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INDIA'S FIRST & ONLY BUSINESS MAGAZINE FOR INDIAN CEMENT INDUSTRY

VOLUME 37 • April 2023 • NO 9

STRONG-LINKING THE SUPPLY CHAIN

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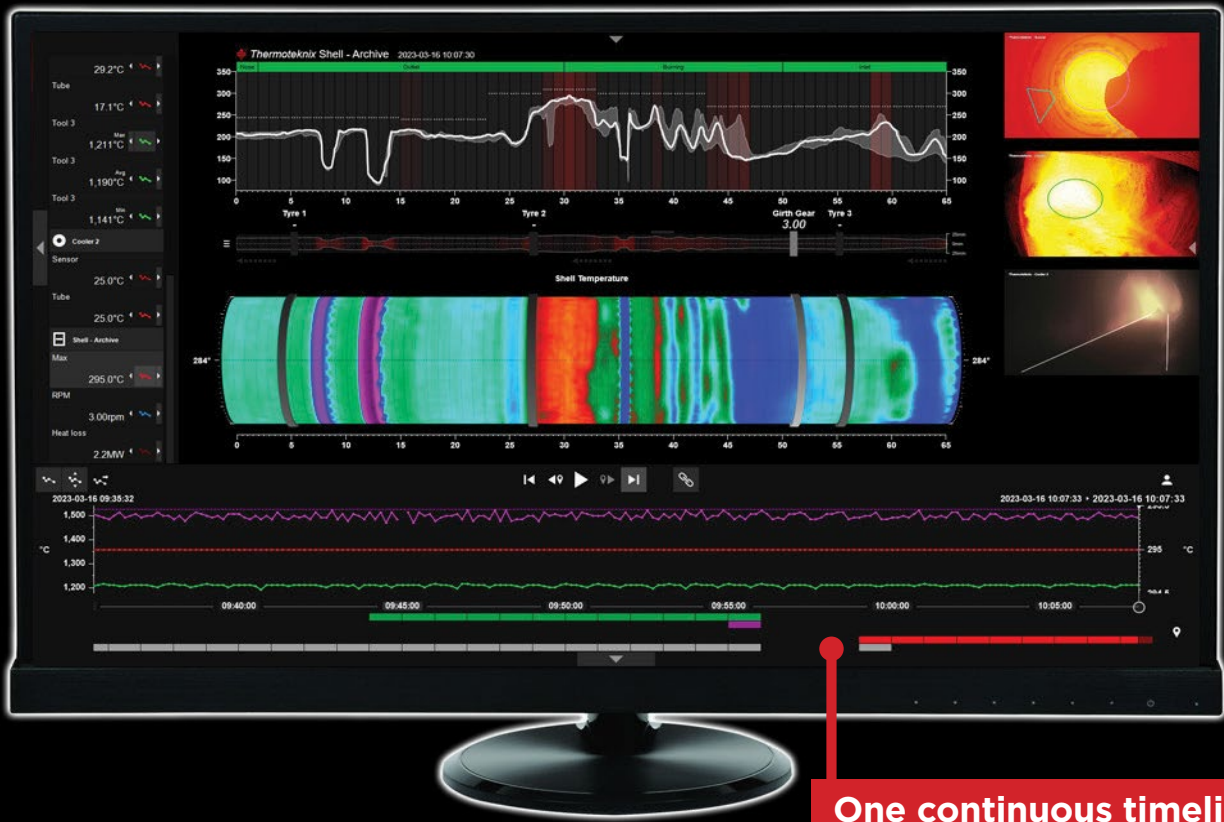


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M/s. Nirma Ltd., Gujarat - PEB Coal Shed
Tonnage: 2000 MT



M/s. Nuvoco Vistas Corp. Ltd.
Coal & Limestone Handling System
Tonnage: 1100 MT



3500 MT Capacity Steel Silo with Packing Plant on Turnkey Basis for
M/s. DHT Cement (Pvt.) Ltd., Colombo, Sri Lanka.



M/s. Bharathi Cement Corporation Ltd.,
Coal Handling System
Tonnage: 3000 MT

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- M/s. Nuvco Vistas Corp. Ltd.
- M/s. Sagar Cements Ltd.
- M/s. Star Cement North East Limited.

Current Projects in the Cement Industry

- **M/s. Star Cement North East Ltd.** - Guwahati Grinding Unit: Belt Conveyors for Clinker, Gypsum & Limestone Handling System.
- **M/s. Sagar Cements Pvt. Ltd.** - Karondiya Plant: Belt Conveyors for AFR Handling System.
- **M/s. Bharathi Cement Corp. Pvt. Ltd.** (M/s. Vicat Group) - Kalburgi Cement Plant: Belt Conveyors for AFR Handling System.
- **M/s. Ultratech Cement Ltd.** - APCW, GCW, RCW, ACW & Dalla Cement Works projects: Belt Conveyors for Bulk Material Handling System.
- **M/s. Dalmia Cement Bharat Ltd.** - Tuticorin grinding Unit: Belt Conveyors for Clinker, Gypsum & Wet Fly Ash handling System.
- **M/s. The Ramco Cements Ltd.** - Haridaspur Unit: Belt Conveyors for Raw Material Handling System



Design, Manufacture & Supply of 9,60,000 m³/hr.
Online Pulse Jet bag House with Pleated Cartridge
Bag Filters for Blast Furnace Cast House at
M/s. Essar Steel India Ltd., Hazira.

M/s. Methods (India) Pvt. Ltd. in Technical Collaboration with M/s. DemcoTECH Engineering, S.A. have the expertise for Turnkey Supply of Cross Country Conveyors & Pipe Conveyors.



Design of 450 TPH Rapid Sulphur export Pipe Conveyor (2.1 Km long) by M/s. DemcoTECH Engineering, S.A.



M/s. Dalmia Bharat Cement Ltd.
Limestone Handling System
Tonnage: 500 MT



M/s. Ambuja Cements Ltd.
AFR Handling System
Tonnage: 1400 MT



M/s. Nirma Ltd.
TG Building Structures
Tonnage: 4000 MT



M/s. Nirma Ltd.
Pre-Engineered Building (PEB)
Coal Shed
Tonnage: 2000 MT

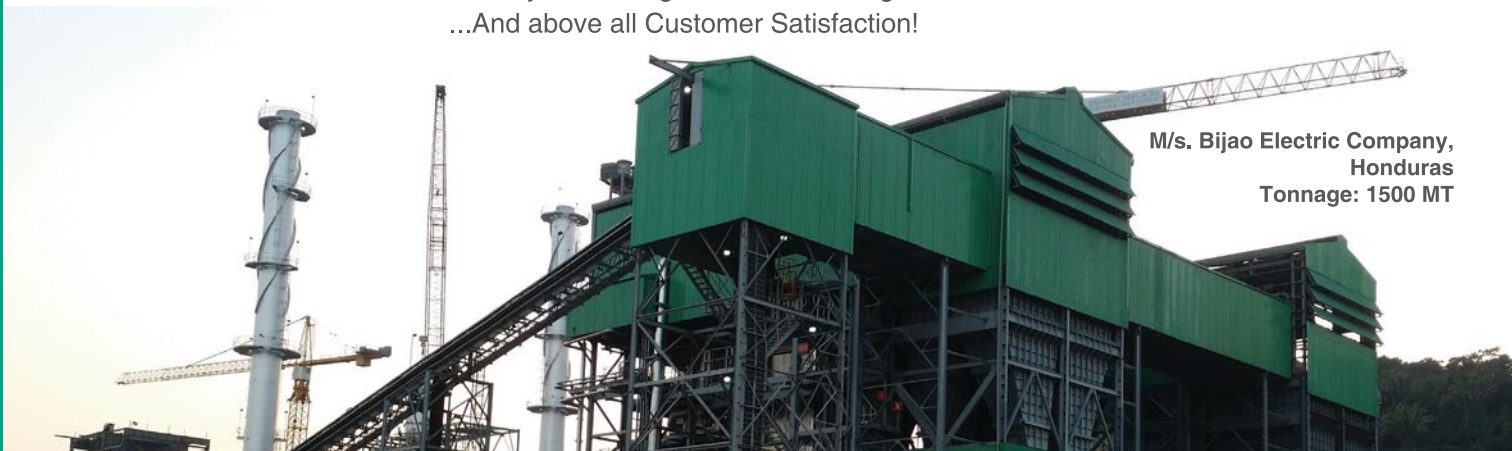
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M/s. Bijao Electric Company,
Honduras
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Founder Editor
Late Roshan Wadhra

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When Volumes Matter

The fourth quarter of the last financial year was a washout for the cement sector as prices dipped across the country. From a drop of ₹5 per bag in central India to a drastic cut of ₹10 per bag in Gujarat, the flat trend of the last few months can be attributed to unseasonal rains and low labour availability affecting construction activities. Volume push, fall in demand and increased discount offerings are

other factors that have affected attempts of price hikes. But fast recovery is expected in the June quarter as demand picks up amid seasonal recovery.

Another reason for the cement sector to recover on the price front is the upcoming elections. With elections scheduled in 2024, the government is accelerating all of its housing and infrastructure initiatives, thereby spurring the demand for cement. Cement companies are definitely bullish about growth and the Indian cement industry is likely to witness a fresh capacity increase of 145 MT-155 MT amounting to a capex of ₹1.2 lakh crore by FY27. A report by CRISIL confirms that demand for cement will remain buoyed at a CAGR of 6-7 per cent over the forecast period. The addition of 145 MT-155 MT to the already existing capacity of 570 MT will further consolidate India's position as the second largest cement producer in the world.

Cement is an important component of revenue for the state governments and this point has been underscored by the recent impasse in Himachal Pradesh where the Ambuja and ACC plants had been shut down for over two months over the disagreement over freight charged by the 6,500 truckers. The state government was losing ₹60 cr to ₹80 cr per day in electricity, VAT and GST. A GST cut from 28 per cent to 18 per cent would reduce GST revenues by ₹13,000 cr annually. However, if this reduction in price is passed on to the consumers, a higher demand could reduce the reduction in revenue. Finally, the impasse was resolved with the intervention of Himachal Pradesh Chief Minister Sukhvinder Singh Sukhu. Himachal Pradesh truckers, agreed to a lower freight rate after the company assured them of additional volumes from neighbouring states.

Another trend that is emerging with regards to adding fresh capacity is the logistics-oriented approach. Many cement companies are preferring to install their new grinding units near the distribution centres for freight cost rationalisation. This will also boost the attempts to decarbonise cement. Further, initiatives such as the launch of LNG trucks by Dalmia Cement (Bharat) for transportation of raw materials and bagged cement is helping build a green supply chain for cement. Decarbonisation is taking place in every step of the supply chain, and India is definitely a trailblazer in green initiatives in the cement sector.

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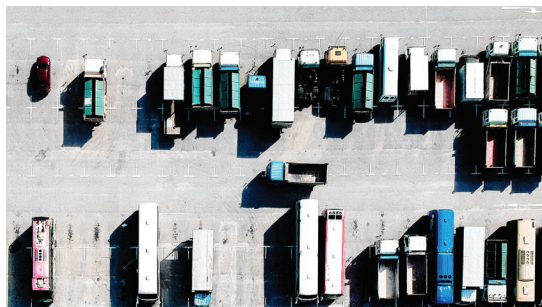
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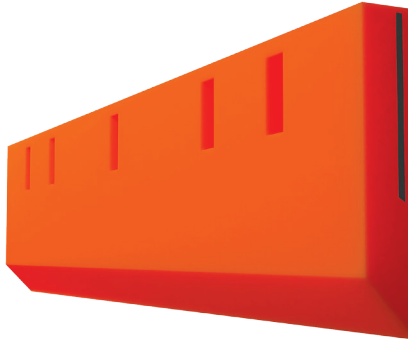
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Conveyor Wear Liner by Martin Engineering

Martin Engineering has introduced a new standard in wear liner technology. The Manufactured Canoe Liner is made from durable urethane moulded around a rugged steel plate to absorb impact and abrasion from the punishing bulk handling environment. With the protective plate integrated directly into the urethane liner, the design delivers superior shielding of the skirt sealing system and chute wall from heavy, fast-moving cargo. The result is extended equipment life, longer periods of dust and spillage control, improved safety and less maintenance, reducing the overall cost of operation.

Dave Mueller, Manager of Conveyor Products, Martin Engineering, said that this is a shift in the engineering and role



of wear liners. Like most conveyor components, the design has evolved into a component that is more effective, safer to maintain and more reliable. Previously, most wear liners were sheets of steel welded onto the internal chute wall of the conveyor loading zone.

TMEIC India Partners with IIT-Kanpur

TMEIC Industrial Systems India, a Group company of Toshiba Mitsubishi-Electric Industrial Systems Corporation (TMEIC) announced that the company signed a Research and Development Agreement with Indian Institute of Technology (IIT) Kanpur. The collaboration will focus on research and development of products featuring advanced technologies in the field of Power Electronics. The current partnership is in line with TMEIC India's commitment to deliver greater value to customers through continuous technological innovations. The agreement will focus

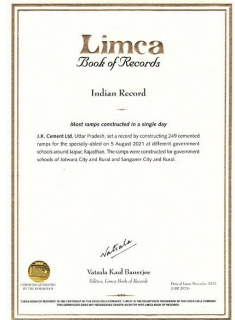
on leveraging the expertise of both organisations to create innovative and sustainable solutions for the power industry. Hemant Joshi, Managing Director of TMEIC India, signed the agreement on behalf of the company in presence of Professor A R Harish, Dean of Research and Development, IIT Kanpur in a function held at IIT Kanpur on March 27, 2023. Under the terms of the agreement, TMEIC India and IIT Kanpur will work together to research, develop and test new power electronics products that meet the growing demand for efficient and environment-friendly energy solutions.

JK Cement makes it to the Limca Book of Records

JK Cement has been featured in the Limca Book of Records for its historic school ramp construction initiative. The company constructed 249 ramps in 249 schools in Rajasthan in a single day under the campaign 'Banaye Har Raah Aasaan.' The construction of the ramps was completed in one day with the support of over 2,000 JK Cement employees, dealers, contractors and labour.

Speaking about the achievement of the record for 'most ramps constructed in a day,' Love Raghav, Head branding, JK Cement said that JK Cement as a brand has always believed in giving back to the society in one way or another. Their focus on social marketing campaigns gave them the opportunity to serve society and brand both simultaneously. This achievement is a result of in-depth planning and execution of the entire JK Cement team.

Haresh Khushalani, Cluster Head (Sales), said that it is a proud moment for the company to have set this record. The school ramp construction initiative was executed without any external agency and over 2,000 people got involved to create the history.



IN BRIEF

5-star ratings for 13 UltraTech limestone mines

Thirteen limestone mines of UltraTech Cement Limited, India's leading cement and RMC company, received 5-star ratings for the year 2021-22 from the Indian Bureau of Mines at the 75th anniversary celebrations of the Indian Bureau of Mines on March 1, 2023. These are the highest number of 5-star ratings awarded to any company in India across all sectors. The Hon'ble Union Minister of Parliamentary Affairs, Coal and Mines, Shri Pralhad Joshi, felicitated UltraTech for demonstrating exceptional performance in all aspects of mining and contributing to India's mining sector.

Cancer awareness initiative by Ambuja Cements

Ambuja Cements, through its CSR arm, has launched a Cancer Awareness and Education programme in collaboration with Association of Breast Surgery (ABS), UK, along with its counterpart Association of Breast Surgeons in India (ABSI) and Tata Cancer Care Program, in Chandrapur, Maharashtra to educate communities. At this three-day event hosted health experts from India and UK, approximately 300 women beneficiaries got themselves examined and frontline workers received training in identification and treatment methods.

JK Lakshmi Cement Joins RE100 and EP100

In a major move to make its production process carbon-free and contribute to creating a sustainable future, JK Lakshmi Cement has joined RE100, a global corporate renewable energy initiative to ensure meeting 100 per cent electricity demand through renewable sources. The company has committed to meeting this target by 2040. With this step, over 400 of the world's leading businesses dedicated to sourcing 100 per cent renewable electricity.

The company has also joined EP100,



a global corporate energy efficiency initiative that brings together over 120 energy smart businesses committed to measuring and reporting on energy efficiency improvements. The company has committed to doubling energy productivity by 2040 and is the 11th India-headquartered company to join EP100. As a member of RE100, the cement major will be working to fulfill all its electricity requirements from renewable sources such as solar installations, increasing

waste heat-recovery capacity at their units, etc. This will significantly reduce its carbon footprint and help address the associated challenges.

