moreover, any significant moderation in exim trade or economic growth due to global factors can have some adverse impact on the cargo growth trend.

On the project side, especially for greenfield projects, the issues include land acquisition roadblocks, environmental and CRZ clearances, protests from the local communities, cooperation between the state and the Central Government and disputes with PPP partners. Further, funding support from the Central and the state governments, either through the proposed MDF or through budgetary allocations, would be a necessity. As seen in the past, aggressive capacity expansion targets may not be achievable or lead to significant underutilisation if the key challenges are not addressed and cargo growth is less than expected.



Sai Krishna
Vice President & Sector Head
ICRA Ltd

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Alternative production centres like India make an attractive destination for EXIM cargo.

RAJIV AGARWAL

Operating Partner (Infrastructure), Essar and
Managing Director, Essar Ports

What could be the trends to look for in the year 2023?

The shipping and logistics sector has never been more challenging. A combination of highly uncertain economic environment, ever increasing demand for consumers and geopolitical situations in different parts of the world is forcing business owners to continuously alter their approach and adapt to different strategies. Therefore, to survive in the future, shipping and logistics companies will have to re-evaluate their relationship with clients, innovate and explore new possibilities that seem to be inevitable.

Some of the key trends/events which will shape the future of ports and logistics sector are the technological developments in automation, technology and digitization which have been instrumental in ushering a new era of efficiency, accessibility, and growth. With the emergence of the pandemic and global turmoil, the world has witnessed various disruptions in the supply chains. This will see an unprecedented shift in trade lanes and modes of delivery which include energy baskets like

oil & gas, green infrastructure (green hydrogen and EV gain popularity), the global agenda of carbon-neutrality with energy transition to green solutions with focus on sustainability at the core, modularity and flexibility of infrastructure like FSU/FSRU etc., which can easily cater to the changing requirements and provide flexibility and systems which can ensure reliability and visibility of supply chains to end customers.

What could be the key challenges and what will drive the growth?

The Russia-Ukraine conflict has had a significant impact on the global logistics market, with supply chain and flow of cargo altered, a huge increase in cost and product shortages, and energy and commodity prices skyrocketing. Amidst this global supply chains are evolving and realigning with the objective of distribution of risks and being resilient. Alternative production centres like India make an attractive destination for EXIM cargo. Coupled with this, is India's strong domestic consumption as India charts its way to USD 5-trillion-economy and more. India and South Asia will be boosted by the flow of goods, services, people, and knowledge. In short, the ensuing economic growth would play a key role in the region and strengthen trade links.

In order to stay relevant with the changing times, the industry players need to look into certain factors such as ensuring supply chain visibility, end-to-end logistics, increasing operational efficiency through mechanization, reducing pre-berthing delays, and most importantly improving turnaround time in the ports sector. Reducing EXIM costs and boosting competitiveness will be the driver. The application of low-cost financing should be a top priority for the sector as it allows private sector participation with desired levels of efficiency.

We are on the cusp of a transformational journey where logistics, green energy and value added services are going to play a major role.



How are you geared up for the year ahead? What are the key plans?

We take pride in delivering value propositions through our state-of-the-art services and end-to-end logistics solutions which also ensure that the growing needs of the economy are met. This year, in one of the largest post-pandemic M&A deals in India, Essar announced signing of definitive agreements with Arcelor Mittal Nippon Steel (AM/NS) for ports and power infrastructure assets which were primarily catering to the Hazira steel plant operations. The deal also envisages a 50-50 joint venture partnership, for building a 4 MTPA LNG terminal at Hazira, Gujarat, between Essar and ArcelorMittal. The Port Assets include the Terminals in Hazira, Paradip and Vizag. We are now focused on reinvesting in our existing operations and in building new assets, with more efficient, carbon neutral and new-age technologies. These will be sustainable and aligned to our theme of Energy Transition, which we hope will lead to a better life for our current and future generations.

We are on the cusp of a transformational journey where logistics, green energy and value added services are going to play a major role.



We not only have plans of diversifying cargo profile at Salaya Port but are also pursuing expansion of facility. Railway connectivity, Green Energy (LNG & Green Ammonia) and clean commodities handling are some of the high value add services which the terminal is poised for in time to come. We are also actively pursuing opportunities both national and international which are centric to our business model.



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Demand for warehousing and logistics parks will gain further momentum.

HEMANT PRABHU

COO, Greenbase Industrial and Logistics Parks

How do you look at the year 2023?

The year 2023 will observe implementation of India's National Logistics Policy in letter and spirit to elevate cost efficiencies, timely delivery, forward integration of a centralized operating system, and create a single-window e-logistics market.

As India is poised to become a global manufacturing centre due to geo-political discord, the global giants are betting big on Indian soil. The higher interest to set up their manufacturing base and expand commercial real estate presence will earmark an era of upbeat growth in this sector. This expansion will drive employment and investment opportunities into the logistics sector, giving impetus to the nation's overall economic growth.

The National Infrastructure Pipeline (NIP), envisioned by our PM under the Gati Shakti Plan with an estimated investment of around Rs. one lakh crore is gearing up with a host of mega-infrastructure projects to completely transform the supply chain landscape. Freight and multimodal corridors will pave the way to create a multitude of new economic zones and establish better accessible geographies.

The diversification of established real estate players into the logistics and warehousing sector is a natural move based on their expertise of land, building and regulatory liaisoning. This will lead to the entry of multiple branded players catering to the huge demand for Grade A assets. Earlier, majorly driven by E-commerce, the logistics sector is now also propelled by the growth in FMCG, retail, automobile, heavy engineering, renewable energy, 3PL and pharma industries. The emergence of tier-II and tier-III cities as potential logistics markets is on the back of the rising last-mile delivery trend. Demand for build-to-suit space is growing as it enables the freedom of choosing one's location, size, and area.

The sectors demand to grant 'infrastructure' status in the Union Budget 2023 to avail long term cheap credit funding and be global competitive. The industry also yearns for better incentivization like labour law relaxation, power at concessional rates, concession in stamp duty and registration fees in land acquisition, and capacity-building incentives.

The Indian logistics sector contributes nearly 14% towards the nation's GDP growth and aims to achieve \$380 billion by the year 2025. India's future looks promising with infrastructure, warehousing, and manufacturing all three geared for robust development in tandem to build an Atmanirbhar Bharat.

What could be the key challenges and what will drive the growth?

With the present world overview, the upcoming quarters might witness inflationary pressure looming across the logistics sector. Fragile supply chain, high crude oil price and raw material costs, shortage of skilled labour, sluggish statutory approvals clubbed with global market volatilities as the major challenges.

Demand for warehousing and logistics parks will gain further momentum owing to growing consumer demand, and government incentivization. Greenfield assets are preferred over brownfield assets, pertaining to higher returns from the former. Cold storage warehousing is on the rise due to the growth of organized food retailers, improved agriculture supply and a healthy need to store biopharma and nutraceutical products. The 'just-in-time' model has gained a strong foothold with faster turnaround of deliveries expected by instant age consumers.

On the brighter side, the growth impetus also falls on factors like higher consumption appetite steering even higher demand for goods

The Indian logistics sector contributes nearly 14% towards the nation's GDP growth and aims to achieve \$380 billion by the year 2025.

& services across the world. An open economy has offered businesses the chance to leverage the power of digitalization and set their footprints across the globe to reach the right target audience. The world has never witnessed tech start-ups and the e-commerce industry flourish at such an unprecedented rate ever before and it is yet to reach even newer pinnacles. Hence, logistics is a promising sector to look forward to in the coming year and witness transformational changes taking place.

How are you geared up for the year ahead?

Greenbase Industrial and Logistics Parks, a Hiranandani subsidiary is in joint venture with Blackstone. The real estate group's natural expertise in land acquisition, regulatory approvals, and development will prove beneficial for the expansion of the Warehousing platform. Today, we have active industrial parks in Chennai, Pune, Panvel, Nashik, and Durgapur with a total development potential of approx. 15 million sq ft and we are looking to expand our capacity to 30 million sq ft in the next five years with additional land banks adding to our portfolio. In addition, we are keen to develop inroads towards in-city



warehousing where the next gravity of center lies. All our operation cycles are built on the foundations of sustainability with special emphasis on recycling, and reusing resources to their optimum potential.

The year 2023 will be a year of 'implementation', waiting for the logistics sector to play a proactive role in economic growth. A robust supply chain network powered by strategic relations with key global economies will bring India to the forefront of the leading world logistics ecosystem and meet the demand of the current market dynamics. 

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There has been an increase in demand for wagons from the private sector.

VIVEK LOHIA

Managing Director, Jupiter Wagons Ltd

What could be the trends to look for in 2023 in railways sector?

We hope 2023 to be a momentous year for railways in India. The sector is charged up to take a quantum leap in terms of all-round performance within the next 4-5 years.

Of the total capex in Union Budget FY23 for railways, track infrastructure constituted the highest share of 38%. This included doubling of lines, new line construction, track renewals, electrification, road over-bridge, and gauge conversion. This will continue in the year to come.

A major change observed is that earlier orders from railways were scattered and not consistent. However, in the past few years, all tenders are issued with a long-term visibility of three years, thus ensuring a smooth flow of cash to contracting parties such as Jupiter Wagons.

How are you gearing up for the year ahead?

As India continues to build infrastructure, there has been a major uptick in orders from

the cement, steel, and coal space. Apart from that, with the opening up of the warehousing sector to the private sector, there has been an increase in demand for wagons from the private sector. Jupiter Wagons Ltd (JWL) has around Rs 6,000-crore order book and currently produces 500 wagons a month. The target is to manufacture 8,000 per month in the next year.

The National Rail Plan has laid down the roadmap for capacity expansion of the railway network by 2030. It plans to increase the modal share of railways in freight to 40-45% from the present level of 26-27%. Part of this scheme is the Dedicated Freight Corridors which are in their advanced stages of implementation and are expected to be completed by end of 2023.

50% of JWL's order book for wagons is from the non-railway sector and these customers are becoming conscious about wagon designs that are being bought. As a part of the modernisation plan, Indian Railways also plan to buy 50,000 new wagons. JWL is revamping the wagon space with completely new models and also offering long tenure maintenance contracts for the wagons.

Indian Railways have taken the high-speed passenger mobility route with the launch of indigenously built Vande Bharat trains and established the National High Speed Rail Corporation Limited. JWL has tied up with Dako for high-speed brake systems and with Kovis for brake discs' technology and expects Rs 1,000-crore business by 2025.

The Indian Railways has set a target of 100% electrification of its network by December 2023. As of now, they have electrified more than 81% of its broad-gauge network. This electrification will help in reducing carbon emissions and will help in making India's railway operations green.

The National Rail Plan has laid down the roadmap for capacity expansion of the railway network by 2030.



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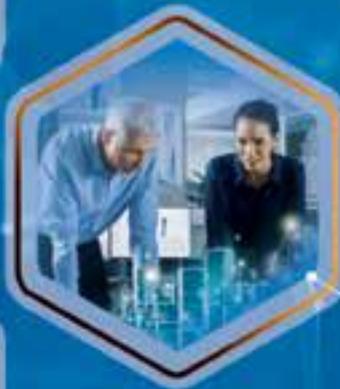
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There is increasing importance given to wastewater treatment and recycling initiatives.

ABHIJIT DANI

BU Head, Water & Wastewater Treatment, Praj Industries

What are the trends to look for in the year 2023 for the Indian water and wastewater sector?

Given the challenges of water availability and depletion, water has become an important area of attention for all industries. Reduced water footprint for the industry, efficient use of water resources, and 'multiple' use of input water with tightening discharge norms are the key factors that are driving the increasing demand in the industry. Regulators are also taking prudent but increasingly stringent stances on water utilisation and effluent discharge into common streams. The movement to save rivers and protect their aquatic life along with larger protection of the ecosystem is driving and increasingly pushing the demand for Zero Liquid Discharge (ZLD) system.

What could be the key challenges and what will drive the growth?

The market in India is growing. There is increasing importance given to wastewater treatment and recycling initiatives. The



regulations on water usage and wastewater treatment are the key drivers for the growth of industrial wastewater treatment market in India. Increasing level of awareness about ESG (Environmental, Social and Governance) goals of various corporates not just for themselves but also from the supply chain will be a major demand driver for ZLD systems. The demand for wastewater treatment in India is mainly driven by sectors such as metals, petroleum refineries, chemicals & petrochemicals, pharmaceuticals, textiles, and power plants.

However, the challenge is to develop innovative, green and energy-efficient solutions to work on CI reduction as well as making them it economically viable.

How are you geared up for the year ahead? What are the key plans?

Praj has been at the forefront of developing techno-commercially viable technologies viable based on the 3Rs - Reduce, Recycle and Reuse. It is possible to achieve up to 95% effluent recycling through our traditional offerings, such as Ultra-Filtration, Nano-Filtration and Reverse Osmosis plants. Our zero liquid discharge and recovery systems provide an efficient way to treat complex industrial waste. We are also working on various initiatives to introduce greener solutions in the ZLD space to help our customers achieve their ESG goals. 





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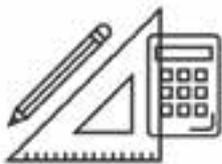
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SUBHASH SETHI

Chairman, SPML Infra Limited

What could be the trends to look for in the year 2023?

India is on the cusp of growth and without creating robust infrastructure, economic progress may be difficult to realize as we have planned to reach \$5 trillion economy. Government of India is intent on achieving the target primarily through infrastructure development due to its high multiplier effect. India would need to spend \$4.5 trillion on infrastructure development by 2030, to become a \$5 trillion economy by 2025. However, the current yearly spending is less than \$100 billion.

The year 2023 is important as the timelines for mega schemes under National Infrastructure Pipeline and flagship water supply scheme under Jal Jeevan Mission will be nearing the target. The huge financial investment announced earlier for infrastructure development projects need to be expedited. We expect there will be huge allocation in Budget 2023 and rapid implementation of infra projects.

What could be the key challenges and what will drive the growth?

With external headwinds accentuating, RBI has lowered the GDP growth projection for FY23 to 6.8%. Despite Indian economy on the

bright spot in the midst of global turmoil, we need to be cautious from the global slowdown. For infrastructure development projects, the biggest challenge remains with land acquisition, environment and other statutory clearances and delayed payments along with supply chain disruptions, especially for import of goods.

Growth indication is visible as lenders are disbursing funds that will transform into better financial closure of projects. We are also seeing a sharp increase in project implementations with the support of PM Gati Shakti that has broken the inter-ministerial silos to integrate planning and monitoring for synchronised and time bound implementation.

As we head into 2023, I can see a return to more conducive market conditions where many government development schemes, private investment and bilateral funding in infra projects and strong relationships will drive business growth.

How are you geared up for the year ahead? What are the key plans?

We are investing to upgrade for latest technological solutions and expediting project execution. Currently, we are executing over two dozen water projects including two large projects under Jal Jeevan Mission to provide clean drinking water facilities to more than two million populations.

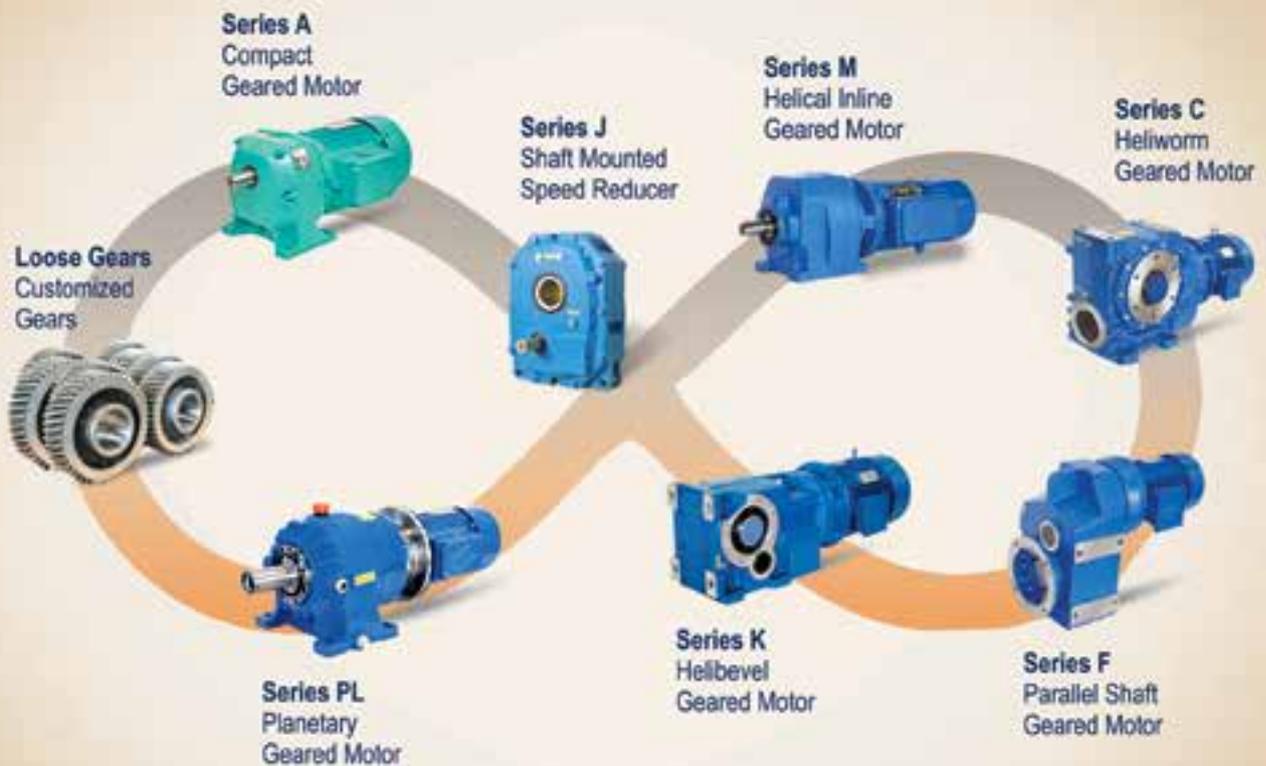
We will continue to improve our operations and services and looking forward to meeting the ever-evolving needs of our esteemed clients. We are expecting more new businesses and we will target to receive as many projects for urban and rural water supply and bulk water supply for irrigation. Most importantly, we are preparing to welcome new clients to serve and improve drinking water scenario in the country. It is a great time to be in the water industry. 

We are investing to upgrade for latest technological solutions and expediting project execution.



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Increased capital spending by government on infrastructure and asset-building projects is set to increase.

SANDEEP GARG

Managing Director & CEO, Welspun Enterprises

How has been the year 2022 and how do you look at the year 2023?

Ukraine war, global slowdown, COVID, high inflation and interest rates are the highlight of year 2022. All of these indicate shrinking GDP. Even under given scenario, World Bank had an upward revision of Indian GDP projections, i.e., from 6.5% to 6.9%. India became the fifth largest economy replacing UK in 2022, thanks to Government focus on infrastructure and initiatives like Atmanirbhar Bharat, Mission Karmayogi, Pradhan Mantri SVA Nidhi Scheme, etc. Some of the major projects completed in 2022 were Chenab bridge, Bundelkhand Expressway, Trans-Haryana Expressway, Ahmedabad and Nagpur Metro Phase I, Asia's biggest hospital, etc and some major projects namely Delhi-Mumbai Expressway, bullet train project etc are under construction.

A new World Bank report estimates that India will need to invest \$840 billion over the next 15 years—or an average of \$55 billion per annum—into urban infrastructure. The year 2023 will be the last year before India enters another national

election cycle. Typically, prior to election year a lot of new initiatives and projects are announced. We expect announcement of many infrastructure projects which have direct impact/connect with masses. This should be good in general for Indian infrastructure industry.

What could be the key challenges and what will drive the growth?

India is no different from rest of the world and is experiencing challenges due to Ukraine war, high inflation and interest rates, COVID etc. Over and above, budgetary constraints of the government, limited private financing for infrastructure, non-availability of long-term financing instruments for infrastructure projects, LI bid awarding criteria, land acquisition and limitation of skilled manpower etc are key internal challenges.

India has emerged as the fastest-growing major economy in the world and is expected to be one of the top three economic powers in the world over the next 10-15 years, backed by its robust democracy and strong partnerships. Rising employment, increasing consumption, supported by rising consumer sentiment, will support GDP growth in the coming months. Increased capital spending by government on infrastructure and asset-building projects is set to increase which will have multiplier effect on the growth.

How are you gearing up for the year ahead?

We have been able to prove the entire value chain of our asset light business model, i.e., winning-executing-stabilizing-monetising the projects. With the recent exit from the completed highway project portfolio, we have the liquidity and balance sheet strength to embark for the next phase of growth, i.e., working on same business model although may be on a much larger scale. **G**



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We are ramping up production to add new product lines.

RAHUL SHARMA
CEO, Vedanta Aluminium

How do you look at the year 2023?

We, at Vedanta Aluminium, are quite optimistic about 2023. The momentum of the global transition to clean technologies is accelerating and this shift will be metal-intensive, increasing demand for sustainable materials like aluminium. The global aluminium industry is already the fastest growing metal industry today, and its demand is expected to increase from 86 million tonnes in 2020 to 120 million tonnes in 2030. India's demand is expected to double to approximately 8 million tonnes by 2030, driven by a surge in building & construction, transportation, packaging, electrical, defense, aerospace, and aviation.

Vedanta Aluminium, as one of the world's top aluminium producers and India's largest producer of aluminium, is well resourced to meet this growing demand. In FY22, we produced more than half of India's aluminium at 2.26 million tonnes, catering to all major growth sectors in over 50 countries through a diverse array of market-leading products.

What could be the key challenges and what will drive the growth?

To truly unlock the potential of the Indian aluminium industry and make India the manufacturing and value-addition hub of the world, there are four key levers that the government must act upon:

- First, promotion of domestically produced aluminium usage in government projects should be a priority area. With the aim to make India a USD 5 trillion economy, the government is rolling out numerous high-impact projects, which have ample opportunities for aluminium.
- Second, focus should be given to build domestic capability for critical application development for the aforementioned industry

sectors under Make in India. Aluminium has potential for myriad uses, majority of which are yet to be explored by the domestic downstream sectors.

- Third, the potential of the aluminium industry should be acknowledged and recognised as a core sector with a National Aluminium Policy that will encourage, protect, and boost the domestic aluminium industry. Alongside this, the domestic industry should be made globally cost-competitive, rationalization of inverted duty structure on critical raw materials, raw material security etc.
- And finally, the domestic capability needs to be promoted in these critical sectors (electrical, automobile, building & construction). Besides enhancing domestic capacity and reducing import dependency and subsequently trade deficit, it will also generate huge employment opportunities in our country with its rich talent pool. We are on the right path, but there is still a long way to go.

How are you gearing up for the year ahead?

Looking at the growth prospects of aluminium consumption, we are ramping up production to add new product lines at our Aluminium Smelters at Jharsuguda and BALCO in Chhattisgarh. This will diversify our product mix to cater to emerging demand for aluminium in sunrise sectors like electric vehicles, high-tech manufacturing, renewables, consumer goods and strategic sectors like aerospace and defence.

We aim to be the world's most customer-centric and sustainable producer of aluminium. We are also investing in the digital transformation of our plants & processes, leveraging green technologies, diversifying our energy mix to include renewables, and working towards our vision of net zero carbon. 

Aluminium has potential for myriad uses, majority of which are yet to be explored by the domestic downstream sectors.



The demand for aluminium is expected to grow by more than 50 per cent by 2050.

PRAGUN JINDAL KHAITAN

Vice Chairman and Managing Director, Jindal Aluminium

How do you look at the year 2023 for Indian infrastructure and construction sector?

We are very optimistic about the domestic market. The vision of being a country whose industry is independent and self-reliant will need engineered aluminium products to meet the various end-user requirements. As it evolved, the construction industry has been influenced by the changing landscape of materials used and the need for faster execution of projects. Developers always try to ensure that their projects meet sustainability targets, are cost-effective, aesthetic in design, and durable; they are constantly on the lookout for a reliable resource for construction that makes the project stand out.

The demand for aluminium is expected to grow by more than 50 per cent by 2050. The government's focus on creating the smart cities offers scope for the downstream aluminium segment to play a critical role in serving the needs of Smart Cities Mission. It is due to several factors such as its role in building a prosperous and sustainable economy. Touted as the metal of the future, it will take the technology of construction to newer heights.

What will drive growth of aluminium industry?

Over the next five to eight years, we see the industry moving towards consolidation. The consumption and demand by the industries for aluminium is going to be fulfilled by its inherent qualities. The automotive sector is witnessing a rising demand as aluminium is a significant contributor to light-weighting and the shift to EVs has seen the metal being sought after. Aluminium alloys are also crucial in the aerospace and aviation sectors, battery casings and such next-generation products. Being a metal that can contribute to larger sustainable initiatives makes aluminium fit



to contribute to the green building concepts that modern construction is fascinated with.

