CHRONICLING PROCESS INDUSTRY INNOVATIONS SINCE 1966 VOL.61 | ISSUE 3 | MARCH 2026 | MUMBAI | TOTAL PAGES 50 | PRICE ₹ 150

CHEMICAL ENGINEERING WORLD

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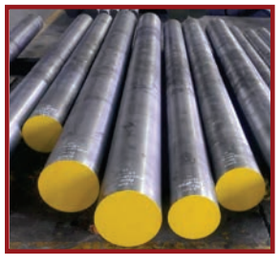

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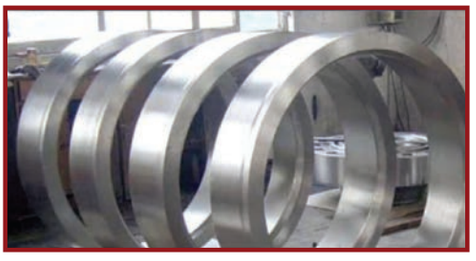

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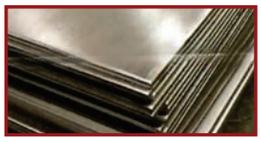

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I Hemant K Shetty, hereby declare that the particulars given above are true to the best of my knowledge and belief.

Date: 28th February 2026

Signature of Publisher

Henkel India partners with DISH to promote workplace safety and labour codes awareness in Kurkumbh MIDC

Kurkumbh, Maharashtra: Henkel hosted senior officials from the Directorate of Industrial Safety and Health (DISH), including Shri Sudhir Shinde, Joint Director, and Shri Pravin Patil, Deputy Director, along with representatives from industries across Kurkumbh MIDC, as part of the National Safety Week observance.

The gathering aligned with this year's theme, "Engage, Educate, Empower," highlighting the importance of strengthening workplace safety through awareness, training, and shared responsibility. During the interaction, Henkel emphasized the need for industries within the Kurkumbh industrial cluster to collaborate more closely, exchange best practices, and learn from each other across areas such as occupational, health, and process safety.

Balaji Gopalaswamy, Site Director, Henkel Kurkumbh, said: "The theme, 'Engage, Educate, Empower,' strongly resonates with our approach to safety. At Henkel, we believe safety is built through continuous engagement with our teams and by learning from each other as industries. Platforms like this allow companies in Kurkumbh MIDC to share expertise across occupational, health, and process safety, and collectively strengthen the safety culture for everyone working in the region." The engagement also focused on raising awareness around the new Labour Codes introduced by the Government of India, particularly the Occupational Safety Health and Working Conditions Code, which aims to streamline and strengthen workplace safety regulations across sectors.

India's global chemical sector share to increase to 5–6% by 2030: Union Minister J P Nadda

New Delhi: The three dedicated Chemical Parks in the country is a strategic bet on India's future, said Union Minister of Chemicals and Fertilisers Shri J P Nadda. Addressing the post-Budget Webinar on the theme *"Sustaining and Strengthening Economic Growth"* Shri Nadda highlighted that while India's chemical sector's output is worth ₹19.4 lakh crore and is strong in segments like dyes and agrochemicals, its global share remains at 3 per cent.

Identifying infrastructure as the key gap, the Minister said ₹3,300 crore for 3 dedicated world-class chemical parks across the country with plug-and-play utilities, advanced effluent treatment systems, integrated logistics, and built-in safety mechanisms would address that gap.

These parks are expected to enable 20–40 per cent cost reduction through industrial symbiosis and promote a circular economy by design. Shri Nadda outlined an ambitious vision to increase India's global chemical sector share to 5–6 per cent by 2030 and achieve a $1 trillion turnover by 2040.

Coal continues to play significant role in energy security

New Delhi: Coal is continuing to ensure reliable baseload power to support core industries such as steel and cement that underpin the economic growth of the country.

The coal production in the country continues at a pace matching with the prevailing demands of the consumer and building adequate stocks at the mine-end for maintaining adequate supplies to the consumers as per their requirements with the continued support of Railways.

The pithead coal stock at the mines of Coal India Limited (CIL), which was 106.78 MT as on 1st April 2025 has grown to about 125.54 MT as on 18th March, 2026. Further, there is around 5.75 MT of coal at the mines of Singareni Collieries Company Limited (SCCL) and another 15.75 MT coal at the mines of captive/ commercial mines and about 12 MT in transit & about 5.49 MT in ports and good-shed sidings.

This coal stock is in addition to the coal already available at the power plants which is around 53.41 MT, adequate for nearly 23 days at the present rate of consumption.

The Ministry of Coal remains steadfast in its commitment to fostering a stable, transparent, and performance-driven ecosystem through sustained policy facilitation, robust monitoring mechanisms, and proactive stakeholder engagement. These concerted efforts are aimed at ensuring reliable coal availability, enabling uninterrupted operations across critical sectors, and effectively meeting the nation's growing energy demands, thereby advancing the long-term national vision of a *Viksit Bharat* by 2047.

GAIL signs MoU with RailTel to explore telecom business opportunities

New Delhi: GAIL (India) Limited entered into a Memorandum of Understanding (MoU) with RailTel Corporation of India Limited to collaborate in the key sectors of the digital infrastructure in the country. The MoU was signed by Shri S S Agrawal, Executive Director (O&M-CO), GAIL and Shri J S Marwah, CS & GGM (Law), RailTel, in the presence of Shri Rajeev Kumar Singhal, Director (Business Development), GAIL, Shri Sanjai Kumar, Chairman and Managing Director, RailTel, and other senior officials from both the companies.

Speaking on the development, Shri Deepak Gupta, Chairman and Managing Director, GAIL, said, "This partnership is fully in sync with our vision to integrate energy and digital infrastructure, leveraging the transformative potential of artificial intelligence (AI), all of which are pivotal to India's development journey."

Shri Sanjai Kumar, Chairman and Managing Director, RailTel stated, "RailTel is committed to strengthening India's digital backbone through robust and secure communication infrastructure. Our collaboration with GAIL will enable both organisations to combine their strengths in network infrastructure and technological capabilities to accelerate the expansion of reliable digital connectivity across the country."

The strategic partnership seeks to reinforce India's communication framework, improve utilisation of resources, and drive forward the nation's digital connectivity initiatives at a rapid pace.

BASF to strengthen local production footprint in India with new dispersions line at Mangalore

Milind Joshi,
Business Director,
Dispersions, South Asia,
BASF

Mumbai: BASF is expanding its dispersions production capacity at its Mangalore site with the addition of a new production line. As demand for high performance dispersions continues to evolve, this addition will strengthen BASF's ability to provide reliable local supply and advanced solutions tailored to the needs of customers in India and the broader region.

"The expansion of our Mangalore site will strengthen synergies across BASF's Asia Pacific manufacturing network, ensure dependable supply, and enable us to provide innovative, cost-competitive dispersion solutions to our customers in India and the region," said Andreas Fechtenkoetter, Senior Vice President, Dispersions Asia Pacific, BASF.