Commenting on the move, Arun Shukla, President & Director, JK Lakshmi Cement Ltd. said that the company has always emphasised on reducing carbon footprint and operating in an energy-efficient manner to facilitate global actions toward creating a sustainable future. Adopting environmentally conscious behaviour is an inevitability to fight climate menace and prevent the degradation of the environment.

UltraTech Cement wins 'TERI-IWA-UNDP Water Sustainability Award'

UltraTech Cement has been conferred the prestigious 'TERI-IWA-UNDP Water Sustainability Award 2022' by The Energy and Resources Institute (TERI) in association with the International Water Association (IWA) and the United Nations Development Program (UNDP) on the eve of World Water Day 2023

The award was conferred to UltraTech at the '2nd Water Sustainability Awards 2022-2023' on March 21, 2023 at New Delhi. UltraTech was recognised under the 'Water For All' category for the watershed project implemented by its integrated cement manufacturing unit Andhra Pradesh Cement Works in two villages located



UltraTech Cement wins TERI-IWA-UNDP Water Sustainability Award

near the unit. The project aims to protect and restore community water structures in rural Andhra Pradesh, uplifting the lives and livelihoods of the local population. The Andhra Pradesh Cement Works project benefited over 2,000 people across 500 households living in these two villages.

Multiple wins for Adani Cement at OHSSAI Awards 2022

Adani Cement has been honoured with multiple awards for safety by the Occupational Health, Safety and Sustainability Association of India (OHSSAI). Adani Cement received awards in several categories in the Manufacturing Sector, including:

- OHSSAI Road Safety Gold Award
 - OHSSAI Safety Silver Award
- In the individual awards segment,
- Sukuru Ramarao, COO honoured with HSE Leadership Award for his contribution towards supporting the cause of HSE.
 - Pankaj Singh, Head – Safety, Manufacturing and Logistics has been recognised as the HSE&S Mentor of the Year.

IN BRIEF

ABB reveals wastewater treatment goals

ABB has released the findings of an independent research commissioned by the company ahead of World Water Day (WWD) on March 22, 2023. The report suggests that global wastewater treatment capacity needs to increase annually by 8.56 billion cubic metres and investment in an additional 469 treatment facilities per year is required to meet United Nations (UN) goals. As the UN prepares to report on progress made against its Sustainable Development Goals (SDG), ABB's research focuses on SDG 6.3.

Cement price stable amid a respite in fuel prices

According to Motilal Oswal Financial Services, imported (South African and Australian) coal prices have dipped sharply with an average QTD price decline of 28-33 per cent in 4QFY23. Imported petcoke price has remained range-bound at USD165-185/t over the past few months. MOFSL expects average energy cost to reduce by INR80-90/t in 4QFY23 and INR200/t in 1QFY24. Cement players have attempted price hikes in Feb-Mar '23.

ACC AEROMaxX launched in Delhi and Hyderabad

ACC Limited has launched ACC AEROMaxX in Delhi and Hyderabad, adding a new dimension to the construction industry through its state-of-the-art ultralight filler and insulation concrete. It is a specialised kind of mineral foam-based insulating technology and a unique superlight concrete that becomes a long-lasting roofing solution insulating the surface at the time of construction itself. ACC AEROMaxX

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in desired thermal insulation. It is available in low densities of 300 kg/m³ and above and promises to deliver these low densities on a consistent basis owing to the precise formulation coming from the rich R&D experience of ACC. It is fully fire-resistant, long-lasting, and sustainable. It can fill any type of shape and cavity. ACC AEROMaxX offers a wide range of solutions between thermal insulation and structural efficiency by reducing deadweight.

REC felicitated with Green Ribbon Champions Award

REC Ltd has been felicitated by Network18 with the 'Green Ribbon Champions' award as a testament to its commitment to Environmental Sustainability. Hon'ble Minister of Power and New and Renewable Energy Shri R K Singh presented the award to Vivek Kumar Dewangan, CMD, REC Limited during an event organised in New Delhi on March 25th, 2023. The company has been recognised for its remarkable contributions to developing a sustainable future for the country. It has been at the forefront of driving sustainability projects all over India. To reduce carbon footprints, encourage green energy production, and ensure a sustainable and reliable power supply. REC has aided various



projects such as the installation of a one MWp Solar Photovoltaic System on the rooftop of the Madurai Kamaraj University (MKU) campus, the installation of 245 KW off-grid solar power plant and solar-based LED lights at 13 campus buildings of Odisha's Sambalpur University, etc.

Ambuja Cements wins the Development Catalyst Award 2022

Ambuja Cements has been felicitated with the Development Catalyst Award 2022 for its CSR for creating livelihood opportunities and empowering economically marginalised communities at the Livelihoods India Summit organised by Access Dev. The company through its CSR arm has been empowering the social and economic growth of communities near its manufacturing facilities. It has facilitated in organising farmers' clubs, self-help groups, women's federations, water-user groups and village development committees in eleven states. Through its Livelihoods initiatives, Ambuja focuses on creating agro-based livelihoods, agri-allied services and skill and entrepreneurship development for the rural youth. It also facilitates women and farmers.

IN BRIEF

New orders for KEC International

KEC International has secured new orders of Rs 1,560 crores for Transmission & Distribution (T&D) projects in India, from Power Grid Corporation of India Limited (PGCIL) under Tariff Based Competitive Bidding (TBCB) route:

- 765 kV Transmission line
- 765/400 kV AIS Substation
- 765 kV GIS Substations

With the above orders, their year-to-date order intake stands at an all-time high of over Rs 21,000 crores.

Cross-border operations by ABB India

ABB India has deployed integrated automation and control solutions for the first Indo-Bangla Friendship Pipeline (IBFPL). This 130-kilometre cross-border oil pipeline will carry diesel from India to Bangladesh. With a potential capacity of one million MT per annum, it will enable Bangladesh to access large volumes of energy. ABB India's solutions enable safe and secure operations with centralised monitoring and real-time data access.



CAC looks forward to green initiatives

The Cement Association of Canada (CAC) said that it is 'confident that Canada will lead in building clean technologies for a sustainable future' following the publication of the government's Budget 2023 on 29 March 2023. The budget includes US\$26bn-worth of green tax credits. US\$19.2bn-worth of this is allotted to renewable energy. It also includes a final design for Canada's Investment Tax Credit for Carbon Capture, Utilisation and Storage (CCUS). CAC president and CEO Adam Auer said that, when finalised, the budget will help to 'close the gap' between existing Canadian legislation and incentives offered under the US Inflation Reduction Act and EU Green Deal Industrial Plan.

European carbon storage quotas

Cembureau, the European cement sector association, has lobbied the EU in support of a draft act for the setting of CO2 storage capacity quotas for member states. It called for the simplification and acceleration of permitting procedures for storage sites. It also encouraged policymakers to strengthen the focus on CO2 transport networks, ensuring fair access conditions for cement plants. A large number of CCUS pilot and demonstration projects have been launched by cement companies across Europe, with the first of them becoming operational as early as 2024.

Holcim acquires Sivyer Logistics

Holcim has acquired leading London construction and demolition waste (CDW) recycling company Sivyer Logistics. Sivyer Logistics produced 500,000t of recycled aggregates and manufactured soils from 1Mt of CDW across its six sites in 2022. Holcim says that the acquisition represents a step towards realising its target of 10Mt/yr of construction and demolition waste in Holcim products by 2025.

Climate advisory board

Solid UNIT Germany, the German construction sector association, has launched its climate advisory board. The board will advise on and jointly instigate initiatives together with the Solid UNIT Germany management board. Its membership comprises representatives from the German Sustainable Building Council (DGNB), the Institute for Sustainable Construction in Germany (ARGE) and the Federal Chamber of Architects, along with members of parliament.



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A Common Control Platform

Combining the old and new production lines on a common FLSmidth ECS/ControlCenter™ Platform at Arghakhanchi Cement, Nepal.



Having experienced the benefits of the latest FLSmidth ECS/ControlCenter™ control software on its newest production line, Arghakhanchi Cement was convinced of the need to upgrade the obsolete and fault-prone software on its existing line 1. With both lines now controlled from a common platform, productivity has increased and knowledge sharing between operators has improved.

AN OBSOLETE CONTROL SYSTEM CAUSES PROBLEMS

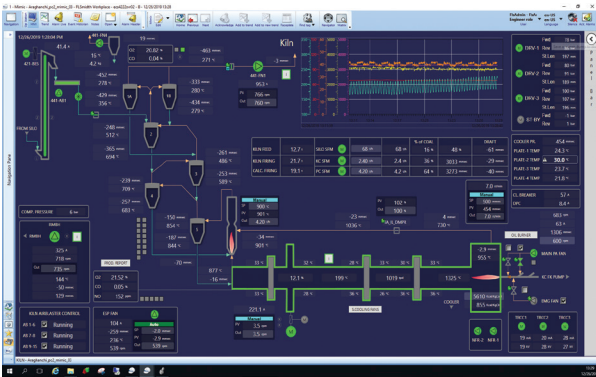
Production line 1 at Arghakhanchi Cement in Nepal was experiencing an increasing amount of unplanned downtime, caused by an obsolete control system. It was resulting in a loss of production. But the issue came to a head when production

line 2 was commissioned with the latest FLSmidth ECS/ControlCenter™ process control software. This really highlighted the benefits of a modern state-of-the-art control for achieving reliable productivity.

“When production line 2 was commissioned with ECS/ControlCenter v8, the benefits were evident. With easier fault tracing, advanced trending and reporting features, it is much easier to achieve stable operation, as operators can easily understand and fix potential issues,” explained **Krishna Pandey, General Manager – Plant, Arghakhanchi Cement.**

The old system was engineered without any standardisation, which meant only specific engineers knew how to troubleshoot and maintain the system.

“A great advantage of ECS/ControlCenter v8 is that everything is based on a standard system,



Production line 2 - kiln

so learning how to operate the system and extract information is simple and intuitive. This applies to everything from troubleshooting to configuring process analytics using trend and reporting tools, and even back-up and restore functions,” said Pandey.

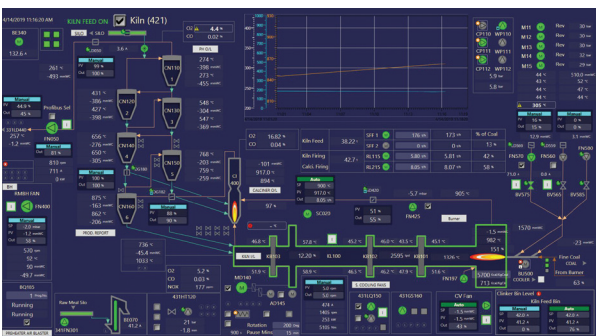
“As a result, operators began to ask for a similar control system to replace the old system on production line 1,” he concluded.

INSTALLATION AND COMMISSIONING

To upgrade the obsolete control system in as cost-efficient a way as possible, much of the existing hardware, with complete I/Os and panels was retained and re-used. This not only made lasting use of the customer’s previous investment; it also has a sustainability advantage. The amount of waste generated and new materials used is reduced – a key pillar of the circular economy.

PLCs and communication cards had to be replaced, as did the entire PLC programming code. To do so, FLSmidth employed several proven engineering and processing tools to ensure consistent and uniform structure in the PLC programmes.

For commissioning, FLSmidth ECS/ControlCenter



Production line 1 - kiln

v8 includes a device simulation mode that allows the operation of the entire plant to be simulated and tested as per process requirements. This helps to ensure smooth and quick commissioning, allowing any problems to be identified and solved, without impacting the real-world operations of the plant.

NEW AND OLD LINES: A COMMON FLSMIDTH CONTROL PLATFORM

As one example of the benefits of the new system, “all interlocks can be seen and bypassed by every authorised user, directly from the faceplate, most often from the engineering system,” explained Pandey. “It means the new system is very easy to operate and – most importantly – we avoid the plant tripping, as operators can take action very quickly. Before, it was very difficult to know the interlocks and impossible to bypass them from the faceplate, as each bypass required reprogramming of the PLC system,” he added.



FLSmidth ECS/ControlCenter™ v8 now runs both production lines at Arghakhanchi Cement from a common control room.

The upgrade of production line 1 is another example of the benefits gained by customers using FLSmidth ECS/ControlCenter v8. It is also a demonstration of FLSmidth skills and expertise to suggest the optimum upgrade strategy, even for obsolete and third-party supplied PLC hardware.

“From a control and logistics point of view, we wanted to have one central control room for both lines,” said Pandey. “The new system from FLSmidth gives us more flexibility with process control, more powerful control capabilities over both lines and excellent reporting capabilities.”



(Communication by the management of the company)

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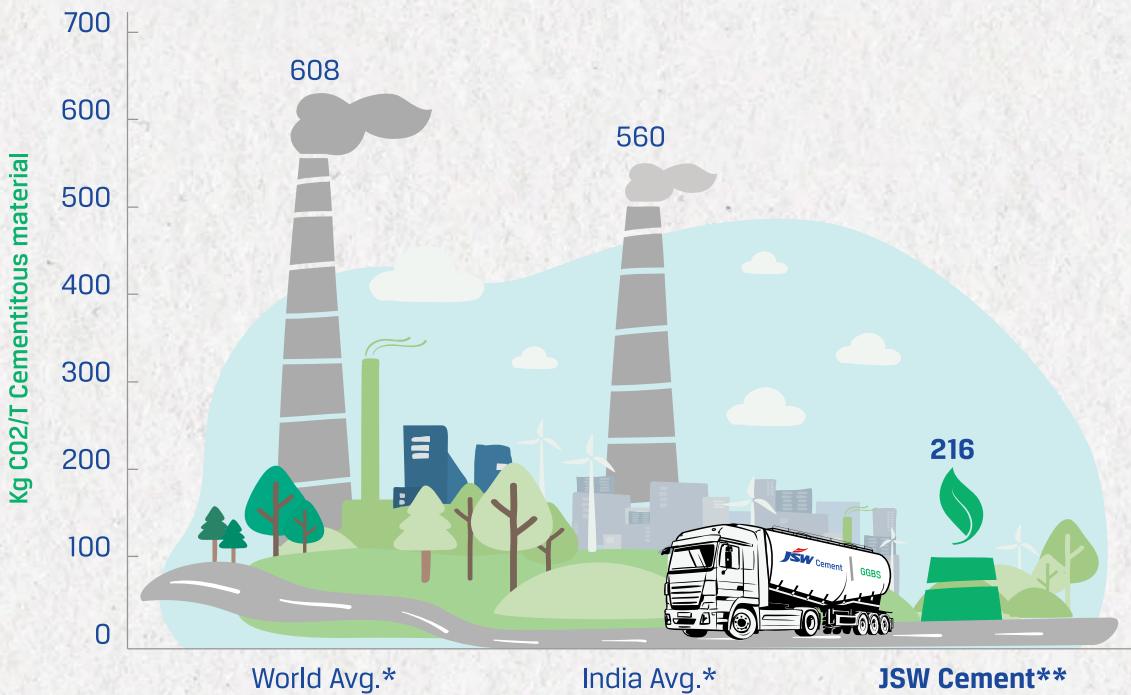
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Strong-linking the Supply Chain

Innovation of distribution channels and logistics solutions is the key to making cement more profitable. Since cement is a low-cost, high-volume commodity, its distribution is a major cost driver for the manufacturers. ICR delves into the current trends in logistics as it is the most price- and time-intensive element in the supply chain of cement in India.



Logistics for cement begins from the source where limestone, the raw material, is procured from mining sites and brought to the plant. Logistics ends with the finished product leaving the manufacturing facility and ultimately reaching the consumer. For this, it travels across the length and breadth of the country. The demand for cement by every organisation must be met on time, or they lose the opportunity to their market competitors. The mode of transport for cement decides its cost and generally holds up to 20 per cent of its retail price. The cement industry today uses multiple modes

of transportation to fulfil its logistical needs.

According to **Cement Manufacturers Association of India (CMAI)**, the Indian cement industry is the second largest revenue source of the Indian railways with a contribution of US\$1.2 billion per annum in freight revenue. To make it a more economical and accessible government of India has launched schemes like long term tariff contract scheme, freight incentive scheme, incentive scheme for auto traditional empty flow directions and general-purpose wagon investment scheme. These schemes have encouraged cement companies to sign contracts with the railways.