Downstream aluminium producers need encouragement towards high-end production and value-added exports. This will not just echo the 'Make in India' and 'Atmanirbhar Bharat' objectives but also emphasize the progress of the overall value chain of the domestic aluminium sector.

How are you geared up for the year ahead?

Jindal Aluminium currently occupies approximately 25-30 percent of the market in the extrusion category and 10-12 percent in the rolling divisions' segment in India.

We have a manufacturing capacity of 1,50,000 metric tonnes per annum at the two manufacturing facilities in Karnataka, and have added another 14,000 metric tonnes per annum after acquiring and operationalising the Indo Alusys Bhiwadi (Rajasthan) plant. A part of capital expenditure will go towards de-bottlenecking the existing units and rest on upping capacities at the Bhiwadi plant. We target to take the Bhiwadi plant manufacturing capacity to up to 50,000 metric tonnes per annum in the nearest horizon.

In the flat-rolled division, our current production capacity is 50,000 metric tonnes per annum. We are shortly commissioning two new casters, increasing its capacity by 50%, taking it to 75,000 metric tonnes per annum from next financial year.

Downstream aluminium producers need encouragement towards high-end production and value-added exports.

CONSTRUCTIVE SOLUTIONS



The changing needs of the customers in line with the quality and strength of the projects is driving the demand for different types of construction chemicals. **Construction Times** highlights the latest product and application trends in construction chemicals.

The construction chemicals industry in India is termed as a 'sunrise industry', growing at a significant rate. This growth is due to increasing government investments in infrastructural projects and rising construction spanning across all sectors. The Indian construction chemicals market is expected to grow by significantly in the coming years. Construction chemicals play a crucial role in the building and construction industry. Owing to their low consumer recognition, use of construction chemicals is not high in India, but with proper understanding of this industry, the demand is expected to increase.

MARKET OVERVIEW

The global construction chemicals market estimated at US\$42 billion in 2021 is expected to grow to US\$72 billion by 2030 at a CAGR of 6.5% between 2022 and 2030. The Indian construction chemical market sales are expected to reach around US\$1,500 million by the end of 2022, registering a Y-o-Y growth of approximately 13%. India's increasing construction activity in various key segments, particularly infrastructure, housing, industrial and commercial segments is driving the demand for construction chemicals. On the latest

market trends, **Anil Anjanappa, Executive Director, Tremco CPG India**, "This rapid urbanization will



ANIL ANJANAPPA
Executive Director
Tremco CPG India

accelerate the demand for affordable housing, connected transport systems, other infrastructure, and commercial structures, which in turn increase the demand and consumption of construction chemical materials. With the growing investments in the infrastructure sector, India construction chemicals market is also experiencing stellar growth."

PRODUCTS & TECHNOLOGY TRENDS

With the new-age construction projects demand better quality and strength in construction, there is a growing need for suitable construction chemical products to achieve these requirements. Leading players are in the process of designing and developing new range of products and solutions. Tremco CPG



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India is a market leader in the manufacture of construction chemical products including seamless industrial and commercial resin flooring solution, waterproofing systems, roofing with insulation, glazing solution, systems for joints & durable sealants, admixtures, passive fire protection product, repair solution, fibres as well as other specialist construction products and coatings. "We are continuously developing and launching new technologies and high-performance products in market for the benefit of customers. Our recent innovations include spray applied technology products in different chemistries (Polyurea, Polyurethane), roof waterproofing solutions for both new construction and refurbishment market, superior speciality admixtures, new age seamless flooring solutions for commercial segments (epoxy terrazzo, flaked systems, MMA flooring, natural stone flooring etc.), says Anjanappa.

Sushil Kathar, Managing Director, Penetron India, says, "Penetron started with Crystalline Waterproofing



SUSHIL KATHAR
Managing Director
Penetron India

& concrete repair products and over the years, we have focussed on enhancing the life of concrete and we have been successfully able to introduce our product for enhancing the concrete durability."

TIKIDAN has a very strong product portfolio in its offerings for sustainable construction. "Waterproofing is a pain-point for every building as it not only destroys the aesthetics of a building but also leads to decreased life-span of structure and is a health-hazard for inhabitants due to high humidity and fungus growth. TIKIDAN offers a holistic solution for all waterproofing needs of a structure in the infrastructure and building space. Whether it is underground construction or wet areas or podiums/roofs/terraces, we provide a wide range of products/solutions from pre-formed membranes to liquid membranes to integral waterproofing to satisfy the needs of absolute water-tightness of any structure," elaborates **Himanshu Agrawal, President, Tiki Tar Danosa India.** TIKIDAN provides Acoustic Solutions



HIMANSHU AGRAWAL
President
Tiki Tar Danosa India

(Sound Insulation) for various requirements which can considerably bring down the sound decibel in structures, apart from solutions for corrosion resistance, sealing of construction and expansion joints, concrete curing compounds, etc.

GROWTH TRENDS

According to Kathar, with urbanisation and infrastructure development, construction chemical demand will only increase, especially as we want a sturdy structure. "Just in one financial year 2021-22, Mumbai added 110,000 housing unit sales. The housing sector is booming in every nook and corner of the country. Add to this, the push by the government in the Infrastructure sector on roads, highways and other infrastructure projects has created a huge demand for construction chemicals in India," he points out.

Anjanappa mirrors the same view as he says, "Increasing trend of urbanisation drastically increases the demand for commercial, residential, and large number of industrial buildings and this accelerates the demand for construction chemical products."

Agrawal is of the view, "As compared to countries like Japan, Europe or USA, the use of construction chemicals in India – though increasing - is still very much on the lower side. The demand for high-performance construction chemicals in the urban market is increasing with the user becoming more aware about the life-cycle benefits of using the right products."

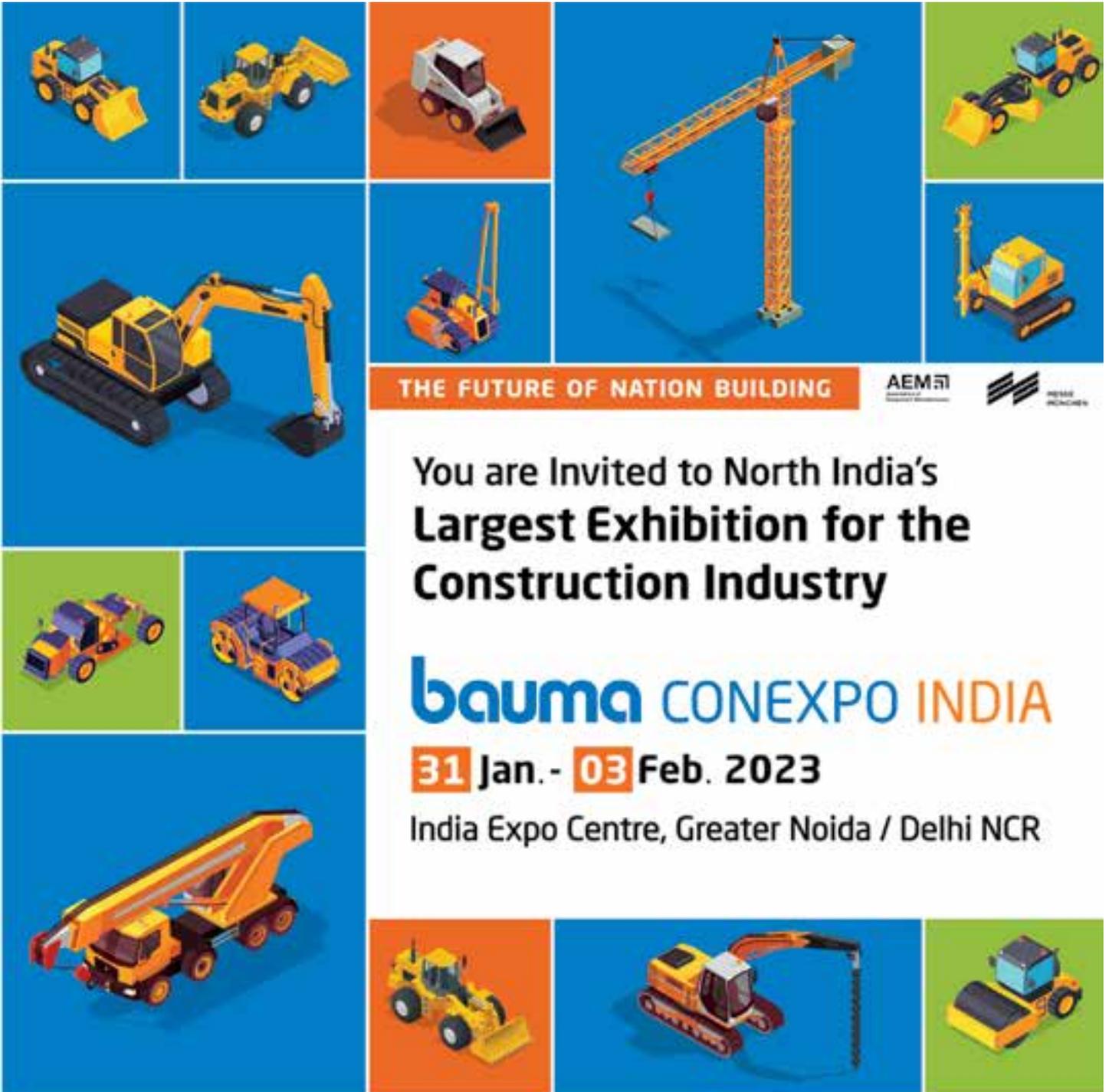
OUTLOOK POSITIVE

The market outlook of construction chemicals looks positive with the way construction activities are evolving in the country with scale and quality are growing together. In this scenario, the construction chemicals will see further demand in the coming years.

According to Anjanappa, the key industrial segment which is set to experience an massive growth in the coming years include automotive because of EV market growth, data centres, food and beverage, pharmaceuticals etc. He also highlights, "Many buildings in India are over 40 to 50 years old and need extensive renovation work. Rising renovation and redevelopment of old structures across India, increasing awareness about construction quality and growing preference for utilization of ready-mix concrete (RMC) in infrastructure projects is expected to boost the overall demand of this segment."

Kathar observes, "With the increase in demand for urban housing and the past pace of infrastructure development, the construction chemical industry is likely to see a growth of 25% YoY for next decade."

"Overall, the construction chemical market in India would grow at a CAGR of 10-12% over the next 15-20 years which will be almost double than a global growth," Agrawal concludes. 



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TIKIDAN has a very strong product portfolio in its offerings for sustainable construction.

HIMANSHU AGRAWAL

President, Tiki Tar Danosa India Pvt. Ltd.

What is your view on the construction chemicals market presently?

Globally, the construction industry accounts for almost 10% of the GDP. Surging population and urbanization are driving the need for sustainable infrastructure, housing and eco-friendly products. Infrastructure is crucial to any economy, particularly emerging markets, as their growth rate is high. Speed of construction, energy conservation, lower carbon foot-print, quality and lifespan of structures are the drivers for increased use of construction chemicals. The global construction chemicals market estimated at USD 42 billion in 2021 is expected to grow to USD 72 billion by 2030 at a CAGR of 6.5% between 2022 and 2030. In India, government initiatives on infrastructure projects, and programmes such as Housing for all, Smart Cities, etc., have provided the required thrust to the growth of the construction industry which in turn is driving the demand for construction chemicals. This market is expected to grow between 10-12% CAGR for India due to a very high thrust on the infrastructure and housing sector.

How is urbanisation and infrastructure driving the demand for construction chemicals?

Urbanization in India has forced a high focus on the infrastructure sector development. Airports, highways, bridges, high speed & metro rails, tunnels, commercial spaces and residential sector are being constructed to cater to the rising population and urbanization which is driving the construction industry at a very fast pace. The need for fast pace sustainable construction has increased the demand for construction chemicals many-folds. Infrastructure construction accounts for almost 60-65% of the Indian construction chemicals market. For the urban projects, apart from reputed Indian consultants and architects, many international designers are taking up projects in India. These consultants due to their international expertise, exposure to global trends in construction design by international codes/standards are further fueling the growth of construction chemicals.

How do you compare the demand trend of construction chemicals in urban and rural markets?

As compared to countries like Japan, Europe or USA, the use of construction chemicals in India – though increasing - is still very much on the lower side. The demand for high-performance construction chemicals in the urban market is increasing with the user becoming more aware about the life-cycle benefits of using the right products. However, lack of proper codes and standards for many aspect of construction leaves it for the consultant or user to decide the technology to be used, often leading to results below the desired levels. In the rural market, though the penetration of construction chemicals is abysmally low due to lack of awareness in the user and most construction happening without



proper consultants/architects, the construction chemical usage is increasing as efforts are being made by construction chemical manufacturers to create awareness and provide technical support for the use of such chemicals.

What are the key products and solutions offered by your company in construction chemicals?

TIKIDAN has a very strong product portfolio in its offerings for sustainable construction. Waterproofing is a pain-point for every building as it not only destroys the aesthetics of a building but also leads to decreased life-span of structure and is a health-hazard for inhabitants due to high humidity and fungus growth. TIKIDAN offers a holistic solution for all waterproofing needs of a structure in the infrastructure and building space. Whether it is underground construction or wet areas or podiums/roofs/terraces, we provide a wide range of products/solutions from pre-formed membranes to liquid membranes to integral waterproofing to satisfy the needs of absolute water-tightness of any structure.

Noise pollution is highly responsible for high anxiety levels amongst people and gradually India is awakening to this fact. For the commercial and residential spaces, TIKIDAN provides Acoustic Solutions (Sound Insulation) for various requirements which can considerably bring down the sound decibel in structures.

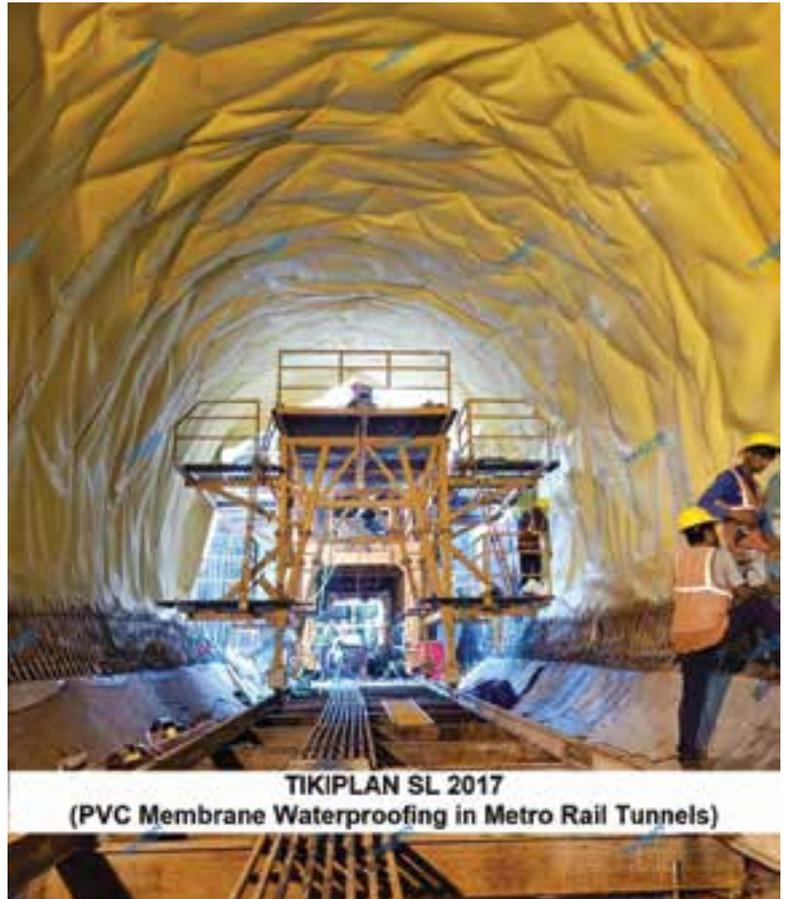
India being a tropical country where summer temperatures are extremely high and in some cold regions the temperatures in winters are sub-zero, the power-consumption to air-condition the interiors is very high and costly. TIKIDAN provides thermal insulation solutions to the construction industry which can effectively bring down the power consumption up to 35%.

High performance industrial flooring demand is rising and TIKIDAN provides resin (epoxy and polyurethane) floor toppings to provide high-functional floors apart from enhancing the aesthetics.

TIKIDAN also provides solutions for corrosion resistance, sealing of construction and expansion joints, concrete curing compounds, etc.

How are you responding towards the changing needs of customers for enhanced quality products?

TIKIDAN has a high focus on R&D to continuously adapt to the ever-changing needs of the construction industry. There is continuous re-engineering in the formulations and production process to enhance the product performance as per the market demand. From sourcing of raw materials to production of finished goods, a zero-tolerance policy on quality has put TIKIDAN on



the list of preferred-supplier of building materials and construction chemicals for our customers. A QMS in place with stringent quality control and tests at every stage of production ensures that our customers are delivered with the highest quality products. Regular training of the team for high customer focus and quality products and services is our way to maintain very high quality standards.

What are the growth opportunities of construction chemicals in future?

The construction industry in India is growing at a very fast pace and the need for sustainable construction focused on life-cycle, construction speed, energy efficiency, environment and carbon foot-print and economics, is fueling the growth of construction chemical industry. India's growth for the next 25-30 years will not slow down as it moves to a USD 5 trillion economy and beyond. Due to continuous rising population and urbanization, the needs of infrastructure and residential sector construction will only grow further. The current government's focus on building highways and connecting the country would fuel further settlements and both city and rural growth along the stretches of these highways. Overall, the construction chemical market in India would grow at a CAGR of 10-12% over the next 15-20 years which will be almost double than a global growth. 



We have recently developed new technology products with different chemistries.

ANIL ANJANAPPA

Executive Director, Tremco CPG India Pvt Ltd

What is your view on the construction chemicals market presently?

India's 'sunrise industry', the construction chemicals industry is experiencing growth at a rapid pace. India construction chemical market sales are expected to reach around US\$ 1,500 million by the end of 2022, registering a Y-o-Y growth of approximately 13%. The construction chemicals market is expanding significantly as a result of India's increasing construction activity in various key segments, particularly infrastructure, housing, industrial and commercial segments. Key players are focusing on the expansion of their business and have installed various manufacturing facilities across India to capture a major share of the market and remain in a leading position in this segment. The players are focused on strengthening their product portfolios to meet the customer needs and expanding their market footprint through the strategic acquisition of companies with similar interest in the market.

How is urbanisation and infrastructure driving the demand for construction chemicals?

The population of India is expected to reach 1.6 billion by the year 2048, with urban population reaching 675 million by 2035. This

rapid urbanization will accelerate the demand for affordable housing, connected transport systems, other infrastructure, and commercial structures, which in turn increase the demand and consumption of construction chemical materials. With the growing investments in the infrastructure sector, India construction chemicals market is also experiencing stellar growth. On the infrastructure front, the demand is there from the asphalt and concrete roads and highways, repairing of old roads, underground tunnelling, bridges, dams, the Bharatmala and Sagarmala projects.

What are the key products and solutions offered by the company in construction chemicals?

Tremco Construction Products Group (CPG) India is a market leader in the manufacture of construction chemical products including seamless industrial and commercial resin flooring solution, waterproofing systems, roofing with insulation, glazing solution, systems for joints & durable sealants, admixtures, passive fire protection product, repair solution, fibres as well as other specialist construction products and coatings. We are continuously developing and launching new technologies and high-performance products in market for the benefit of customers. Our recent innovations include spray applied technology products in different chemistries (Polyurea, Polyurethane), roof waterproofing solutions for both new construction and refurbishment market, superior speciality admixtures, new age seamless flooring solutions for commercial segments (epoxy terrazzo, flaked systems, MMA flooring, natural stone flooring etc.)

Tremco CPG India is a part of wider global Tremco Construction Products Group company (one of the RPM Inc operating division) headquartered in Cleveland, Ohio (USA).



RPM International Inc. (\$6.7 billion) is a conglomerate with subsidiaries that manufacture and market high performance specialty coatings, sealants and building materials.

Tremco CPG is a powerful union of some of the world's most trusted & leading chemical and coatings technology brands owned by RPM Inc (Tremco, Euclid Chemical, Willseal, Flowcrete, Nullifire, Illbruck, Dryvit and Vandex).

What are the growth opportunities of construction chemicals in future?

Rising investments (domestic and international), Government's initiatives like Make in India, Smart City and Housing for all projects, growth in number of infrastructural projects and resultant spending increases the construction activities driving the growth for construction chemicals. Increasing trend of urbanisation drastically increases the demand for commercial, residential, and large number of industrial buildings and this accelerates the demand for construction chemical products. The key industrial segment which is set to experience an massive growth in the coming years include automotive because of EV market growth, data centres, food and beverage, pharmaceuticals etc. Many buildings in India are over 40 to 50 years old and need extensive renovation work. Rising renovation and redevelopment of old structures across India, increasing awareness about construction quality and growing preference for utilization of ready-mix concrete (RMC) in infrastructure projects is expected to boost the overall demand of this segment.

How are you responding towards the changing needs of customers for enhanced quality products?

We believe in innovation, and we are purely a customer-centric organisation. We do and develop what our customers want to make their life easy and simple, thereby building durable structures. Tremco CPG India is a part of global conglomerate (RPM Inc) and its products strictly adhere to the international quality standards. Our R&D systems are accredited, and we believe

that any new product development should focus on addressing the existing concerns of our customers. We have recently developed new technology products with different chemistries and have been successful in building volumes to the new launches. Few of them are TREMproof



Micorea S5, Tremproof Micorea S3 (both are polyurea spray applied products), Blueshield PmB (spray applied system of polyurethane chemistry), epoxy resin terrazzo flooring (Mondeco Earth) which has been used across multiple airports in the country, decorative flakes flooring, MMA flooring which gives the advantage of ultra-fast cure benefit. Additionally, we recently launched non-sticky high performance specialty admixtures (Plastol Ultra range), Roof waterproofing solution which has been successful in US market (AlphaGuard BIO, Solargard 6083). Structural concrete fibers (Tuf-Strand SF) are used to reduce or replace the use of steel in concrete reinforcement thus reducing the CO2 footprint drastically. More products are in the pipeline for infrastructure market segments like bridge waterproofing, roads, tunnels, dams etc. 

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Today one cannot imagine civil construction without the use of some construction chemicals.

SUSHIL KATHAR
Managing Director, Penetron India

What is your view on the construction chemicals market presently?

For the longest time, waterproofing of underground structures was achieved through BOX TYPE waterproofing. Membrane-based waterproofing using membranes of various types such as PVC membranes, APP/SBS membranes, EPDM membranes or TPO membranes were the preferred choices. All these technically created just built a method of creating a physical barrier outside the concrete surface. These methods are time consuming, expensive and less reliable.

With new innovation and advent of technology, now we work with creating Integral Crystalline waterproofing admixtures. Using such technology ensures water tight structures where the concrete that is water tight by itself. In this method, Integral Waterproofing admixture is added to the concrete at the batching plant resulting in up to 90% reduction in co-efficient of permeability of the concrete, thereby producing a water tight concrete.

The construction chemicals market has evolved over time and now we observe that there are several construction-related activities, where construction chemicals have replaced traditional methods of construction, leading to increased demand. In the present day construction, one cannot imagine civil construction without the use of some construction chemicals.

What are the key products and solutions offered by the company in construction chemicals?

Our company specialises in the field of Crystalline Durability Admixtures and the entire range of crystalline waterproofing and concrete repair products.

Penetron Admix, a third-generation crystalline concrete-enhancing admixture, is the most advanced formula to effectively waterproof

concrete structures. It eliminates problems related with first and second generation admixtures such as loss of compressive strength and unusually long delays of the setting time.

Penetron Admix can be applied to any commonly-used concrete mix in today's construction industry. It doesn't have any known incompatibilities with other workability enhancing admixtures such as retarders or super-plasticizers and there are no limitations in regards to the w/c ratio of the concrete to be treated. With dosage rates as low as 0.8% (by weight of cement) it is not only one of the most cost-efficient and economic waterproofing choices, but an effective formula that has been proven in many international laboratory tests and on countless projects worldwide.

Penetron Admix is a non-toxic product and is approved for use in projects involving potable water (NSF 61 approval, European Environmental License). Penetron Admix does not contain any volatile organic compounds (VOC) and is used in green projects acquiring LEED certification points.

When applied to concrete Penetron Admix assists in the hydration process acting as a catalyst to un-hydrated cement particles already existing in the concrete. This already takes place in the early stages of the cement-reaction resulting in the development of internal strength build up compensating to some extent the formation of shrinkage cracks as well as the increase in compressive strength. At the same time, a longer workability of the fresh concrete is provided.