India is among the fastest-growing major economies globally, driven by strong demographics, rising consumption, and government initiatives to boost infrastructure and manufacturing. To meet growing demand for premium, sustainable dispersions, BASF is enhancing its Mangalore operations, supporting customers' long-term growth and the evolving needs of key end-user industries.

"The new line is designed to manufacture advanced dispersions that deliver targeted performance and sustainability benefits," said Milind Joshi, Business Director, Dispersions, South Asia, BASF.

"Acronal® and Basonal® technologies enable low-VOC, durable formulations across paints, construction, and paper applications, backed by reliable local production."

Octave launches new brand built around unleashing intelligence at scale

Huntsville, Alabama: Octave, the potential software spin-off from Hexagon AB, has unveiled its new brand identity, marking a major step toward its transition into an independent company. Comprising Hexagon's Asset Lifecycle Intelligence and Safety, Infrastructure & Geospatial divisions, alongside the Bricsys, ETQ and Projectmates businesses, Octave's brand signals a clear vision of purpose and mission to unleash intelligence at scale.

"Octave exists to help customers make better decisions when complexity is high and the stakes matter," said Mattias Stenberg, Chief Executive Officer of Octave. "We aren't just launching a logo; this is a commitment to help organizations achieve the outcomes that matter most. When failure isn't an option and success is essential, Octave provides the clarity and accountability leaders need to realize their most critical outcomes."

Industrial and infrastructure organizations are facing escalating complexity and uncertainty across their operations. Today's leaders face a world of operational chaos, fragmented systems and data they can't trust.

Octave meets these challenges by transforming fragmented data into decisive action, helping leaders cut through the noise and turn unpredictability into a competitive edge.

By connecting the flow of data into one contextualized platform and leveraging domain specific artificial intelligence, Octave solutions provide the intelligence required to optimize performance across four core pillars - Design (Supports 3D modeling, engineering analysis, simulation and geospatial intelligence. Allows teams to create information-rich digital representations that serve as the basis for downstream activities); Build (Connects engineering, procurement, fabrication, construction, and commissioning workflows. Octave solutions coordinate materials, track progress, manage changes and improve cost and schedule predictability.); Operate (Unifies operational data, historical information, maintenance activities, quality systems and worker tools. This enables real-time insight, predictive intelligence and improved asset and system performance.); Protect (Elevates public safety, physical security and industrial cybersecurity. This includes incident response, emergency management, situational awareness, digital security and regulatory compliance.)

As part of Octave's new brand, the company also launched its new website, octave.com, and a social media presence (www.linkedin.com/company/octaveintelligence/) to bring to life how Octave supports critical assets and people across the globe.

The spin-off of Octave remains subject to an ongoing separation process and final approval of the board and shareholders, as well as other conditions, consents and regulatory approvals. There can be no assurances a separation, spin-off or listing will occur.

Lubrizol and Ashirvad enable safe water access for 500+ students in Pune

New Delhi: In a significant step toward equitable access to safe water, Lubrizol, a global specialty chemicals leader, in partnership with Ashirvad Pipes, India's leading CPVC pipes and fittings brand has completed the installation of Water, Sanitation and Hygiene (WASH) infrastructure across four government schools in the Pune district of Maharashtra. The initiative, implemented with support from Jal Seva Charitable Foundation, will ensure access to 13,000 litres of safe and clean water every single day benefiting over 565 students and 26 staff members.

The four schools covered under this initiative serve students who come largely from tribal and historically underserved households. Prior to this intervention, these schools faced significant gaps in safe water access and sanitation infrastructure.

The programme addresses these gaps directly. Lubrizol has funded the end-to-end setup of water and sanitation infrastructure across all four schools. Ashirvad Pipes has contributed to the project by supplying FlowGuard® Plus CPVC plumbing pipes and fittings. ■

Deepak Gupta assumes charge as CMD of GAIL

Deepak Gupta has assumed the charge as Chairman and Managing Director (CMD) of GAIL w.e.f. 01.03.2026. Mr. Gupta, Mechanical Engineer from Delhi College of Engineering, has more than 35 years of deep and diverse experience across oil and gas value chain. He brings comprehensive blend of technical, strategic and board level leadership. His expertise spans project and construction management, contracts and global procurement, technology selection, business development, operations and maintenance. A thought leader and prolific writer, Mr. Gupta, has authored several technical papers/ articles on critical packages and fast-tracking project execution. His ideas on project acceleration, digitization and excellence have been institutionalized as best practices. ■

Praveen M Khanooja assumes additional charge of CMD of EIL

The Ministry of Petroleum & Natural Gas has informed that the Hon'ble Minister (PNG) has approved the entrustment of additional charge of the post of Chairman & Managing Director, Engineers India Limited to Shri Praveen M. Khanooja, Additional Secretary, MoPNG for a period of three months w.e.f 01.03.2026 or till the appointment of a regular incumbent to the post or until further orders, whichever is the earliest. Mr. Khanooja is working as Additional Secretary in the Ministry of Petroleum & Natural Gas since August 2022. He is a B. Tech in Chemical Engineering and M. Tech in Management & Systems. He belongs to 1994 batch of Indian Audit & Accounts Service and has worked in various capacities in Defence Audit, Railways Audit, State Government Accounts & Audit at many field and CAG Headquarters' postings. ■

Shivtek Spechemi Industries appoints Dr. Trusar D. Bagul as Independent Director to lead scientific governance and innovation

Shivtek Spechemi Industries Ltd, the leading specialty chemicals manufacturer and flagship company of the Shiva Group of Industries, has announced the appointment of Dr. Trusar D. Bagul as an Independent Director to its Board. Holding a PhD in Organic Chemistry from the National Chemical Laboratory (NCL), Pune, Dr. Bagul brings a rare combination of profound academic research and industrial expertise to the board. The strategic appointment is part of Shivtek's continued focus on strengthening governance, deepening technical oversight, and supporting its long-term growth and innovation roadmap. ■

Government allocates extra ₹19,000 crore for fertilizer subsidy

New Delhi: Union Finance Minister Smt. Nirmala Sitharaman has informed that the country currently holds a robust fertilizer stock of 163 lakh metric tonnes (LMT) for the month of April. This represents a significant 26 per cent increase over the previous year's stock of 128.54 LMT, a result attributed to the government's visionary planning.

The Finance Minister highlighted that the government is spending approximately ₹19,000 crore more than the original Budget Estimate for fertilizer subsidies in second supplementary demands. She emphasized that the focus remains on boosting domestic manufacturing alongside necessary imports. Domestic urea production has seen a steady rise, growing from 225 LMT in 2014-15 to 306.67 LMT in 2024-25.

To further enhance self-reliance, the government has already operationalized six new production units under the New Investment Policy initiated by Prime Minister Narendra Modi. These units, each with an average annual capacity of 12.7 LMT, have collectively added 76.2 LMT to the nation's urea production capacity. Additionally, work is underway on two new plants in Odisha and Assam under the 2015 New Urea Policy, which are expected to add another 25.4 LMT annually once they become functional. Beyond new installations, the government is also expanding the capacity of existing plants to meet agricultural demands.