Roadways is also largely used for transporting cement in fleets of trucks from the manufacturing plants to the distributors, dealers, and franchises.

CREATING A STRONG NETWORK

Largely there are three contenders in the distribution channels – wholesalers, retailers and end consumers. Cement organisations sell their end product to the consumers through wholesalers or retailers. With changing times and demands, companies may create a system to sell to their end consumers directly using the internet.

The distribution channels for cement can vary depending on the market and location, but generally, there are a few common channels through which cement is distributed:

- **Direct sales to construction companies:** Cement manufacturers often sell their products directly to construction companies and contractors who use the cement in their projects.
- **Distributors and wholesalers:** Cement manufacturers may also work with distributors and wholesalers who purchase large quantities of cement and resell it to smaller retailers and construction companies.
- **Retailers:** Retailers such as home improvement stores, hardware stores, and building supply stores also sell cement to consumers and small contractors.
- **Online sales:** Some cement manufacturers and retailers offer online sales and delivery services, allowing customers to purchase cement and have it delivered directly to their construction site.
- **Export:** Cement manufacturers may export their products to other countries through international trade channels, such as shipping companies and international distributors.

Overall, the distribution of cement can involve



Automated Guided Vehicles can help automate the movement of materials within warehouses and production facilities, reducing labor costs and improving efficiency.

a complex network of manufacturers, distributors, wholesalers, retailers, and exporters.

THE COST FACTOR

According to a Logistics Report published by **Motilal Oswal Investment Services** in March 2023, India's logistics cost to GDP ratio hovers around 13 per cent 14 per cent as compared to 8 per cent to 10 per cent for other major economies. The high cost

KEY REASONS FOR THE HIGHER COST OF LOGISTICS INCLUDE

Modal mix tilted towards Roads

- ❖ Roadways is a major mode of freight movement in India, which is costlier than Rail or Water
- ❖ Other countries have a better, balanced modal mix

The sector is highly unorganised

- ❖ Nearly 90% of the sector is dominated by unorganised players, adversely impacting operational efficiency

Higher Fuel Consumption

- ❖ Trucks used in India are not as fuel efficient as those used in other countries, thereby, driving up transportation cost per km



More than 70 per cent of the freight movement in India is via road as compared to 44 per cent in China, 45 per cent in Europe, and 39 per cent in the US.

of logistics in India has been due to an inefficient modal mix, owing to a relatively inefficient road segment. More than 70 per cent of the freight movement in India is via road as compared to 44 per cent in China, 45 per cent in Europe and 39 per cent in the US.

In order to bring the overall logistics costs of India to competitive levels, the Government of India has formulated the National Rail Plan (NRP), where the share of Indian railways in the overall modal

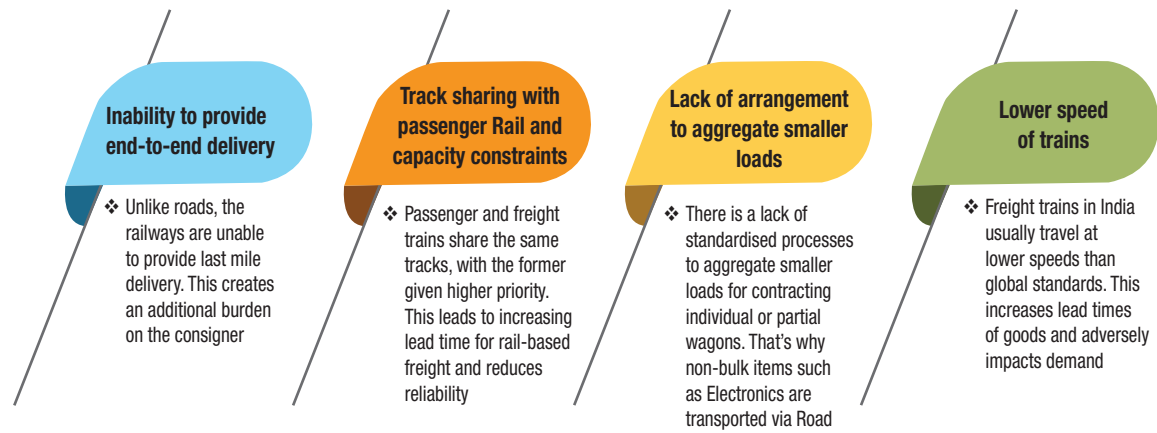
mix is envisaged to increase to 40 per cent (~18 per cent in 2020) by 2031. Further, with dedicated freight corridors getting operationalised in phases, the market share for rail would likely increase in the modal mix.

Pushpank Kaushik, CEO, Jassper Shipping, says, “Since commodities such as cement are transported in bulk, the freight cost for cement rises and railways are the favoured method of transport for bulk commodities because roadways are impractical. However, railways present their own set of freight transport difficulties. The main issue raised by cement industry participants, particularly the small plants, is the difficulty in obtaining railway rakes or wagons, particularly during peak/seasonal periods. The fluctuation of power, fuel, and diesel has a significant effect on freight costs. As a result of these difficulties, India’s logistics costs account for 13-14 per cent of overall GDP, compared to 7-8 per cent in developed nations.”

According to **Teamlease Regtech, India’s leading Regulatory Technology (Regtech)** solutions company’s report titled ‘**Simplifying Compliance Management for The Logistics & Supply Chain Industry**’, the logistics industry in India employs 22 million people and is on track to reach a valuation of \$215 billion in the next two years. The National Logistics Policy (NLP) was recently introduced to address the infrastructure and policy gaps in the industry. The objective of this policy is to reduce the cost of logistics from the current 14 per cent of GDP to 8 per cent of GDP by 2030. In addition, there has been a renewed focus on implementing technological solutions to push paperless trade operations and place India within the top 25 on the Logistics Performance Index (LPI).

The report also reveals that three major regulations

KEY REASONS FOR RAIL LOSING SHARE TO ROADWAYS



Source: MOFSL

of the industry, such as the Multimodal Transportation of Goods Act of 1993, the Carriage of Goods by Road Act of 2007, the Carriage of Goods by Sea Act of 1925, the Merchant Shipping Act of 1958, and the Carriage by Air Act of 1972 all required updation.

Rishi Agrawal, CEO and Co-Founder, Teamlease Regtech, says, “A robust logistics and supply chain industry is the key for India’s transformation as the factory of the world. The report looks into the logistics industry’s regulatory environment to provide readers with an understanding of the complexities of the compliance landscape. It highlights the limitations and inefficiencies in the current compliance practices used by these businesses. It also makes recommendations that will allow these businesses to efficiently manage their compliance requirements through the use of digital procedures.”

TECHNOLOGY: THE SAVIOUR OF LOGISTICS

Technology can play a significant role in optimising the logistics function of the cement industry in India. Following are the ways in which technology can be integrated into the operations of the cement industry:

- **GPS tracking:** Cement companies can use GPS tracking technology to monitor the location and movement of their trucks carrying cement. This helps them track delivery times, optimise routes, and reduce fuel consumption.
- **Warehouse management systems (WMS):** Implementing WMS software can help companies better manage their inventory, reducing storage costs and minimise stockouts.
- **Electronic Data Interchange (EDI):** EDI can help cement companies exchange business documents with their partners electronically, reducing the need for paper-based communication and improving the efficiency of the supply chain.
- **Predictive analytics:** Predictive analytics can help cement companies forecast demand and optimise their production and distribution schedules, reducing waste and improving customer satisfaction.
- **Automated guided vehicles (AGVs):** AGVs can help automate the movement of materials within warehouses and production facilities, reducing labour costs and improving efficiency.
- **Blockchain technology:** Blockchain technology can help improve transparency and traceability in the supply chain, reducing the risk of fraud and counterfeiting.

By leveraging these technologies, cement companies in India can optimise their logistics function, reduce

costs, and improve customer satisfaction, ultimately enhancing their competitiveness in the market.

“Today, the way digitisation is happening across the world, it is bringing a good amount of visibility across different segments in any organisation. While you talk about logistics, which is the last mile towards delivering the finished goods to a customer, it is very important that manufacturing works in tandem with it. This will work if you have the right technology and if you want to scale, have more visibility and give your customer a good experience. Technology is the backbone, which will help you achieve all this. If you are looking at a 10x or 20x growth in a duration of three years, you need to scale up through technology,” say **Sunil Kharbanda, CRO and Co-Founder, Trezix Software**.

The Indian government is also expected to continue to play an active role in regulating dust emissions from the cement industry.

ACHIEVING EFFICIENCIES

The Indian cement industry is going green. While they are resorting to alternative fuels and raw materials to achieve sustainability in their productions, logistical operations can achieve sustainability by using alternative fuels for their vehicles, optimising the routes for their carriers, adopting green packaging of product, implementing green warehousing and encouraging their vendors to procure their product in a greener fashion. By incorporating sustainability in their logistics operations, the Indian cement industry can reduce their environmental impact, improve their reputation, and gain a competitive advantage in the market.

According to the spokesperson at Dalmia Cement (Bharat) (DCBL), green initiatives or ESG is increasingly crucial for companies, especially in hard-to-abate sectors. As part of their ESG initiatives, they are committed to reducing the emissions footprint of their operations and that includes road logistics. DCBL has introduced LNG and EV trucks as part of their green logistics strategy for the decarbonisation of its transportation fleet, which accounts for around 1.5 per cent of total CO₂ equivalent emissions. They



The logistics industry in India employs 22 million people and is on track to reach a valuation of \$215 billion in the next two years.

have tied up with various players in the logistics sector for supply of greener transport. Some of these vehicles are already being used for transportation for inward and outward movement of raw materials and manufactured goods in their different plant locations. The current consignment of 35 LNG trucks is also one of the biggest in the cement sector. DCBL is planning to convert 10 per cent of their existing fleet of 3,000 vehicles to the eco-friendlier LNG and EV, alternative transport by end of FY24.

Optimisation of logistics freight costs is a critical area for the Indian cement industry, as logistics costs can account for a significant portion of their overall operational costs. Here are a few strategies that cement companies in India can adopt to optimise their logistics freight costs:

- **Multi-modal transportation:** Cement companies can use a combination of transportation modes such as road, rail, and sea to minimise transportation costs and reduce transit times.
- **Collaborative logistics:** Cement companies can collaborate with other manufacturers to share logistics resources and reduce costs.
- **Real-time tracking and monitoring:** Using real-time tracking and monitoring systems can help companies optimise routes, improve delivery schedules, and reduce transportation costs.
- **Consolidation of shipments:** Cement companies can consolidate shipments to reduce the number

of trips required and achieve better economies of scale.

- **Negotiation of rates:** Cement companies can negotiate rates with logistics service providers and carriers to get the best rates and terms.
- **Optimisation of inventory:** Cement companies can optimise their inventory levels and use just-in-time (JIT) inventory management techniques to reduce transportation and storage costs.
- **Use of advanced technologies:** Technologies such as AI, machine learning, and predictive analytics can help cement companies optimise logistics freight costs by predicting demand, identifying opportunities for cost savings and streamlining operations.

By adopting these strategies, the Indian cement industry can optimise their logistics freight costs, reduce operational expenses and improve their bottom line.

“Digitising proof of delivery and freight invoicing is something I have never seen before. Not only for the cement companies, but everyone who works in the value chain, the trucker, the logistics provider, the transporter, each one of them can benefit from this and that would be a big change and step to remove paper trails and make them as digital records. When we think about EPOD and digital freight invoicing that you do at the end of the day ensures all stakeholders are benefited from it. Cement companies have contracts with logistics providers or transporters or they sometimes hire fleet owners and trucks from the market if they do not have their own. Any solution or change ultimately needs to impact life like everyone in the ecosystem. EPOD and digital freight invoicing achieves just that by easing the operations for everyone,” says **Swapnil Shah, Founder and CEO, Freight Tiger.**

The Indian cement industry has a complex network of distribution channels, which includes direct sales to construction companies, wholesalers, retailers, and online sales. The industry can also leverage innovative technologies to optimise logistics operations and improve sustainability. To optimise freight costs, the Indian cement industry can adopt various strategies, and advanced technologies like AI and predictive analytics. By implementing these strategies, the industry can reduce costs, increase efficiency, and gain a competitive edge in the market. In sum, the Indian cement industry has great potential to leverage innovation and optimise logistics to overcome challenges and grow sustainably in the future. 🚛

- Kanika Mathur

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FOR REGULAR UPDATES

“Digitisation is very significant in today’s times.”

Swapnil Shah, Founder and CEO, Freight Tiger, emphasises the need to digitise logistics processes for better management and optimum productivity.

What is the role of digitalisation in optimising the distribution and logistics of cement?

Digitalisation plays a huge role. It has a massive impact and almost every customer we work with today has a chief digital officer. Digitisation is very significant in today’s times. Companies are also investing in dedicated digital teams and it is happening across all industries. Industry leaders are not only hiring digital experts for their operations but are also involved with the same for their business. This is about digitalisation only from an impact involvement point of view.

Looking into the details of what digitisation means, there are a whole lot of things that are happening today. To share a few examples,

- It allows the ability to have visibility into every delivery in terms of location, ETA, etc. Customers are consuming it for their own use, within their company, and they want to give that visibility to their end customer, too. So, the most basic use of digitalisation is bringing visibility for every order to customers and helping them plan better.
- Being digital allows companies to track their footprint, get data analytics, understand issues with their services and analyse their costs. This helps them make many distribution decisions based on location data, average transit times, lead distance and more.
- Often cement deliveries get diverted and this is a huge problem that most service providers are trying to resolve. With digitalisation and use of technology, cement makers can keep a track of their actual end user and understand their issues and try to work on them.

How can your system make a difference in managing cost efficiency for the cement industry?

We essentially give transportation management



Swapnil Shah, Founder and CEO, Freight Tiger

software and a visibility platform. Transportation management software is changing rapidly today. Freight Tiger builds a unifying platform as a connective tissue among all IT platforms, stakeholders and vendors. That is the first role we play. We help our customers manage order to delivery timelines in a very tight manner.

Often there are minor issues, like distances not being correct for which freight is paid and sometimes there is backloading at cement plants. In these cases, Freight Tiger allows customers to make sure the distances are correct. If diversions or backloading happens, it gives visibility into it. That’s a unique solution that we provide.

Measurement of performance is another area where we play a role. In terms of performance of distribution footprint, optimised lead time, per kilometre rate, lead distance, free trade routes etc. Freight Tiger allows you to understand service quality and its competitive edge over the market in terms of the delivery SLAs. We allow companies to measure and influence all of this in their operations.

Tell us about 360-degree management of freight operations for the cement industry through your platform.

On the one hand, you are sourcing raw material, and on the other, you are making all these deliveries either through your distribution footprint or directly from the plant. So, a 360-degree approach means the total cost of raw material sourcing logistics, the whole cost end-to-end, day-to-day distribution, percentage of deliveries directly serviced through plants versus through a series of distribution layers.

How do you connect the Freight ecosystem for the cement industry with your platform?

Freight Tiger is a technology- and a product-first company. We are a neutral party to all that happens in our customers' environment.

What I mean by neutral is we do not play the role of an aggregator or a logistics service provider. We have no conflict with the existing logistics service providers that the cement company uses. We integrate telematics vendors. We have done close to 200 telematics company integrations, so we stay neutral. We believe that collaboration and neutrality will take us in the industry a lot farther than just trying to remove someone from the value system.

These two are very pivotal when you think about Freight Tiger as a player in this ecosystem.

What are the key pain points in the logistics of cement. How can you help resolve the same?

First and foremost, there is inefficiency and waiting during loading or unloading of the material at the plants. Transit times also are not monitored well. So, part of the inefficiency is because people have to wait due to space constraints or other reasons.

Secondly, cement organisations often have to service their customers in a relatively tighter delivery window. That is a pain point that involves making day-to-day decisions about choosing the right way to service the customers at an optimum cost, without compromising the quality of product or service.

Another major pain point is that cement organisations do not know where their product is unloading. This means that they do not know their end consumer. This is a unique problem in the cement industry because deliveries get diverted. Participants in the ecosystem may divert the deliveries based on requirements. So, knowing the exact unloading location and knowing the end customer is a massive gap in the cement industry.