How do you view the demand trend of construction chemicals in future?

With the increase in demand for urban housing and the past pace of infrastructure development, the construction chemical industry is likely to see a growth of 25% YoY for next decade. 

The construction chemical industry is likely to see a growth of 25% YoY for next decade.



REFURBISHING TALKATORA INDOOR STADIUM

The XIX Commonwealth Games, also known as the Delhi 2010 Commonwealth Games, was a spectacle to watch. The whole world was waiting with bated breath to witness India's presentation and culture. This was the first time India was hosting a global multisport competition. This came with a lot of pressure to upgrade India's infrastructure and redevelop the existing structure and bring it at par with international standard.

As part of the rehabilitation of sporting facilities, numerous stadiums were constructed. Along with that Dr. Shyama Prasad Mukherjee Swimming Complex (Talkatora Indoor Stadium), an Olympic-size swimming facility in New Delhi, which comprises three pools: a warm-up pool, a diving pool, and the main competition pool was built. An Olympic-sized three pools were refurbished to replace a 10-lane swimming pool which was a 25-meter diving pool. The re-constructed pool was half underground and partially above ground and has a combined capacity of 6 million litres.

The Penetron waterproofing portfolio was chosen, because it was the only waterproofing system that could complete this project within two months. The project size was approx 6,000 sq m coating + 400 cu m of concrete with admix + 500 RMtr Penebar + 3,000 kg Penecrete Mortar.

Penetron team was all set to start the given job, which had a two-month deadline for completion. The client, CPWD (Central Public



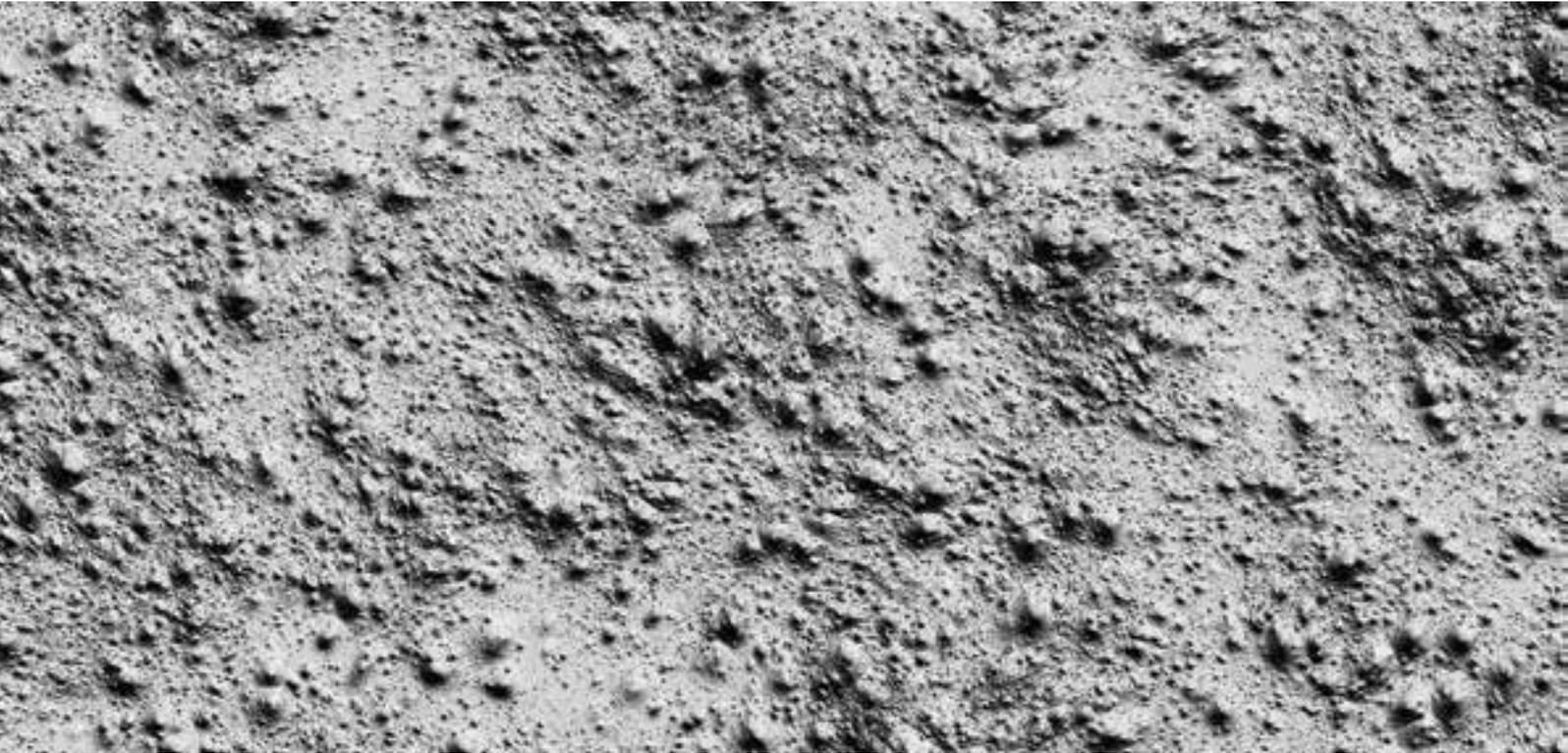
Works Department), required the sub-structure to be completely dry since numerous high definition cameras and transmission equipment were going to be placed for live coverage of sporting events.

Given the limited time, we ensured the quality of products are with the broad range of concrete waterproofing solutions, like Penetron Admix, Penetron, Penebar, Penecrete Mortar and Penepug.



Based upon the past performance of Penetron in India, the clients chose the Penetron System. Yet again, Penetron completed the task and the swimming competitions were held successfully at the venue after the Penetron crew turned over the facilities in a record-breaking period of two months. In addition, the facility includes the largest 150 m x 130 m COHE strand supported, elliptical-shaped, aluminium roof in the world. With an Olympic-sized pool, it is now the biggest covered aquatic stadium in the county which has the capacity to accommodate 5,000 people inside the stadium. 

The Penetron waterproofing portfolio was chosen, because it was the only waterproofing system that could complete this project within two months.



INNOVATION in CEMENT INDUSTRY and the RACE to NET-ZERO

The key component of concrete is mortar, fine and coarse aggregates and cement. It serves as the binding agent between constructions and buildings. Ordinary Portland Cement (OPC), which is the majority of cement manufactured today, is manufactured by inter-grinding cement clinker, gypsum, and additional cementitious material (SCM).

While producing one kg of OPC, 0.7 g of CO₂ will be released during the process. Clinker production is responsible for the majority of the emissions. The calcination of the limestone accounts for 50-60 per cent of these emissions, with the majority of the remaining emissions coming from the burning of fossil fuels to reach the requisite kiln temperatures. Due to this release of CO₂, cement production is to blame for roughly 7-8% of all worldwide CO₂ emissions. Demand for cement will rise along with population expansion through the year 2050. In order for the world to achieve its climate targets, it will be essential to abate these emissions.

CHALLENGES ADDRESSED BY INNOVATION

When it comes to reducing emissions, the cement industry has some particularly tough obstacles to overcome. New industrial methods that produce less pollution typically have higher production costs because manufacturers' profit margins are too small to cover them. In addition, industry is resistant to change since it has invested a lot of money in the way things are done now.

Clinker substitution and, to a lesser extent, carbon capture are mature mitigation strategies. Both have particular difficulties to overcome. Alternative fuels like tyres, household wastes are used on a regular basis. The method replaces the use of fossil fuels while releasing carbon from these wastes.

INNOVATION IN PROCESSES: CARBON CAPTURE AND USE

In order to store CO₂ underground, carbon capture includes separating CO₂ from other gases in exhaust. This method of CO₂ capture and storage is more expensive and frequently

limited by the lack of infrastructure for CO₂ transit and storage. As technology is cheaply deployed at smaller scales by companies like Carbon Clean and Svante, the cost of capture is decreasing. Novel calciner arrangements can also make it possible to electrify or use alternative fuels while still separating process and fuel emissions. In Hanover, Germany, Leilac is presently implementing technology to capture around 100,000 tpa of CO₂ and its construction commences in 2023.

The use of carbon in fuels, chemicals, building materials and other products can address some of the challenges of capture and storage. For example, CarbonCure and Carbicrete use CO₂ in the concrete for curing. The injected CO₂ reacts with the concrete mix and becomes a calcium carbonate increasing the concrete's compressive strength and improving its performance.

One of the businesses seeking to exploit CO₂ emissions to produce fuels or chemicals is Synhelion, which creates syngas from CO₂ and water using focused sun radiation. In December 2022, Synhelion raised \$24 million from CEMEX and other sources, and is presently building an industrial facility to make sustainable fuels with solar heat (and captured carbon). In order to create solar clinker, the startup additionally connected its solar receiver to a CEMEX clinker production process (without use of fossil fuels).

CLINKER SUBSTITUTION AND ADDITIONAL CEMENTITIOUS MATERIALS

Clinker substitution entails replacing clinker with increasing volumes of SCM. Depending on the rate of substitution, these cements, which are now produced on a large scale by businesses like Ecocem, can dramatically reduce emissions. The method may be restricted by prescriptive standards (which call for minimum clinker ratios) and may be restricted by the availability of additional cementitious materials in the future

(common SCMs include fly ash from the coal-fired plants or blast furnace slag from the steel industry).

Fundraising efforts by innovators to scale the use of substitute supplementary cementitious materials are increasing. To speed up the commercialization of Terra's OPUS cementitious materials derived from a variety of regional feed stocks and waste products, Terra CO₂ raised \$46M in June 2022. When post-consumer coloured glass fines are activated using Carbon Upcycling's carbon utilisation technique, CO₂ emissions are sucked up and high-performance SCMs are created. This technology is now in pilot testing.

ALTERNATE RAW MATERIALS, INTEGRATED PROCESSES, AND ALTERNATIVE CEMENTS

Using alternate raw materials or techniques that do not require calcining limestone for clinker manufacture can significantly reduce emissions. The materials used as SCM are frequently also employed as binding materials (when activated).

The use of 'bio-cement', which is made when organisms break down limestone and then reconstitute it to create an end product like bio-concrete, can also result in significant reductions.

ACROSS THE VALUE CHAIN INNOVATION

The cement industry's emissions can be greatly reduced through innovation, but it will need finance to scale and lower costs. An emphasis on performance-based standards can also assist alternative cements get access to the market. Additional innovation across the value chain is also to be anticipated: large amounts of CO₂ can be sequestered by the mineralization of aggregates, production facilities can benefit from software that optimises production processes and blends, and concrete 3D printing can help with installation optimization. 



Dr. S B Hegde
Professor, Department of Civil Engineering, Jain College of Engineering and Technology, Hubli, Karnataka; and Visiting Professor, Pennsylvania State University, USA

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CONSTRUCTION TIMES
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REGAINING MOMENTUM

As India is gearing up to become a \$5 trillion economy in the near future, infrastructure development activities are going to regain momentum where involvement of a large number of construction equipment and machineries will be visible in the coming years. **Construction Times** explores the market trends and outlook.

India is the third-largest construction equipment (CE) market globally, after China and the US. According to the Indian Construction Equipment Manufacturers' Association (ICEMA), the Indian CE industry sells between 80,000-100,000 units per annum on an average. Construction equipment plays a major role in infrastructure development as more than 30 per cent of the project execution cost goes into equipment cost. The Government's enhanced focus towards creation of world-class infrastructure in the country has opened up a host of opportunities for the CE industry.

CURRENT TRENDS

After the Covid pandemic impacting the global as well as Indian economy in the past 2-3 year, coupled with recession in some leading global economies, there has been a slowdown visible in project execution. Especially in the roads and highways, the project execution has come down considerably. **Dimitrov Krishnan, President, ICEMA**, highlights, "One of the challenges which remained for the CE sector during FY22 was the slowdown in construction of roads and highways (from 36.5 km/day in FY21



DIMITROV KRISHNAN
President, ICEMA

to 28.64 km/day in FY22) which accounts for nearly 40% of construction demand. This has adversely impacted the demand for construction equipment." However, going forward, the forecast for CE industry is positive, especially in view of the improved YoY results of Q1 and Q2 of FY22-23. "With over 35% increase in budget outlay on capital expenditure for FY23, the industry sentiments have received a boost on the back of enhanced export prospects as well as continued governmental thrust on infrastructure development," adds Krishnan.

There has been a direct correlation between infrastructure development and equipment sales in the past. **Deepak Shetty, CEO & Managing Director, JCB India**, says, "This year we witnessed



ahead. Construction, earthmoving, material handling and mining equipment are vital for successful and timely completion of Government's mission critical infrastructure projects.

bauma CONEXPO INDIA TO BOOST POSITIVE SENTIMENTS

Industry exhibitions are ideal platforms to witness and experience the new technologies and solutions coming up in the market in a touch-and-feel manner. Though the Covid pandemic had temporarily halted the physical format of exhibitions, the activities have restarted, creating new optimism among the manufacturers and customers. Thus, the latest edition of bauma CONEXPO INDIA is going to be held from January 31 to February 3, 2023, after a gap of almost four years.

Bhupinder Singh, CEO, bauma CONEXPO INDIA, gives an overview of the exhibition. "The



BHUPINDER SINGH
CEO
bauma CONEXPO INDIA



DEEPAK SHETTY
CEO & Managing
Director, JCB India

a slow beginning in terms of equipment sales. This was due to a few reasons: the Russia-Ukraine conflict disrupted supply chains, and a steep increase in commodity prices led to lower demand in the year's first quarter. However, with the government's increased focus on the infrastructure sector, the cooling off of commodity and fuel prices, and the resumption of supply chains, we are seeing a steady rise in sales for construction equipment. Current trends indicate that the increase in the sale of machines will continue through the next year. It is predicted that the industry will see a growth of 15-20%."

OPPORTUNITIES

The National Infrastructure Pipeline (NIP) offers a huge opportunity for creating world class infrastructure in the country and a wide range of equipment are needed in the execution of these projects. Equipment and machinery such as earthmoving & mining, concrete, material handling, material processing and road construction are expected to see increased demand this year and

upcoming edition of bauma CONEXPO INDIA 2023 is bigger compared to our previous editions in terms of exhibitor participation and expected visitor footfalls. bauma CONEXPO INDIA will be held from 31 Jan to 3 Feb 2023 at the India Expo Centre. We are expecting participation from more than 600 exhibitors from 20+ countries, showcasing 10,000+ products and solutions, and drawing more than 50,000 visitors during the four-day event."

This edition of bauma CONEXPO INDIA will have a special focus on machinery innovations for the mining sector, especially pertaining to energy efficiency and safety measures. The show will also focus on skill-building initiatives to create quality jobs in the construction equipment space.

On the further services offered by the exhibition, Singh elaborates, "We are offering an exclusive experience to our visitors through live product demos, 20+ knowledge-rich conferences, and business-to-government sessions. bauma CONEXPO INDIA is a vibrant meeting place for exhibitors and visitors. On this front, we are executing 5000+ buyer-seller meetings that would enable meaningful handshakes and unlock business opportunities. This edition of bauma CONEXPO INDIA will have a special focus on machinery innovations for the mining sector, especially pertaining to energy efficiency and safety measures. The show will also focus on skill-building initiatives to create quality jobs in the construction equipment space."

All the exhibitors are excited to be part of the 6th



international trade fair for construction machinery, building material machines, mining machines and construction vehicles to be held at the India Expo Centre, Greater Noida. **Arvind K Garg, Senior Vice President & Head - Construction & Mining Machinery Business, Larsen & Toubro**, says, "The



ARVIND K GARG
Senior Vice President
& Head - Construction
& Mining Machinery
Business, Larsen &
Toubro

industry is eager to participate wholeheartedly and will put its best foot forward for the event's success. L&T will display many unique solutions to customers at bauma CONEXPO INDIA 2023. We are looking forward to active participation in engaging with our valued customers. The next few years will hold tremendous potential for the CE Industry, and we expect participation. bauma CONEXPO has earned credibility in the industry over the previous editions, and we look forward to the upcoming edition in January 2023 at Greater Noida."

According to **V G Sakthikumar, Managing Director, SCHWING Stetter India**, the company will be launching 14 new products in the bC India show along with other regular products such as batching plants, concrete pumps, recycling plants, TSRs, self-



V G SAKTHIKUMAR
Managing Director
SCHWING Stetter India

loading mixers, wheel loaders, excavators, piling rigs, truck cranes, horizontal directional drilling machines, etc. "We have always been a vivid supporter of bC India since its debut in India. We look at it as a platform for us to bond with our customers in the north and eastern region. We are looking forward to this edition as a big event after four years, to connect with our customers and to showcase our latest range of products," he adds.

BKR Prasad, Head - Marketing & Product Development, Tata Hitachi Construction Machinery Company, talks about the company's plans at the



BKR PRASAD
Head - Marketing &
Product Development,
Tata Hitachi Construction
Machinery Company

exhibition, "This year, bauma CONEXPO INDIA is happening with the theme 'The future of nation building' and we are very keen to showcase our readiness in building the India of tomorrow. We will be displaying our versatile, CEV IV-compliant backhoe loader model Shinrai Prime, our newly launched, indigenously developed, NextGen 3 ton mini excavator model NX30 along with some of our mid-range construction excavators. Also, on display will be parts, attachments, and solutions offered by us."

CE MARKET OUTLOOK

The demand for construction equipment is on the uptrend in the current financial year. According to Shetty, India's infrastructure development for the next decade is lined with huge projects and government schemes. **Dheeraj Panda, Chief Operating Officer (Sales, Marketing & Customer Support), Sany Heavy Industry India**, says, "The good times that we have seen in 2022 in terms of positive market



DHEERAJ PANDA
Chief Operating Officer
(Sales, Marketing &
Customer Support), Sany
Heavy Industry India

dynamics, increased sales and government support will continue to gain pace in 2023 as well."

"The CE industry's outlook for 2023 is positive. There has been an upward trend in demand observed during 2022 which is likely to be continued during this year as well with many of the planned infrastructure projects expected to be implemented in 2023," concludes Krishnan on a positive note.





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We could soon be looking at the sales up to the 2019 levels, or even beyond this year.

DIMITROV KRISHNAN
President, ICEMA

How do you visualize the revival of Indian construction equipment industry in the past two years?

The construction equipment (CE) industry, which was adversely impacted due to COVID-19 pandemic, along with various other factors, has been on the road to recovery in the last two years and is showing encouraging signs in the current financial year. In fact, we could soon be looking at the sales up to the 2019 levels, or even beyond this year.

Looking at the figures for the last two years, as compared to the FY20 levels, there was a composite 10% year-on-year growth in sales of the CE industry in FY21. This was remarkable given the 7.3% contraction observed in the economy during the same period. High resilience was shown by most of the equipment segments, particularly, by the earthmoving equipment segment which contributes nearly 75-80% of the total equipment sales in India. In FY22, while there was a drop of 8% in overall sales, the actual overall numbers were slightly higher than the FY20 levels, largely as a result of increased exports and the positive performance of material handling and concrete equipment.

However, one of the challenges which remained for the CE sector during FY22 was the slowdown in construction of roads and highways (from 36.5 km/day in FY21 to 28.64 km/day in FY22) which accounts for nearly 40% of construction demand. This has adversely impacted the demand for construction equipment.

Going forward, the forecast for CE industry is positive, especially in view of the improved YoY results of Q1 and Q2 of FY22-23. With over 35% increase in budget outlay on capital expenditure for FY23, the industry sentiments have received a boost on the back of enhanced export prospects

as well as continued governmental thrust on infrastructure development.

What are the new technology trends in Indian CE market?

The Indian CE industry is headed for exciting times, with influx of technological advancements such as digital technologies, Internet of Things (IoT) and CEVs with alternate fuels which will catapult the industry into a new era of sustainable growth. Some other new technology trends for the Indian CE market include telematics, advanced electronic controls and additional safety features for CEVs on par with global standards.

How do you experience the current demand trend of construction equipment?

The demand for construction equipment is on the uptrend in the current financial year. The overall sales in the first eight months i.e., April-November 2022, have shown an increase of more than 25% over the same period of 2021. Except for road construction equipment, there has been a significant increase in sales across all other equipment segments. While sales of earthmoving equipment such as backhoe loaders, excavators, motor graders, etc. witnessed about 23% growth during this period, material handling equipment like pick-and-carry crane sales and concrete equipment sales including concrete mixers, batching plants, boom pumps, etc. have gone up by 40% and 28%, respectively.

This high growth recorded by all equipment segments shows an increasing demand for these machines which are primarily used for infrastructure and mining projects. We expect this trend to continue this year with construction activity gaining momentum during the last quarter of the current fiscal.

The demand for construction equipment is on the uptrend in the current financial year.



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What is your view and expectations of bauma CONEXPO INDIA 2023?

We are eagerly looking forward to our participation in bauma CONEXPO INDIA 2023. The event has been playing a pivotal role in the inculcation of new state-of-the-art construction technologies and will witness the latest machines and new product variants being manufactured by Indian and international companies. This will provide an ideal opportunity for the industry to exchange technical knowledge and the best practices with their counterparts. Exposure to the vast product offerings from the Indian CE industry will encourage higher mechanization levels in the Indian construction equipment industry and will also help develop a robust manufacturing ecosystem in the country. This initiative will strengthen India's position as a major potential exporter of construction equipment to global markets.

What is your outlook on the CE market in 2023? How are you gearing up for the year ahead?

The CE industry's outlook for 2023 is positive. There has been an upward trend in demand observed during 2022 which is likely to be continued during this year as well with many of the planned infrastructure projects expected to be implemented in 2023. A few such projects have already been launched in recent months. These include eight National Highway (NH) projects of Rs 3,000 crore in Andhra Pradesh,

three NH projects worth Rs 1,206 crore in West Bengal, 75 infrastructure projects worth Rs 2,180 crore in Ladakh, the six-lane Greenfield Raipur-Visakhapatnam Economic Corridor with a cost of more than Rs 3,750 crore, various road projects in Telangana worth over Rs 2,200 crore, eight NH projects worth Rs 4,054 crore in MP, the country's first multi-modal logistics park (MMLP) in Chennai and a number of upgradation and improvement projects with similarly huge outlays.

Besides these projects, the execution of several other projects planned under the National Infrastructure Pipeline over the next 2-3 years will help in boosting the demand for construction equipment in the country in the short to medium term.

The industry is gearing up to ride the expected growth wave on the crest of cutting-edge technological developments, with CEVs powered by IoT, digitization and alternate fuels, which will also make future products more viable by promoting sustainability. Moreover, complete adoption of the new CEV-IV emission standards by the industry has made it possible for Indian CE manufacturers to access export markets in developed nations.

And so, in a nutshell, we feel that as India steps into an era of infrastructure-led growth from a position of strength supported by the Government's vision of an 'Atmanirbhar Bharat' and strong exports push on the back of 'Make in India for the World', the outlook of CE industry is positive. 

The earthmoving equipment segment which contributes nearly 75-80% of the total equipment sales in India.

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We expect our turnover to increase by 53% this year based on the sales projection.

V G SAKTHIKUMAR

Managing Director, SCHWING Stetter India

How do you visualize the revival of Indian construction equipment industry in the past two years?

Last year (In 2021) SCHWING Stetter India witnessed its highest turnover since its stint in India, notwithstanding the pandemic and the global slowdown of the economy. But the steep hike in the steel prices and other allied cost increases are a worry which has been to an extent been addressed through lean manufacturing process, JIT practices and digitalization of after-sales support network such as e-commerce platform for customers. We expect our turnover to increase by 53% this year based on the sales projection, and due to increase in the product portfolio to the SCHWING Stetter stable. Close to 28 dealers have been appointed pan India to reach this target and we have crossed this target as of December 2022.

How do you experience the current demand trend of construction equipment?

SCHWING Stetter India is a leading provider of construction equipment in the Indian market, offering a comprehensive range of products including concrete batching, concrete transport, concrete pumping, earth moving, and road construction equipment. The company is known for its world-class product range, customized and complete package offerings for projects, and a wide range of variants to suit the needs of all customers, from small real estate developers to large construction conglomerates. In addition to its state-of-the-art manufacturing facilities, SCHWING Stetter India also provides unbeatable after-sales support with a pan-India presence and a commitment to continuous innovation through in-house R&D. The company's latest offerings feature cutting-edge technology to ensure maximum efficiency and productivity

on the job site. These factors that set us apart from our competitors support the demand for our products as well. The multiple infrastructure projects fuelled by the Government through NIP (National Infrastructure Pipeline) and the YoY predictions for the first half of 2023 promise a highly demand driven period for construction equipment.

What is your view and expectations on bauma CONEXPO INDIA 2023?