Centre declares fertilizers essential commodity

New Delhi: The Government of India has taken stringent steps to ensure the availability of quality fertilizers to farmers and to curb the manufacture and sale of fake fertilizers in the country.

The Minister of State for Chemicals and Fertilizers Smt. Anupriya Patel informed that the Fertilizer (Inorganic, Organic or Mixed) Control Order, 1985, administered under the Essential Commodities Act, 1955, strictly prohibits the manufacture or sale of fertilizers that do not meet prescribed standards. State Governments are the designated enforcement authorities responsible for taking action against violations, including cancellation or suspension of licenses and penal action under the Essential Commodities Act, which provides for imprisonment ranging from three months to seven years. Further, as per the information received from the State Governments, most States have reported that no factories and companies are found involved in the manufacturing of fake chemical fertilizers during the last five years. However, a few States have reported such cases against person/vendors and actions taken by them. The State of Chhattisgarh registered two FIRs; Haryana registered four FIRs; Karnataka registered 15 FIRs; Madhya Pradesh reported 16 cases of fake fertilizers and registered 14 FIRs; Maharashtra registered cases against 19 manufacturers involved in fake fertilizers; Odisha reported three cases; Rajasthan took action against 42 manufacturers of suspicious fertilizers; and Uttar Pradesh reported 36 cases during the last five years.

Furthermore, Government of India has declared fertilizers as an Essential Commodity under the Essential Commodities Act, 1955, and has adequately empowered State Governments to prevent any form of tagging/forceful selling. However, DoF has issued instructions on regular basis to fertilizer companies and State Governments to discourage tagging of other products with subsidized fertilizers.

Government enhances gas supplies to increase fertilizer availability

New Delhi: Amid recent developments in West Asia, the Government of India has successfully executed a multi-pronged strategy to stabilize and increase fertilizer availability ahead of the Kharif 2026 season. Through a combination of domestic production hikes and a sophisticated global procurement strategy, the Department of Fertilizers has moved to insulate Indian farmers from global supply chain volatilities.

Government has successfully concluded EPMC (Empowered Pool Management Committee) bidding for natural gas, a move that directly translates to more Urea on the ground. By securing an additional 7.31 MMSCMD (Million Metric Standard Cubic Meters per Day) of gas on a spot basis, the total supply to urea plants has jumped by 23 per cent (from 32 MMSCMD to 39.31 MMSCMD). This technical intervention is set to yield immediate results: domestic Urea production is projected to climb by almost 23 per cent i.e. from 54,500 MT/day to 67,000 MT/day. Crucially, this brings the plants' gas requirement fulfillment to 76 per cent of their average needs, up significantly from the previous 62 per cent. ■

Croda opens new manufacturing facility in Dahej to support growth and sustainable innovation

Gujarat: Croda International Plc, the company that uses smart science to create high-performance ingredients and solutions that improve lives, has inaugurated a new greenfield manufacturing facility in Dahej, India, strengthening its ability to serve fast-growing markets in Asia.

Located in Gujarat, the facility benefits from strong logistics connectivity and is designed to serve both domestic customers and selected export markets. It will support demand across Croda's Consumer Care, Life Sciences and Industrial Specialties sectors.

Built around the theme 'Built Green. Built Smart. Built for the Future', the Dahej site has sustainability embedded from the outset. It has been designed to significantly reduce Scope 1 and 2 emissions, enabled by renewable electricity and fuel sources. Additional features include Zero Liquid Discharge systems that are expected to become operational later in the year, the use of RSPO-certified oleochemicals and alignment with Extended Producer Responsibility plastic recycling requirements.

The site has also been developed with advanced operating systems, robust quality infrastructure, and high safety standards to enable reliable, efficient manufacturing. During construction, the project achieved over 5 million safe working hours, reflecting Croda's 'Safety First Always' culture.

In addition, the facility supports Croda's commitment to inclusion, with 100 per cent women-led packaging operations and an ambition to achieve 30 per cent female representation at the site.

Murali Duvvuri, Senior Managing Director, Life Sciences - Asia & Region India, said, "India is a strategically important market for Croda, and this investment brings us closer to our customers while strengthening local manufacturing capability. The Dahej site enables us to deliver high-quality, sustainable solutions with greater speed, reliability and flexibility, supporting our customers' growth and innovation needs."

WABAG JV secures order from CMWSSB to build Chennai's city-wide looped water grid

Chennai: VA Tech Wabag, a leading pure-play water technology, has secured a Letter of Award from the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) to develop a looped transmission network under the Chennai Climate Resilient Water Security and Sewerage Project (CCRWSSP) for Greater Chennai City (GCC). Funded by the Asian Development Bank, the project will establish a city-wide water grid platform for Chennai, enabling flexible water routing, improved pressure management, and greater operational reliability under both normal and emergency conditions. This project will be executed by a joint venture where WABAG will be the leader.

The proposed ring main system will form the backbone of Chennai's water grid, strengthening the city's bulk water transmission network. By interconnecting existing and new pumping stations, service reservoirs, and key network nodes, the system will enable dynamic balancing of water flows across zones, reduce reliance on single transmission corridors, enhance resilience to supply disruptions, and ensure more equitable and reliable water distribution across the city. Beyond physical infrastructure, the project will introduce digital monitoring, automated control, and performance-based operations and maintenance, enabling smarter network management and strengthening CMWSSB's operational capabilities.

The scope of this project includes development of bulk transmission pipelines, feeder mains, pumping stations, and underground tanks, along with integration with the central SCADA system and testing and commissioning of the entire network. The project will be completed within 54 months, followed by 10 years of operation and maintenance.

Huntsman marks grand opening of operational unit expansion in Petfurdo, Hungary

The Woodlands, Texas: Huntsman Corporation celebrated the grand opening of its expanded Performance Products manufacturing facility in Petfurdo, Hungary, where operations were initiated at the beginning of this year. The successful completion of this investment increases Huntsman's global capacity providing greater flexibility, and innovative technologies for the polyurethane, coatings, metalworking and electronics industries.

One of the world's leading amine catalyst producers with over 50 years of experience in urethane chemicals, Huntsman has seen demand for its JEFFCAT® amine catalysts continue to grow across the globe. These specialty amines are used in everyday applications such as automobile seats, mattresses and energy-efficient insulation for buildings. Huntsman's latest product portfolio supports industry efforts to save energy, lower emissions and reduce odors in consumer products.

"This new capacity builds on our long-standing investments in Performance Products and strengthens our ability to support customers in fast-growing and evolving markets," said Jan Buberl, President, Huntsman Performance Products. "The expansion unit enhances our manufacturing flexibility, enables next-generation products and reflects our continued focus on sustainability, operational excellence and long-term value creation. As demand grows for cleaner, more efficient solutions, this investment positions us to respond with speed, innovation and reliability."

The project, supported by an investment grant from the Hungarian government, reflects the community's confidence in Huntsman and our shared commitment to future growth. Government officials joined the celebration to mark this investment in the region's long-term success.