Digitising proof of delivery and freight invoicing



Digitisation will play a pivotal role in cement distribution for visibility and ease of transport, invoicing etc.

is something we've never seen before. Not only for the cement companies, but everyone who works in the value chain - the trucker, the logistics provider, the transporter - each one of them can benefit from this and that would be a big step to remove paper trails and make them into digital records. When we think about EPOD and digital freight invoicing that you do at the end of the day ensures all stakeholders are benefited from it. Cement companies have contracts with logistics providers or transporters or they sometimes hire fleet owners and trucks from the market, if they do not have their own. Any solution or change ultimately needs to impact everyone in the ecosystem. EPOD and digital freight invoicing achieves just that by easing the operations for everyone.

How do you foresee the changing face of logistics for the Indian cement industry?

It is my understanding that as a cement manufacturer, I would like to know my customer or where my product is exactly getting unloaded, instead of directionally knowing where the product is headed to. Another important factor is sustainability, whereas as a manufacturer or distributor the target would be to have the same or more deliveries by travelling less, optimising and reducing empty miles.

Cement companies are also moving towards alternative fuel vehicles, electric vehicles for some part of their delivery. I see that as a big change. And overall, analytics and how some sort of machine learning AI can help me make better decisions day to day. That is also on everyone's mind. And, I think it is going to transform how people make decisions going forward. Those are the few things I will say are quite important as we look at the future. 🚛

- Kanika Mathur

“Logistics is transforming.”

Haresh Calcuttawala, CEO and Co-Founder, and Sunil Kharbanda, CRO and Co-Founder, TreZix Software, speak about the importance of technology in consolidating logistics and its processes.

Tell us about the role technology plays in optimising logistics operations in terms of cost and productivity.

Calcuttawala: There are two major elements from an industry perspective. One is technology that helps in planning and execution, and the second is a major lag in logistics - the turnaround time. Technology has a big role to play when it comes to shipments, their planning and execution.

Kharbanda: Today, the way digitisation is happening across the world, it is bringing a good amount of visibility across different segments in any organisation. While you talk about logistics, which is the last mile towards delivering the finished goods to a customer, it is very important that manufacturing works in tandem with it. This will work if you have the right technology and if you want to scale, have more visibility and give your customer a good experience. Technology is the backbone, which will help you achieve all this. If you are looking at a 10x or 20x growth in a duration of three years, you need to scale up through technology.

As a SaaS platform, how would you define your role in bringing innovation to the Indian cement industry?

Kharbanda: What we are doing is something very specific. We come from the ERP world and we understand the cement industry very well, because a lot of our customers use SAP. Tools and systems are already in place but ERP has been transforming customer organisations. We have taken a little leap ahead and we are specifically looking at the import-export segment across industries including cement. So, we have taken the game to the next level in terms of digitisation and helping companies scale up not just within the country but outside it, too. Our Trezix platform ensures that you promote your innovations across borders. We want more industries to come and participate in the growth of the Indian economy.

Calcuttawala: Trade is going to be more complex and technology is the only solution. It is all about how you capture the international market with the right quantity and quality. Quality norms are changing



Haresh Calcuttawala - CEO and Co-Founder, Trezix



Sunil Kharbanda - CRO and Co-Founder, Trezix

and getting more complex. An agile platform is required to quickly work with foreign buyers and customers and get the ball rolling from day one. That is how a company will be able to scale up their operations.

How does your platform help in the compliance of cement being exported across borders?

Kharbanda: It's an end-to-end process. The journey starts by getting an order from a customer across the border. The compliance of that is around your quality and the quality of documentation, what you do for yourself and for them. So, Trezix as a platform covers that end-to-end process of that particular transaction, which involves visibility, correct documentation and the right calculations for that documentation. Apart from the product, there are inspections, too. Trezix takes care of the inspections, getting them in the system, and compliance of the given order. The requirement of international trade comes through Trezix, which helps in three ways:

1. Efficiency: Import and export, even today, are manual activities because the philosophy of ERP is very different from the philosophy of an export. In a regular export, one takes a sales order, looks at getting the product from the manufacturing unit, invoices it and delivers it. The system of exports is totally opposite, therein after the sales order, they have to raise the invoice. Thereafter the process of banking, shipping

and clearing starts. With our system, you don't have to toggle between Excel sheets, emails and other documents.

2. **Quality:** Our system also comes with a quality process, which is a software that allows a digital trail of transactions both for the respective governments.

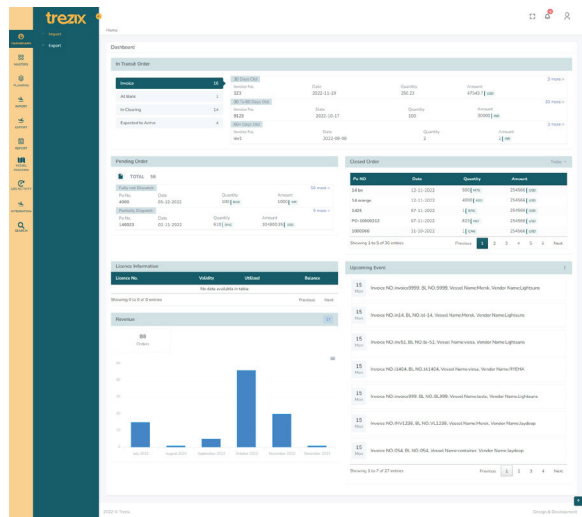
3. **Records:** Records of each and every step of the transaction and the entire chain of documentation is available for follow up, in case any customer raises concerns. Trezix captures every process in the entire journey of this order, which includes documentation, parallel processes with banks and shipping and customs details. This helps the organisation to become more efficient and scale up more.

This is how the product is built to keep everything automated and integrated with governmental norms. It allows our customers to get all their documents, permissions and compliances sorted at one place.

What are the key pain points according to you that the cement industry is experiencing in its logistics operations and how can that be resolved?

Calcuttawala: First and foremost is the volume. Cement plants have huge volumes and hardly any physical storage capacity. The material has to move really fast. That is where an integration platform is required to make functions better. Secondly, one of the biggest problems in the cement industry is the order booking versus the delivery time or the lead time. The customer expects to receive their order in the shortest amount of time. If the lead time for delivery is 24 to 36 hours, it would mean that the cement is dumped at a shore of a certain country and shipped from that location to meet customer's requirements. This is a complexity the cement industry deals with. Third and the most important pain point in the cement industry is the quality of goods and third party inspection. There are many norms to control the quality and standardisation such as the ISI mark. For third party inspections and record keeping, a lot of manual work is required even today. Digital platforms are required to ensure that the entire ecosystem works in tandem with each other.

Kharbanda: Logistics is transforming. Specifically for the cement industry, the challenges are many more from a product standpoint. One of them is how to give logistics companies faster visibility so that they can deliver their goods in time to their customers because the competition is tough. We might be the largest producer today, but we need to do a lot to keep our position intact because international trade is moving very fast. Decreasing the product damage



Trezix platform Dashboard in a snapshot.

to increase profitability is another challenge.

Calcuttawala: Logistics cost in the cement industry is between 12 to 15 per cent and this is one of the major points where cement companies get impacted in the international market in comparison to other international players who have a logistics cost ranging between 7 to 10 per cent.

How do you foresee the face of logistics changing for the cement industry in the years to come?

Kharbanda: If we look at the way our infrastructure is building up, the way the government is coming up with new policies in terms of creating hubs for logistics, the new logistics policies, and a unified interface that has been built, I see a huge transformation in logistics. For example, in the cement sector, the product is most important and everything in logistics is designed around it. From this perspective, I see a lot of work happening on logistics, especially facilitating technology and making it the backbone for logistics. Not only infrastructure but technology is also giving an extra edge to last mile connectivity by generating and analysing last mile data.

Haresh: The national logistics policy and its execution, various ministries working together on a single platform, synchronisation between all modes of transport even rural roadways, railways, waterways and especially the ports, and everyone coming together with integrated logistics - I think all this will help optimise the costs of logistics. The wait time on ports and other places will reduce considerably. I think the focus is largely on that.



- Kanika Mathur

Intervention is the Name of the Game

Cement channels and solutions in logistics are evolving to relinquish traditional methods for more innovative and modern ones. The key driving factor in this transition is finance. ICR delves into the changes in logistics in the face of automation and data analytics.



The connection between logistics, channels of selling, the revenue line and the cost line were established over the last several decades with a mix of supply chain efficiency and cost optimisation. The recent best cases talk about innovation as the driver of change, which in some cases could be deemed as common sense but that seems to be in short supply.

Take the example of cost. Logistics cost (presumably the highest element of cost in the cement cost hierarchy) is not merely transportation cost that most of us make it out to be but the sum total of transportation, warehousing and distribution, inventory holding, ordering cost and documentation, which includes all the wastes that are associated with this. It also includes the trade-offs that are made, which is where most cement companies differ in their approaches to channels and logistics.

There are so many trade-offs that come in the way of cement manufacturing and distribution right up to reaching it to the customer. Some of these

trade-offs include reach, penetration and growth versus the cost of each of these when you construct an end-to-end view of the cement outbound chain. Some trade-offs could be around service level and number of warehouses or direct shipsets versus moving through sticky stocking. There is no end to the number of warehouses that will enhance penetration and reach to the markets and service levels, while inventory holding would zoom.

WORKING WITH SMARTER SOLUTIONS

Maister's Square Root Law when applied to cement tends to point to as few stocking points as possible to make the optimisation work, but then Maister's Rule of Inventory is one-dimensional around safety stocks for reduction of lead time variability and demand variability. It does not look at the trade-offs around inventory and the other objective functions. Thus, the network optimisation programme that most cement companies run is a cauldron where many objective functions go in, but only a few emerge

as the winning combination of inter-dependencies on which Management Action is to be ordained. Building algorithms around these inter-dependencies start with rocking the entire boat with data requirements at every stage of the cement journey from the inbound to the outbound, right up to the point where customer exchange happens. Most companies are straddled with one part of the chain governed by the proximity to the resource, while the other outbound part needs a network to establish cost efficiency, together with service levels.

At the end, the optimiser should rule the roost as this could be very complex when constructed over micro markets, prices, availability, service, inventory and transportation cost that need data tables not as static interfaces but a more dynamic one. Most companies have ended with an oversimplification as when complexities rise to the hilt, the solutions tend to become just the opposite. Guided by data and observations, communication and sharing of information, a very complex interaction of all of these is vetted for management review almost on a daily basis. That is where the most successful sales and operations implementation rests in the best of cement companies in India. Most of them have planning algorithms to facilitate these processes. But not as a hands-free approach.

Some innovation in channel and logistics is predicated on the digitisation initiatives that separates data as it exists in the system, with the actual reality on the ground. Data is the source of everything, but it must be real, as we know that prices in spatially separated markets are governed by the equivalence of logistics cost. In simple terms, it means prices must cover logistics cost differences in spatially separated markets. Cement logistics cost being the most sensitive parameter, the actual knowledge of the associated cost of moving millions of parcels of cement over distances in spatially separated markets therefore becomes a huge area of focus. A price, which includes the associated logistics cost, must convey in the information the true cost by which two parcels could be separated, given that similar commodities do not have more significant differentiating factor to make a decision 'play'. Samuelson's treatise of 1958 still holds good and the question therefore is to digitise information on price as accurately as possible, where the true cost of logistics is part of the information. Best cases in this regard struggle to achieve a 100 per cent accuracy rate, understandably. But efforts are directed to achieve this with tracking and tracing and control towers and the rest.



Logistics cost for a cement plant is a sum total of transportation, warehousing and distribution, inventory holding, ordering cost and documentation.

PARADIGM SHIFTS

The next level of innovation will be to actually move from bagged to bulk entirely and from cement to concrete. That is where the world has moved. This changes the supply chain question and one of the major dimensions holding inventory and warehousing for a sales channel is hugely moderated or eliminated at the end, as selling becomes directly to the projects, no matter how small or large they may be.

The advanced nations have moved to this paradigm, which has changed the entire logistics, channel and innovation question to a different level, where the product cement is converted to a service of concreting at prescribed schedules. This, however, is no small switch, it would obviously mean the setting up of supply chains, that would be different from the current ones, with channel partners who are very different. The optimisation question for Ready Mix Concrete would also be different as there are more than one material source involved, aggregates, sand, gravel etc would step in. To be able to extend this step by step across the whole of India, starting with cities and towns and then the deeper areas would need several actors to step in to see how value can be created. At least the world has many examples where this has progressed with more sophistication of markets in construction. It would, however, need more planning and scheduling, use of digital tools and data driven decision support systems. This is where slowly and steadily some companies are progressing and they would obviously be the leaders in the next transition.



- Procyon Mukherjee



Dust Control: Balancing Health and Sustainability

With governmental norms for reduction of dust emissions and technological advancements for dust control, the Indian cement industry is geared up to reduce the environmental and health hazards of dust emissions and to make cement processing more sustainable.

Dust emissions from cement plants can have significant environmental and health impacts, as well as affecting nearby communities. Cement plants generate dust during the production process, which can include raw material grinding, blending, preheating, kiln processes, clinker cooling and cement grinding.

Dust emitted from cement plants is a significant environmental and health concern in India, where the cement industry is a major contributor to air

pollution. According to the Central Pollution Control Board (CPCB), the cement industry is one of the top five polluting industries in India, and dust emissions are a major contributor to this pollution. To address this issue, the Indian government has set emissions standards for the cement industry under the National Ambient Air Quality Standards (NAAQS) and the Environment Protection Act (EPA). The standards set limits on particulate matter (PM) emissions, which include dust particles, from cement plants.



The Indian cement industry has also implemented measures to reduce dust emissions such as using modern filters and control technologies, optimising production processes and providing training to employees on dust control practices. However, despite these efforts, the industry still faces challenges in meeting emissions standards, particularly for smaller, older plants. To further address the issue of dust emissions, the Indian government has launched initiatives such as the National Clean Air Program (NCAP) and the Swachh Bharat Abhiyan (Clean India Mission), which aim to reduce air pollution and improve environmental cleanliness.

“We have addressed fugitive emissions in the clinker tunnels at the cement plant where the clinker is stored in the silos and a lot of dust comes out when it is discharged onto the conveyor belts. Conventionally cement plants have used back filters which are connected to exhausts located besides the discharge point, but it is common knowledge that these systems were not entirely effective, resulting in a lot of dust in the tunnels. It also made it very difficult to get maintenance done in these tunnels because anyone who enters would have to breathe the dust and that is a health hazard,” says **Venkatesh Ravula, CEO, DCL Bulk Technologies.**

DUST EMISSION HAZARDS

Dust hazards are a significant concern in Indian cement plants due to the high levels of dust generated during production processes. Exposure to cement dust can have negative health effects on workers, including respiratory issues such as bronchitis and asthma, as well as skin and eye irritation. Some of the major sources of dust hazards in Indian cement plants include raw material handling, clinker production, and cement grinding processes. Dust can also be generated during maintenance activities such as cleaning, repair, and replacement of equipment.

To address these hazards, Indian cement plants have implemented a variety of measures, including using personal protective equipment (PPE) such as respirators, dust masks, and goggles, as well as installing dust collection and control systems. In addition, training programs for employees on the

The Indian government is also expected to continue to play an active role in regulating dust emissions from the cement industry.

safe handling and control of dust are often provided. The Indian government has also established regulations and guidelines to protect workers from dust hazards in the workplace. The Factories Act, 1948 and the Mines Act, 1952 set standards for occupational health and safety, including measures to control dust emissions and protect workers from exposure to hazardous materials.

“For achieving effective prevention and control of potential fugitive emission sources in cement manufacturing plants, specific requirements along with guidelines have been evolved by the central government. For the Indian cement industry, the Ministry of Environment Forest and Climate Change has notified the norms for reduction of dust emission from cement plants, which includes Particulate Matter, SO_x and NO_x. The notification clearly defines the limits for above mentioned emissions, particulate matter should be <30 milligram, SO_x should be <100 milligram, NO_x should be <1000, 800, 600 milligrams. It depends on the age of the plant or we can say that on the commissioning date of the plant,” says **Anil Gupta, Technical Head - Nimbahera Plant, JK Cement.**

It is important for Indian cement plants to prioritise the implementation of dust control measures and training programmes to protect the health and safety of their workers and nearby communities.