We have always been a vivid supporter of bC India since its debut in India. We look at it as a platform for us to bond with our customers in the north and eastern region. We are looking forward to this edition as a big event after four years, to connect with our customers and to showcase our latest range of products. SCHWING Stetter India will be launching 14 new products in the bauma CONEXPO INDIA show along with our regular products such as batching plants, concrete pumps, recycling plants, TSRs, self-loading mixers, wheel loaders, excavators, piling rigs, truck cranes, horizontal directional drilling machines, etc.

What is your outlook on the CE market in 2023?

SCHWING Stetter has invested around Rs 350 crores in the Chennai Global Manufacturing Hub and is planning to invest more. The investments made so far are as per the requirements prescribed by Global Investor Meet (GIM) and the Memorandum of Understanding (MoU) signed with Tamil Nadu Government. With this facility addition, SCHWING Stetter has become the biggest subsidiary in the group and its parent company. We have also made significant progress in the field of introducing EV in construction equipment industry which will be more evident in the coming exhibitions and product launches in 2023.

The company's latest offerings feature cutting-edge technology to ensure maximum efficiency and productivity on the job site.



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Environmental protection and long-term sustainability are priorities for us in the CE sector.

ARVIND K GARG

Senior Vice President & Head, Construction & Mining Machinery Business, L&T

How do you visualize the revival of Indian construction industry?

The Indian construction industry registered a CAGR of over 5% in the last five years despite two years of disruptions during the pandemic. Indian Government's focus on growth driven by Infra development and manufacturing is aiding demand growth. In addition to the various ongoing infrastructure projects under the National Infrastructure Pipeline valued at USD 1.4 trillion for the period 2020-25, the Government of India has recently launched the USD 1.26 trillion Gati Shakti National Master Plan for Multimodal Connectivity, an integrated infrastructure development plan for seamless connectivity for movement of people, goods and services from one mode of transport to another and to facilitate the last mile connectivity to reduce travel time for people.

Additionally, India is expected to have the second-largest metro connectivity globally by 2025, with 982 km being added to the existing 810 km spread across 15 cities. These projects will drive demand and support us in our growth story.

What are the new technology trends in Indian CE market?

The adoption of sustainable technologies is the overarching technology trend. As committed at the COP26 Summit, India is to achieve carbon neutrality by 2070. The entire ecosystem in India is working towards this direction. Environmental protection and long-term sustainability are priorities for us in the CE sector. We are currently offering a wide range of biodiesel-compatible Komatsu equipment, which includes hydraulic excavators, dump trucks, wheel loaders, crawler dozers, motor graders and water sprinklers. We also pioneered

the introduction of electrically operated excavators in India and the recently supplied Komatsu PC3000 electrically driven excavators for the mining industry in Central India. We have also started working on battery-operated CE and exploring the introduction of hybrid machines in the near future.

What is your view and expectations on bauma CONEXPO INDIA 2023?

With the challenges of Covid fading, infrastructure development is expected to pick up the pace, creating a positive sentiment in the industry. This edition of the event will focus on future trends and the latest innovations to enhance the infra-project execution in the construction and mining machinery industries.

bauma CONEXPO INDIA, north India's leading trade fair for the construction industry, will present a large platform for the industry to exchange insights and best practices while showcasing customers to new technologies and an extensive range of products from the Indian and overseas construction equipment industry.

Being held after three years, it will bring the construction and infrastructure community, both domestic and international, together to fuel business and infrastructure growth solutions. The industry is eager to participate wholeheartedly and will put its best foot forward for the event's success. L&T will display many unique solutions to customers at bauma CONEXPO INDIA 2023. We are looking forward to active participation in engaging with our valued customers. The next few years will hold tremendous potential for the CE Industry, and we expect participation. bauma CONEXPO has earned credibility in the industry over the previous editions, and we look forward to the upcoming edition in January 2023 at Greater Noida. 

The next few years will hold tremendous potential for the CE industry.



Current trends indicate that the increase in the sale of machines will continue through the next year.

DEEPAK SHETTY

CEO & Managing Director, JCB India

How do you experience the current demand trend of construction equipment?

India is going to be a growth driver for the world in the coming decades, and much of this growth will come from infrastructure development in the country. There are projects of significant national importance that are gaining encouraging momentum across the country. Large-scale Infrastructure development requires larger and more productive machines.

There has been a direct correlation between infrastructure development and equipment sales in the past. This year we witnessed a slow beginning in terms of equipment sales. This was due to a few reasons: the Russia-Ukraine conflict disrupted supply chains, and a steep increase in commodity prices led to lower demand in the year's first quarter. However, with the government's increased focus on the infrastructure sector, the cooling off of commodity and fuel prices, and the resumption of supply chains, we are seeing a steady rise in sales for construction equipment.

Current trends indicate that the increase in the sale of machines will continue through the next year.

What is your outlook on the CE market in 2023?

India's infrastructure development for the next decade is lined with huge projects and government schemes. Plans to develop India's infrastructure have been given impetus through the National Infrastructure Pipeline (NIP), the National Monetisation Plan (NMP) and Gati Shakti and the National Single Window System (NSWS). Also, government programmes for the development of highways, ports infrastructure, railway network, airports and logistics

infrastructure are expected to create more opportunities for construction activities.

All these mega projects will attract use of construction equipment in large numbers in the coming years. The industry estimates sales of construction equipment (domestic sales and exports) to grow 15-20% in fiscal 2023.

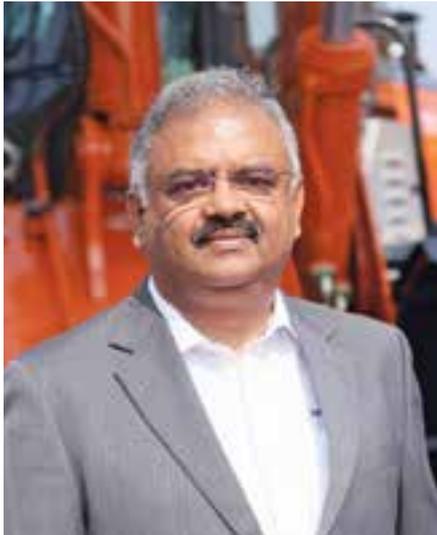
How are you gearing up for the year ahead?

For over four decades, JCB has remained committed to the India growth story. From introducing the backhoe loaders in India in 1979, to the global manufacturing force the company has become today, JCB India has been making the nation and its communities stronger every day. While the backhoe loader is an ideal machine to reach remote/rural areas, with new road development projects coming up in remote areas, we are also seeing an increase in the purchase of excavators and mini excavators. Large-scale infrastructure development will require larger and more productive machines, and a recently launched new range of excavators (JCB NXT 225LC M) addresses that need.

We are also observing an increase in government tenders floated to acquire construction equipment. The municipal corporations of big states like Maharashtra, Gujarat and Uttar Pradesh regularly acquire JCB machines. In rural sectors, Gram Panchayats across the country float tenders for equipment that is regularly fulfilled by JCB.

Since JCB has a high market share in the sector, the demand for JCB equipment will increase accordingly. One in every two machines is a JCB and we expect that we will continue to support the government at the same level. 

We are observing an increase in government tenders floated to acquire construction equipment.



We are very keen to showcase our readiness in building the India of tomorrow.

BKR PRASAD

Head - Marketing & Product Development
Tata Hitachi Construction Machinery Company

What are the new technology trends in Indian CE market?

The construction and infrastructure domain in India is way ahead in terms of adapting future technology. Technologies like an autonomous truck, connected equipment, geological surveys using drones, project monitoring using onsite digital communication, use of augmented reality to visualize projects, remote operation of equipment in places that are difficult to reach, artificial intelligence for operation optimization, simulator for operator training, machine health monitoring, etc. have been there from more than a decade.

Although these technologies were developed and available for use, it is only now that the industry has started adopting them at a very fast pace now. Highway projects, railway projects, industrial and residential projects, etc., have started reaping benefits from it.

Very soon we will see that most OEMs using these. The benefit of project execution in less time and low cost will be visible in project reports. The industry also needs to make sure that they are using reliable sources or OEMs for this adoption as the ability to integrate and upgrade is very important. Most important is the security of data as it is going to flow through

multiple channels. Hence, the role of partners becomes more important than ever.

The construction industry is constantly evolving with the introduction of new technologies. To stay competitive, construction companies need to embrace these new technologies. Autonomous vehicles and Robotics are some of the most important technologies that will shape the future of the construction industry.

How do you experience the current demand trend of construction equipment?

To accelerate infrastructure development as well as implement holistic planning to improve logistics efficiency, the government had announced the Gati Shakti- National Master Plan in 2021. The focus on infrastructure continued in 2021-22 too. However, the CE industry contracted by 11% mainly due to the impact of the change in emission norms for wheeled construction equipment to CEV4, while the excavator segment continued to grow.

With the focus on infrastructure investment announced in the 2022-23 Budget, capex increased by 35% to Rs 7.5 trillion (USD 101 billion), mostly in infrastructure. Guided by the NIP and Gati Shakti Master Plan, the CE industry is expected to sustain growth this year and in the coming years.

Regarding mining operations, the country is blessed with immense mineral resources. India has one of the largest cement industries in the world and has been able to systematically extract limestone over the past several decades. Limestone and hence cement is a building block in the development of infrastructure as well as real estate construction and housing. Similarly, the country is bestowed with a large deposit of iron ore which companies have been able to convert to iron and steel: driving the development of the country.

The construction industry is constantly evolving with the introduction of new technologies.





India also boasts of having the fifth largest coal reserves in the world, and we are the third largest producer. Recent developments thrust focus on the issue of energy security of the country and coal will play an important role in achieving this. In this direction, Coal India has a target to achieve one billion tons of coal production by the year 2024-25. With a total of 46 coal mines auctioned for commercial mining and many MDOs being executed by Coal India, the private sector is going to play an important role in coal production. This will enable the scientific and systematic extraction of coal in an economical and environment-friendly way with the use of large-class modern mining equipment.

Mining of mineral resources is very important and the above measures will aid in the development and growth of the CE industry in the future.

What is your view and expectations on bauma CONEXPO INDIA 2023?

The most popular tradeshow in North India is returning after the hiatus caused by the pandemic and we are all geared up and look forward to participating in it. In the past, bauma CONEXPO has given us and the CE industry a good opportunity to meet, discuss, and exchange ideas with all the industry stakeholders and policymakers. Also, physical events like this give us the ability to give customers, policymakers, and other attendees a first-hand touch and feel of our machines, which is important in an industry like ours. It has also been an excellent platform to launch new products apart from demonstrating our technologically advanced and future-ready solutions.

This year, bauma CONEXPO INDIA is happening with the theme 'The future of nation building' and we are very keen to showcase our

readiness in building the India of tomorrow. We will be displaying our versatile, CEV IV-compliant backhoe loader model Shinrai Prime, our newly launched, indigenously developed, NextGen 3 ton mini excavator model NX30 along with some of our mid-range construction excavators. Also, on display will be parts, attachments, and solutions offered by us.

What is your outlook on the CE market in 2023? How are you gearing up for the year ahead?

FY 23-24 is the penultimate year before elections in HI 2024 and therefore we expect the government to continue its focus on growing the economy through capex and focus on execution. However, this will need to be balanced with fiscal responsibility and limited borrowing. Also, advanced economies are expected to enter a recession in an era of increasing interest rates. This will possibly hamper the high growth rates, unlike the pattern observed in the past with the years preceding the election year.

Further, the national highway construction, a major driver for CE, is facing headwinds in accelerating execution and is projected, at best, to touch 31 km/day this fiscal as against a reduced target of 33km/day. Even highway construction awards which are a lead indicator of works in the future are also trending almost flat on a YoY basis. Keeping this in mind, we expect moderate growth in the coming year for the CE industry.

Tata Hitachi is a pioneer in introducing the latest technologically advanced equipment in the Indian market. We will continue to introduce next-generation machines for our customer basis the emerging requirements and developments to offer the most cost-effective high performance and reliable products and solutions. 

Autonomous vehicles and Robotics are some of the most important technologies that will shape the future of the construction industry.



We are well equipped for 2023 with many new product launches in the pipeline.

DHEERAJ PANDA

Chief Operating Officer (Sales, Marketing & Customer Support)
Sany Heavy Industry India

How do you visualize the revival of Indian construction equipment industry in the past two years?

Once the pandemic's effect diminished, we certainly saw a revival of the market and I am sure this holds true for all other sectors too besides construction equipment industry. In the past two years, the demand for construction equipment has increased substantially thanks to government initiatives in several projects, private infrastructure development, mining reforms etc. This year, Government increased the budget on the development of roads, metro rails, flyovers and commercial complexes which has benefited the infrastructure sector and created growth opportunities in the market. With rapid urbanization and infrastructure activities across the country, we expect the Indian construction equipment market to cross \$ 4.7 billion by 2025.

What are the new technology trends in Indian CE market?

We see the usage of telematics, AI, and Machine Learning gaining momentum. In sync with this, we at Sany have an integrated facility in Pune with modern manufacturing equipment, testing facilities, R&D centre, and training centre all under one roof which has the capacity to manufacture construction equipment.

We have already developed our EVI app which helps our customers to monitor and analyse the real time performance of the machine on site and act accordingly while our mobile-based applications eliminate the need for physical interaction with customers. We have already moved ahead with our Telematics system (which is an emerging trend), which helps monitor the key operational parameters and provide timely intimation to the users.

How do you experience the current CE demand trend?

We are already seeing high demand for construction equipment like hydraulic excavators, mobile cranes, piling rigs, motor graders etc. Thanks to the steadfast support and trust rendered by our customers, channel partners, and team Sany, we can easily meet the demand trend and capture new markets in 2023.

What is your view and expectations on bauma CONEXPO INDIA 2023?

bauma CONEXPO INDIA 2023 will be a wonderful platform to showcase our latest products, expand our client base and forge new business ties. We eagerly look forward to participate in this amazing event.

What is your outlook on the CE market in 2023?

The good times that we have seen in 2022 in terms of positive market dynamics, increased sales and government support will continue to gain pace in 2023 as well. We are gearing up pretty well for the year ahead. To give you a perspective, let me tell you that we always believe in moving ahead with the times staying true to our mission of quality changes the world. With localization being the prime focus of our company, most of our new generation machines are being manufactured as part of the 'Make in India' initiative. We have invested more than Rs 750 crores in our state-of-the-art manufacturing facility in Pune and we have made a successful transition from a global to local company with over 50 models being manufactured locally in our Pune facility. Having said that, we are well equipped for 2023 with many new product launches in the pipeline, which I believe has the potential to disrupt the construction equipment industry in India and abroad. 

We have made a successful transition from a global to local company with over 50 models being manufactured locally.

“ CONCRETE results you'll see all year

Other shows may talk a big game, but only World of Concrete speaks concrete and masonry. We know that a solid foundation isn't just part of the structures you build — it's also the key to a more profitable business. That's why you'll find everything you need to strengthen your operation here, from new products, innovative solutions, and new technologies to help you capitalize on emerging opportunities.

We Speak Your Language: www.worldofconcrete.com

 **WORLD OF
CONCRETE**

 Informa Markets

EXHIBITS: JANUARY 17-19 2023
EDUCATION: JANUARY 16-19
LAS VEGAS CONVENTION CENTER



Wirtgen Group machines with great performance on **SAMRUDDHI EXPRESSWAY**



The new Samruddhi Expressway, also known as Mumbai–Nagpur Expressway, is currently under construction and will connect the Indian cities of Mumbai and Nagpur on a total length of 701 km. When completed, this expressway will link India's largest container port JNPT in Mumbai to MIHAN in Nagpur simplifying import and export activities throughout the country. Additionally, interconnecting highways and feeder roads are constructed to connect all important cities and tourist places along this route.

The Samruddhi Mahamarg project consists of 16 packages and was awarded to 13 companies: Megha Engineering & Infrastructures (Pkg-1&9), Afcons Infrastructure (Pkg-2&14), NCC (Pkg-3), PNC Infratech (Pkg-4), Sadbhav Engineering (Pkg-5), Apco Infratech (Pkg-6), Reliance Infrastructure (Pkg-7), Iron Triangle (Pkg-8), Larsen & Toubro (Pkg-10), Gayatri Projects (Pkg-11), Dilip Buildcon (Pkg-12), GVPR Engineers (Pkg-13), and Navayuga Engineering Company (Pkg-15&16).

WIRTGEN SLIPFORM PAVERS SHOW THEIR POTENTIAL ALL THE WAY

With a speed limit of 150 km/h, the expressway is the fastest in all of India, reducing the travel

time between Mumbai and Nagpur from 16 to 8 hours. This calls for maximum concrete paving performance both in terms of output and quality to ensure the drivers' comfort and safety on their journey. Along the whole 701 km, 16 Wirtgen slipform pavers SP 1600 were in operation to

HIGHLIGHTS OF WIRTGEN SLIP FORM PAVER SP 1600

- Working width of up to 16 m (Special paving heights and widths up to 18.75 m are available on request.)
- Cost-effectively paves concrete surfaces for traffic areas, roadways, industrial areas or surfaces at airports, such as runways or taxiways
- Unparalleled concrete paving performance
- Long-term reliability
- Ergonomically designed, walkthrough operator's platform for non-tiring, productive working
- High-powered, fuel-efficient diesel engine for concrete paving in the optimum performance and torque ranges
- Spreading plough for even distribution of the freshly delivered concrete in front of the inset delivered mould
- Electrically driven vibrators for reliable concrete compaction
- Automated insertion of longitudinal joint tie bars to prevent the slabs from drifting apart
- Inset paving mould suitable for mounting between the track units, underneath the machine
- Pivoting legs for full adjustment of the track units to the conditions prevailing on site

A true highlight: The complete PQC work of this Greenfield project of 701 km was done by Wirtgen slipform pavers SP 1600. In total, 16 of them worked on this expressway.

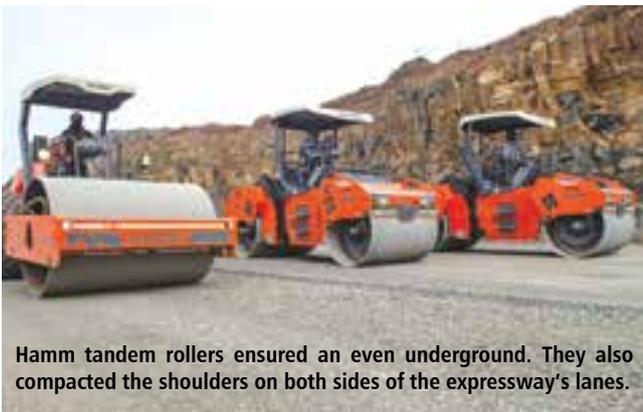




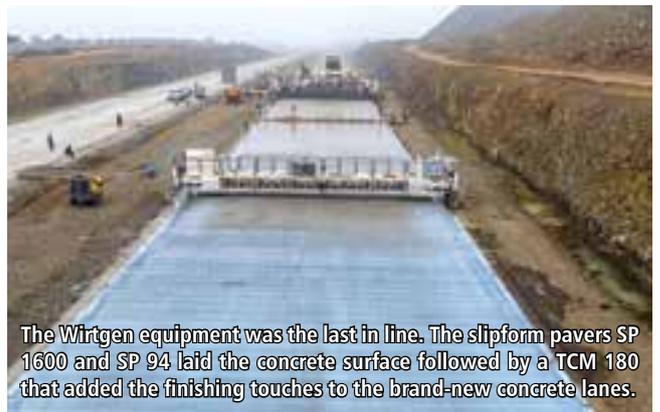
Kleemann screens and scalpers did the groundwork. They produced the aggregates.



Different models of Vögele pavers were responsible for the DLC (dry lean concrete) pavement on various sections including approach roads and toll areas. They laid a surface with a thickness of 150 mm.



Hamm tandem rollers ensured an even underground. They also compacted the shoulders on both sides of the expressway's lanes.



The Wirtgen equipment was the last in line. The slipform pavers SP 1600 and SP 94 laid the concrete surface followed by a TCM 180 that added the finishing touches to the brand-new concrete lanes.

lay the concrete surface. Concrete is the ideal material for a gigantic project like this: It is cost-effective, extremely durable and requires very little maintenance. Over a working width of 15 m, pavement quality concrete (PQC) in a depth of 310 mm was used. The proper reinforcement could be managed by an automatic dowel bar inserter and 3 longitudinal tie bar inserters. These make sure that the cracks which are invariably produced as a result of stresses and temperature fluctuations are diverted into the concrete pavement in a controlled manner.

WIRTGEN GROUP SERVICE IMPRESSES ON SITE

When it comes to the experience and day-to-day handling of their equipment, there is unanimity: Everyone is more than happy with the performance of the machines. "They are doing very well, and we are extremely satisfied with their services," said Neeraj Sharma, Quality In-charge (Sr. Manager) at Apco Infratech Pvt. Ltd., responsible for package 5. "They are good in technology, quality and output." Wirtgen India, the local subsidiary of the Wirtgen Group, is always at hand, should there be any customer requirements: "They always care for our needs and challenges. From time to time, they guide our team and help. Whenever challenges arise, they are always there."



The machines are doing very well, and we are extremely satisfied with their services.

NEERAJ SHARMA
Quality In-charge (Sr. Manager)
Apco Infratech Pvt. Ltd.

FACTS AND FIGURES FOR THE WORKS OF PACKAGE 9 ON THE SAMRUDDHI EXPRESSWAY

PARAMETERS

Length of the job site	4 lanes on 54 km (section 9 of 16)
Used material	PQC (Wirtgen slipform pavers) DLC (Vögele pavers)
Working depths	310 mm PQC 150 mm DLC
Working widths	Wirtgen slipform pavers 15 m Vögele pavers up to 4.75 m

MACHINES

Wirtgen slipform pavers	1 SP 1600 1 SP 94
Wirtgen texture curing machines	2 TCM 180
Vögele pavers	2 SUPER 1800-3
Hamm tandem rollers	2 HD 99
Hamm soil compactors	3 Hamm 311
Kleemann screens	1 MS 703 EVO
Kleemann scalpers	1 MS 800

Committed to INDIA'S GROWTH STORY



Hyundai CE India is an embodiment of the 'Make in India' program and has remained committed to India's growth story. We have efficiently and effectively contributed to the building of world-class infrastructure in the country. Aligning our strategies with those of Government of India, our key initiatives encompass the core philosophy of 'Bringing World's Best to India, and Providing India's Best to the World'.

Hyundai CE India today has state-of-the-art manufacturing facility in Chakan, Pune. We manufacture a wide range of world-class excavators for India and also for the global markets. All Global HCE factories operate on same platform on the principles of 'Zero-defect' and 'One Global Quality'. Our philosophy of excellent workmanship ensures at par performance with global products and assures the customers with 'Big Savings and High Profitability'.

With a plan to achieve 20% of the company's revenue through exports, Hyundai CE India has been successful in consistently exporting over 600 units of excavators year-on-year to over 30 countries. Hyundai CE India is currently No. 1 in exports of crawler excavators, with growing

demand for its excavators in SAARC, the Middle East, Africa and ASEAN countries.

The key strengths of HCEI lies in quick order to delivery cycle, competitive logistics cost, global quality practices and skill development. HCEI has a strong focus on creating a progressive ecosystem for infrastructure development and skill development of its stakeholders through manpower deputation for on-site training, virtual trainings using real-time software technologies and extensive on-job training at its world-class training facility in Pune. HCEI's training center is affiliated with IESC (Infrastructure Equipment Skill Council), the apex body for spearheading the skilling of workforce in the infrastructure equipment sector.

In its journey of successful operations in India and globally, HCEI has grown to become a full-range construction equipment partner, offering indigenous, innovative and versatile solutions of One-Global Quality. This has helped us gain a strong position for ourselves in the global arena. To maintain our position in the market, we will be investing more and more in automation, defect free products, SMART factory project and in diversifying our product portfolio.



Sharwan Agnihotri
Head – Corporate
Sales & Export
Hyundai Construction
Equipment India Pvt Ltd



READY TO BUILD 500 X 500 MM BOX SECTION: THE BIGGEST REVOLUTION IN PEB STRUCTURES

India has the second fastest growing economy in the world and a lot of it is attributed by its construction industry. In this steadfast development, the construction industry has discovered, invented and developed a number of technologies, products and new concepts. The journey of construction industry has changed many folds over the years and Tubular Construction is one of the latest and rapidly growing technologies. We can easily say that tubular steel structures are the future of construction.

To make this concept even more efficient, APL Apollo is now coming up with the biggest ever facility in Raipur-Chhattisgarh. First time ever in India, we are launching ready box sections to make the tubular construction faster, better and more efficient than ever. APL Apollo is the first ever company in India to produce ready square box sections of size 500x500 mm and 20 mm thickness.

WHY APOLLO BOX SECTIONS?