"We greatly appreciate the support of the Hungarian government and value the strong partnership that helped bring this project to completion," Buberl added. "We look forward to continuing our collaboration as we advance economic development and manufacturing excellence in Hungary."

Plastic Energy technology powers start-up of advanced recycling plant at TotalEnergies' Grandpuits site

Plastic Energy and TotalEnergies have announced the start-up of their joint advanced plastics recycling plant, TotalEnergies Plastic Energy Advanced Recycling (TEPEAR), at TotalEnergies' zero-crude Grandpuits complex outside Paris. The facility, which has an annual processing capacity of 15,000 tonnes, uses Plastic Energy's patented advanced recycling technology to convert hard-to-recycle plastics into circular feedstock for the production of new plastics.

Following the successful production of the first batch of TACOIL™ earlier this year, the plant is now operational and producing circular feedstock from end-of-life plastics. Plastic Energy's proprietary TAC™ technology converts hard-to-recycle plastic waste that would otherwise be sent to landfill or incineration into TACOIL™, a circular alternative to traditional fossil-based feedstocks.

The recycled oil is processed at TotalEnergies' petrochemical sites and enables the production of plastics suitable for demanding applications such as food-contact packaging, medical-grade materials and other high-quality products.

The technology deployed at Grandpuits has already been proven at industrial scale at Plastic Energy's commercial plants in Spain. ■

Chemtech World Expo 2026: Photo Feature

The 32nd edition of Chemtech World Expo 2026, held during 3-6 February 2026, in Mumbai was a huge success. The four-day international exhibition included concurrent conferences on Engineering Procurement and Construction (EPC), Specialty Chemicals, Health Safety & Environment; Industry Automation & Control and Pumps Valves & Fittings; Bio-X India; Refining & Petrochemicals; Agrochemicals & Fertilizers; WaterEx; Surface Engineering & Corrosion Control; SCALE and Student Outreach Program.

Chemtech 2026 witnessed:

- 700+ Global Exhibitors from 15 countries
- 25,000+ Business Visitors from 50 countries
- 9 Concurrent technical Conferences
- 100+ ClimateTECH Startups (SCALE)
- 1000+ Engineering & Science Students from 56 cities of India (Student Outreach Program)

In this edition, we bring to you glimpses of the event held during 3-6 February 2026 and testimonials from industry leaders, who participated in the event.

Mr. Nadir Godrej

STUDENT OUTREACH PROGRAM 2026

Dr. R A Mashelkar

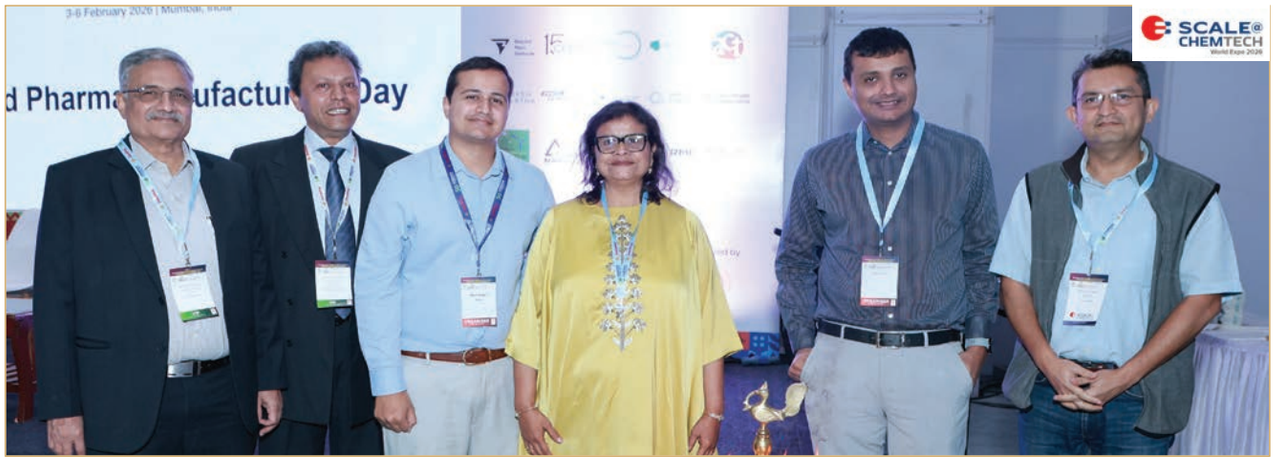
Dr. Rajesh S. Gokhale

Prof (Dr) Aniruddha B Pandit

Inaugural session of BioX India Conference on 4th February 2026: (L-R) Mr. Nadir Godrej, Chairperson, Godrej Industries Group and Chairperson and Managing Director, Godrej Industries; Mr. Maulik Shah, Chairman & Chief Executive, Jasubhai Group & Chemtech Foundation; Dr. P.M. Murali, Chairman, Jananom Group & President, Council of Presidents, ABLE; Mr. Hemant Shetty, CEO, Jasubhai Group & Chemtech Foundation; Dr. Rajesh S. Gokhale, Secretary, Department of Bio Technology, Government of India & Chairman – Central Advisory Board, Bio-X India World Expo & Conferences 2026, during the lighting of the lamp at the inaugural session of Bio-X India World Expo & Conference 2026.

Inaugural Session of Agrochemicals & Fertilizers Conference on 5th February 2026: (L-R) Mr. U K Bhattacharya , MD - STEAG Energy Services India, Former Director Projects, NTPC, Core Advisory Committee Member –ChemTECH, Dr. Siba Prasad Mohanty, Managing Director, Hindustan Urvarak & Rasayan Limited (HURL), Ms Ritu Goswami, Director (Technical), Rashtriya Chemicals & Fertilizers Limited

Inaugural Session of WaterEX Conference on 5th February 2026: (L-R) Mr. Suryam KV , Senior VP- Water, Centre of Excellence-Research & Technology, Reliance Industries Limited, Dr Arup Kumar Misra, Chairman, Assam Pollution Control Board, Mr Ajay Popat, Senior Advisor, Ion Exchange India Limited



Inaugural Session of SCALE Conference 2026

Inaugural Session of Surface Engeening Conference on 5th February 2026: (L-R) Mr. Sujoy Choudhury, Chief Strategy Officer, Haldia Petrochemicals Limited, Mr. Rajeev Mathur, Director, HCG Group, Core Advisory committee member, ChemTECH, Shri Shyam Jagannathan, IAS, Director General of Shipping & Additional Secretary to the Govt. of India, Ministry of Ports, Shipping and Waterways, Govt. of India, Shri Rajiv Agarwal, Director Technical, EIL, Cmde. Manoj Joseph , Principal Director, Naval Architecture, Naval Headquarters, Indian Navy