FILTRATION TECHNIQUES AT CEMENT PLANTS

Cement plants use various types of dust filtration equipment and techniques to control dust emissions and improve air quality. Some of the common methods used include:

- **Bag filters:** Bag filters are commonly used in Indian cement plants to capture dust particles from the production process. These filters consist of bags made of fabric material that trap dust particles as air passes through them.
- **Electrostatic precipitators (ESPs):** ESPs are another type of dust filtration equipment used in Indian cement plants. They use an electrostatic charge to attract and trap dust particles.

- **Cyclones:** Cyclones are a type of mechanical separator that can be used to remove larger dust particles from the air. They work by creating a cyclonic effect that causes particles to be separated from the air stream.
- **Wet scrubbers:** Wet scrubbers are used in some Indian cement plants to capture and remove dust particles from the air. They work by spraying water onto the particles, causing them to stick to surfaces and be removed from the air.
- **High-efficiency particulate air (HEPA) filters:** HEPA filters are highly efficient filters that can remove up to 99.97 per cent of particles as small as 0.3 microns. They are commonly used in cleanrooms and other sensitive environments.

In addition to these filtration techniques, Indian cement plants also use various operational and maintenance practices to reduce dust emissions, such as regular equipment cleaning and maintenance, optimising production processes to reduce dust generation, and providing training to employees on dust control practices.

“Modern mining equipment is deployed with dedicated dust separation systems. Electric/hydraulic equipped mining machinery is also being used to minimise the dust. The cement industry has been modernised by introducing specific dedusting equipment used in the production, transport, and storage processes. The installation is equipped with specific filters (bag filters or electrostatic filters). This has reduced the flue gas emission and amount of dust released into the atmosphere. The main dedusting machine is the state-of-the-art bag filter, which is available and guarantees a maximum emission of 10 mg/Nm³,” says **Pankaj Kejriwal, Whole Time Director, Star Cement.**

“Truck mounted road/area sweeping machines are also operated to clean the dusty area. High pressure water spray systems are used to clean the tyres of vehicles moving inside the plant to minimise the fugitive dust emission,” he adds.

DUST CONTROL NORMS IN INDIA

The Indian government has established norms and regulations to control dust and fugitive emissions from cement plants. Some of the key norms include:

- **National Ambient Air Quality Standards (NAAQS):** The NAAQS set by the Central Pollution Control Board (CPCB) establish limits on air pollutants, including particulate matter (PM) emissions, from all industries, including cement plants.
- **Environment Protection Act (EPA):** The EPA provides guidelines and regulations for controlling



Failure to comply with dust control norms and regulations can result in fines, legal action, and suspension of operations.



Exposure to cement dust may lead to health hazards for workers like respiratory issues, and skin and eye irritation.

emissions from industries, including the cement industry.

- **Cement Industry (Prevention and Control of Pollution) Rules, 2013:** These rules set specific emission limits for cement plants in India. For example, the rules specify that PM emissions should not exceed 30 mg/Nm³ for dry kilns and 50 mg/Nm³ for wet kilns.
- **Ministry of Environment, Forest and Climate Change (MoEFCC) guidelines:** There are guidelines for the installation of pollution control equipment in cement plants, including bag filters, electrostatic precipitators and wet scrubbers.
- **State pollution control boards:** State pollution control boards are responsible for enforcing the norms and regulations related to dust and fugitive emissions at cement plants.


Cement plants in India are required to comply with these norms and regulations to minimise their impact on the environment and public health. Failure to comply can result in fines, legal action and suspension of operations.

It is important for cement plants to prioritise reducing dust emissions to protect both the environment and nearby communities from potentially harmful effects. The future of dust emission in the Indian cement industry is likely to see a continued focus on reducing emissions to improve air quality and

protect public health. The industry is under increasing pressure to adopt cleaner technologies and more sustainable production processes, and there is a growing demand for environmentally friendly cement.

To meet these challenges, Indian cement plants are likely to adopt a range of strategies and technologies to reduce dust emissions, such as using low-emission fuels, implementing more efficient production processes, and investing in advanced dust filtration and control technologies. There is also likely to be increased focus on recycling and reusing waste materials to reduce environmental impact.

The Indian government is also expected to continue to play an active role in regulating dust emissions from the cement industry. This may include strengthening existing regulations and standards, as well as developing new policies and initiatives to encourage the industry to adopt more sustainable and environmentally friendly practices.

Overall, while the Indian cement industry faces significant challenges in reducing dust emissions, there are also many opportunities for innovation and progress. With continued investment in new technologies and sustainable production processes, the industry can help to create a cleaner, healthier and more sustainable future for all. 

- Kanika Mathur

“Automation can provide real-time monitoring of emissions.”

Anil Gupta, Technical Head, JK Cement Works, Nimbahera, discusses the adverse effects of dust emissions on human health and the environment and how use of advanced filtration systems, automation and other technology solutions can help reduce it.

What are the key areas where dust emission is prominent in cement manufacturing?

Cement manufacturing unit consists of various sections such as mining, crusher, raw mill, kiln, coal mill, cement mill, packing plant, etc. However, the key areas where dust emission is highly prominent are dump hoppers of limestone and additive crusher, raw material storage yards, feeding circuits of clinker and cement raw material, packing and loading area, raw mill bag house, cooler ESP, coal transport and grinding circuit, cement mills bag house and CPP stack.

What are the measures taken to control the dust emissions at a cement plant?

We have two types of dust emissions:

- Stack or vent duct: From process operation and have fixed point of release.
- Fugitive dust: Dust that is generated or emitted from open air operations or at material transport point (emissions that do not pass through as stack or vent).

To control both the types of dust emissions in a cement plant, following measures are taken:

- Installation of de-dusting bag filter.
- Installation of bag house and electro static precipitator.
- Installation of water spray system in yard area.
- Enclosure should be provided for all unloading operations, except wet materials like gypsum.
- The pathways in the coal yard for vehicle movement should be paved.
- Accumulated dust shall be removed / swept regularly and water the area after sweeping.
- Air borne fines extracted from the clinker cooler shall be separated and sent to the last possible destination directly, if possible.



**Anil Gupta, Technical Head,
JK Cement Works, Nimbahera**

Tell us about governmental regulations and compliance for dust emissions.

For achieving effective prevention and control of potential fugitive emission sources in cement manufacturing plants, specific requirements along with guidelines have been evolved by the central government. For the Indian cement industry, the Ministry of Environment Forest and Climate Change has notified the norms for reduction of dust emission from cement plants, which includes particulate matter, SO_x and NO_x. The notification clearly defines the limits for above mentioned emissions, particulate matter should be < 30 milligram, SO_x should be < 100 milligram, NO_x should be < 1000, 800, 600 milligrams. It depends on the age of the plant or we can say that on the commissioning date of the plant.

Some relaxation is there in the SOx limit. It should be 700 and 1000 milligram with more pyretic sulphur presence in limestone deposit. In cases where SPM concentrations exceed the prescribed limit, necessary corrective measures in terms of improving the controls shall be taken and action taken records of improvements carried out be maintained.

Tell us about the role of dust collectors in cement production.

A dust collector is a system used to enhance the quality of air released from industrial processes by collecting dust and other impurities from air or gas. It is designed to handle high-volume dust loads. A dust collector system consists of a blower, dust filter, a filter-cleaning system, and a dust receptacle. It is distinguished from air purifiers, which use disposable filters to remove dust. It may be of single unit construction, or a collection of devices used to separate particulate matter from the process air. It is also used as an air pollution control device to maintain or improve air quality.

A dust collector also helps to increase productivity as when dirt, dust and debris collect on equipment, it can make its way inside, interfering with the mechanics of the equipment. This can lead to slower machines and broken equipment. Compromised machinery constantly needs attention and repairs. Dust collectors remove this risk, allowing your machinery to work at optimal performance.

Where is the collected dust discarded?

The environmental concerns related to cement production, emission and disposal of dust is becoming progressively significant. Cement kiln dust (CKD) is fine-grained, particulate material chiefly composed of oxidised, anhydrous, micron-sized particles collected from electrostatic precipitators during the high temperature production of clinker. CKD so generated is partly reused in cement plant. No dust is discarded in the environment except stack dust. However, Stack emitted dust is discarded in an environment which is under the limit of governmental norms.

What is the impact of dust emission on the environment in and around?

In the past, cement dust spread out over large areas due to wind and rain and accumulated over the soil and plants. It has the potential to affect animal and human health adversely. Dust from cement factories adversely affects the forest ecosystem, soil enzymes, fungi and bacteria population within the vicinity of cement factories. Furthermore, it was



Photo Courtesy: Nimhahera plant, JK Cement Works

Cement plants are minimising health risks through the use of advanced filtration systems, automation, and other technology solutions.

shown that plant height, phytomass, net primary productivity, chlorophyll content, metabolites and yield were reduced in response to cement dust in the polluted areas.

After the 1990s, the cement industry did a lot of investment for dust control. Several modifications have also been carried out in the existing system to make the system more efficient. This can be achieved through the use of advanced filtration systems, alternative fuels, automation and other technology solutions. It is also important to monitor and report emissions to regulatory agencies to ensure compliance with environmental regulations. No significant impact has been observed in and around the cement plant.

Can dust emission be qualified as a health hazard at a cement plant?

Yes, dust emission can be qualified as a health hazard at a cement plant. Inhalation of cement dust can cause a range of respiratory problems, including bronchitis, asthma and silicosis, a lung disease caused by inhaling crystalline silica dust. Prolonged exposure to high levels of cement dust can also increase the risk of developing lung cancer.

To minimise the health risks associated with dust emissions, cement plants are continuously implementing measures to reduce the amount of dust generated during the manufacturing process. This is achieved through the use of advanced filtration systems, automation, and other technology solutions. It is also important to provide proper personal protective equipment (PPE) to workers and to ensure that they receive adequate training on the health risks associated with working in a cement plant.



The Ministry of Environment, Forest and Climate Change has norms for reduction of dust emissions from cement plants, which include particulate matter, SO_x and NO_x.

How can automation and technology help in reduction of dust emissions?

Automation and technology are contributing in reduction of dust emissions in following ways:

- Real-time monitoring and control: Automation can provide real-time monitoring of emissions, which can help to identify and address potential issues before they become major problems. This can be achieved through the use of sensors and advanced data analytics.
- Optimised process control: Advanced process control technologies can optimise the cement manufacturing process and minimise dust emissions. This technology can help operators monitor and control the process in real-time, ensuring that emissions are kept to a minimum.
- Advanced filtration and scrubbing systems: Technology can improve the efficiency of filtration and scrubbing systems, such as bag filters and electrostatic precipitators. These systems can remove particulate matter and other pollutants from the air, reducing dust emission.
- Use of drones for inspection: Drones can be used to inspect hard-to-reach areas in the plant, such as the top of the kiln or preheater tower, without risking the safety of personnel. This can help to identify areas where dust emissions are high, and take corrective actions.
- Overall, automation and technology can help

reduce dust emissions in cement plants by providing real-time monitoring and control, optimising process control, improving filtration and scrubbing systems and using drones for inspection.

Tell us about newer innovations that help reduce the dust emissions and control it?

The cement industry has been under increasing pressure to reduce its environmental impact, especially concerning the emission of dust and pollutants. Here are some of the newer innovations that the cement industry is adapting to reduce dust emissions and control them:

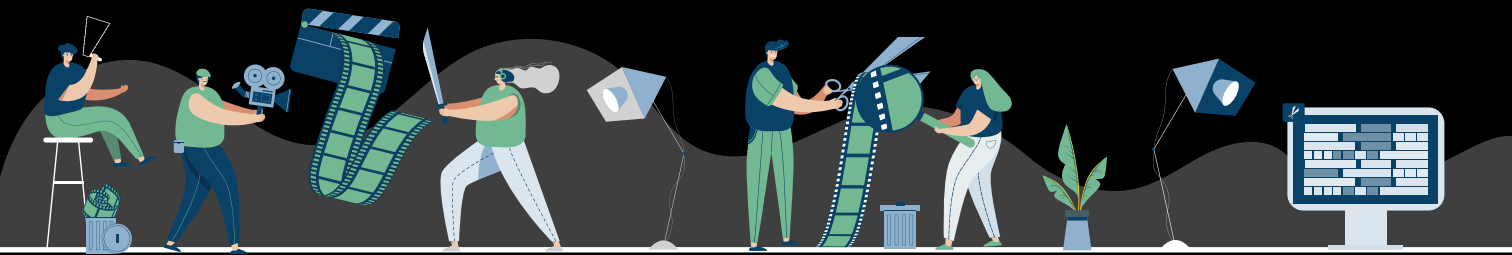
- Use of Low-NO_x Burners: The use of low-NO_x burners in cement kilns reduces the emission of nitrogen oxides (NO_x), which are one of the major contributors to air pollution. These burners help in reducing the temperature inside the kiln, which in turn reduces the formation of NO_x.
- Installation of Bag Filters: Bag filters are used to capture particulate matter emitted during the cement manufacturing process. These filters are highly efficient and can capture up to 99 per cent of the particulate matter emitted from the kiln. This reduces the emission of dust and improves the air quality around the cement plant.
- Use of Alternative Fuels: Cement manufacturers are increasingly using alternative fuels, such as waste materials, biomass, and municipal solid waste, to power their kilns. These fuels emit less carbon dioxide (CO₂) and other pollutants than traditional fossil fuels.
- Automation of Process Control: Advanced process control technologies can optimise the cement manufacturing process and minimise dust emissions. This technology can help operators monitor and control the process in real-time, ensuring that emissions are kept to a minimum.
- Introduction of Green Cement: Green cement is a new type of cement that is produced using environmentally friendly manufacturing processes. It can reduce carbon emissions by up to 80 per cent compared to traditional cement. Green cement can be produced using waste materials such as fly ash and slag, and can also be made using renewable energy sources.

Overall, the cement industry is making significant strides in reducing its environmental impact, particularly concerning dust emissions. These innovations are helping to improve the sustainability of the industry and protect the health of nearby communities. 🚚

- Kanika Mathur

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“Dust can adversely affect living organisms.”

Pankaj Kejriwal, Whole Time Director and COO, Star Cement, shares how dust pollution is a severe problem and the efforts that are required to keep dust emissions in check.

What are the key areas where dust emission is prominent in cement manufacturing?

In the cement industry, dust is emitted from mining, transportation and many processes such as crushing of limestone, clinker production and storage, cement grinding and packing and power utilities (the coal mill and the power generators).

What are the measures taken to control the dust emissions at the cement plant?

Cement industry is one of the few industries where the dust generated is a value-added raw material and hence all cement manufacturers try to arrest the dust as it has its own pay back.

Generation of dust is being reduced by modification of transfer points, installation of efficient separators, modern cyclones, etc. Dust generation during mining and transportation is being reduced by effective water / mist / fog spraying. Modern mining equipment is deployed with dedicated dust separation systems. Electric/hydraulic equipped mining machinery is also being used to minimise the dust.

The cement industry has been modernised by introducing specific dedusting equipment used in the production, transport and storage processes. The installation is equipped with specific filters (bag filters or electrostatic filters). This has reduced the flue gas emission and amount of dust released into the atmosphere. The main dedusting machine is the state-of-the-art bag filter, which is available and guarantees a maximum emission of 10 mg/Nm³.

Truck mounted road/area sweeping machines are also operated to clean the dusty area. High pressure water spray systems are used to clean the tyres of vehicles moving inside the plant to minimise the fugitive dust emission.

Tell us about the regulations and compliance issued by the government for emission of dust particles in a cement plant.

In India, regulatory bodies like the Ministry of Environment, Forest and Climate Change, the Central



Pankaj Kejriwal, Whole Time Director and COO, Star Cement

Pollution Control Board (CPCB) and the respective State Pollution Control Boards (SPCB) deal with environmental issues. SPCB regularly inspects the cement plants/limestone quarries to verify compliance with emission norms. CPCB also inspects the cement plants to check compliance with emission standards under environmental surveillance squad activities. Cement plants also have to comply with the charter on Corporate Responsibility for Environment Protection (CREP).