Unlimited availability: APL Apollo has large capacity of producing tubes, which ensures quick availability of ready box sections in nick of time. Lower lead time of our technology ensures no delays in project deadlines and faster construction, reducing the overall project time and cost.

Speed: Manually welded box section is time intensive and has less dependability as compared to machine made box sections. High rise buildings and mega factory/warehouse buildings can now be made faster than ever, lower project timelines

reduces the overall costs and faster construction ensures faster IRR.

Better quality: The company is ISO 9002 and ISO 9001 certified, so when it comes to quality, there's no question of compromise. Machine made tubes have better uniformity and quality assurance as compared to the manually welded box sections. Our Direct Forming technology ensures minimum wastage, lower lead time and cut to length sizes, so that the fabrication is much easier.

More carpet area: Other sections require RCC encasing to get smoother edges and appealing aesthetics, additionally shuttering and de shuttering is required to support the structure. Square hollow sections have smooth edges and better aesthetics than I-sections. They do not require encasing or shuttering to get the best of both the world. Concrete can be filled inside the tube, giving us more space in the structure.

No on-ground fabrication: Structural steel tubes reduce the overall fabrication time as our tubes are pre-fabricated, precisely engineered and cut to length. There is little or no on-site fabrication required which accelerates the construction process.

Environment-friendly: Construction sector contributes 30% of direct and indirect CO₂ emissions. Structural steel is preferred for construction as steel is infinitely recyclable and is easy to pre-fabricate. Research indicates replacing reinforced concrete with steel structures can reduce emission by 60% as there's no air pollution and less water consumption. 



HASBER Machine brings a new revolution in construction industry to supply fresh mix concrete on site.

SACHIN KATE
CMD, HASBER Machine

What are the latest concrete technologies developed by the company?

After 20 years of dedicated working in concrete technology and RMC industry, we at HASBER team have innovated and developed a unique and revolutionary concrete manufacturing machine through extensive research for Indian construction industry. The HASBER C-30 is India's first patented truck-mounted mobile concrete plant having capacity to produce freshly mix concrete on site.

How are your mobile concrete plants bringing in new revolution in India?

Mobile concrete plants have already been using successfully in the US, UK and many European countries for the past 20 years. Even though their climatic conditions, raw material availability, and design standards are different than Indian conditions still usage of mobile plants is increasing at very rapid pace in western countries market.

Presently in India, we are using concrete on construction sites which is manufactured at ready-mix concrete (RMC) plant. As per IS code suggestion, any concrete produced at RMC plants has to reach and consume on construction site within 120 minute. Due to present traffic conditions and site locations from RMC plants, it's difficult to maintain transit time criteria of RMC. This leads to add-on extra fuel and admixture cost to buyer with risk of concrete quality.

HASBER Machine is patented, 100% Indian make, fully automatic, new edge of advance concrete manufacturing machine which is specially designed for Indian construction industry. HASBER Machine brings a new revolution in construction industry to supply FRESH MIX CONCRETE on site as per clients MIX design with cost-effective and transparent way.

FEATURES OF HASBER – C-30

- Three separate storage bins for aggregates 10 mm, 20 mm, crushed sand
- Auto control 350 fully automatic batching system (patented)
- Twin shaft mixer with output batch capacity 0.35 cu m (wet) (patented)
- Fully automatic PLC-based control panel with printer interface & USB drive.
- Cement & fly ash (or GGBS) screw conveyor with separate storage compartments
- Main structure with VWT (Volume, Weight, Time)
- Water pump of required output
- Admixture pump of required output
- Pre-cabled connections
- Modular fabricated structure
- Efficient hydraulic system with auto calibration
- No permission required
- Approved in RTO

Which are the major application segments for HASBER concrete plants?

HASBER mobile concrete plant is basically strong alternative solution to concrete manufacturing process with great capacity and flexibility. HASBER Machine is designed for small concrete volumes to large concrete requirements of all types of construction projects like: residential and commercial buildings; mega townships projects; institutional projects, IT parks; industrial structure; monumental structures; infrastructure projects like roads, bridges, flyover, tunnel, and concrete works; Railways, metro

HASBER mobile concrete plant is basically strong alternative solution to concrete manufacturing process with great capacity and flexibility.

HASBER C-30: BENEFITS OF MOBILE BATCHING PLANT TO CONSTRUCTION INDUSTRY

- Fresh concrete made onsite in front of you with your customised requirements
- Controlled water-cement (w/c) ratio
- Eliminates huge cost of infrastructure
- Controlled on mix design with flexibility of different grades
- Transparent mixing process with material choice
- Easy to use
- Hassel-free
- Reduces waste and associated costs by providing exact quantities
- No risk of premature stiffening of concrete if delays are encountered
- Permits delivery of smaller quantities of concrete
- Night time works do not require the reopening of a concrete batch plant
- Flexibility to alternate between multiple concrete mixes as required for the application
- Ability to do continuous concrete pours

rail, mono rails; irrigation projects like canal and dam projects; docks and harbour construction site; Defence projects like Border Road Organisation (BRO), Military, Navy and Air Force construction projects; Airport runways, taxiways, airport terminal building; marine structure; and specialised concrete application works and many more applications.

What opportunities do you look forward in future for your solutions in Indian construction industry?

Construction sector play key role in the country's GDP contribution. Indian as well as the global construction industry in all sectors is changing at very high pace. In other sectors, technology adoption is part of process which results in more efficient work system. Construction industry in India is still working in traditional way. Our work force in construction industry is majorly driven by non-technical and unskilled team members. So it is challenging to adopt technology in day-to-day work. On the other hand, some of the leading corporates, big companies and institutes are already dealing with these challenges and effectively implementing technological platform for their growth with quality conscious and effective way of working. We at HASBER Machine are one of them who already make our machine GPS- and IoT-enabled and who gives you clear idea of about all INPUT and OUTPUT report



USP OF HASBER C 30

- Compact size
- Excellent fresh concrete mix with great quality
- Patented machine
- RTO approved
- Cost saving
- Environment-friendly
- Zero wastage
- Flexibility of different concrete grades at a time.

details as per your requirement. Our HASBER machine with great features and fully automatic operating functions makes it for reliable, advance, compact and user-friendly. We are confident and sure that with current changing pace of technology in construction industry, our HASBER machine will be great alternative solution for current concrete manufacturing process. We are looking forward to associate with all Government, Semi-Government, and private sector construction projects as a safe, reliable, economical, eco-friendly, and strong concrete partner.

How do you look at the demand for your solutions? What are your expansion plans?

In a short span of two months, we received thousands of enquiries from Indian and International market for this unique and revolutionary HASBER concrete machine. We are expecting to deliver thousands of HASBER concrete machines in the next five years. We are decided to reach out to every part of India by the coming financial year with great visibility and sharing better option of fresh concrete with mobility and flexibility in advance technological way. We want to add value to construction industry to promote FRESH CONCRETE ON SITE practice with more economical, fair and transparent way. By mid-2023, we will launch our new model HASBER C 30 PLUS and HASBER C 30 HYBRID.





Our Group has supplied over 60,000 products across the world to various reputed clients.

YASHODHAN GUPTA

Managing Director, Syemco Switchgears P Ltd

Can you give us an overview of the company and its services?

The Group has over 50 years of experience in supplying specialized motor starting solutions with vast technical know-how in the electrical field. Our Group has supplied over 60,000 products across the world to various reputed clients. The company has a state-of-the-art manufacturing and testing unit in Indore, Madhya Pradesh. The founders of Syemco® have a rich experience in the electric field of more than 60 years.

What are the major products and solutions offered by the company?

The company offers motor starters, APFC panels and distribution panels for crushers. Key products include: jaw crusher extra torque starter, cone crusher extra torque starter, fully automatic on-load & off-load power factor panel, MCC & distribution panels, step-less slip-ring motor starters, etc. The company also provides solutions such as starting of a jammed jaw/cone crusher, maintaining 0.999 power factor at any site, and reducing maximum demand recorded and reducing electricity bills.

How far do the motor starters provide a safer solution to the customers?

There are practically no mechanical and electrical stresses on the machines operated by Syemco® make starters or controllers as our products are based on closed transition principle and they provide high initial starting torque as required by the load connected. Syemco® starters avoid motor burning since starting the subject motor is connected to 'delta'.

How do Syemco® motor starters provide better energy efficiency to customers?

Auto transformer provides optimum voltage

to the motor at start. Appropriate lower voltage tapping –customized as per the application – is provided to the motor. After the motor has attained significant torque changeover from auto transformer to online take place, the changeover is 'closed transition', i.e. during changeover the auto transformer acts as a choke supplying voltage to motor – hence smooth or stepless or soft starting takes place. The motor then runs on line current. The transformer is isolated from both the ends. Adjustable high torque: a high torque setting is possible and can be customized. No power quality issues: all standards electrical components ensure that there are no harmonics or other power quality issues. Transient elimination: Korndorfer closed transition technology ensures that transients are eliminated. Motor protection: motor is connected in delta at the time of starting to avoid high inrush current in the motor winding, thus providing lesser heat generation.

Who are the customers of Syemco® products and solutions?

Syemco® has provided its solutions to major stone crushing units manufactured by renowned brands like Propel, Sandvik, Puzzolana, Metso, National, Sayaji, Diamond, Almeida, Sangharsh etc., ranging from 40 tph to 700 tph in various states in India: Tamil Nadu, Kerala, Andhra Pradesh, Telangana, Karnataka, Goa, Maharashtra, Gujarat, Rajasthan, Madhya Pradesh, Uttar Pradesh, Uttarakhand etc., apart from foreign countries.

What are the future plans of the company?

Our vision is to be the leader in providing best electrical solutions in the field of electric motor starting, power factor and electrical distribution, at an affordable price, ensuring 100% customer satisfaction. 

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Implementation of OMNICOMM gives up to 30% savings in fuels and lubricants.

SURJODOY GHOSH

Managing Director, OMNICOMM in India

How important is optimizing the use of fuel in the current scenario?

Fuel costs for the construction equipment compile up to 50% of operating costs and companies most likely aren't managing these expenditures optimally. The need for the construction companies in fuel and lubricants can be reduced by at least a third while maintaining the full scope of work, and this is a good way to increase efficiency in the construction industry. And this is not only fuel costs what can be optimized. As many as 35% per cent of the companies who implemented the fuel & fleet management solutions see performance increase and 15% of the companies track maintenance cost reduction. So, if you want to be competitive, you need to install solutions that will help you in your fleet management.

What are the fuel monitoring solutions offered by OMNICOMM for commercial vehicles and other construction equipment?

We have more than 20 years of expertise in fuel management solutions. It includes three key components: fuel sensors with incomparably high-quality and reliability and negligible percentage of warranty claims that decline year to year. They are exceptionally robust, demonstrate 99,5% accuracy in all conditions despite changes in fuel characteristics and does not require servicing for re-calibration, reducing costly vehicle downtime, have highest possible ingress protection rating of IP69k, can work in the hardest conditions.

High-quality terminals able to meet extreme working conditions and maintain uninterrupted data transmission even in areas with incomplete GSM coverage, in conditions of constant shaking and intense vibration, high dust content in the air and extreme weather temperatures (-40° to +85°). The third component - software module

provides a comprehensive fuel data analytics that have no analogue on the market. With OMNICOMM online monitoring system, you will have advanced fuel analytics and report: control fuel level on each vehicle online, fuel use on the route, refueling and draining, detailed statistics, deviation from the rated fuel consumption.

The implementation of fuel management system from OMNICOMM makes efficiency comes true: vehicles are operated in optimal mode, without overloads and downtime. The OMNICOMM system records running hours and alerts you when scheduled maintenance is needed, reducing repair costs by up to 15%. The OMNICOMM solution remotely shows the exact amount of fuel left in the tanks. Online monitoring allows you to eliminate equipment downtime caused by a lack of fuel. The work is going according to the schedule, without delays. The OMNICOMM reports contain data on fuel consumption for each piece of construction equipment. Using them, it is easy to calculate the need for fuel resources and timely plan the cost of fuel and lubricants by time/objects.

What are the fleet management solutions introduced by the company?

OMNICOMM's comprehensive IoT solution for monitoring construction equipment allows you to remotely track the movement of special equipment and monitor its operation parameters in real time, including fuel consumption and driving style. Implementation of OMNICOMM gives up to 30% savings in fuels and lubricants, improves safety at construction sites, improves the production of equipment by 30-35%, extends its service life and eliminates misuse. With the OMNICOMM system, construction equipment is distributed to construction sites extremely efficiently, fuel consumption is precisely planned - without surpluses and shortages.

If you want to be competitive, you need to install solutions that will help you in your fleet management.

How do you view the trends in adopting various monitoring and control technologies in construction industry?

The construction industry is one of the most actively developing industries and as most of the others is driven by digitalization, IoT and advance analytics. These are key things that can make company to be on top of competitive edge. When you know and can control your fleet including drivers' behaviour, fuel use and leakage, then finally you can save and invest more money to meet your customer's demand.

Companies in this industry are focused on reducing costs through high-quality monitoring of the fleet, performance and control over the actions of drivers.

Telematics solutions that are integrated into business model can ensure advantage of controllable processes in that area. There is a clear demand for the solid integrated solutions, combining hardware and software telematics services, as well as high-quality international support that totally corresponds with OMNICOMM's capabilities and expertise. We provide high-quality reliable integrated telematics solutions for monitoring vehicles and fuels with international support on all continents.

What will drive the demand for monitoring solution in construction industry?

One of the key drivers in the construction industry is the need for comprehensive control over all types of equipment including construction machinery and personnel, which can significantly reduce the cost of maintenance and post-warranty maintenance of equipment, reduce the amount of equipment downtime, solve the problem of the fuel theft and unauthorized flights, optimize the number of vehicles, as well as significantly increase the efficiency of its use.

Rapid growth and development in construction industry as well as high competition requires getting the maximum ROI in the shortest possible time from implementation of telematics solutions. The expertise of the OMNICOMM team and the comprehensive support of wide international partner network allow us to demonstrate an average return on investment in the construction industry of about 3-5 months, depending on the depth of implementation of telematics solutions.

How do you look at the demand for your solutions? What are your expansion plans?

The digitalization drives many industries, and we see very positive market development for the telematics services and especially for fuel management system. Over 20 years, we have been providing this deep expertise and actively developing our business in international markets like India, Africa, Brazil and Mexico. Our newly opened production facility in Ho Chi Minh City (Vietnam) serves with product supply all over the world, ensuring six stages of quality check and certified according to all requirements of the industry. Our strengths are our technology, analytics, quality, and continuous improvement. We have our own development center, and invest 20% of profit yearly to R&D. So, we are very optimistic about future development and committed to serve our customers with the best quality and value solutions in telematics space.

We have our own development center, and invest 20% of profit yearly to R&D.



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We are revamping our production capacity to meet the growing demand.

ANKIT GAUR

Managing Director, EINS Technik

How is aluminium formwork making a difference in the building construction?

It has been a challenge for the construction industry to deliver a quality product on time in an easy and efficient way. The aluminium formwork system enables the construction industry, especially residential projects to meet such challenges in a very easy and cost-effective manner. It gives you a slab cycle of 7 to 9 days which is half of conventional formwork. Aluminium formwork provides a smooth surface finish as there is no need of plastering. Since aluminium is light in weight, it does not require any equipment for lifting and fixing. It is erected using simple pin & wedge system and deck supported by MS props. It is easy to understand and adapt for any labour and does not require any additional skilled labour. The aluminium formwork enables you to cast non-structural RCC walls which are of less thickness as compare to conventional brick work/block work which results in an increase in carpet area for the end user.

What are the products and services offered by EINS Technik?

EINS Technik is a premium and one of the largest manufacturers of high precision and customized aluminium formworks. We have our manufacturing facility in Sahibabad, Ghaziabad near Delhi. This is an advanced manufacturing facility which includes robotic welding, friction welding and automatic cutting machine. Our finished product has lacquer coating to ensure smooth finish.

We have an elaborate after-sales service available for clients such as: Redesigning of existing material for reuse; Shuttering repair and maintenance; Site supervision; Periodical evaluation and training; Onsite visits from our

trained professionals at regular intervals; and Accessories.

How is the demand-supply scenario of aluminium formworks and allied services in India? What opportunities do you foresee for your products and services?

The market is currently enjoying a very good boom and the demand is constantly expanding: A direct result of huge demand for quick delivery of residential projects in both government and private sector. Our product which was predominantly in tier 1 cities is now expanding its presence to tier 2 and tier 3 cities in mass housing. In order to accomplish these projects on time and with a high quality of finishing, aluminium formwork has become the default choice as a method of construction. During Covid, many people faced eviction from their rental accommodation. So, after Covid when situation returned to normal, people opted to buy their own accommodation and they give preference to developers who deliver the project quickly and on time. During Covid, many people left metro cities and moved back to their native place in tier 2 and tier 3 cities, which increase the demand of residential projects in these cities, thus added new market for our product.

What are your expansion plans in the country for the coming years?

We already have projects been executed in 12 states across the country, and also we are executing our first international project in Maldives. One of the largest manufacturing companies in India, we are revamping our production capacity to meet the growing demand. We are looking forward to increasing our presence in the country and also looking for opportunity to be a part of international market.

We already have projects been executed in 12 states across the country, and also we are executing our first international project in Maldives.

EARTH MOVING EQUIPMENT



Backhoe Loader



Wheel Loader



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HIGHWAY EQUIPMENT



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Tracked Crusher



Static Crusher



Screeners



Compactor



Motor Grader



Hot Mix Plant



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Skid Steer Loader



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MINING EQUIPMENT



Crawler Dozer



Dump Truck



Boring Equipment



Compressor

REAL ESTATE EQUIPMENT



Batching Plant



Transit Mixer



Self Loading Mixer



Concrete Pump

ABOUT IESC

The Infrastructure Equipment Skill Council (IESC) is a 'Not for Profit' sustainable organization promoted by the Indian Construction Equipment Manufacturers Association (ICEMA) and supported by the Confederation of Indian Industry (CII) and funded by National Skill Development Corporation (NSDC) under the Ministry of Skill Development and Entrepreneurship, Govt of India to spearhead the skilling of workforce in the Infrastructure Equipment Sector with primary focus on training and certification of Operators and Mechanics.

The council is governed by 19-member Governing Body from various segments of the Industry along with the representative from Department of Heavy Industries, Academia and National Skill Development Corporation.

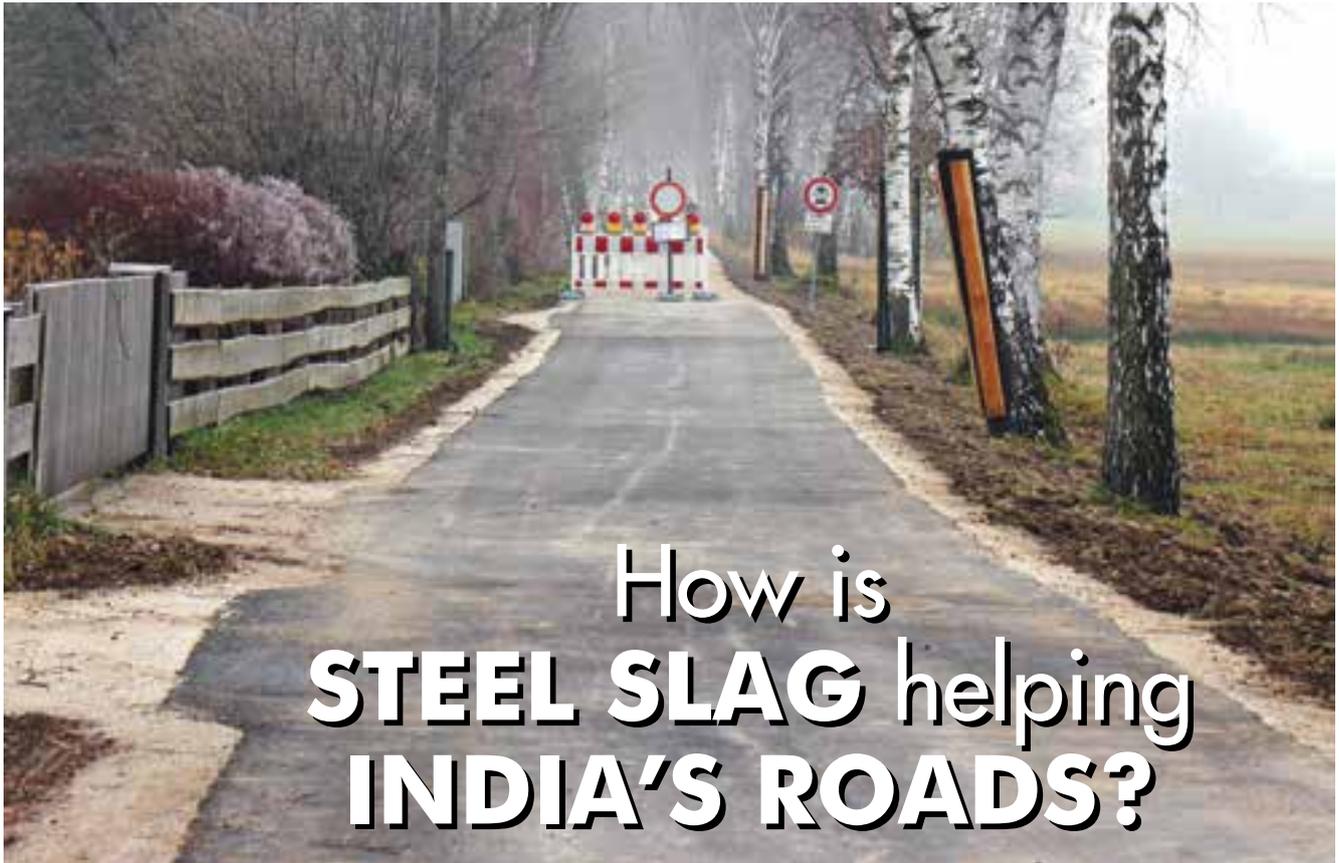


MISSION

To train over million Operators & Mechanics in ten years to have 5000+ Certified Trainers in over next decade To accredit 400 Training Organizations meeting Global Standards Pan India

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How is STEEL SLAG helping INDIA'S ROADS?

The next time you pick up a fork and spoon to polish off a treat, know for a fact that a part of the steel that makes the spoon-fork called slag, a by-product, goes into the making of various products, including roads, glass, ceramics and cement. In fact, with each passing day, the uses of steel slag could match those of the final steel itself.

Ore that we see being excavated from the earth and dumped on trucks is subject to processing in a range of furnaces in the presence of various other chemicals (including lime and coking coal) to remove the presence of different elements, be it metal-based or otherwise. Prominent 'impurities' include copper, lead, nickel and silica in various forms and densities. When subjected to high temperatures and various flux chemicals, these 'impurities' rise to a different level and are removed from the furnace by various means. These so-called 'impurities' is slag. Its characteristics include:

- Stable at temperatures close to 1,000°C: A property most looked forward to in construction and road-making for various reasons, it starts with being made part of asphalt (tar) or cement. Neither asphalt at its hottest state nor heated lime that forms the majority of cement roads can materially change the slag's composition or physical characteristics. A dense matter, water does not affect slag in any material way. These



properties help slag maintain the form and shape of the road.

- When subjected to temperatures beyond 1,200°C in the blast/arc furnace, limestone and silica that constitute slag fuse to form something that's as hard as ceramic and just as wear-resistant - quite unlike naturally occurring stone which forms the aggregate that goes into the making of most roads.
- The presence of fused and heated silica makes pieces of slag extremely rough on the outer surface, a property which aids in adequate adhesion.
- The fused mix of calcium and silica makes slag extremely dense with very low permeability, which does not let water or any other element pass through.
- Slag is also heavy for its volume, making it ideal when restricting movement in any direction.

Roads, a necessity anywhere in the world,



ought to have specific characteristics, including: cost-effectiveness, durable and long-lasting, weather and wear resistance, easily available, and environmentally sound. Slag as aggregate in road-making matches all these points in every count!

COST-EFFECTIVENESS

You can't make steel without bringing about slag. It's like trying to burn diesel without raising smoke! Anywhere in the world, when iron ore is fed into the furnace, there are two clear lines of output: steel (in basic or advanced form) and slag (again in basic or advanced form). The more steel produced, the more slag. While steel has its marked uses, what does one do with its lumpy, stone-like by-product besides dumping it in landfills? Among others, it can just as easily be repurposed to form all forms of aggregates, from large lumps to almost sand-like particles with the very basic of machinery like crushers and sieves, otherwise used in crushing naturally occurring rocks and stones.

DURABLE AND LONG-LASTING

Subject to incredible heat that almost turns it into a liquid, slag with its mix of sedimentation and chemicals including calcium and silica cool to forms a substance which is said to rival ceramic in density. With technology now available to break it into sizes as required, it can turn any road, be it of asphalt or concrete, into a timeless classic with just the right amount of longevity while carrying tonnes of movement.