Inaugural Session of Refining & Petrochemicals Conference on 4th February 2026: (L-R) Dr. Arup Misra, Chairman, Assam Pollution Control Board, Ms. Sukla Mistry , Former Director Refinery, Indian Oil , Core Advisory Committee Member ChemTECH, Mr. Saumitra Priya Srivastava, Director- Marketing , Indian Oil Corporation Ltd, Mr. R K Srivastava , Former Director Exploration and CMD - ONGC , Independent Director - Essar Oil & Gas , Distinguished Professor , Core Advisory Committee Member, ChemTECH

Inaugural Session of IAC + PVF Conference on 4th February 2026: (L-R)Mr. Anil V. Parab, Whole-time Director & Member of L&T Board, Heavy Engineering & Manufacturing , Larsen & Toubro (L&T), Mr. U K Bhattacharya , MD, Steag Energy Services Pvt Ltd, Former Director Projects, NTPC, Core Advisory Committee Member ChemTECH, Mr Ranjay Sharan, President, Nuclear Energy Business -Reliance Industries Limited Advisor – RIL (Nuclear), Former Director Projects, NPCIL

India-Russia Round Table Meeting "Doing business with Russia"

Inaugural session of Health Safety & Environment Conference on 3rd February 2026: (L-R) Mr R K Srivastava , Former Director Exploration , ONGC , Core advisory committee member, ChemTECH; Dr. Alok Sharma , Director R&D, IOCL & Chairman, Central Advisory Board, Health, Safety & Environment Conference 2026; Mr. U K Bhattacharya , MD, Steag Energy Services Pvt Ltd, Former Director Projects, NTPC, Core Advisory Committee Member ChemTECH; Mr. Luc Herwin, Group Head - EHS, Larsen & Toubro and Mr. Rajeev Mathur, Director, HCG Group, Core Advisory committee member, ChemTECH.

Inaugural Session of Engineering Procurement & Construction Conference on 3rd February 2026: (L-R) Shri Neeraj Lal, ED-Asset Manager B&S Asset, ONGC; Mr Arvind Kumar, Director (Refineries), Indian Oil Corporation Ltd; Mr. Subramanian Sarma; Deputy MD & President, Larsen & Toubro Group; Mr Maulik Jasubhai, Chairman & Chief Executive, Jasubhai Group & Chemtech Foundation; Mr. B Narayan- Group President Projects & Procurement, Reliance Industries; Mr. Vinayak Pai, MD, Tata Projects and Ms Sukla Mistry, Former Director – Refineries, IOCL & Patron – Refining & Petrochemicals World Expo, ChemTECH.

Inaugural Session of Specialty Chemicals Conference & Release of Exhibitors Directory on 3rd February 2026: (L-R) Mr. Zareer Langrana, Former ED & President, Global Chemical Business, Tata Chemicals; Dr Raman Ramachandran , Director & Dean, KJ Somaiya Institute of Management; Mr. Artemyev Alexey Yuryevich, Deputy Director of the Department of Chemical Industry of the Ministry of Industry and Trade of the Russian Federation; Mr. Ashwin C Shroff, Executive Chairman, Excel Industries Limited; and Mr. Rajendra Gogri , CMD, Aarti Industries.

ChemTECH has long been a catalyst for meaningful business engagement and strategic alliances for the chemical and energy value chain. It is gratifying to see successful inaugural HSE Conference at ChemTECH 2026 in Mumbai, themed "Delivering HSE excellence with a unified approach." The conference effectively underscored the need to break silos and align leadership intent, technological innovation, and frontline execution for sustainable growth. Well done and keep it up."

- Dr Alok Sharma,
Director(R&D), Indian Oil Corporation Ltd
Chairman, Technical Advisory Group, Health Safety & Environment Conference 2026

It was an honour to deliver one of the keynote addresses at the recent HSE conference during the ChemTECH and Health, Safety & Environment World Expo 2026 in Mumbai. Participating in this prestigious platform and engaging with industry leaders, experts, and stakeholders was truly enriching. I sincerely appreciate the organisers and the ChemTECH team for the invitation and for curating such an impactful event that fosters dialogue, innovation, and collaboration across the HSE community. The insightful discussions and the collective commitment to advancing safety excellence made the experience deeply meaningful. My heartfelt thanks to everyone involved for the warm hospitality and the opportunity to contribute."

- Luc Herwin,
Group Head - EHS, Larsen & Toubro

It was a delight to be part of the Inaugural Session of the ChemTECH EPC Conference during Chemtech World Expo 2026 and quite inspiring to hear interesting perspectives on the theme "POWERING THE NEXT EPC GROWTH WAVE – REDEFINING EXCELLENCE." The 3 days Conference started on the positive note, with renewed optimism for Indian industry, especially in light of the recent India–US developments that are strengthening global collaboration and industrial momentum. Acknowledge the remarkable journey of the Jasubhai Group, creating a powerful global platform connecting stakeholders across chemicals, EPC, energy, pharma, automation, and allied sectors. Overall an impactful Chemtech World Expo 2026."

- Neeraj Lal,
ED-Asset Manager B&S Asset, ONGC

BIO-X India – World Expo & Conference 2026 convened a dynamic cross-section of industry leaders, innovators, researchers, startups, and policymakers to reflect on and shape the future of biotechnology in India. The discussions underscored the accelerating momentum in areas such as biomanufacturing, healthcare innovation, and emerging bio-based technologies. Platforms like BIO-X play a critical role in fostering dialogue, enabling partnerships, and facilitating the translation of scientific innovation into impactful applications. ABLE was pleased to partner with Chemtech in powering this initiative and contributing to strengthening India's position as a leading global biotechnology hub."

- Dr. P. M. Murali,
President, Council of Presidents, Association of Biotechnology Led Enterprises (ABLE)

It was an honour to be a part of Chemtech 2026 held during 3-6 February 2026. I was associated with both Health Safety & Environment and WaterEx conferences, and it was wonderful to moderate panel discussions with experts during the event. Chemtech is a great platform and has played an instrumental role in bringing the experts and leaders from the industry to discuss and deliberate on the challenges, advancements and the future of the industry. The message is loud and clear – we need to gear ourselves to move towards the goal of achieving HSE excellence and focus on innovation, collaboration and sustainability to secure India's water future. I extend my heartfelt congratulations to the Chemtech team for organizing another successful edition of Chemtech 2026. My best wishes for your future events."

- Mr. Mukesh Mohan,
ED-HSE, IndianOil Corporation Limited

ChemTECH has consistently served as a powerful platform for fostering business partnerships, meaningful dialogue, and strategic collaboration across the chemical process industry and the energy value chain. It was a privilege to Chair and participate in the Industry Automation & Control Conference at ChemTECH 2026 in Mumbai, themed "Industry 4.0 and Beyond." The conference underscored the transformative role of Industry 4.0 in driving technological innovation, enhancing operational excellence, and strengthening frontline project execution. The scale of the event was truly impressive, with 700+ exhibitors showcasing cutting-edge technologies and 9 technical conferences facilitating deep industry engagement. Such gatherings reaffirm the industry's collective commitment to innovation, digital transformation, and sustainable growth."