The Indian cement industry must comply with the various environmental acts and regulations notified by the Ministry of Environment and Forests (MoEF), etc., which covers different spheres of the environment, encompassing emissions of air pollutants, consumption of water, generation and discharge of trade effluents, utilisation and storage of hazardous waste, noise generation, utilisation of forest land and wildlife

areas. For dust emissions, the following are applicable:

- Air (Prevention & Control of Pollution) Act, 1981
- Environment (Protection) Act, 1986 (EPA)
- The Factories Act, 1948
- The Mines Act, 1952. Mines Rule 1955 and the Metallic Ferrous Mines Regulation 1961

These Acts/Regulations, together with some of the stringent conditions that are relevant for environment protection from industrial pollution are imposed by the pollution control boards. The government has made norms stricter for the cement industry, capping the stack emissions of PM to not more than 30 milligrams per cubic metre from 200 milligrams per cubic metre earlier. The 24-hour safe limits for ambient PM 2.5 and PM 10 are 60 ug/m³ and 100 ug/m³ respectively.

Tell us about the role of dust collectors in cement production?

Dust collector systems (Bag Filters, Electrostatic Precipitator, etc.) control the dust and gases from various sources during process at various stages, which helps to provide the factory with cleaner air that can provide numerous benefits. A dust collection system works by sucking air in from a given application and processing it through a filtering system so that particulate matter can be deposited into a collection area. Then the cleaned air is either returned to the facility or exhausted to the environment.

Where is the collected dust discarded?

After dust-filled air has been captured by a dry dust collection system, dust must be separated, collected, and disposed of. The dust collector separates dust particles from the airstream and discharges cleaned air either into the atmosphere or back into the workplace. The collected dust goes back into the process system as it is a value added product to cement. Nearly 100 per cent collected dust is recycled.

What is the impact of dust emission on the environment in and around the cement plant?

Dust pollution is the introduction of chemicals, particulate matter or biological materials that cause harm or discomfort to humans or other living organisms or cause damage to the natural environment.

Dust can adversely affect living organisms. Increased concentration of cement dust pollutants causes invisible injuries like progressive decline in the physiological process such as photosynthetic ability and respiration rate.

Can dust emission be qualified as a health hazard at a cement plant?


The point source emissions from the cement industry include particulate matter and gaseous emissions. Since the cement industry deals with various size reduction operations from limestone crushing to clinker grinding, dust emissions are a major pollutant. Gaseous emissions such as sulphur dioxide (SO₂), oxides of nitrogen (NO_x), carbon monoxide (CO), carbon dioxide (CO₂), etc., are generated during pyro processing. All of these are major health hazards at a cement plant, if not controlled and minimised.

How can automation and technology contribute towards reduction of dust emission?

It is necessarily required to put in place the latest technology, management systems and continuous online monitoring system that helps to routinely implement the activities that facilitate adherence to the emission norms prescribed under the pollution control legislation. The real time data of online stack monitoring and Ambient Air Quality Management Systems (AAQMS) is published on the web for better monitoring and controlling.

Tell us about newer innovations that the cement industry is adapting to reduce the emission of dust and control the same.

Some of the sustainable new innovations for air pollution control methods followed by the Indian cement industry are:

1. In bag filters, use of low air to cloth ratio and use of latest filter media/fabric in pleated/cartridge shaped filter bags. For bag filters, the use of membrane filter bags is a useful innovation.
2. Installation of hybrid bag filter and electrostatic preceptors for more effective control of dust emission.
3. Substituting clinker with fly ash/blast furnace slag/limestone, which is readily available and reduces dust emissions and fuel consumed for producing clinkers.
4. Using alternative fuel resources.
5. Co-processing, i.e., using waste materials as fuel by burning them in the high temperature of the kilns. This also effectively disposes of solid waste.
6. Installation of Waste Heat Recovery System (WHRS), in clinker production units. 

- Kanika Mathur

“We help in reducing the carbon footprint.”

Anup Nair, Managing Director – India and South Asia, Martin Engineering, speaks about the key role their products play in making cement processes more efficient.

Tell us about the role that your products and technology play in the cement industry.

We are into bulk material handling products. In the cement industry, our products are used in two different areas - in the plants and at the mines. In the mines, there are conveyor belts that help move the bulk material and these conveyor belts need lot of maintenance. If the conveyor belt stops, the entire mine will stop. Our products improve the efficiency of the conveyors by a great extent. This is one part of our offerings.

The second one, which is a major influencer for the cement industry, is within the plant. Cement plants have kilns and preheats. A lot of material blockages happen in them. Our air cannons blast and push this material out. It helps in bringing down plant maintenance considerably. You don't have to shut down the plant to deal with the blockages. This process is becoming more and more significant today as cement companies are using alternative fuels. So, more blasting is required.

Conventional compressors or blasting cylinders are available but compared to them, we have a greater advantage because we have the better technology. We help in reducing the carbon footprint and also give huge savings in energy. With our technology, not only is carbon footprint reduced but energy costs also come down.

Elaborate on how carbon footprint is reduced?

A conventional blasting requires a 300-litre tank, whereas our modern technology gives the same or more blasting force using a 70-litre tank. The compress is considerably reduced and this is important because compress making requires energy or electricity. When electricity or energy usage is reduced, carbon footprint is reduced, too. It can be said that one blaster reduces about 70,000 kg of carbon per year. So, a typical cement plant kiln requires about a hundred blasters.



Anup Nair, Managing Director – India and South Asia, Martin Engineering

Now, you can imagine the reduction in carbon.

With such advantage of cost efficiency and reduction in carbon footprint, shouldn't all cement companies be looking at this product?

The cement companies are definitely looking at our product. Earlier they used to manage it manually and then they moved to traditional modes such as large tanks. Now they are turning to us for modern technology. Our products may be priced higher when compared to the conventional modes but once the traditional methods are removed and only our product is made to perform, the cost is recovered by energy saving itself. The cost of the product is realised in a year's time. One year is the payback period.

What innovations should we expect from Martin Engineering in the near future?

At Martin Engineering, apart from the air blasters



Reduction in carbon footprint is directly proportional to energy savings, and advanced technology is the bridge that links these facets and makes them work in tandem with each other.

that I spoke about we also have nozzles for the cement industry. These nozzles come with a different type of technology, which gives all round blasting inside the refractory areas. It also requires less maintenance and are much more efficient. These nozzles can also be replaced without stopping the equipment. So, it is both safe and economical for the cement manufacturer.

“In all the other sectors, too, our deliverables are focussed on cost efficiency and reduction of carbon footprint.”

As far as innovations in our conveyor products are concerned, we have a remote monitoring system called N2, which enables the customer to sit anywhere in the world and oversee the progress on their mobile phone or device, like a live feed. This remote monitoring system uses the latest modern technology.


Are all these products and technologies exclusive to the cement industry?

No, we are very much present in the steel sector, too. We are also present in power plants, ports, food verticals such as sugar and several other industries.

Wherever there's a need for bulk material handling, Martin Engineering is present. And this is in India. In other countries, we are present in many applications such as quarry aggregates. In all the other sectors, too, our deliverables are focussed on cost efficiency and reduction of carbon footprint.

With regards to the cement industry in India, what kind of future do you envision over the next 10 years?

Our tagline is 'Problem Solved Guaranteed.' So, we are not just product sellers. We solve our customers' problems and address their pain points. Today, the pain points are energy efficiency and carbon footprint, and we are solving them. We are looking at a long-term partnership with our customers as they will definitely require solutions that reduce costs and help them make their processes more modern and competitive. Our philosophy is well-matched with their philosophy in this regard.

We have a full-fledged plant in Pune, and we are moving ahead with 'Make in India' initiative. We also have the capacity to expand in Pune. We are spreading out by adding more team members and with the help of our dealer network across the country. We are trying to be as close to our customers as possible. 

- Kanishka Ramchandani

“Getting it Done” - Integrating Innovation with Technology

D D Wanjale, Managing Director, Gebr. Pfeiffer India, lists out innovations in Vertical Roller Mills (VRMs) and its resultant impact on producing more sustainable cement.



Gebr. Pfeiffer looks back on 158 years of company history and is well established as a pioneer in grinding solutions via vertical roller mills used in the cement and minerals industry. Till date, more than 175 VRMs have been sold in the Indian market, including Ultratech Cement (45 VRMs) and Shree Cement (35 VRMs). The cement mill type MVR 6000 C-6 alone was ordered more than 20 times, which is the

highest number of mills in this category.

During the '80s, vertical roller mills from Gebr. Pfeiffer were sold directly to the Indian cement industry by our German headquarters. With a further increase in end user demand in the '90s, Gebr. Pfeiffer Germany decided in the year 2000 to incorporate its largest subsidiary. Gebr. Pfeiffer was founded in India to serve its esteemed customers to be available locally following the principle of 'Think Global Act Local'. The rest is history. The company's success in India in the new millennium is mainly due to the commitment of the experienced Pfeiffer specialists in India, who focus even more on the individual challenges and demands of our valued Indian customers. Our colleagues in India know the market and the conditions and offer innovative solutions with global support from our in-house experts and support the customers from the early project phase, leading to smooth commissioning and extending comprehensive services.

In the area of raw material grinding, the opinion was sometimes held, especially in the Indian market, that roller presses would be more economical. Gebr. Pfeiffer has addressed this issue by redesigning of gas flows and other innovations to optimise the fan power and mill Δp . Comparisons with MVR mill of the latest design to demonstrate that this is not the case anymore. Joint effort with the Shree Cement team and the operating data received on the new MVR vertical roller mill of the latest design at Shree Cement's Chhattisgarh plant has established that the power consumption of the MVR mills is reduced even further, resulting in energy savings for the cement industry. Now that it has been established that the specific energy consumption for a Pfeiffer raw mill can be considered equal to roller presses. The many advantages of MVR mills kicks in - single mill solution for higher capacity, such as lower CAPEX for civil

and layout requirement, lower OPEX and downtimes due to the higher availability with the advantage of compact design of the grinding plant. As per customer feedback, Pfeiffer MVR mills are operator friendly, commissioned very fast, and put to commercial operations in the fastest way possible vis-a-vis all technologies in grinding. All this together naturally has a very positive effect on the cement manufacturer's CAPEX and OPEX.

Gebr Pfeiffer VRMs have minimum vibration during operations due to their special profile of grinding elements. Low vibration means stable operation, low water consumption, lower heat, low fatigue and that leads to continuous production at optimum cost. Gebr. Pfeiffer also sets the benchmark in this field, especially in the challenging field of cement grinding, because the unique roller suspension and other design features make MVR cement mills extremely smooth-running, with vibrations in the range of 0.5 mm/s, often even below. Pfeiffer's MVR

The best thing cement manufacturers can do is to reduce the clinker factor and produce greener cement, because producing less clinker offers the greatest potential for CO₂ savings in cement production.

mills are also characterised by the highest power density on the market, which means they perform better; others must provide larger grinding track diameters to achieve the same grinding result. This is a huge advantage over competing mills, because a high power density reduces the footprint of the grinding plant, but also the operating costs, because compact mills offer lower pressure drops (Δp) and require less energy for the main plant fan. The MVR mill is currently the most modern vertical mill in the market, and it is constantly being further developed to ensure that Pfeiffer continues to make its contribution on the way to greener cement.

EVOLVING NEEDS

We have limited resources on our Earth. There is only one planet. We are all required to act responsibly

without endangering the environment for future generations. Cement is the core industry for catering to customer demand of housing and infrastructure, which means clinker has to be produced continuously to cater to the per capita consumption of large economies like India. The best thing cement manufacturers can do is to reduce the clinker factor and produce greener cement, because producing less clinker offers the greatest potential for CO₂ savings in cement production.

Producers are therefore striving to increase the use of supplementary cementitious materials (SCMs) while still maintaining high cement quality. Depending on the source of supply and the market needs, the addition of SCMs such as fly ash, slag or calcined clay for example results in different blended cements, some of which must be ground finer to achieve the desired cement properties. Here, too, the MVR mill plays out its advantages, because its enormous running smoothness allows products down to the ultra-fine range to be produced without any problems. MVR mills already produce blended cements with only 30 per cent clinker content or, elsewhere, CEM I with finenesses of more than 6000 cm²/g (Blaine). Another plus is the fact that VRMs can generally change from one product to the next within a few minutes, this is due to the short material dwell time within the mill, this looks quite different with other grinding systems, such as the roller presses and ball mills.

Pfeiffer has taken up the cause of sustainability through technology, which is the reason for the innovative strength of the company, resulting in numerous improvements again and again, thus saving resources and energy even more. In the case of grinding plants, however, greener cement does not only have to do with design and process improvements, since the degree of digitisation of the plant also has an influence that should not be underestimated.

DIGITISATION AND AUTOMATION

New processes are coming along every day to integrate innovations. When people talk about Industry 4.0 digitisation, Internet of Things (IoT) or artificial intelligence (AI), this is not a future scenario, because due to the many possibilities, this has long found its way also into the cement industry. Gebr. Pfeiffer recognised the potential and importance of digitisation early on and formed a powerful team consisting of process and programming specialists who have jointly developed their own software and continue to expand it, because who understands the grinding process better than the vertical roller mill manufacturer itself.



MVR 6000 C-6 installed at the Shree Cement, Raipur plant.

The company’s portfolio of digital products includes practical and future-proof automation solutions as well as a Conditions Monitoring Systems (CMS) that go far beyond pure monitoring of the gearbox or data acquisition as well as data storage and artificial intelligence.

The digital product GPlink, for example, collects and saves sensor data. If the customer grants Pfeiffer access to this data, then this leads to optimised operation because it enables most effective remote support. The service engineer can quickly get an overview via the operation data and provide targeted assistance. The digital product GPpro builds on GPlink and offers several modules, including a CMS system, data analysis tools and reports. Another GPpro module is dynamic water injection to save water. To stabilise the grinding bed in VRMs, a little water is often sprayed in before the grinding rollers. The mentioned module helps to keep the amount of water needed as low as possible, because the system reads data and automatically adds only as much water as is necessary.

Of course, the exciting topic of AI must not be missing when it comes to digital modules. Even the most experienced plant operator, with an eye for optimised plant operation, is not capable of doing what AI makes possible. By using AI, any number of mutually influencing parameters can be calculated


through to find the ideal operating setting. And this know-how is retained even if the person in the control room changes. When the feed material is changed, the optimum parameter settings can be loaded or recalculated. Initial extensive tests with AI on operating plants have been very promising, and there is enormous potential for improvement here.

In response to changing requirements, all digital products from Gebr. Pfeiffer are constantly being further developed. The modular design offers, for example, functions in the areas of preventive maintenance, protection of the mill, reduction of water consumption, increased performance, reduction of energy consumption and more. GPlink and GPpro are not only available for new machines, because they can of course also be retrofitted to existing MPS or MVR mills.

CEMENT COLLABORATIONS

Vertical roller mills with the highest power density are of course the mills with the highest level of development. Gebr. Pfeiffer’s pioneering leadership is also reflected here, as its mills are more compact and perform better compared to the past and even today compared to the competition. Capacities that were once achieved in a specific mill size can be realised in a smaller mill now, which improve the carbon footprint and are accompanied by improved efficiency and cost reduction, benefiting cement producers.

Consumption of clinker will decrease, and consumption of SCMs will increase in the coming years to meet growing demand without further impacting the environment. As a reliable partner to its customers, Pfeiffer subscribes to this philosophy and does not rest on the fact that its MVR mill currently performs best compared to the competition.

The topics of efficiency, sustainability and digitisation are closely linked. These topics will continue to be the driving force in the further development of Pfeiffer products and processes. Economy and sustainability are not mutually exclusive; both must be in focus to continue to accompany the Indian cement industry on its journey. 



ABOUT THE AUTHOR:

D D Wanjale, Managing Director, Gebr. Pfeiffer India, has been with the company for the past nine years and comes with vast experience in the cement industry.

Bringing About a Green Change

VN Balasubramanian, Director - Head BU Polysius India, thyssenkrupp Industries India (tkII), discusses the various factors challenging Indian cement sector's fight against carbon emissions and the role technology partners play in the larger scheme of things.

BU Polysius has been in existence for over 150 years and has grown from a family-owned brand to a conglomerate. The philosophy of the Polysius group has always centred on quality, reliability and performance. India is a very price sensitive market, but as a group, thyssenkrupp Polysius is driven by the quality and ruggedness of German machinery. Their products may not be the cheapest in terms of price, but are amongst the best in quality. They do not believe in slashing their prices and compromising quality.

Major cement players from the Indian cement industry have relied on thyssenkrupp Polysius and have added multiple lines over the years. In addition, several new customers have also placed orders on Polysius in the recent past. Between 2010 and 2020, tkII Polysius have built 22 Pyro lines, which is a testimony to the reliability, quality of the equipment and service focus for the customer.