WEATHER AND WEAR RESISTANCE

Steel slag has high abrasion resistance, soundness characteristics, bearing strength and durability. Coupled with its immense bulk density, strength, abrasion resistance and rough texture, it is best for making wear and wear-resistant roads in the most economical way, given that such a

road would outlast its usage by large margins.

EASILY AVAILABILITY

India's per capita consumption of 75 kg of steel is way, way below the world's average of 233 kg (and certainly below China's + 500 kg) though the country is gearing up to be producing 300 MMTs of steel by 2030, making it one of the largest producers of steel. The scope for the production of steel is thus immense and inevitable. After going through its share of being part of landfill material and other myriad uses, it will be seen seriously in creating infrastructure given its volumes. That said, given that it can very easily be converted into forms that find easy application in road construction - compared with the blasting, transport, crushing and grading of natural stone, India would most naturally turn to steel slag for its roads.

ENVIRONMENTALLY SOUND

There was a time in India when moving mountains made sense to make way for roads. It would clear and hurdle, and the aggregate thus produced found its way into making the road bed. With most mountains disappearing to make way for roads and other forms of construction, and rocks therein going into related or unrelated creations, India, in parts, suddenly finds that there aren't enough mountains to move! That said, you can't endlessly move natural structures to facilitate roads and other forms of construction or use the former as aggregates in the latter. Sooner or later, India would be at a crossroads where it would have to choose between saving the environment or going ahead with a very destructive form of construction. Into this conundrum comes a saviour. Steel slag! It not only aids in making roads but every other creation where tough, wear-resistant aggregates are a dire necessity. The added advantage of slag is that (given its composition) it isn't affected by weather, unlike natural stones and is perfect for roads on coasts or places where aggregates get exposed to the elements, including moisture and salts.

Like always, it's a necessity that's behind every invention. When rocks disappear with overuse, science and observation bring the perfect substitute: Slag!



Vedant Goel
Managing Director, Neo Mega Steel LLP

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Coal is the most polluting of all fossil fuels. When burnt, it emits greenhouse gases, causes acid rain, and pollutes the environment. With all of the talk about hydropower, nuclear energy, as well as biofuels, one might be forgiven for assuming that filthy coal is on its way out. But that is not the fact in reality. What comes into the entire scenario here is the huge amounts of carbon emissions. With the increasing carbon emissions, particularly from industrial activities, the trend has shifted towards the usage of clean coal technologies for the sustainable development of various industries and also to achieve the carbon emissions target worldwide.

According to Future Market Insights, the global demand for clean coal technology is expected to reach US\$ 3.8 billion by 2022, exhibiting growth at a CAGR of 4% during the forecast period 2022-2032. Rapid rise in power consumption as well as a shift away from renewable energy sources is expected to fuel market expansion in the coming years.

Clean coal technologies are advanced coal utilization methods of the next generation that are aimed to improve the environmental acceptability as well as efficiency of coal mining, preparation, and also use. Such techniques are being developed to reduce the negative environmental effect of coal energy production and to alleviate global climate change by reducing greenhouse gas emissions. Although new rules and rigorous emission standards favour renewable energy

sources, coal is expected to remain a critical power generation source globally. As a result, companies are focusing on sophisticated CO₂ reduction strategies to reduce emissions and dispel clean coal illusions. Increasing demand for improved process methods such as capture and gasification that aid in the use of coal with little environmental effect is expected to enhance the need for clean coal technology across various sectors globally.

In this blog, we will discuss the various types of clean coal technology. We will highlight how carbon can be captured and separated to reduce emissions, the different ways of storing and using the existing carbon in various industries and various coal gasification techniques, and how it is getting popular all across the globe.

CAPTURE AND SEPARATION OF CARBON DIOXIDE

There are several methods for capturing carbon dioxide from the gas streams, but none have been optimized at the scale needed in coal-burning power stations. Historically, the emphasis has been on acquiring pure CO₂ for industrial applications rather than lowering CO₂ levels in power plant emissions. But with growing environmental concerns like the EU carbon neutrality target by 2050, industrial emissions are required to be restricted. Hence, industries have started to capture the CO₂ emissions and hence reuse them later on. The capturing of CO₂ is mainly done in ways: Post-combustion capture,

Oxyfuel combustion, and Pre-combustion capture.

Post-combustion capture: Since nitrogen makes up the majority of the flue gas while there is only a paltry 14% to 16% carbon dioxide content, carbon dioxide capture from the flue gas streams after burning in the air is far more challenging and costly than that from natural gas streams. Absorption of carbon dioxide occurs as flue gases travel via an amine solution in the primary process, which handles it just like any other pollutant. The solution can be heated to release it afterward. The removal of CO₂ from natural gas is another application for this amine scrubbing method.

This method is still not being used in a lot of commercial-scale power plants. For instance, a \$100 million Alstom pilot project handled less than almost 2% of the plant's off-gas for CO₂ recovery at the 1,300 MWe Mountaineer power station in West Virginia, which releases 8.5 Mt CO₂ annually. The project used chilled amine technology. Around 20% of the plant's CO₂ was intended to be captured and separated. However, these plants were shelved in 2016 owing to a lack of government backing. Hence, industries would be in need of a lot of government support to lower their CO₂ emissions in the first place.

Oxyfuel combustion: When coal is burnt in oxygen instead of air, the flue gas is primarily composed of CO₂, making amine scrubbing a much more effective method for capturing it. This method also costs roughly half as much as capturing from traditional plants. Many oxyfuel systems are in use in the USA and other countries. For instance, the FutureGen 2 project makes use of oxy-combustion. An air separation plant, a boiler island, as well as a compressor, and purifying unit for ultimate flue gas are all features of such a plant.

Another example is the Integrated Gasification Combined Cycle (IGCC) plant that uses steam with coal to create carbon monoxide (CO) and hydrogen, which are then burnt in a gas turbine with just a secondary steam turbine (i.e., a combined cycle) to create electricity. If oxygen is used to fuel the IGCC gasifier instead of air, the flue gas will then include highly concentrated CO₂, which can easily be recovered after burning, thus reducing emissions by almost 38%.

Pre-combustion capture: The IGCC method will be further developed by adding a shift reactor for oxidizing the carbon monoxide with water, resulting in a gas stream primarily composed of carbon dioxide and hydrogen, with some nitrogen. Before burning, the CO₂ along with Hg and H₂S contaminants is separated (with around 85% CO₂ recovery), as well as the hydrogen alone will become the fuel for power

generation (or other purposes), whereas the concentrated pressured carbon dioxide is easily disposed of. No commercial-scale power plants are using this technique currently, but there is one demonstration project being thought of by industries.

Some units have already successfully captured carbon dioxide from coal gasification at low marginal costs. One example is the Great Plains Synfuels Plant in North Dakota, which gasifies 6 million metric tonnes of lignite annually to create synthetic natural gas that is clean and safe.

CARBON SEQUESTERING TECHNOLOGY TO GAIN TRACTION IN THE NEXT FEW YEARS

Early breakthroughs in carbon capture and storage (CCS) focused on a single source connected to a specific storage location. An emphasis on hubs that combine, dehydrate, as well as transport CO₂ fluxes from various sources, has emerged as a result of economies of scale. In North America alone, there are currently



roughly 15 hubs being established. The Northern Lights Project being developed in the North Sea off Norway is one of the most significant hubs currently under development. It combines CO₂ streams that are produced by plants, starting at 0.8 Mt/yr and growing to roughly 5 Mt/yr. The initiative, created by Shell, Equinor, and Total, would compress as well as liquefy CO₂ at source facilities before shipping it to a storage location in a special CO₂ ship.

The three primary types of carbon sequestration are coal seam storage, deep saline aquifers, and oil and gas replacements, particularly enhanced oil recovery (EOR). The expense of the second option may be outweighed by immediate

economic benefits. Deep saline aquifers hold the vast bulk of the potential for storage. Around 55 million tonnes of carbon dioxide had been sequestered through monitoring up until 2017. As per the IEA's Energy Technology Perspectives, by the end of 2022, 19 large-scale operational initiatives had a combined potential capture capacity of 30 Mt CO₂ annually, but only 28% of the captured CO₂ was being stored with proper verification and monitoring. This CO₂ is mostly a result of the treatment of natural gas.

Coal seams are another way to sequester CO₂ and use it for other purposes. Storage in coal seams differs from storage in oil-gas systems and saline aquifers because CO₂ is deposited in the coal matrix rather than stored inside the pores of rocks as it is in saline aquifers as well as oil-gas systems. The qualities of the coal have a significant impact on whether carbon dioxide will soak into it. The economics of improved coal bed methane recovery with CO₂ disposal is not always as favorable as they are for better oil recovery, but the opportunity is enormous as coal seam gas is progressively exploited. Hence, more and more industries are slowly shifting towards these processes to lower their emissions and gain sustainable growth in the coming years.

COAL GASIFICATION TECHNOLOGY TO HELP CARBON GET CONVERTED INTO SYNGAS

Coal gasification is a thermo-chemical process that uses steam as well as oxygen to transform lignite into a synthesis gas (syngas). It has been around for a long and is considered an effective clean coal technology. Since syngas is mostly made of carbon monoxide and hydrogen, most other unclean contaminants are frequently eliminated. It is anticipated that the coal gasification process will be utilized more frequently for the manufacture of chemical raw materials and electricity, particularly because it offers clean coal technology with greater energy efficiency.

For example, Chiyoda Corporation offers various industries with effective coal gasification projects. Chiyoda provides plant technology to enhance coal usage efficiency and reduce the environmental effect in various industrial plants that use coal-gasified syngases by leveraging their extensive expertise in gas purification as well as conversion facility construction from petroleum and natural gas projects. They have extensive expertise and technological capabilities in the field of chemical plant building and provide the best technique for producing chemical raw materials using syngas generated by coal gasification.

Underground coal gasification (UCG), another

method that has been available ever since the 19th Century but hasn't yet achieved widespread commercial viability, has one operational plant in Uzbekistan and is now being tested in pilot projects in South Africa and Australia. It is regarded as a novel method of utilizing coal power without the typical environmental effects. UCG is now a practical means to reach the massive coal deposits that are too deep to mine, because of technological advancements and the growing price of gas. Estimates indicate that up to 85% of the world's coal reserves cannot be reached using conventional mining methods. Opening them up for exploitation might have severe consequences for carbon dioxide emissions and global warming, but the industry claims these resources can be obtained cleanly.

CONCLUSION

Next-generation, cutting-edge methods for using coal that is called 'clean coal technologies' are intended to increase the efficiency as well as acceptability of coal mining, preparation, and usage from an environmental standpoint. These techniques are being introduced to diminish the damaging environmental effects of coal energy production and to slow down global warming by cutting greenhouse gas emissions.

There are recent developments that will decrease prices while simultaneously improving carbon capture efficiency. One modification would be to switch from utilizing water as that an absorbent to employing solid adsorbents. For instance, at Georgia Tech, one such absorbent was created by creating solid hollows out of polyethyleneimine-silicon dioxide (PEI), which flue gas then travels through. Such solid hollows are just as effective at absorbing carbon dioxide as the liquid absorbents. Scientists put the fibers under hot water to cause the carbon dioxide to escape and be stored.

Metal-organic frameworks (MOFs) are another helpful invention produced at UC Berkeley. With a huge interior surface area as well as the ability to absorb CO₂, MOFs are composed of diamine and magnesium molecules (two amino groups) inserted into the pores. By guaranteeing CO₂ links to a diamine in such a way that enables other CO₂ molecules to connect to the close-by diamine molecule, MOFs are capable of soaking carbon dioxide. To liberate the CO₂ from the fibers, high temperatures are needed. Thus, with these innovations in the domain of clean coal technology, various industries should utilize these techniques at the earliest, especially the cement and steel manufacturing units as it is the most difficult for them to reduce carbon emissions during their production methods. 



Nikhil Kaitwade
Associate Vice President
Future Market Insights



REAL ESTATE

CAUTIOUSLY OPTIMISTIC



While Indian real estate market has come out of the blues of slowdown, the year ahead could be quite optimistic for the real estate players and customers, with a caution.

4S DEVELOPERS TO DEVELOP 10-MN SQ FT MEGA PROJECT

4S Developers, the premier real estate developer in the NCR, is set to achieve the milestone of developing over 10 mn sq ft by FY2023-24 with an investment of more than Rs 2,000 crores as the total cost of the project. These are located in Gurgaon Sector 59 and Sohna. With massive projects in the pipeline, they are on the cusp of truly transforming the real estate sector in Gurugram.

4S Developers with their projects have amalgamated luxurious dwellings



with residential projects, disrupting the luxury residential property market. Their growth tangent can be attributed to multiple facets of their business operations and quality project delivery; their strategic acquisition of land parcels in Gurgaon and Sohna is a testament to this. Their planning, construction speed, and execution of projects are unparalleled in the industry. 4S Developers have proved their mettle with outstanding luxury real estate designs with an unprecedented speed of delivery.

BLUM INDIA INAUGURATES NEW DISTRIBUTOR SHOWROOM IN BENGALURU

Blum launched its new distributor showroom 'Vera Enterprises' in Bengaluru city. Located at No. 59, Ground Floor, 10th A Cross Rd, West of Chord Road 2nd Stage, Mahalakshmi Puram, Bengaluru, consumers can buy products directly from the brand's authorized distributor.

This new Blum experience centre was inaugurated by Nadeem Patni, Managing Director, Blum India and Saquib Malik, Director of Vera Enterprises.

Blum has been represented in India for more than 20 years, offering innovative fittings for the furniture

industry. With the opening of this store, Blum India continues to enjoy a network spread across 50 cities with over more than 40 outlets across India.



The showroom offers a range of Blum products and complete kitchen & wardrobe solutions. The idea is to give customers greater design scope and plenty of possibilities for differentiation.

RAYMOND REALTY SETS A NEW BENCHMARK IN REAL ESTATE SECTOR IN INDIA

Raymond Realty marked a momentous milestone to celebrate the completion of TenX habitat towers, the maiden project of the group's real estate venture. The first three towers in the project have been completed 24 months ahead of RERA timelines. This aspirational project envisaged to elevate the benchmark of living standards in Thane was launched in 2019 and



designed by renowned architect Hafeez Contractor. TenX Habitat currently comprises the tallest towers in Thane skyline of 42 floors comprising of 10 towers. A first few buyers were handed over the keys to their exquisite flats by Gautam Hari Singhania, Chairman and Managing Director, Raymond Group, during the event.

The group's premiere real estate projects - The Address by GS and TenX Habitat - have bagged the first and the second position in Thane city region with 78 and 124 units sold worth Rs 201 crores and Rs 147 crores, respectively. This achievement stands in line with Raymond Realty showcasing a strong three-fold sales growth.

LODHA ACQUIRES ~8 ACRES LAND TO GROW ITS GREEN DIGITAL INFRASTRUCTURE IN MUMBAI

Lodha announced that Lodha Green Digital Infrastructure (LGDI) platform has acquired ~8 acres of land in Kurla (Mumbai). The land will be used for the development of ~4 lakh sq ft of Grade-A multi-tenanted in-city fulfilment centre to provide the last mile warehousing infrastructure to 3PL, e-commerce, and quick-commerce companies. The development will involve a total investment of ~Rs 330 crores and is expected to be completed in the next 12-18 months in phases.

This is the second asset acquired by LGDI platform in Mumbai as it seeks to acquire more such assets in the city and other key consumption/manufacturing hubs across India like Pune, Bangalore, NCR, and other cities.

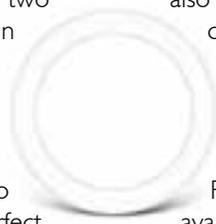
MAHINDRA LIFESPACES RECOGNIZED WITH A DOUBLE 'A' LEADERSHIP RANKING

Mahindra Lifespace Developers Limited, the real estate arm of Mahindra Group, announced that it has secured a double 'A' leadership ranking in corporate transparency and performance on climate change and water security by CDP, a global non-profit that runs the world's environmental disclosure system for companies, cities, states and regions. CDP encourages companies and governments to reduce their greenhouse gas emissions, and switch to more sustainable materials and operations. Mahindra Lifespaces® is the only Indian company to secure a place on CDP's annual 'A' list and has been awarded the 'Leadership' status.

Mahindra Lifespaces has paved a unique path as a real estate developer with a 100% green-certified portfolio since 2014. The company also has established a new benchmark in the field of sustainable development with the launch of India's first Net Zero Energy residential project in Bengaluru. Another major milestone in Mahindra Lifespaces' journey is its commitment to build only Net Zero buildings from 2030 onwards.

SIGNIFY LAUNCHES PHILIPS O-BULB & HEXA-BULB IN INDIA

Signify has launched two uniquely shaped LED bulbs in India, called Philips Hexa-Bulb and O-Bulb. The hexagonal and circular shaped bulbs can be used as decorative lights to lend an elegant touch to indoor space and create the perfect ambience.



Both the bulbs have a simple plug-n-play form that can be easily installed into existing LED bulb sockets. Designed to be comfortable for eyes, the bulbs

also offer a wider light spread as compared to regular round-shaped LED bulbs.

Philips Hexa-bulb is available in a 16W, 1,500-lumen variant and Philips O-Bulb is currently available in a 20W, 1,800 lumens variant. Both bulbs are available in cool and warm white colors, across all small and large format retail stores and e-commerce platforms at an MRP of Rs 999/-and Rs 1,199/-, respectively.

TK ELEVATOR WINS AWARD AT NECA 2022

TK Elevator has been conferred with the second prize at the 'National Award for excellence in Energy Management (NECA) 2022' in the manufacturing category by the Ministry of Power, New & Renewable Energy. This prestigious award was conferred by Raj Kumar Singh, Minister of Power, New & Renewable Energy at an illustrious award ceremony held at Vigyan Bhawan, New Delhi on 14 December. The President of India, Droupadi Murmu graced the occasion with her esteemed presence.



TK Elevator has won this award for its commitment and outstanding performance in the arena of Energy Conservation and Management. As an industry leader and responsible company, TK Elevator prioritizes

minimizing the environmental footprint of our operations and achieving ambitious carbon reduction targets through the substitution of non-renewable energy sources by cleaner and renewable energy. In India, TK Elevator is committed to achieving a Green House Gas (GHG) emission reduction target of 53% by 2050 from the base year of 2018-2019.

ATMOSPHERE O2 AT MULUND WEST SET TO ACQUIRE JAPANESE TECHNOLOGY

Almost a 75-year-old leading Japanese conglomerate Marubeni Corporation having a global presence exchanged its international experience with The Wadhwa Group for their project at Mulund, Atmosphere O2. Knowledge was exchanged between the entities on how they ensure better safety of building structures, increased use of renewable energy



and automation/artificial intelligence for Building Management and customer service. The developer plans to incorporate technological advancement in the project and has invited suggestions from Marubeni Corporation. Post the implementation of the ideas and relevant best practices the project will work towards enhancing safety of building structures in terms of managing vibrations being close to a highway and railway station, increased usage of renewable energy like solar for end user consumption inside the house, ensuring that it will be used on a frequent basis, the project will also see the implementation of Artificial Intelligence (AI) for managing building facilities, inventory and customer service.

STANLEY GROUP UNVEILS REVOLUTIONARY KITCHEN AND CABINETRY SOLUTIONS

Stanley Group announced the launch of the world's finest kitchen and cabinets Cabinetry Cult. This is a revolutionary kitchen and cabinetry solution crafted using the perfect blend of German precision manufacturing, French carpentry techniques, Italian design sensibilities and craftsmanship with 26 years of manufacturing expertise.



Stanley offers an elite range of kitchen and cabinetry. The cabinets come in a variety of styles, colours, sizes, and floor plans offering customers a range of styles and layouts for their kitchen and cabinetry needs of the entire home. The materials used in Cabinetry Cult cabinetry are globally sourced and of the highest quality which includes marine plywood, FSI-certified timbers, wood veneers, laminates, natural stones, and finishes.

OBEROI REALTY APPOINTS PANKAJ GUPTA AS COMMERCIAL REAL ESTATE CEO

Oberoi Realty announced the appointment of Pankaj Gupta as Chief Executive Officer, Commercial Real Estate. He will play a pivotal role in formulating the strategy of Oberoi Realty's commercial business, which presently includes International Business Park that comprises premium commercial spaces - Commerz, Commerz II and Commerz III in Oberoi Garden City, Goregaon, Mumbai. With more than two decades of experience in commercial real estate, retail, and hospitality, Pankaj also brings a wealth of expertise in leasing, marketing, facilities & asset management, and SEZ-Compliance & Certification. In addition, he is an accomplished chartered accountant and a postgraduate from IIM, Kozhikode. Oberoi Realty is known for its financial prudence, construction quality, and ability to deliver.

CAUTIOUSLY OPTIMISTIC



While Indian real estate market has come out of the blues of slowdown, the year ahead could be quite optimistic for the real estate players and customers, with a caution.

The Indian real estate market has seen a revival in 2022 after Covid pandemic playing spoilsport a year before. While affordable market has seen a slow progress in 2022, middle and luxury segments saw substantial growth in sales during the year. The market sentiments are expected to improve further in 2023 and beyond.



DR NIRANJAN HIRANANDANI
National Vice Chairman
NAREDCO



ANUJ PURI
Chairman, ANARCOK
Group

NEW PROJECTS

According to Anuj Puri, Chairman, ANARCOK Group, the launch trend in 2022 was calculated caution, with developers refraining from putting more inventory on the market than it could reasonably absorb - especially in already abundantly supplied markets. "2023 will continue to witness controlled new launches in most of the top cities," he feels. Also, ready-to-move-in housing will continue to draw most of the demand in 2023. The focus of buyers opting for new launches will not waver from projects by leading and listed players.

Dr Niranjana Hiranandani, National Vice Chairman, NAREDCO, says, "The funnel of new property launches will reflect an improved capex cycle to cater to growing demand from the end-users and investors' interest. Home prices will

continue to grow by another 5 to 7% in FY23 in lieu of sticky inflation, high cost of borrowings and skilled labour. Going forward, industry recommends a blend of fiscal and monetary intervention to herald the growth of the labor-intensive real estate sector."

SALES TRENDS

Housing sales remained upbeat throughout 2022, and the current sales momentum will sustain at least into the first quarter of 2023. According to Anshuman Magazine, Chairman & CEO - India, South-East Asia, Middle East & Africa, CBRE, positive homebuyer sentiments are expected to drive housing sales and new launches; however, a lagged impact of the ongoing monetary tightening on sales could be a key risk. "In the likelihood of a moderating sales momentum, capital value rise



ANSHUMAN MAGAZINE
Chairman & CEO - India,
South-East Asia, Middle
East & Africa, CBRE

could slow and remain selective. Decline in unsold inventory levels will continue in the short term. Increased traction is expected in premium and luxury segments; however, mid-end and budget segments will still garner a dominant share of sales," he adds.

In the office segment, Magazine is of the view that global headwinds and the possibility of an economic slowdown in developed economies are expected to slightly weigh on occupier sentiments and leasing activity in 2023. In the retail segment it is expected that brands would continue to resize and recalibrate their physical store strategies to diversify their portfolio and expand footprint, with 'experience' becoming an important frontier to bridge the retailer-consumer gap.

Commenting on the rising interest rates, Dr Hiranandani says, "The sustained home buying demand buoyancy may dip if interest rates cross the upper tolerance limit of 9.5%, leading to demand contractions. The confidence index of key stakeholders comprising homebuyers, investors, institutional lenders, and developers remains upbeat despite economic vagaries. NRI homebuyers to catapult currency depreciation benefit and propel in luxury housing."

At the same time, he feels that the unfurling of inevitable recession in the global economies will have a marginal impact on housing, with postponement in logging housing sales. "The volatile capital markets may lead to subdued discretionary spending, which may slow down the consumption rally, especially in an interest rate sensitive housing sector. The market share of branded players will be upscale as financial discipline precipitates in the trend of market consolidation."

According to Dr Hiranandani, in the commercial real estate, the demand forecast for Grade A assets remains optimistic with short-term deferment due to recessionary cautiousness. He adds, "The expansion and diversification plan of the commercial players remains bullish as the Indian economy is poised for 6.8% GDP growth, the fastest among the global counterparts. The attractive rental yield generating asset will continue to stay favored amongst the investor class."

REGIONAL MARKET TRENDS

Rajendra Pate, President, NAREDCO Pune, says, "Pune's real estate market has again shown its dominance in 2022 as demand surged considerably



post the pandemic. Even after the hike in property prices, the growth momentum continued in Pune which highlighted the fact that there was a genuine demand in the market," points out.