- Anil V Parab,
Whole-Time Director & Sr. EVP (Heavy Engineering and Manufacturing) Larsen & Toubro Limited

Indo-German Pavilion

Russian Pavilion

Indian Oil Corporation Limited Stall

Visitors at Chemtech 2026

UK Pavilion

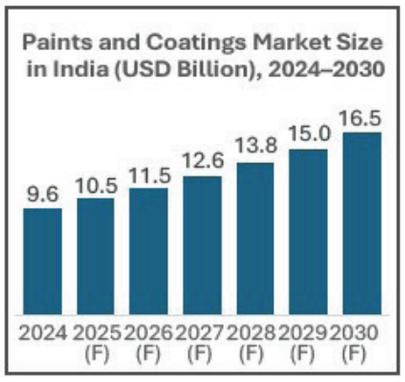
India's Paints & Coatings Industry Eyes $16.5 Billion in Next 5 Years: Rubix Industry Insights

India's paints and coatings industry, which was valued at about $9.6 billion in 2024, is projected to grow at a CAGR of 9.4% till 2030, and is likely to reach approximately $16.5 billion in the next five years, says ***Rubix Data Sciences'*** latest Industry Insights Report. While long-term demand drivers remain strong, FY2025 marked a turning point for the industry, exposing rising competitive pressure, margin stress, and structural challenges across the value chain. We bring excerpts from the report.

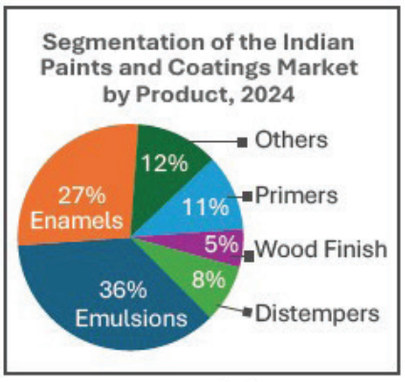
Growth in the Indian Paints and Coatings industry, continues to be supported by rapid urbanisation, rising disposable incomes, sustained infrastructure development, and expanding housing construction. India's position as the world's third-largest automobile market, combined with its ambition to reach the top spot within five years, also creates sustained demand for automotive and industrial coatings, strengthening the medium-term outlook. However, FY2025 proved particularly challenging, even for market leaders. Leading paint manufacturers faced compressed margins, softer urban demand, and intensified price-based competition, as consumers increasingly traded down to value offerings. Aggressive discounting and higher dealer incentives weighed on profitability, signalling a shift from a historically stable, brand-led market to a far more contested competitive environment.

The pressure is especially acute for the nearly 3,000 small and unorganised paint manufacturers operating across the country. Rising compliance costs linked to environmental and low-VOC regulations, limited ability to invest in R&D and product innovation, and the absence of meaningful marketing and distribution budgets are making survival increasingly difficult for smaller players. For many of these manufacturers, sustaining operations amid regulatory, technological, and competitive pressures has become a challenge, and growth is a far cry.

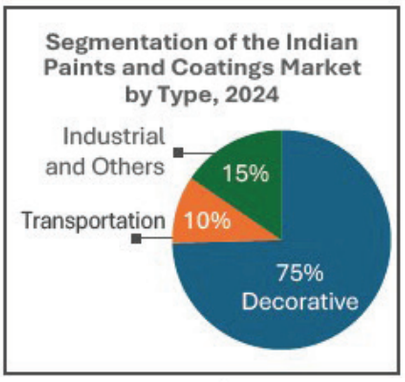
At the same time, the industry has witnessed significant disruption from new entrants and consolidation. In the last few years, the entry of players such as Grasim Industries' Birla Opus, JSW Paints, and Pidilite's Haisha Paints, along with consolidation moves, including

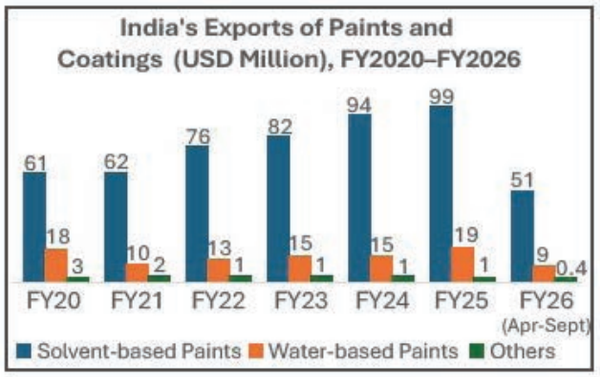


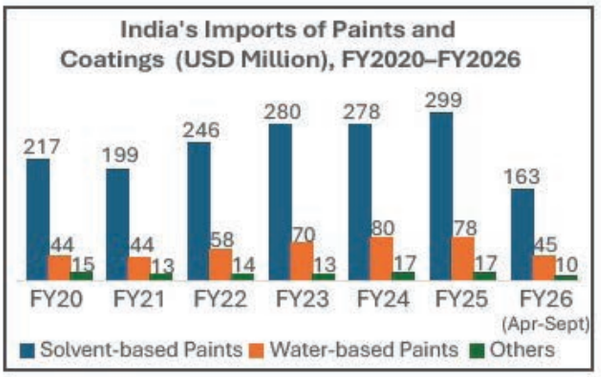
Source: ICICI Direct



Source: CRISIL Market Intelligence and Analytics (MI&A)

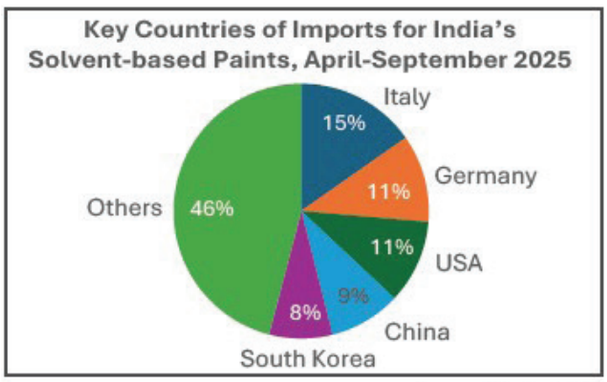


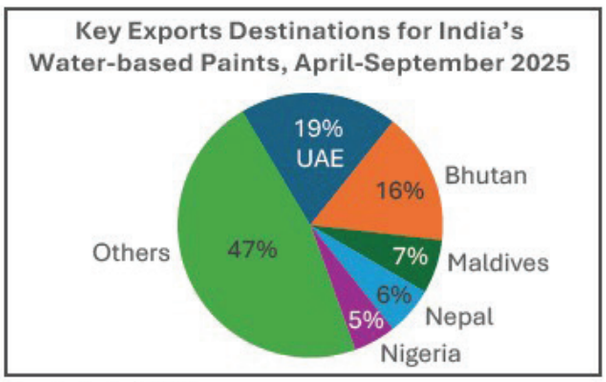




Source: Directorate General of Foreign Trade (DGFT)

Note: Solvent-based paints refers to HS code 3208, water-based paints refers to HS code 3209, and others (comprising other paint varnishes, including enamels, lacquers, etc.) refers to HS code 3210.