REDUCING CARBON FOOTPRINT

Carbon footprint reduction in the Indian cement industry is not yet a mandatory norm like in the west but the mandates are round the corner. The Indian cement industry has strict guidelines on noise and dust emissions, which they have admirably complied with. There are guidelines on SOx and NOx emissions but no penalties yet for carbon emissions. But the awareness has surely increased. Outside India, BU Polysius have come up with a lot of green technology initiatives for reduction in use of fossil fuels, utilisation of activated clay etc. There are plants in Europe operating on 100 per cent alternative fuel and raw materials (AFR) with equipment supplied by BU Polysius. This has twin advantages of reduction of carbon emissions as well as operational cost advantages to the customers. Polysius offers a complete solution for AFR handling from the collection point to feeding in the calciner with assurance of total substitution rate (TSR) and throughput. The solution is field proven, with several



VN Balasubramanian, Director - Head BU Polysius India, thyssenkrupp Industries India (tkII)

operating references and highly beneficial to the customer and of course, the environment in the larger scheme of things.

In India, the AFR usage is around 15-25 per cent and is very fragmented. The main hurdle in achieving higher TSR rates is the supply chain to ensure continued availability of the waste of the right quality. Secondly, many plants are not AFR ready. However, this trend is changing for the better now with customers insisting on designing AFR-ready plants.

Apart from the standard ISO specifications that they adhere to and following the DIN standards for designs that are based out of Germany, all their equipment are initially designed in Germany and horizontally deployed in India. Hence, the thyssenkrupp India team does not copy, only improvise/ modify to match Indian conditions, get their approvals for BU Polysius and move forward. The vetting is a mandatory process for maintaining standards and reason for higher costs of their products. Every big and small equipment is DIN standard specified and over a period they are vetted. tkII workshops are approved by BU Polysius Germany Quality experts,

who also carry out periodic inspections to ensure quality standards.

Customer Complaints at tKII are accorded top priority and resolution within a fixed period is an absolute must. They have a standard four-eyed principle for offer and design submission, vetted by a minimum of two people to avoid any errors.

thyssenkrupp BU Polysius India Global Engineering Centre is one of the two centres in the world, catering to plant design for BU Polysius Germany for their global projects. It comprises handpicked designers trained by Polysius Germany to deliver top class quality on rigid timelines. To maintain the high standards, German experts constantly evaluate and upgrade the skills of the team.

ROLE OF AUTOMATION AND TECHNOLOGY

Operating costs are constantly on the rise. The goal is to reduce the production cost to the best possible extent for the customers. In the former days, there used to be about 800 people working in a cement plant and today it has been reduced to less than 250 in India. Similar plants overseas operate with less than 100 personnel. This has been possible largely due to digitalisation and automation. The trend is gradually gaining pace in the Indian cement industry as well. Manual intervention in inspection and operation not only increases the cost but also the

probability of errors. Today automation is not just a buzzword but the need of the day.

For example, their R&D Centre in Germany can evaluate the real time performance of a Polysius plant in India or any corner in the world without physically visiting. It, of course, comes at a price but with proper planning in the early stages of the project, the cost is negligible. It is possible even in operating plants of any make. The cost incurred vis-à-vis advantages of an automated solution is a no brainer.

Developing a digitalised solution for improving operational efficiency is a challenge, and there are many players in the market but with thyssenkrupp Polysius, the added advantage is the knowledge of process technology that comes along. Thus, the output from their automation solutions are more precise and accurate, which are accompanied by precise recommendations.

Regarding polab® laboratory automation, Polab stands for POLYSIUS Laboratory. It is one of the most automated and reliable products in the market today. It is a step towards the future where it cuts out personal and human intervention. With the POLAB, samples are collected automatically from every stage of the production line, transported to the lab and results delivered within a few minutes and correction is carried out online.

Earlier cement plant laboratories used to have



The return on investment at the Wonder Cement pyro lines is high as the entire system is fully integrated and operational.



Fragmented use of AFR is a hurdle towards achieving higher TSR rates.

6-8 people in a shift and at least 10-12 in the lab for the physical and chemical testing. Now, the POLAB carries out the tests automatically with a robot that does all the testing, and usually operates with just one person per shift to oversee the operation. The total design and supply of crucial components are from Germany. Another USP is the assembly and trial of the entire system in our R&D centre in Germany before being shipped out to the plant location. thyssenkrupp BU Polysius specialises in this kind of automation.

In India, Wonder Cement has four pyro processing lines from BU Polysius through tkII. The association started with the first line and with each new Pyro line, modules added subsequently. The entire system is fully integrated and operational. The key components in all lines are manufactured and assembled in Germany. The quality control at every stage is excellent and very precise. It contributes to the image of Wonder cement. The return on investment is high in this scenario. There are other players also in the market but very few bring with them the technology that is akin to BU Polysius.

polab® is yet another equipment that the company is proud of. They are thinking of steps to further indigenise some components to optimise costs and work on the lines of 'Make in India' initiative so that over a period of time, it becomes more affordable for all cement players in India, without any compromise on quality. For the past two years, India has been one of the most fiercely expanding economies and top of the order in terms of capex investments in

the cement sector.

A few years ago, thyssenkrupp India used to execute 2-3 pyro lines in a financial year. But in the past couple of years, they are executing on at least five pyro lines with 10-12 raw grinding units simultaneously without any big-time increase in headcount. This has been possible due to the proactive support from the parent organisation in Germany and excellent work of the young and exuberant team in the BU Polysius India. It would not have been possible without them.

With the tremendous thrust on infrastructure in the recent budgets, the Government of India has opened floodgates of opportunity for the cement sector. Hence, the bullish trend should continue for a few more years but will continue to be severely price competitive. Hence, the key lies in optimising design and cost without compromising quality. Indian cement plants are amongst the most efficient worldwide in terms of fuel and power consumption but we are not yet there in terms of emissions and cost competitiveness.

The Government of India and the cement industry are putting efforts in that direction. But, given the size of India and its diversities, the task is daunting. They are optimistic that change will happen soon and tkII BU Polysius with the technology back up is prepared to partner the cement makers to bring this green change to cement manufacturing, which will not only help the current generation but also the future generations.



- Kanika Mathur

Leveraging Technology for Efficiency

Nischal Mehrotra, Vice President, Sales & Marketing LiuGong India, discusses the role of advanced engineering technology in developing efficient equipment for the cement industry.



Nischal Mehrotra, Vice President, Sales & Marketing, LiuGong India

Tell us about the equipment used at limestone quarries and coal mines that majorly supply to cement plants?

The equipment used in limestone quarries and coal mines can vary depending on the type of mining operation and the specific needs of the cement plant. However, some common types of equipment used in these industries include:

- **Drilling equipment:** This includes drill rigs and drilling machines that are used to create holes in the ground to extract the limestone or coal.
- **Excavators:** These are heavy-duty machines used to remove large amounts of soil, rock, and other materials from the ground.
- **Loaders:** These are used to move materials, such as limestone and coal, from the ground to trucks or conveyors for transport to the cement plant.
- **Crushers:** These are machines that break down large rocks into smaller pieces for easier transport and processing.

- **Conveyors:** These are used to transport materials from one location to another, such as from the quarry or mine to the cement plant.
- **Bulldozers:** These are used to level and shape the ground for mining operations and to move large quantities of material.
- **Blasting equipment:** This is used to break up rock formations in the quarry or mine to make it easier to extract the limestone or coal.
- **Haul trucks:** These are used to transport materials from the quarry or mine to the cement plant.

The equipment used in limestone quarries and coal mines that supply to cement plants can be quite diverse, but these are some common types that you might find in these industries.

What is the USP of your equipment that makes them the choice for operation by any contractor?

The company provides a range of construction equipment and machinery for various applications, such as earthmoving, mining, road construction, and material handling. Here are some USPs of Liugong India machinery that make them a preferred choice for contractors:

- **Quality and reliability:** Liugong India machinery is known for its quality and reliability. The company uses advanced technology and high-quality materials to manufacture its machines, ensuring they are durable and able to withstand tough working conditions.
- **Fuel efficiency:** Liugong India machinery is designed to be fuel-efficient, which helps contractors save money on fuel costs. This is achieved through advanced engine technology and optimised machine design.
- **Versatility:** Liugong India machinery is versatile and can be used for various applications, such as earthmoving, mining, and material handling. This makes it a preferred choice for contractors.

who need equipment that can perform multiple tasks.

- **Low maintenance:** Liugong India machinery is designed to require minimal maintenance, which helps reduce downtime and maintenance costs. The company also offers excellent after-sales support to ensure the machines are always in top condition.
- **Operator comfort and safety:** Liugong India machinery is designed with operator comfort and safety in mind. The cabs are spacious and ergonomic, providing a comfortable working environment for the operator. The machines are also equipped with advanced safety features to prevent accidents and ensure operator safety. Liugong India machinery is a preferred choice for contractors due to its quality, reliability, fuel efficiency, versatility, low maintenance, and operator comfort and safety.

How do you achieve cost efficiency and profitability in your operations?

Liugong India can achieve cost efficiency and profitability in its operations by focusing on the following strategies:

- **Manufacturing efficiency:** Liugong India can focus on optimising its manufacturing processes to reduce costs and improve efficiency. This can be achieved through automation, lean manufacturing principles, and other process improvement strategies.
- **Supply chain management:** Effective supply chain management can help Liugong India reduce costs and improve profitability. This can include optimising logistics, sourcing raw materials at competitive prices, and managing inventory levels.
- **After-sales support:** Providing excellent after-sales support can help Liugong India improve customer satisfaction and retention. This can lead to repeat business and positive word-of-mouth recommendations, which can ultimately help improve profitability.
- **Product innovation:** Liugong India can focus on developing innovative products that meet the changing needs of its customers. This can help the company differentiate itself from competitors and capture market share, leading to improved profitability.
- **Strategic partnerships:** Liugong India can form strategic partnerships with other companies to improve its operations. For example, partnering with a logistics company can help reduce

Liugong India achieves fuel efficiency through advanced engine technology and optimised machine design



transportation costs, while partnering with a technology company can help improve manufacturing processes.

By focusing on these strategies, Liugong India can achieve cost efficiency and profitability in its operations. This will help the company remain competitive in the market and continue to grow its business.

What is the role of technology in achieving efficiency in your operations?

- Technology plays a critical role in helping Liugong India achieve efficiency in its operations. Here are some examples of how technology is used by Liugong India to achieve efficiency:
- **Advanced engineering:** Liugong India uses advanced engineering technology to design and manufacture its machines. This includes computer-aided design (CAD) software and simulations that allow engineers to optimise machine performance and reduce the need for physical prototyping.
- **Telematics:** Liugong India machines are equipped with telematics systems that allow for remote monitoring and diagnostics. This helps to identify and address issues quickly, reducing downtime and improving machine performance.
- **Automation:** Liugong India uses automation technology to improve manufacturing efficiency and reduce costs. For example, robots can be used for welding, painting, and other repetitive tasks, reducing the need for manual labor.
- **Fuel efficiency:** Liugong India machines are designed with fuel-efficient engines and other features that help reduce fuel consumption. This not only saves money on fuel costs but also reduces the environmental impact of the machines.
- **Connectivity:** Liugong India machines can be connected to the internet, allowing for real-time data sharing and analysis. This can help optimise

machine performance, reduce downtime, and improve overall efficiency.

Technology plays a crucial role in helping Liugong India achieve efficiency in its operations. By leveraging advanced engineering, telematics, automation, fuel efficiency, and connectivity.

How do you ensure the delivery of quality product post mining or quarrying?

Liugong India ensures the delivery of quality products post-mining or quarrying by implementing the following measures:

- **Quality control:** Liugong India implements rigorous quality control measures at every stage of the manufacturing process. This includes using high-quality materials, testing components before assembly, and conducting final inspections before the machines are shipped.
- **After-sales support:** Liugong India provides excellent after-sales support to ensure its machines are always in top condition. This includes regular maintenance, repairs, and replacements of parts as needed.

- **Training and education:** Liugong India provides training and education to its customers to ensure they are able to operate the machines safely and effectively. This includes operator training, maintenance training, and troubleshooting support.
- **Customer feedback:** Liugong India actively seeks feedback from its customers to identify areas for improvement and ensure that its machines meet their needs. This feedback is used to improve the design and functionality of the machines.
- **Warranty:** Liugong India provides a warranty on its machines to ensure customers have peace of mind and are protected against manufacturing defects.

By implementing these measures, Liugong India ensures the delivery of quality products post-mining or quarrying. This helps to build trust with its customers and improve its reputation in the market.



(Communication by the management of the company)

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Innovation to Drive Efficiency

Chintan Parikh, Executive Director, Techflow Enterprises Pvt Ltd, talks about dynamic air pollution control solutions for the cement industry.

In the Indian cement industry, several foreign suppliers are creating barriers to entry, limiting the number of options for Indian companies. However, Techflow Enterprises Pvt Ltd, a company with nearly five decades of experience, is emerging as a dynamic and innovative player in the industry. The company is gaining attention for its cost-effective air pollution control solutions and its locally-made Centrifugal Blowers, which boast world-class technology and innovation. Techflow's approach is making waves in the industry, offering a refreshing alternative to traditional suppliers. By providing high-quality products and services, Techflow is establishing itself as a leading provider of air pollution control solutions.

Techflow's in-depth expertise in product creation is one of its greatest assets. The company understands the unique demands and challenges of the market and creates products specifically designed to meet those needs. With a focus on reliability, cost-effectiveness, and efficiency, Techflow's air pollution control solutions are tailored to provide optimal performance. Their team of highly qualified engineers has developed a range of centrifugal blowers and bag filters to meet the diverse requirements of cement plants of all sizes. Techflow's commitment to crafting high-quality, customised solutions has earned it a reputation as a leading provider of air pollution control solutions.

Below are a few of the main USPs of Techflow's bag filters and blowers:

- AI-based operation to extend the life of the filter bag and other important components,
- Accurate problem prediction before it happens
- Condition based maintenance,
- Virtually minimal downtime,
- Savings in CAPEX and OPEX,
- Monitoring, data logs and AMC with both off-site and on-site support to plant maintenance team with our cloud-based system monitoring software,
- Energy Saving Module for compressed air and other areas,
- Entirely designed and manufactured in India that can rival and surpass the performance of any competitor's product created in developed countries.

Along with its superb products, Techflow also has a state-of-the-art infrastructure for the manufacturing




Reverse Pulse Jet Bag Filter with ID Fan and Blower specifically designed for the cement industry.

and engineering of its air pollution control solutions and centrifugal blowers. The company has invested heavily in advanced technology and machinery to produce high-quality products efficiently and cost-effectively. Its manufacturing facilities are equipped with cutting-edge equipment.

Techflow is also known for its exceptional customer service. The company works closely with its customers to understand their unique needs and challenges, and it provides expert advice and support throughout the installation and commissioning process. Techflow also offers comprehensive after-sales service and maintenance, ensuring that its products remain efficient and effective over their entire service life.

As the cement industry continues to evolve and face new challenges, Techflow is well-positioned to be at the forefront of this change. With its focus on innovation and efficiency, the company is constantly developing new products and solutions to meet the industry's changing needs. Its commitment to sustainability and environmental responsibility also aligns well with the industry's increasing focus on reducing its carbon footprint and improving its environmental impact.

In conclusion, Techflow Enterprises is fully prepared to use world-class products to produce a win-win situation for the Indian cement manufacturing plants. 