Ram Naik, Director, The Guardians Real Estate Advisory, comments on Pune real estate



RAM NAIK
Director, The Guardians
Real Estate Advisory

market, "The Pune housing market is expected to remain robust in 2023 because of rising buyer demand and increased investment in infrastructure projects. With more new projects in the pipeline and investments from both local and out-of-town buyers, Pune's housing market is expected to remain active and develop further. For buyers, this could mean more housing options and lower property prices; for investors, it could mean new opportunities for capital gains and returns on investment (ROIs). It appears that Pune's real estate market has a bright future ahead, with a lot of promise."

Talking about the projects in Mumbai region, **Rajat Rastogi, Executive Director, Runwal Group,** says, "We continue to see robust sales growth across all our projects in MMR. We have achieved our best ever sales numbers this year, which enabled us to



RAJENDRA PATE
President
NAREDCO Pune



RAJAT RASTOGI
Executive Director
Runwal Group

increase the prices across the portfolio, ensuring capital appreciation to our customers.”

Talking about the city markets, **Bijay Agarwal**, **Managing Director, Sattva Group** is of the view, “Despite climbing prices and loan rates, there



BIJAY AGARWAL
Managing Director
Sattva Group

has been a consistent demand for mid-range and premium housing in major cities.” According to him, Bengaluru witnessed a steady upsurge in demand, in many parts of the city, particularly North Bengaluru. “In Hyderabad, buyers jostled for a limited number of ready units, but we expect further activity to offset the pressure on the market,” he adds.

Navin Makhija, **Managing Director, The Wadhwa Group**, says, The Government has laid a strong emphasis on the expansion of Mumbai



NAVIN MAKHIJA
Managing Director
The Wadhwa Group

through a lot of ongoing and upcoming infrastructural developments. Mumbai being a concrete jungle will soon be expanding beyond its territories like Panvel, Ulwe, Uran, Dronagiri, Thane, Kalyan, Palghar, etc and will be connected to current business districts through the support of ongoing infrastructure like the Navi Mumbai Airport, Mumbai Trans-Harbour Link, Virar-Alibaug Multimodal Corridor, Coastal Road, Goregaon-Mulund Link Road, Airoli-Katai Tunnel and Metro Connectivity to name a few. With such fast-paced infrastructure evolution and exceptional connectivity, the real estate market is slated to create a strong demand in 2023.”

Shraddha Kedia-Agarwal, **Director, Transcon Developers**, adds, “With RERA ensuring transparency



SHRADDHA KEDIA-AGARWAL
Director, Transcon
Developers

and laws allowing 100% FDI in construction, Indian real estate is witnessing sharp investment infusions from NRIs. The new class of ultra-rich people is on a buying spree of luxury homes in global cities like Mumbai, Bangalore, etc.”

While residential sales momentum is expected to continue in 2023, it will be a watchful year for the Indian commercial real estate sector. 

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LEADERS SPEAK

The Indian real estate market is entering a new action-packed year in 2023. After the Covid pandemic fading the sheen of the market in the past couple of years, leaders of real estate sector are optimistic about the year ahead amid some unexpected challenges that may crop up in between.



Dr. Niranjan Hiranandani

National Vice Chairman, NAREDCO

The sustained home buying demand buoyancy may dip if interest rates cross the upper tolerance limit of 9.5%, leading to demand contractions. The confidence index of key stakeholders comprising homebuyers, investors, institutional lenders, and developers remains upbeat despite economic vagaries.

The funnel of new property launches will reflect an improved capex cycle to cater to growing demand from the end-users and investors' interest. Home prices will continue to grow by another 5 to 7% in FY23 in lieu of sticky inflation, high cost of borrowings and skilled labour. Going forward, industry recommends a blend of fiscal and monetary intervention to herald the growth of the labor-intensive real estate sector.

The demand forecast for Grade A assets in the commercial real estate sector remains optimistic with short-term deferment due to recessionary cautiousness. Growth in emerging real estate asset classes like warehousing, industrial housing, logistics, data centers, student housing, senior citizen homes, flex spaces to gain ground in the ensuing year 2023.



Rajat Rastogi

Executive Director, Runwal Group

The real estate market saw a steady growth post the pandemic years and a strong performance was seen in 2022. The pandemic had made people realize the need of owning a home, leading to a surge in demand. Various offers by developers gave further impetus to the industry.

For our residential portfolio, we expect demand to remain robust in 2023, especially in the affordable housing segment and in ready to move in or soon to be ready projects. Keeping aside the concern of the rising interest rates, the growth momentum should continue and the real estate sector should see a great 2023.



Navin Makhija

Managing Director, The Wadhwa Group

We have already witnessed a very robust demand in the past few quarters on the back of improved consumer sentiments. We anticipate the Government to announce incentives that will propel the growth of the sector such as introducing tax breaks which will increase public spending, less transaction cost, etc. Developers should focus to complete the existing projects, sales will happen as the buyer gets to see development and the project reaches a close to completion stage and therefore the demand for good developers and ready-to-move-in inventory will continue.



Venkatesh Gopalkrishnan

CEO, Shapoorji Pallonji Real Estate

The real estate sector's business cycle has been in a flux for the past few years. In 2022, the sector experienced an upward trend due to factors like homeownership, the desire for bigger homes, lower interest rates, and attractive pricing; all these resulted in the market to pick up. The last six to eight months have seen a tangible return to pre-pandemic conditions as foreign investments and NRI homebuyers have taken centre stage.

We feel that 2023 will pivot towards many opportunities. The sector will continue to have strong and positive momentum. The demand for luxury homes will continue to be the driver for the real estate sector in 2023.



Shraddha Kedia-Agarwal
Director, Transcon Developers

In the post-Covid world, there is a shift in demand for sea-facing homes with large open spaces like balconies, terraces, courtyards, gardens, and parks in the vicinity. Work-from-home and the hybrid work culture have changed the pattern for most home buyers in the post-Covid era. The latest trends of customer preferences have shifted from premium real estate to a more sophisticated approach, buyers who want to get a lifestyle that can flawlessly include the work-from-home notion, while not giving up on the lavishness and comforts of luxury living, which could continue in 2023 as well.



Hardik Pandit
Director, APICES Pvt Ltd

With a huge growing population to address, there is an ever growing demand for infrastructure in India. Currently, at a very exciting space with several landmark projects launched, infrastructure development will be one of the top economic drivers of the country in 2023. This year is an exciting year with many infrastructural projects being worked on. These will uplift the area and also open new pockets for developments. With the Indian market also showing good growth, commercial place development is booming. We look at doing excellent work around sustainable green buildings in 2023.



Aditya Kushwaha
CEO & Director, Axis Ecorp

The year 2023 is both exciting and promising for the Indian realty sector. Despite the mounting interest rate and inflation, the demand for residential properties will remain strong. Luxury and second homes witnessed a surge in demand in 2022, and this trend will continue. The holiday home segment will see excellent traction as people continue working in hybrid mode.



Rajendra Pate
President, NAREDCO Pune

Pune's real estate market has again shown its dominance in 2022 as demand surged considerably post the pandemic. Even after the hike in property prices, the growth momentum continued in Pune which highlighted the fact that there was a genuine demand in the market.

The increasing interest rates will temporarily impact the growth momentum of the Pune residential market. However, the demand for affordable housing will sustain in 2023 as well. Townships and gated community projects too will continue to witness a sustained demand as post-pandemic homebuyers have realized the importance of healthy living, convenience and security that these projects offer.



Bijay Agarwal
Managing Director, Sattva Group

The real estate sector performed exceptionally well in 2022, a momentum it carried forward from 2021. The residential sector in particular has done phenomenally well with developers registering good sales figures throughout the year, including SATTVA Group. To further establish this fact, one of the top performing Indian cities, Bangalore, witnessed a steady upsurge in demand, in many parts of the city, particularly North Bangalore. To our delight, the Bengaluru market stayed competitive the whole of 2022; unsold inventory has fallen amidst buyers lining up for houses in the central and inner parts of the city. In Hyderabad, buyers jostled for a limited number of ready units, but we expect further activity to offset the pressure on the market. We foresee steady demand prevailing alongside resilient supply, as we step into 2023.



Kaushal Agarwal
Chairman, The Guardians Real Estate Advisory

The surge in demand for housing in the Indian real estate sector despite the backdrop of uncertainty, looming global recession, and rising interest rates has given an indication that there is a genuine interest in housing and the momentum is expected to continue in 2023. We have every reason to believe that the performance of realty in the New Year is going to be rock steady and robust, especially with the government also stepping in and taking initiatives that support and enhance the growth in the sector.

The year 2023 will also see the remote working model, which gave way to a hybrid work structure in 2022, change completely with the full-fledged return to the pre-pandemic structure of work from office (WFO). Therefore, CRE (commercial real estate), which has been on the rise last year, is expected to dominate with Grade-A offices in huge demand as big companies are seeking to expand their operations in the coming days.

TOWARDS INTELLIGENT FAÇADE SYSTEMS

Façade systems have evolved from aesthetic to functional over the years. **Construction Times** explores the evolving application trends in façade systems and the market outlook.

The usage of facades in building construction has seen a significant growth in the recent times. While earlier façade systems were used for better aesthetics of the building or structure, now it has been used for beyond looks and aesthetics. The India facade market reached a value of US\$ 2,424.4 Million in 2021, and the market is expected to touch US\$ 3,930.4 million by 2027, exhibiting a CAGR of 8.30% during 2022-2027, according to figures of IMARC Group.

EMERGING TRENDS

Facades are the most crucial component of a building, looking from the perspective of the designers, developers, architects and the consumers. The recent trends have witnessed a considerable surge in terms of façade treatments and the latest building material in exteriors. **Ar. Sumit Dhawan, Founder and Principal Architect, Cityspace' 82 Architects**, says, "Many architects and designers



AR. SUMIT DHAWAN
Founder and Principal
Architect, Cityspace' 82
Architects

are experimenting with complex patterns and symbolizing forms, making them a visual identity of the building. Integral materials like aluminium, corten steel, WPC, and porcelain are extensively being used for cladding exteriors. Dry cladding is an emerging

trend." According to him, lacquered and opaque glass is also an alternative cladding option in outlining the entire façade rather than being restricted to fenestrations.

Rounaq K Choudhari, Founder and Managing Director, Micasa Luxuries, adds, "Adaptive fritting is



ROUNAQ K CHOUDHARI
Founder and Managing
Director, Micasa Luxuries

the evolution in the fritting industry. It is an integrated glass unit with a personalised movable graphic design that may adjust its transparency to manage transmitted light, solar gain, privacy, and views. Adaptive fritting has the ability to adjust between opaque and transparent states while conventional fritting depends on a set pattern. Façade lighting design has acquired relevance in recent years and is utilised to modernise and iconize significant buildings."

T. Chandrasekhar, Director-Technical, Aparna Enterprises, says, "The use of materials and facade



T. CHANDRASEKHAR
Director-Technical
Aparna Enterprises

treatments has increased significantly over the past ten years. Nowadays, facades serve more useful purposes than a decorative one. The most recent application trend in India uses a variety of materials to clad buildings, including glass, wood composite polymers, tiles, dry cladding systems, solar screens, aluminium, titanium, and zinc.”

DEMAND – SUPPLY SCENARIO

Chandrasekhar is of the view that nowadays, the preference for the façade is constantly evolving. According to him, earlier commercial buildings focused more on facades but now residential buildings are also choosing facades. The major reason being the sturdy material used to make facades is it protects the building from noise pollution and creates a barrier from the outer world.

Dhawan says, “Façade and fenestration industries are building back post-pandemic, undismayed by significant labour & supply chain challenges, reduced margins, and raw material price variations. To maintain the momentum, the industry is in immediate need to navigate elevated risks while advancing sustainability priorities. To achieve long-term profitability, companies should embrace digital capabilities and progress with digitalization, seeing results from more connected, efficient, and reliable processes at production.”

PRODUCTS AND SOLUTIONS

Nowadays, facades serve more useful purposes than only decorative ones. Buildings can be covered with a variety of materials, including smart glass, wood composite polymers, tiles, dry cladding systems, solar screens, aluminium, and titanium. Choudhari adds, “From glass glazing to stone cladding, ACP to louvers and now doing the world’s largest smart glass project Bagmane Rio, we have a vast variety of façade options for the architects and developers.”

Aparna Craft is presently providing services for the most commonly used façade system like bespoke unitized & semi-unitized curtain walls, metal & metal composite cladding (ACP, aluminium, zinc, SS, atriums, spiders, shop fronts, canopies). “We have professionals who are well versed and have knowledge of BIM modeling, thermal and acoustic analysis, finite element analysis to meet the structural requirements and ensuring the façade stability along with warranties of all materials,” claims Chandrasekhar.

DESIGN & TECHNOLOGY TRENDS

Along with the evolving materials that furnish the look and feel of a building, technologies applied to façades and fenestrations are also unfolding at a greater level. **Ar. Robin Sisodiya, Founder and Principal Architect, ASRO Arcade India**, elaborates, “Technological advancements have been made in the application of new techniques that have made recent façade trends more responsive to the environment



AR. ROBIN SISODIYA
 Founder and Principal
 Architect, ASRO Arcade
 India

as well as the design. The deviation towards energy conservation and efficiency paves way for flourishing trends of perforated metal facades, kinetic facades, and smart facades, that maintain ambient internal temperature, ventilation, and natural light at the same time ensuring visibility from inside. Metals like copper, corten steel, aluminium, and brass alloys are now being explored as new façade elements in Indian homes.”

Design and application trends vary with commercial and residential structures. According to Chandrasekhar, commercial building and residential building have their own set of advantage look wise and utilities. “The façade primarily holds importance from appearance, superior performance and design standpoint setting the tone of the building and the final selection of the type of façade plays a crucial role in differentiating a building’s aesthetics and function-wise,” he adds.

However, in residential facade systems, aluminium and uPVC, both will co-exist with aluminium being the choice for long and tall systems and uPVC for high level noise insulation and thermal properties.

FUTURE OUTLOOK

According to Choudhari, innovation and sustainability are perhaps the most preferred words in the world of architecture lately. “In light of climate change and the growing population, a larger group of consumers have limited resources, resulting in developers and architects looking for innovative façade developers. And talking about innovation, if I have to note down a few points for façade innovation, I would say the façade needs to be not only visually appealing on the exteriors of a building but also driven with high-end technology and performance when it comes to functionality,” he concludes. **CT**



Innovation of smart facades is a trend to this industry as we lead travel towards future.

ROUNAQ K. CHOUDHARI

Founder and Managing Director, Micasa Luxuries

How is the trend evolving in the façade and its applications in India?

With respect to façade trends, many architects and designers are experimenting with symbolising forms and intricate patterns for façade designs. The overall façade pattern is basically just a simple module repeated and given more interest by the use of fritting patterns, although looking intricate from a distance. Adaptive fritting is the evolution in the fritting industry. It is an integrated glass unit with a personalised movable graphic design that may adjust its transparency to manage transmitted light, solar gain, privacy, and views.

When we talk about new materials, today we need a lot more than just the traditional stone, glass and aluminium composite panels for the building facades. We need new products keeping Indian climate, dust, humidity and low maintenance in mind.

How is façade system transforming from just aesthetics to a functional element in building structures?

Nowadays, facades serve more useful purposes than only decorative ones. Buildings can be covered with a variety of materials, including smart glass, wood composite polymers, tiles, dry cladding systems, solar screens, aluminium, and titanium.



Integral materials such as glass, aluminium, stone wools, etc., are now produced locally to serve the Indian market's focus on price. The current growing trends include the use of architecturally exposed concrete, fair face concrete, and concrete moulded to the design using liners created with CNC precision. The tremendous desire and passion shown by the designers who created novel solutions using, among other things, cloth, smart glass, and wood polymer composites have benefited the Indian construction sector.

One such example of façade system is the one executed by us (Glass Wall Systems) in Bengaluru for Bagmane Developers. The Bagmane Rio (Google HQ) is also the world's largest electrochromic glass project, with 1.6 m sq ft of commercial space for Google India.

How do you visualize the future of façade systems in India? What will drive the demand?

In my opinion, innovation and sustainability are perhaps the most preferred words in the world of architecture lately. In light of climate change and the growing population, a larger group of consumers have limited resources, resulting in developers and architects looking for innovative façade developers. And talking about innovation, if I have to note down a few points for façade innovation, I would say the façade needs to be not only visually appealing on the exteriors of a building but also driven with high-end technology and performance when it comes to functionality. Taking the example of Rio Business Park, the façade is not just visibly entreating but also caters to the high-end performance and functionality with the innovation of dynamic glass and smart façade. All in all, I believe innovation of smart facades is a trend to this industry as we lead travel towards future.





There has been an amplifying focus on the effect of facades on indoor comfort.

AR. ROBIN SISODIYA

Founder and Principal Architect, ASRO Arcade India

How is the trend evolving in the façade and its applications in India?

In addition to their insulation, waterproofing, and aesthetic functions, façade design now encompasses energy efficiency to a greater extent, which adds another layer of complexity to the process. Further, façade engineers have access to a number of new materials, and developments in technology allow them to create iconic building facades. Modern façade design has harnessed the most recent technological advancements and techniques that have led to new construction processes and materials, such as smart materials, which have opened up huge design possibilities.

How is the façade system transforming from just aesthetics to a functional element in building structures?

Facades are no longer an element of aesthetics and visual appeal for a building. Architects and designers strive to create sustainable facades, which are aesthetically pleasing. The cost-effective, energy-saving yet aesthetic construction has the potential to support the property owners and also to be effective for the environment. Building façades play a vital role in enhancing the properties like weather resistance and acoustic, thermal, and fire resistance. In recent years, there has been an amplifying focus on the effect of facades on indoor comfort. Recent trends such as perforated aluminium panels or kinetic facades regulate ventilation and natural light, thus contributing to the functionality of the buildings.

How do the demand and applications vary in commercial and residential buildings?

With residential structures playing a crucial part in the urban fabric, it demands a façade that reflects the inner personality and character of the building. Complex geometric forms, distinctive material palettes, and indoor comfort define the



residential facades, while facades of commercial buildings seek to express their brand identity in the first place. Though both residential and commercial facades focus on sustainability, commercial buildings prioritize their energy efficiency, enabling access to sufficient lighting, controlling air flow and ventilation, and maintaining heat gain and UV rays under control. Structural considerations also play a vital role in huge commercial buildings.

What are the design and technological developments happening in the façade industry, and what future you see for the market?

Along with the evolving materials that furnish the look and feel of a building, technologies applied to façades and fenestrations are also unfolding at a greater level. Technological advancements have been made in the application of new techniques that have made recent façade trends more responsive to the environment as well as the design. The deviation towards energy conservation and efficiency paves way for flourishing trends of perforated metal facades, kinetic facades, and smart facades, that maintain ambient internal temperature, ventilation, and natural light at the same time ensuring visibility from inside. Metals like copper, corten steel, aluminium, and brass alloys are now being explored as new façade elements in Indian homes.

Building façades play a vital role in enhancing the properties like weather resistance and acoustic, thermal, and fire resistance.



We try to maximise the use of materials that are zero maintenance.

AR. SUMIT DHAWAN

Founder and Principal Architect, Cityspace' 82 Architects

How is the trend evolving in the façade and its applications in India?

The recent trends have witnessed a considerable surge in terms of façade treatments and the latest building material in exteriors. Many architects and designers are experimenting with complex patterns and symbolizing forms, making them a visual identity of the building. Integral materials like aluminium, corten steel, WPC, and porcelain are extensively being used for cladding exteriors. Dry cladding is an emerging trend. Lacquered and opaque glass is also an alternative cladding option in outlining the entire façade rather than being restricted to fenestrations. The architecture industry in India has harnessed the benefits of the intense passion displayed by the designers to create iconic structures that resulted in innovative solutions and the use of smart materials.

How is the façade system transforming from just aesthetics to a functional element in building structures?

The façade of a building has undoubtedly remained the most important from the perspective of both the designers as well as the developers, as it sets the first impression of the building. However, facades have now gained more significance as a functional element of a building rather than purely aesthetic. The materiality of the façade not only influences the aesthetics of the exterior but also significantly impacts the performance of the building and has the capability to make it more energy efficient and sustainable. For instance, instead of introducing a metal cladding in a single-skin façade system, a double-skin façade system can be considered as they integrate insulation properties keeping the indoor environment comfortable irrespective of the outdoor climate. Also, cleaning in double-skin façade systems is more accessible as the indoor

skin is glass. These systems also vouch for privacy serving multiple purposes.

With a single-skin façade, instead of using wet cladding, one can always go with a drywall system where the cavity can trap the heat, making for a comfortable indoor environment. Vertical or horizontal shading devices are another alternative to cut direct sunlight from entering the building. In fact, the designer can control the heat and natural light depending on the orientation of the building.

Hence, there are various ways of choosing elements that are better for the performance of the building while complementing the aesthetics simultaneously. With the abundance of solar energy in our country, there is a vast potential that lies in reaping solar power through the integration of photovoltaic panels in the facades.

What is the demand-supply scenario of façade systems in India?

Façade and fenestration industries are building back post-pandemic, undismayed by significant labour & supply chain challenges, reduced margins, and raw material price variations. To maintain the momentum, the industry is in immediate need to navigate elevated risks while advancing sustainability priorities. To achieve long-term profitability, companies should embrace digital capabilities and progress with digitalization, seeing results from more connected, efficient, and reliable processes at production.

How do the demand and applications vary in commercial and residential buildings?

Residential façade design distinguishes itself from commercial building facades in various aspects. Commercial facades demand to give a building a sense of brand identity, while residential facades focus on visual aesthetics and indoor

Periodic façade maintenance is essential to prolong the lifespan of a building and to avoid consequential damages followed by them.

comfort. For instance, retail stores opt for large glazings to showcase products and elevate the business. On the other hand, residential facades display a play of form and material that adds personalization and uniqueness to the home.

What are the maintenance practices to be followed for the upkeep of façade systems?

Periodic façade maintenance is essential to prolong the lifespan of a building and to avoid consequential damages followed by them. In addition, façade maintenance contributes to the continued attractiveness of a building without losing its visual aesthetics. It further enhances the health of occupants. Maintenance measures include inspection of waterproofing envelopes, checking for damages in brick or other coatings, assessing the condition of roofs and skylights, and sealants for windows and doors.

Today's architecture uses a diverse range of materials, each with unique features that assure the long-term durability and sustainability of spaces. Choosing the right building material helps achieving its ultimate lifespan with the proper installation technique. When it comes to façade design, we at Cityspace' 82 Architects incorporate steel and aluminium, which in addition to having a great aesthetic, also provides high quality, longevity, efficiency, and affordability. We try to maximise the use of materials that are zero maintenance. For instance, one of

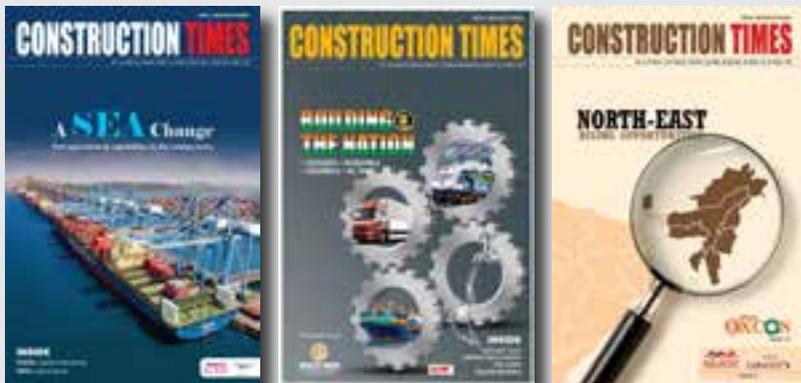
our favourite materials is porcelain which we often use in multiple projects owing to its remarkable properties like scratch-resistance and waterproofing. In conclusion, it's important to understand principles like zero maintenance as fundamental requirements rather than challenges to which a service system must adhere.

What are the design and technological developments happening in the façade industry, and what future do you see for the market?

Technological developments are rapidly changing the façade trends in the Indian market. Software for determining the building orientation and energy consumption has become an essential tool in the planning of a project. To further strengthen the sustainability goals, architects and designers look for newer technologies and move towards intelligent façade systems. The world is progressing towards the trend of dynamic facades; the automated metal louvers, interstitial louvers, and adaptive fritting respond to the sunlight and helps optimize both lighting and HVAC loads. Technologies like digital facades and solar active architecture can integrate building systems, and the façade can respond to external conditions such as sun path and wind directions. Designers today are trying to give something innovative to their potential customers and develop unique façade ideas that are durable and pro-environment at the same time. 

Choosing the right building material helps achieving its ultimate lifespan with the proper installation technique.

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We have witnessed a growing demand for facades in the last few years.

T. CHANDRASEKHAR
Director-Technical, Aparna Enterprises

How is the trend evolving in the façade and its applications in India?

A bright and contemporary façade requires a lot of thought and engineering, from design to material selection to contractor selection and installation.