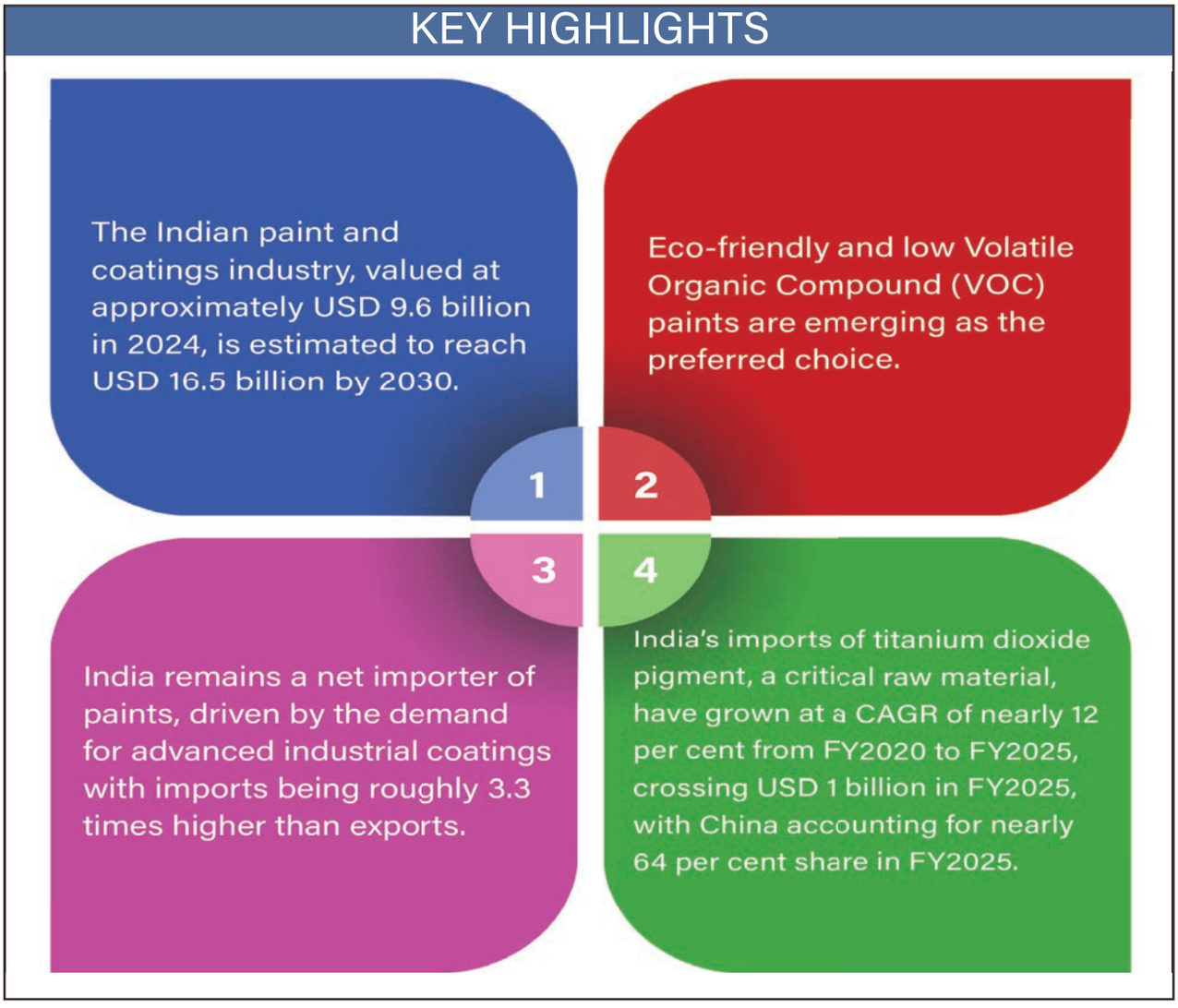




Source: Directorate General of Foreign Trade (DGFT)

Note: Solvent-based paints refers to HS code 3208, and water-based paints refers to HS code 3209.

KEY HIGHLIGHTS



JSW Paints' acquisition of Akzo Nobel India, Astral's purchase of Gem Paints, and JK Cement's acquisition of Acro Paints, has intensified rivalry. These developments have accelerated capacity expansion, reshaped dealer dynamics, and heightened pricing pressure across both incumbents and smaller manufacturers.

India: A Net Importer

From a trade perspective, India continues to remain a net importer of paints, reflecting domestic dependence on advanced industrial coatings and critical raw materials such as titanium dioxide and specialised resins. Imports stood at $219 million in the first half of FY2026, 3.3 times larger than the exports of $61 million during the same period. India primarily exports paints to developing markets while importing advanced coatings from developed economies. Solvent-based products continue to dominate, making up 84 per cent of exports and 75 per cent of imports, supported by strong industrial and automotive demand, even as eco-friendly, low-VOC paints gain ground. While trade is not the primary driver of industry growth, this imbalance highlights gaps in high-performance coating capabilities and underlines the importance of technology and scale in the evolving market.

The shift towards eco-friendly, low-VOC, and high-performance coatings, along with growing adoption of advanced materials and nanotechnology, is expected to redefine product portfolios and competitive strategies.

The report concludes that while India's paints and coatings industry is well-positioned for sustained growth, the path forward will be increasingly shaped by scale, compliance readiness, technology investment, and distribution strength. Near-term pressures are likely to persist, but companies that adapt quickly to the changing competitive and regulatory landscape will be better placed to emerge stronger in the next phase of growth. ■

CASE STUDY

Mangrove Restoration in Adyar Estuary, Chennai: Challenges, Achievements & Lessons Learned

The mangrove restoration at Adyar Estuary, Chennai, is one of the first attempts in the country to restore mangroves and their associates in a waste dump site. Initiated as part of the eco restoration development between 2007-2021 in the Adyar estuary as Phases I, II, and III, covering more than 500 acres, the restoration program aimed to establish native mangrove and mangrove associates, focusing on native species and mangrove species common to the Tamil Nadu coast. ***Dr. Ilangovan KumaraSwamy, Director, Research & Restoration, InnoVoTek Pvt Ltd,*** explains in detail the success story of this green project.

Comparative view before and after of Mangrove plantation 2015-2025

The restoration of the Adyar estuary was a long and challenging process, as most attempts to restore coastal wetland ecosystems in urban environments have failed to achieve their objectives. Despite facing significant challenges, including altered hydrology, soil salinity issues, and urban environmental stressors, the restoration program has achieved great success in establishing mangrove communities that now support diverse wildlife, provide critical ecosystem services, and enrich the nearshore coastal biodiversity. The Estuary now serves as a critical coastal system, an educational centre, and a model in the country for the possibility of reviving damaged urban ecosystems.

The Restoration Journey

The Adyar Estuary restoration program was started in 2007 by Tamil Nadu Urban Infrastructure Financial Services Ltd. on behalf of the Adyar Poonga Trust and the Government of Tamil Nadu. The Masterplan was prepared in 2007, which could meet both the objectives of the civic bodies and the requirements of the High Court's decision.