(Communication by the management of the company)

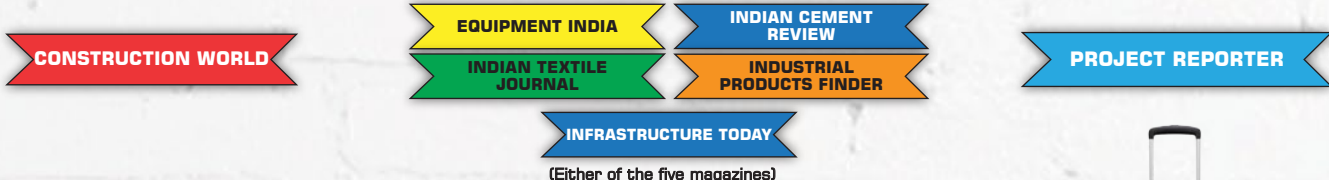
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Sr. No.	Company Name	Project Title / Details	Location	State	Budget (₹ Million)	Contacts
1	Ola Electric	Ola Electric Mobility's plan to launch four-wheeler Electric Vehicles (EVs) by 2024, the SoftBank-backed company has signed a memorandum of understanding with the government of Tamil Nadu to set up a four-wheeler EV manufacturing.	Krish-nagiri	Tamil Nadu	76140	17 Mn, Regent Insignia 100 Ft Rd, 414, 3rd Fl Bangalore-560034, Karnataka
2	Housing Board Haryana	The Haryana government presented a Rs 1.83 lakh crore budget for the financial year 2023-24 and set aside Rs 5,893 crore for urban development (UD) and the housing sector.	Multiple	Haryana	58930	Awass Bhawan, C-15, opp. General Hospital, Sector 6, Panchkula-134109, Haryana. T: 0172-2585852, 2568687 and 2567233 (Sh. Kabul Singh, Chief Engineer, T: 0172-2568007, Ritu Bhatia, Architect, ritu.bhaita@hbh.gov.in)
3	Government of Karnataka	Prime Minister Narendra Modi laid the foundation stone and inaugurated multiple development projects worth more than Rs 2,700 crore in Belagavi, Karnataka. He released the 13th installment amounting to about Rs 16,000 crore under PM-KISAN.	Belagavi	Karnataka	270000	No. 16/1 Miller's Tank Bed Area Vasanthanagar, Bangalore, Karnataka. T: 080-22260932, mdkf-csc123@yahoo.com
4	JSW Group	YS Jagan Mohan Reddy, Chief Minister, Andhra Pradesh, laid the foundation stone for JSW Group's proposed steel plant at Sunnapuralapalle village in YSR Kadapa district.	Kadapa	Andhra Pradesh	88000	Mr. Jayant Acharya, Director (Commercial & Marketing)/ Mr Lancy Varghese, Company Secretary, Bandra Kurla Complex, Near MMRDA Grounds, Bandra East, Mumbai-400051, Maharashtra. T: 022-42861000, F: 022-42863000, jayant.acharya@jsw.in, lancy.varghese@jsw.in
5	InoxCVA	Indian multinational, InoxCVA, inked an MoU with the government of Gujarat to set up a Rs 200 crore cryogenic tank manufacturing facility at Savli, near Vadodara.	Vadodara	Gujarat	2000	9th Floor, K P Platina, Race Course Vadodara-390007, Gujarat. T: 0265-6160100/2341449, inox@inoxcva.com, www.inoxcva.com
6	Bangalore Metro Rail Corporation	The Bangalore's Metro Rail network is set to expand by 40.15 km in the current financial year. The government has announced a sum of Rs 2500 crore in the latest state budget towards the ongoing projects of Namma Metro for the fiscal year 2023-2024.	Bangalore	Karnataka	25000	Vasanth Rao, CPRO, 3rd Floor, BMTC Complex, K.H.Road, Shanthinagar, Bangalore 560027, Karnataka. T: 080-22969216, 22969305, 206, 22969200, F: 22969222, vasanthrao@bmtc.co.in, www.bmtc.co.in, (A K Mathur, Executive Director)
7	Mumbai Metro Rail Corporation (MMRC)	The long-pending project to extend Mumbai Metro service on the Kalyan-Taloja stretch is finally taking momentum. The Maharashtra government has recently announced a fund of Rs 1,521 crore for the project and informed the works on the ground will start soon.	Mumbai	Maharashtra	15210	S K Guptam Director Projects, 202, 2nd Floor and 801 & 803, 8th Floor, Hallmark Business Plaza, Opp. Gurananaka Hospital, Sant Dnyaneshwar Marg, Bandra (East), Mumbai - 400051. (Ranjit Singh, MD)

Sr. No.	Company Name	Project Title / Details	Location	State	Budget (₹ Million)	Contacts
8	Indian Oil Corporation (IOC)	India's top oil firm IOC will set up green hydrogen plants at all its refineries as it pivots a Rs 2-lakh crore green transition plan to achieve net-zero emissions from its operations by 2046.	Multiple	Multiple	2000000	Anirban Ghosh, Executive Director and Maharashtra Head, 3079/3, Sadiq nagar, New Delhi-110049, Delhi. T: 011-26260142
9	NHPC	NHPC informed that the Cabinet Committee on Economic Affairs has approved an investment of Rs 1,600 crore for 'pre-investment activities' for its 2,880 MW Dibang multipurpose project in Arunachal Pradesh.	Multiple	Arunachal Pradesh	16000	Y K Chaubey, Director (Technical), PC Office Complex, Sector-33, Faridabad-121003, Haryana. T: 0129-2588110, www.nhpcindia.com (Smt. Rupa Deb-Company Secretary, T: 0129-2254684, companysecretary@nhpc.nic.in)
10	Gujarat Mineral Development Corporation (GMDC)	State-run Gujarat Mineral Development Corporation (GMDC) will invest Rs 300 crore to maximise power generation at its 250MW Akrimota (Kutch) power plant.	Kutch	Gujarat	3000	Khanij Bhavan, 132 - Ring Road Gujarat University Ground, Vastrapur Ahmedabad-380052, Gujarat. T: 079-27913501, 27913200, contact@gmdcltd.com, www.gmdcltd.com
11	Indian Railways	The doubling of the Guntur-Bibinagar railway project has been approved by the Centre, providing a significant boost to the industrialisation of underdeveloped areas in Andhra Pradesh and Telangana.	Multiple	Andhra Pradesh	28530	Kultar Singh PRO, Rail Bhavan, Raisina Road, New Delhi-110001, Delhi. T: 011-23381224, 23363469, M: 9717630035, pro@nr.railnet.gov.in, mail.cpro.nr@gmail.com
12	Migsun Group	The Migsun Group is planning to invest Rs 706 crore in a nine-acre high-street commercial project at a newly acquired site in Rohini's Sector-22 in New Delhi.	New Delhi	Delhi	7060	Yash Miglani, Managing Director, C1/C2 Mahaluxmi Metro Tower, Sector-4, Vaishali, Ghaziabad-201010. T: 0120-4888650, info@migsun.in
13	Triveni Glass	Triveni Glass will invest Rs 1,000 crore to set up a 840 metric tonne per day capacity solar glass manufacturing plant in Andhra Pradesh. The glass-maker will set up the plant at Pangidi in East Godavari district, which will create 2,000 jobs.	East Godavari	Andhra Pradesh	10000	Mr.A.K.Dhawan, Director Finance, I, Kanpur Road, Allahabad-211001, Uttar Pradesh. T: 0532-2407325, F: 0532-2407450, M: 09415217268, akd@triveniassltd.com, www.triveniassltd.com/
14	Ministry of Road Transport and Highways	Union Minister for Road, Transport and Highways, Nitin Gadkari approved Rs 1292.65 crore under Bharatmala Pariyojana for the development of 32.00 km long 6-lane Access Controlled Greenfield Highway from Chandrasekharapuram to Polavaram on NH-544G.	Multiple	Andhra Pradesh	12926.5	Shri. I.K Pandey, DG(RD)&SS, Transport Bhawan, 1, Parliament Street, New Delhi-110001, Delhi. T: 011-23739088, dgrdss-rth@nic.in (Sh. S.K. Chakraborty, PPS, T: 011-23739088, M: 09871706242, sk.chakraborty@nic.in)
15	National Highways Authority of India (NHAI)	The Centre will spend Rs 44,950 crore in 2023-24 in Bihar under Bharatmala, a centrally funded project which aims to build a network of roads, highways and expressways across India.	Multiple	Bihar	449500	N N Giri, Project Manager, G-5&6, Sector-10, Dwarka, New Delhi-110075. T: 011-25074100 - 200, 25093507, 25093514. F: 011-25093507-14(Sh. Rajendra Choudhary, M: 09571669226, rajenc15596@gmail.com / Sh. Harish Sharma, 07727822200/ 011-25074100/200, harish-sharma@nhai.org)

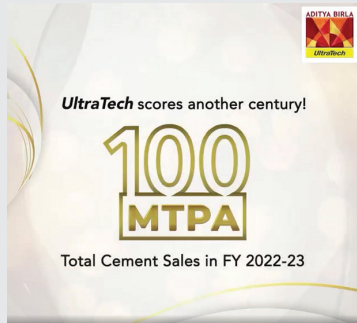
Sr. No.	Company Name	Project Title / Details	Location	State	Budget (₹ Million)	Contacts
16	Government of Madhya Pradesh	Rs. 511.15 crore was approved to abate pollution in Rivers Kahn and Saraswati in Indore. The project envisages construction of 2 STPs of 120 MLD, 40 MLD and 35 MLD capacities.	Indore	Madhya Pradesh	5111.5	Mukesh Chand Gupta, Commissioner, Technical Education, Skill Development and Employment Department, Vallabh Bhavan, Mantralaya, Bhopal- 462004, Madhya Pradesh. T: 0755-2708350, ctemp.bpl@mp.gov.in
17	South Western Railway	Tenders are invited for Construction of new broad gauge line track between Sindhanur (excl.) (84820) and Hirekotangal (incl.) (115500) (30.68 km) under Ginigera (gin) - Raichur (rc) new line project (165.57 km) including signalling, telecommunication & electrical works on EPC mode	Raichur	Karnataka	6317659793	General Manager, Civil, Projects, Dr. Rajkumar Road, Rajajinagar 1st Block, Bangalore-560010, Karnataka. T: 080-24482800, dgm@kride.in
18	Uttarakhand Metro Rail Corporation Ltd	Tenders are invited for Development of Personalised Rapid Transit (PRT) System in Haridwar City of Uttarakhand called Haridwar Darshan PRT on PPP Model under Design Built Finance Operate and Transfer (DBFOT basis)	Haridwar	Uttarakhand	13285900000	Dr. Raghvendra Sharan Dubey, General Manager (Civil), UKMRC, 4th Floor, SCI Tower, Opposite- Mahindra Showroom, Haridwar Bypass Road, Ajabpur, Dehradun-248121, Uttarakhand.
19	Uttar Pradesh Metro Rail Corporation (UPMRC) Ltd	Tenders are invited for Design and Construction of TBM Tunnel, Cut & Cover Tunnel, ramp after Double Pullia, ramps in Agriculture Depot for main line and depot connections and three underground metro stations (viz. Rawatpur, Kakadeo and Double Pullia) including Architectural finishes etc on Corridor-2 of Kanpur MRTS Project at Kanpur, Uttar Pradesh	Kanpur	Uttar Pradesh	10250000000	Sh. Shambhu Nath Jha (Chief Engineer/Contract), Administrative Building, Near Dr Bhimrao Ambedkar Samajik Parivartan Sthal, Vipin Khand, Gomti Nagar, Lucknow, Uttar Pradesh. M: 07705005642, cecontract@upmrc.co.in, www.upmetrorail.com
20	Border Road Organisation	Tenders are invited for Construction of road Manali-Sarchu-Leh to NHDL specifications from design chainage km 244.000 to km 268.670 on nh-03 (taken manali as km 0.000) under project Himank in Ladakh (ut) on EPC mode (length 24.670 km)	Multiple	Ladakh	3464000000	Dr. Krashnendra Singh, Director (Contracts), HQ ADGBR (NW)/ BRO Complex Near Motor Market, Sector 48C Chandigarh-160047. T: 0172-2923300, bro-adgnw@nic.in
21	Public Works Roads Department, Government of Assam	Pre-Qualification application for construction of extra dosed PSC bridge over river Brahmaputra connecting Palashbari and Sualkuchi including via duct, approaches, river training works etc. on EPC mode	Kamrup	Assam	26000000000	Chief Engineer, PWD (EAP) Assam, Fatasil Ambari, Guwahati-781025, Assam
22	National Highways And Infrastructure Development Corporation Ltd	Tenders are invited for Construction of balance works of major bridge over middle strait creek between Km. 106.590 to km 107.762 of NH-04 connecting South Andaman and Baratang Island in the Union Territory of Andaman and Nicobar Islands on EPC Basis	Multiple	Andaman and Nicobar Islands	2475500000	Devender Kumar, Dy. General Manager (Tech), 3rd floor, PTI Building, 4-Parliament Street, New Delhi, Delhi. T: 011-23461620, devender.kumar91@gov.in



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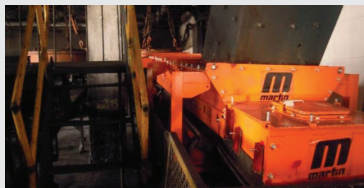
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#ESG #GrowthWithGoodness
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#WaterConservation

in Dalmia Bharat Group

Reflecting on last years water conservation efforts: Anandibai Saronobat Girls Highschool and Junior college, Asurle-Porle celebrated World Water Day in a unique way! Dalmia Bharat Foundation organized a Water Conservation Drawing Competition and engaged in an activity where we sat in the pose of water's H2O formula. Let's keep spreading awareness about the importance of water conservation and work towards a sustainable future!

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PROBLEM SOLVED! Belt Support Solves Fugitive Dust & Spillage Problems. Read it here:



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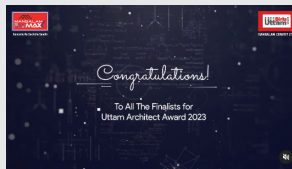
"Yes, I can sit on the board as a shareholder from the family, but am I the right person to lead those businesses?"
Says our MD, @ParthJindal11

Humbled by his attitude, we see how he does what's best for the collective, and constantly puts the company first.



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Congratulations to the 5 talented participants who have been shortlisted for the final round of the prestigious Uttam Architect Award 2023! We were blown away by the creativity, innovation and skill displayed by all the entries, but these five stood out from the rest.

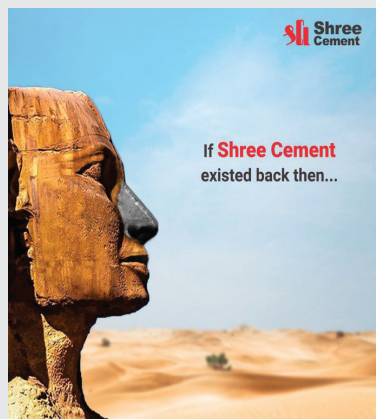


Without further ado, the shortlisted participants are:

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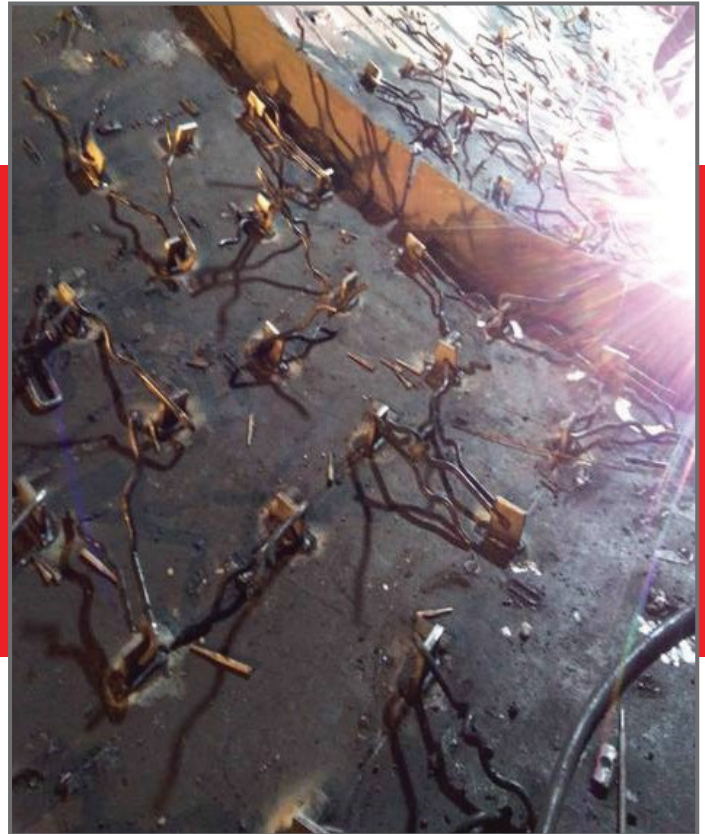
With two dazzling Oscars, Indian cinema makes a huge statement at the 95th Academy Awards. Heartiest congratulations to the winners!
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