Both from the perspective of the consumers and the architect, facades are the most crucial component of a building. Additionally, they are difficult to design because the perception and cutting-edge façades technology is constantly changing. For example, glass aluminium façades have become ancient as modern materials including rusted iron panels, zinc, copper, and steel, as well as high pressure laminates, are available in the market.

The use of materials and facade treatments has increased significantly over the past ten years. Nowadays, facades serve more useful purposes than a decorative one. The most recent application trend in India uses a variety of materials to clad buildings, including glass, wood composite polymers, tiles, dry cladding systems, solar screens, aluminium, titanium, and zinc.

How is façade system transforming from just aesthetics to a functional element in building structures?

Facades' primary function is to create a barrier that separates a building's interior from the outside world. High-performing facades are more than just physical barriers between the inside and outside of a building; rather, they are integrated building systems that actively respond to their surroundings to produce comfortable interiors while also drastically lowering the building's energy usage.

Additionally, a well-structured facade will maximize natural light and ventilation in the building. The sturdiness and toughness that

facades provide to a structure is another advantage that endures strong winds and rain. The final advantage of building facades is the potential reduction in noise pollution by creating a sturdy barrier.

What is the demand-supply scenario of façade systems in India?

We have witnessed a growing demand for facades in the last few years. The India facade market achieved a value of US\$ 2,424.4 million in 2021, according to the most recent research analysis, "India Facade Market: Industry Trends, Share, Size, Growth, Opportunity and Forecast 2022-2027. It is estimated to reach US\$ 3,930.4 million by 2027."

Nowadays, the preference for the façade is constantly evolving. Earlier commercial buildings focused more on facades but now residential buildings are also choosing facades. The major reason being the sturdy material used to make facades is it protects the building from noise pollution and creates a barrier from the outer world.



The use of materials and facade treatments has increased significantly over the past ten years.

How do the demand and applications for façade systems vary in commercial and residential buildings?

Commercial building and residential building have their own set of advantage look wise and utilities. The façade primarily holds importance from appearance, superior performance and design standpoint setting the tone of the building and the final selection of the type of façade plays a crucial role in differentiating a building's aesthetics and function-wise. Sustainable façade material which is capable of shielding buildings from environmental harms like strong wind, heat, and extreme rains has led to the demand for its growth. With technological innovations taking place more frequently, the development of energy-saving façade material has taken birth as these advanced products are powerful solar energy absorbers and hence find widespread adoption by many commercial and residential buildings as a backup source of electricity generation. Over the next eight years, the product demand in commercial buildings is expected to remain high due to the growing need for safety measures and ambiance in the corporate and hospitality industry. To name a few facades for building structures include steel and glass façade, panel frame façades, solar shading façade, kinetic façade, dynamic façade, etc.

In residential facades systems, aluminium and uPVC, both will co-exist with aluminium being the choice for long and tall systems and uPVC for high level noise insulation and thermal properties. The client's budget generally decides on the selection of aluminium or uPVC for their premium apartments or properties. Façade systems used in residential aluminium products (higher-end) are sliding window, tilt and turn window, ventilators, fixed window, villa window and casement window etc. While the façade systems that have been used in residential uPVC products (higher-end) are casement windows, sliding windows, arch windows, special windows, and coloured windows offer architectural design with suitably placed colour handles and other hardware.

What are the products and solutions offered by the company?

We at Aparna Craft are presently providing services for the most commonly used façade system like bespoke unitized & semi-unitized curtain walls, metal & metal composite cladding (ACP, aluminium, zinc, SS, atriums, spiders, shop fronts, canopies). We have professionals who are well versed and have knowledge of BIM modeling, thermal and acoustic analysis,



finite element analysis to meet the structural requirements and ensuring the façade stability along with warranties of all materials.

What are the design and technological developments happening in the façade industry, and what future do you see for the market?

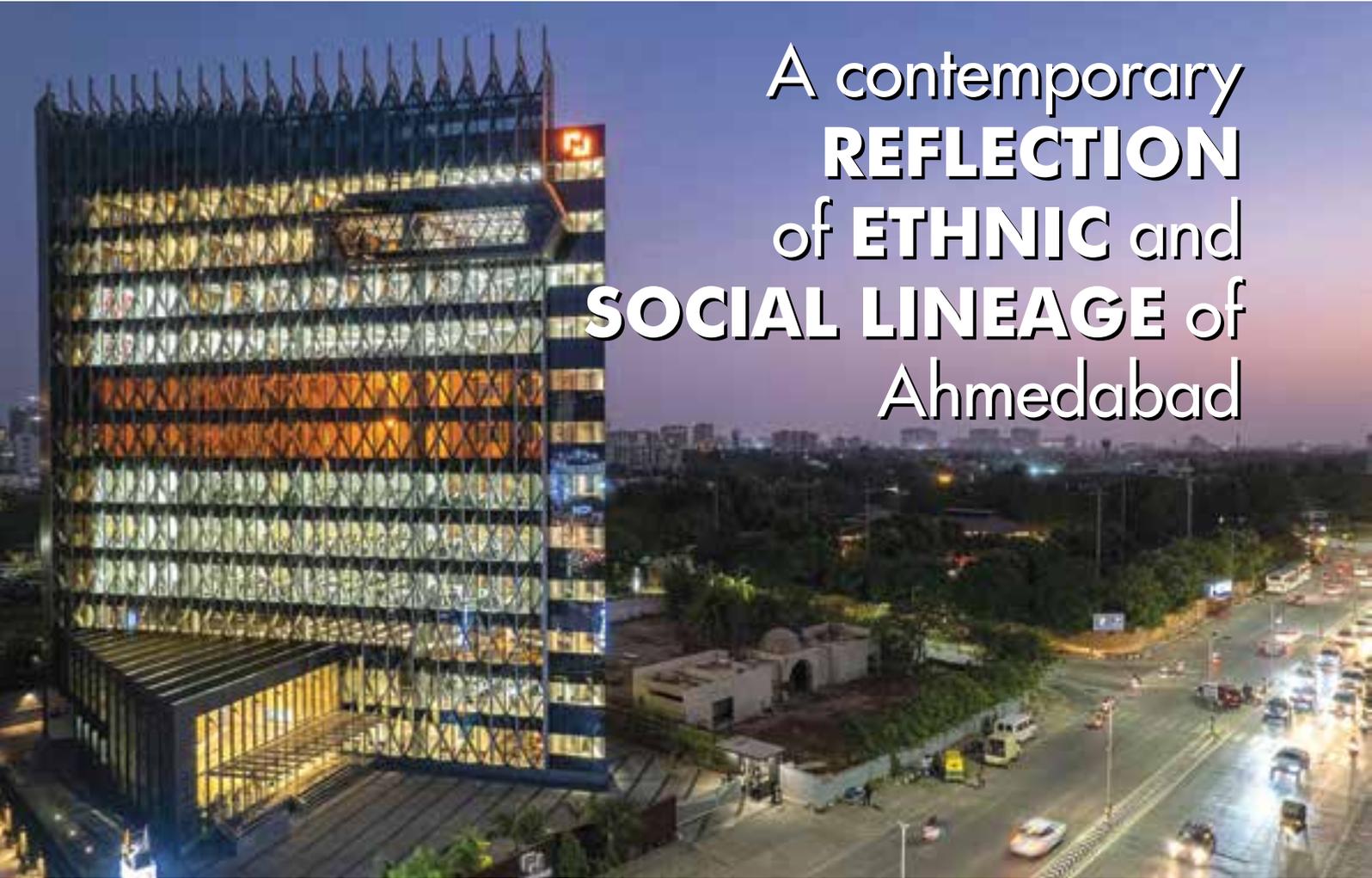
Regarding Design Technologies in Façade, nowadays façade contractors are designing the façade element in BIM model, to analyse the whole structure using FEA (Finite Element Analysis) and simulation. All kinds of upgradation happened in the recent past in the market due to the competition and differentiation from others. It also shows the aggression of optimising the system, research, and development skills in the core.

The development of sustainable facade materials offering the capability of shielding buildings from environmental conditions such as heat, wind, and rain is a primary factor in its growth in demand. The kind of façade you opt for plays a major role in terms of making your building stand out aesthetics-wise as well as function-wise. The product demand in commercial buildings is expected to remain high over the next eight years owing to the growing need for better safety measures and ambiance in the corporate and the hospitality industry.

The goal is to provide customized solutions by bringing in the latest technologies and high-class products, backed by a high level of services, including installation. Along with keeping up with the latest trends, we also work towards building a better and greener future through the use of eco-friendly materials for sustainable development. It has been our goal to bend the paradigm involving products and services with short, linear life spans into a circular value stream that includes products and services that are a part of a sustainable economy.

The product demand in commercial buildings is expected to remain high over the next eight years.

A contemporary REFLECTION of ETHNIC and SOCIAL LINEAGE of Ahmedabad



Located in Ahmedabad, the cultural and economic centre of Gujarat, the corporate office for Monte Carlo has been designed to embrace the social and ethnic lineage of the city. The striking design of the building encapsulates the essence of the reputed infrastructure company, seamlessly intertwined with the traditionally sensitive design narrative of the city of Ahmedabad. The contemporary structure has been fabricated whilst preserving the intrinsic historic essence of its context.

Spread over a sumptuous area of 0.60 acres, the 38m x 61m parcel of land served as the site for the project. The site has been strategically located abutting a 36 m wide road. The conception of the form unveiled through optimising existing site conditions to maintain appropriate road frontage and allow future road widening along the building frontage. The site situated along the East-West axis necessitated climate responsive design interventions and sensitive zoning. The building orientation has been optimised to minimise the permeation of heat gain into the interior spaces. The angular configuration of the building has been tactically conceived to capture vibrant and panoramic exterior views whilst limiting the

exposure to glare from the South façade. By screening the Northern and Eastern sides of the building and orienting the primary façade towards Northeast, diffused and glare-free daylight has been manoeuvred into the interior spaces. The form of the building has been perceived as a response to accommodate the prevailing wind pattern of the area as a dynamic design element.

The diverse heritage of the walled city of Ahmedabad has been integrated with the geometrical conception of the form. The city has been envisaged as an amalgamation of various villages, spawning over an area of 464 sq km. These villages seem innately interweaved into each other like patchwork in a quilt. The quilted pattern of the façade is a reflection of this vision. The atypical façade has been crafted through triangular tessellations, interpretive of the famous kite-flying festival in the city, Uttarayan. Ahmedabad, once a leading diamond manufacturing hub, served as a prominent diamond cutting centre globally. The fabrication of the peculiar cut-form of the strongest gemstone has been superimposed on the façade, maximising natural light into the building by intricate articulation of every facet of the structure such that every surface on the façade

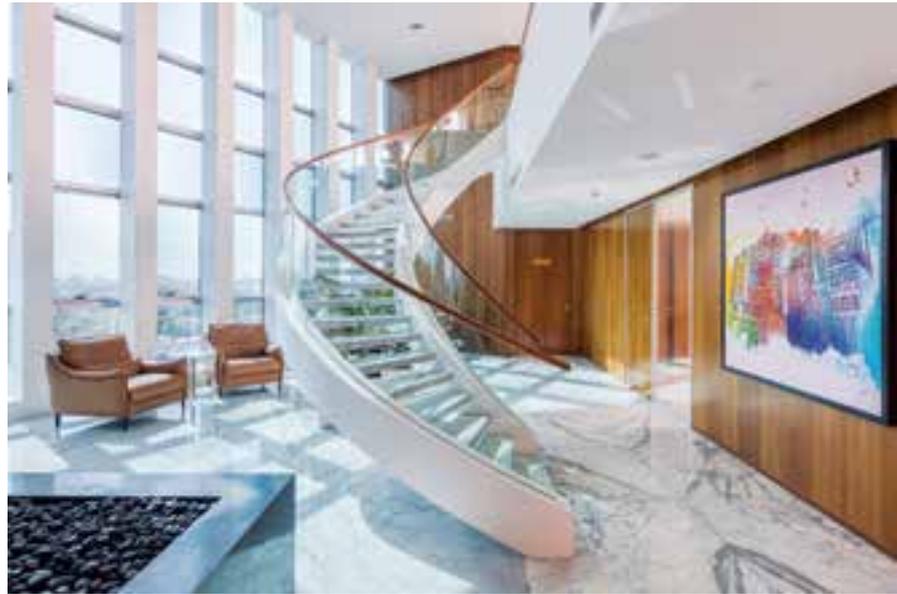


has the potential to change a light ray's plane of travel. The precise incisions of the glass envelope wrapping the building are a manifestation of the multifaceted diamond form. The robust form of the building, exhibiting a unique glass façade composed of rhomboid fractals, gleaming in its iconic glory, reveals the illusion of the celebrated heritage of the city in a modern assemblage.

The triangulations of the glass façade render the interior spaces with a unique play of light and shadow. The transparent envelope with distinct angular indentations unravels exclusive exterior views from indoor spaces. The vertical zoning of the building has been worked out to incorporate a café on the third floor, office and corporate activity from the fourth to the 12th floor along with a terrace garden crowning the structure.

An innovative material palette has been conceived for the project. The dead core walls on the South and Southwest have been clad with solid and perforated aluminium panels. These panels have been designed to project from the façade in a triangulated geometry, creating a sense of texture in the elevation. The interiors have been rendered with natural and earthy textures, evident with the use of stone and wood in the indoor spaces. Biophilia has been induced in the design as a user wellness strategy through the incorporation of indoor plants and green walls in interior spaces. The false ceiling has been designed to contain radiant baffle aluminium fins carrying chilled water to stimulate space cooling.

The design challenge posed by the hot and dry climate of the area has been viewed as an opportunity to seek sustainability and elevate building efficiency in an inclusive design approach by the architects. Efficiently designed external shading devices on the façade prevent intense and harsh heat from entering the interiors. The strategic configuration of the louvers on the elevation obstruct direct solar radiation from permeating into interior spaces through the glazing, thereby reducing heat ingress indoors and ultimately reducing the load on active energy systems. The control of translucency of the shading



elements concealed in the façade is manifold, elevating aesthetics, ensuring thermal comfort and augmenting day-lighting requirements. The solid structural cores have been placed facing the South and Southwest to restrain the office floor plate from excessive heat gain. A glass skylight has been engineered to project out of the double height reception lobby, supplying ample natural light into the space while tactfully being shaded by the tower itself. An effective glazing system has been devised to maximise day-light into indoor spaces while regulating heat gain and glare control. Electro-chromic glass, also known as smart glass or electronically switchable glass that automatically changes opacity and tint to control the visible light transmittance and solar heat gain has been employed on the West elevation and the skylight glazing in the reception area. The triangulated three dimensional panels on the North-East façade have been fabricated with high-performance glazing technology that aid in energy efficiency. The technique of radiant baffle cooling has been adopted for almost 80 per cent of the office space, facilitating a reduction in energy demand by almost 35 per cent if compared to a conventional mechanical cooling system. Sustainability has been evaluated as a comprehensive approach in the project, encompassing various aspects such as systematic site study, methodical zoning, optimised form, building orientation, enhanced glazing technology, dead mass strategy and precise design detailing. The company's ethos and vision statement - "To be the leading infrastructure organization admired by all stakeholders with sustainable growth through the process, people and innovation" - has been upheld by careful design interventions that elevate the notion of inbuilt sustainability of the iconic structure, dually performing as an energy-efficient and cost-effective edifice. 

The triangulations of the glass façade render the interior spaces with a unique play of light and shadow.

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How **RISE** in **NCR** has **PRIORITISE** **PROJECTS** in **REAL ESTATE DOMAIN**

One of the greatest real estate markets in India is Delhi-NCR, which provides a diverse selection of properties to investors. The Delhi-NCR real estate market has seen a significant change in recent years and it for long been a favorite among immigrants and job seekers due to its status as the country's capital. One of the most recent projects was the Dwarka Expressway, which has swiftly gained popularity among investors and home buyers due to its prime location, first-rate connectivity, and superior physical and social infrastructure.

According to the dynamics of supply and demand, some alterations have been seen with the rising demand for residential real estate. Compared to Gurugram and Noida, Delhi's housing supply has been relatively modest. The cause appears to be an imbalance between supply and demand. Despite the enormous demand in the city for affordable housing, real estate costs have soared in the majority of local neighborhoods. As a result, various micro-markets and property sectors around the region have been performing substantially better in places that provide inexpensive housing or mid-segment developments.

One of the top performers for stimulating the real estate market has been thought to be the micro-markets. The majority of the purchasers have been drawn to New Gurugram,

encompassing the Dwarka Expressway and Golf Course Road. The demand for home projects along this highway belt has been boosted by mid-segment purchasers searching for inexpensive property who have been drawn to neighbourhoods close to Greater Noida West. Projects launched in these locations had a positive reaction, which is seen in how they are extending NH 24 and selling quickly after being introduced.

Two urban forests are being constructed in Sector 10 and the area around Dwarka Highway. The Dwarka Expressway will have more room for green living as a result. The recent announcement by Haryana's Department of Town and Country Planning (DTCP) to build group homes on 2,800 acres in both old and new Gurgaon, including sectors 113, 110, 105, and 103 along the Dwarka Expressway, is among the strongest arguments for this.

In addition to the inexpensive and micro market categories, the growth of luxury real estate is another area of real estate that should be watched, particularly in the Delhi-NCR region. The variety of luxury and ultra-luxury residential alternatives, which may very well meet the need for planned and personalized abodes, as favoured by HNIs, UHNIs, and NRIs, is evolving at a higher rate with the growing number of ultra-net-worth individuals. Delhi-NCR has grown to be a valuable asset for the real estate industry and will remain as such.



Vineet Chellani
 Founder & Director
 Jai Guruji Asset Deals LLP

CP Kukreja Architects to design 'THE BRIJ'



Serendipity Arts Foundation has announced that renowned Indian architecture practice CP Kukreja Architects along with London-based Crab Studio have been selected to design the 'Serendipity Arts Foundation – The Brij', a new cultural centre in New Delhi at the foundation's ongoing arts festival in Panaji, Goa.

The Brij is envisioned as an immersive

environment that will facilitate collaborations between artists and visitors. The museum seeks to create discursive opportunities, promote the exchange of ideas, and inspire practitioners and visitors to access and engage with the arts on a more personal level.

"The project is called a 'The Brij' because it is very different from the traditional idea of a museum," says Dikshu C. Kukreja, Managing Principal at CP Kukreja Architects. "Apart from housing art displays, it will be home to the artistic processes that simultaneously expand and renew our engagement with multiple histories, presents and futures. Spaces such as flexible indoor and outdoor exhibition spaces, performance areas, and an artisan village will bring art to the people."

In addition, the The Brij will educate and nurture creativity through residencies, and cultural and artistic exchanges – resembling a quasi-university to support the arts ecosystem. Furthermore, it will activate and improve Delhi-NCR's urban milieu by enhancing its social, cultural and economic standing. 

FACT FILE

Design Team: CP Kukreja Architects (India), Crab Studio (UK)

Location: Vasant Kunj, New Delhi

Site Area: 7.6 acres

Built-up Area: 1 million sq ft

Facilities: Exhibition spaces, performance spaces, artisan village, museum, library, outdoor arena, visitor centre, etc.



TOUCHLESS HYGIENE VITRA ROOT FAUCETS

The Root faucet collection from Vitra features a wide array of forms and sizes, which are perfect for complementing any bathroom design concept. The touch-free faucet collection from the Design Team Vitra has motion-activated technology that provides convenient, hands-free hygiene. Touchless faucets, which are particularly useful in public use areas, can help reduce the transmission of pathogens and other organisms that lead to contamination.

Vitra's Root faucets provide a combination of safety and water savings by preventing water wastage as they automatically stop water flowing when the user moves away from the sensor. Vitra's Root also features thermostatic bathroom mixers which keep the water temperature constant without requiring adjustment, providing a comfortable user experience. When the cold water is cut off, the mixers also disconnect the hot water thereby preventing users from being harmed. The mixers, which are either connected to the mains or battery-operated, have waterproof cables for safe use.

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Make a clear style statement with the pure lines and crisp angles of a cube. GROHE's Eurocube collection of bathroom ceramics is the embodiment of minimalist chic, with every element drawing inspiration from Cubist geometry.

Explore a comprehensive range of basins, WCs and bidets, all manufactured from high-quality ceramic with GROHE's trademark design and engineering excellence. GROHE Eurocube ceramic sanitaryware allows you to create a completely cohesive bathroom scheme using the same dynamic, architectural lines throughout – every element complimenting the various faucet designs from GROHE.

GROHE EurocubeWC adds a feeling of luxury and space to any modern bathroom or cloakroom! It not only looks fantastic but takes comfort and cleanliness to a new level. With an innovative surface technology, bowl profile and water injection system, this dual-flush WC produces a perfect flush every time.

GROHE Eurocube Ceramics Innovative features:

DreamClean - Innovative rim design releases a powerful rush of water, scrubs the bowl top-to-bottom with every flush

Powerful Flush - Forceful, clog-free siphon flushing action clears the bowl completely on the first flush.

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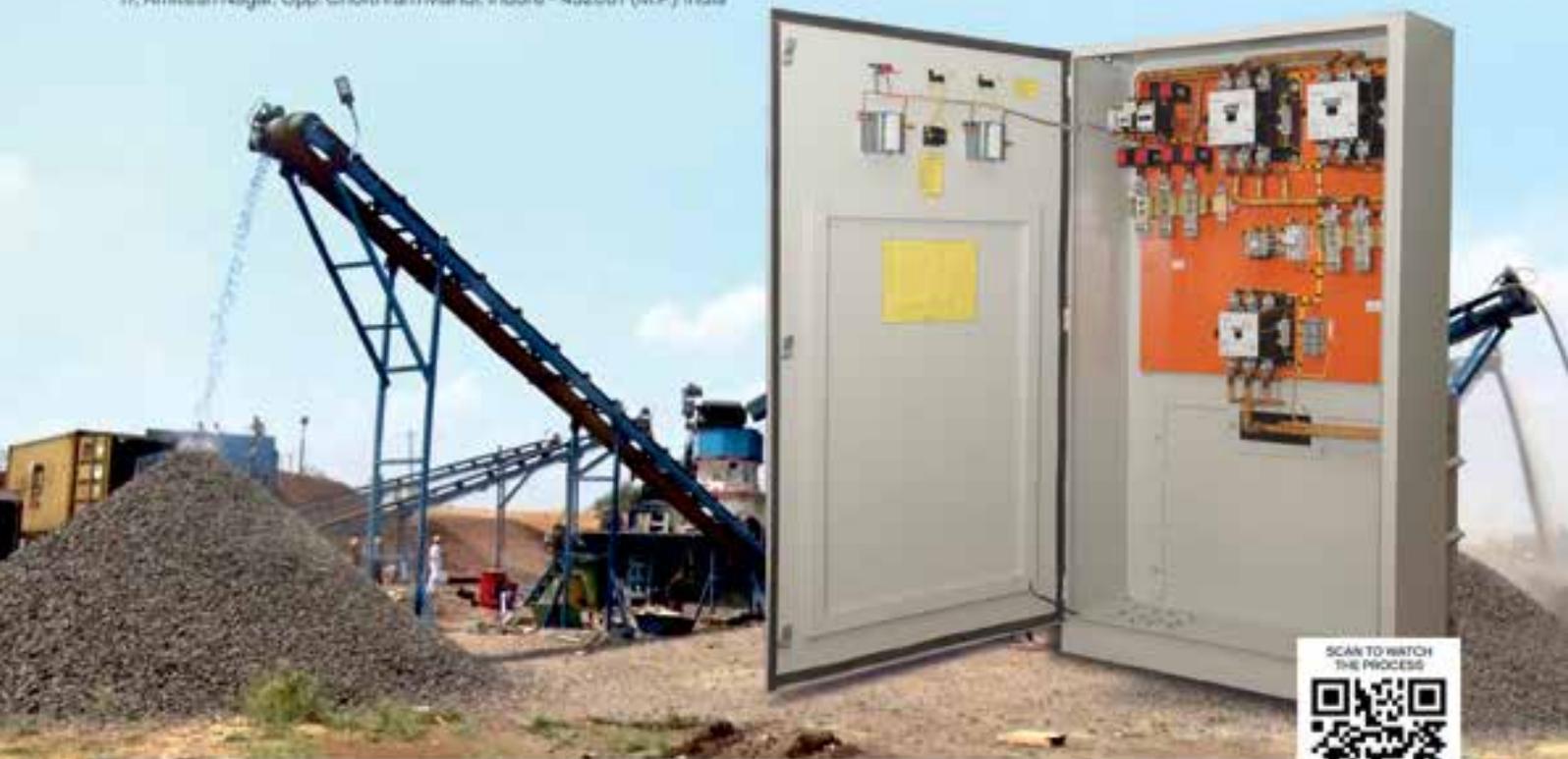
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