The major objectives of the restoration program were excavation of soil to increase the water spread area from 5.53 per cent to 65 per cent, arresting of sewage discharge from outfalls, land development to improve hydrodynamics, recreating vegetation with mangrove,

and Tropical Dry Evergreen Forest species (TDEF), which was dominated by Prosopis juliflora to more than 90 per cent.

Massive earthwork, to landscape the region, was the first step in the implementation work to restore the wetland. Phase I implementation began in 2008 for 58 acres of the creek, Phase II implementation began for 300 acres in 2014, and Phase III implementation began for 125 acres in 2021. In Phase I, 1.4 lakh seedlings of 172 indigenous native species were planted, including 35,000 mangroves of 9 species. In Phase II, 1.1 lakh mangrove and mangrove associate seedlings of nine different species were planted, and in Phase III, 0.53 lakh of native species and mangroves were planted. The survival rate was 90-100 per cent in all the Phases after execution, and the sites were covered under post plantation maintenance, which was one of the major reasons for their success.

Operational Challenges

The mangrove restoration program at Adyar Estuary displays both the challenges and tremendous potential of restoring similar coastal ecosystems within urban environments. Despite facing significant technical difficulties, including degraded soils, altered hydrology, and urban environmental stressors, the project has successfully established thriving mangrove communities supporting diverse wildlife while providing multiple ecosystem services to Chennai's urban population. A good pre-execution plan includes complete site preparation, site-specific species selection, adaptive management approaches, and integration with broader management objectives. In all the sites, the combination of ecological restoration with public education and recreation demonstrates innovative approaches to urban ecosystem restoration that serve both conservation and community needs.

Keeping the mangroves alive on a compacted landfill substrate and in polluted waters was a challenging task. In the summer, the Adyar estuary mouth remains closed, and the sewage water from the city flows into the estuary. The grey water rises and stays stagnant for more than 15 to 20 days, elevating the estuary's water levels by 1-2 meters above the highest high tide limit. For over six months, this process is repeated, during which time salinity levels and other environmental parameters fluctuate significantly. In the monsoon season, the entire activity changes; high runoff brings sudden damage. The plantation and the planted species must withstand both the rapid changes, maintenance was the key in monitoring the hydrodynamic changes and the changes in the vegetation.

Lessons Learned

Key lessons from the Adyar experience include:

- The importance of extensive site preparation in urban polluted environments, the value of adaptive management based on monitoring results, and the potential for urban restoration projects to serve multiple objectives.
- The project shows that degraded urban environments can support successful ecosystem restoration when appropriate techniques and adequate resources are applied. Looking forward, the Adyar Estuary mangrove restoration serves as a model and inspiration for urban coastal restoration throughout India and other developing countries facing similar challenges of rapid urbanization and ecosystem degradation. The documented approaches, lessons learned and demonstrated success provide valuable guidance for scaling up urban mangrove restoration as a strategy for building more resilient and sustainable coastal cities.
- The restored mangroves of Adyar Estuary stand as living proof in the country that urban environments and healthy ecosystems can coexist when proper planning, implementation, and management approaches are employed.
- As Chennai and other coastal cities continue to grow rapidly, the Adyar model offers hope for creating urban coastal environments that support both human communities and thriving natural ecosystems.Similar models were executed in both the Cooum and Ennore estuaries of Chennai, Tamil Nadu, and are successful. ■

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InnoVoTek Pvt Ltd

CASE STUDY

Lubrication Intelligence: How Whole-Site Condition Screening Reduced Oil Changes and Delivered Seven-Figure Savings

Refineries rely on thousands of lubricated assets, yet most sites only analyse oil from a small proportion of them, typically the most critical systems or those capable of providing large sample volumes. The remainder often operate on fixed-interval oil changes, leading to unnecessary maintenance, wasted lubricant and increased operational risk during intrusive activities. This article explores how a large North American refinery challenged this model by implementing a whole-site, minimal-volume oil condition assessment programme. Using handheld infrared spectroscopy, the site gained visibility into lubricant health across most of the rotating equipment. The result was a rapid return on investment, elimination of hundreds of unnecessary oil changes, improved maintenance planning and a step change toward condition-based lubrication. **Daniel C. Shorten, CRL MLE, SME Asset Condition Management, John Crane Service Solutions,** through this article outlines the technical approach, implementation lessons, operator feedback and the pathway to extending condition-based lubrication across all rotating assets.

Calendar-based oil change intervals remain standard practice across the industry, particularly in large refining environments. They are familiar, predictable and easy to plan, but they are not always optimal. Decisions based solely on time rather than actual lubricant condition can lead to unnecessary maintenance activity and can limit the reliability potential of bearings, seals and other critical rotating equipment components.

In many cases, lubricants are replaced long before their useful life has ended. In others, oils remain in service beyond acceptable limits, without any knowledge of degradation, increasing the risk of component deterioration or failure and machinery breakdown. The underlying issue is simple: without real data on oil condition, maintenance teams are forced to rely on time-based assumptions.

A large refinery operation sought to move away from this model by making oil change decisions based on lubricant health rather than calendar dates, across the entire site, not just the most critical assets.

The Challenge: Thousands of Systems, Limited Visibility

The site operated thousands of lubricated systems across pumps, compressors and other rotating equipment. Historically, only around 15 - 25% of these assets were included in routine laboratory oil analysis programmes.

While these systems benefited from detailed insights into fluid health, contamination, wear debris and causation, the remaining majority were serviced solely through scheduled oil changes. This resulted in a high volume of predetermined oil changes each year, many of which were unnecessary.

The cost impact was significant, not only in lubricant consumption, labour and downtime, but also in the added risk associated with opening equipment and the potential for maintenance-induced failures.

A New Direction: Whole-Site Oil Condition Assessment

To challenge the traditional approach, the maintenance

team asked a fundamental question:

What if we knew the condition of the oil in every lubricated system?

Conventional laboratory testing could not deliver this at scale. Cost, logistics and sample volume requirements made full-site coverage impractical.

Any alternative solution needed to:

- require only a minimal oil sample
- provide fast, reliable on-site screening
- correlate well with established ASTM methods
- deliver a clear "suitable / not suitable" assessment

The team adopted a rugged, handheld infrared spectrometer capable of identifying key degradation indicators, such as oxidation, acidity, water ingress, and antioxidant depletion, using only a few millilitres of oil per test.

This made whole-site lubricant screening feasible for the first time.

Implementation: Practical Lessons Learned

Several important insights emerged during implementation:

- **Sampling access matters** : Many systems lacked appropriate sampling points. Retrofitting valves and improving access became a clear opportunity for future reliability improvements.
- **Consistency is critical** : Sampling location within a sump significantly affects results. Repeatable sampling methods and dedicated tools will improve data quality over time.
- **Testing environment affects result:** Although in-field testing was possible, conducting analysis in a controlled indoor environment produced more consistent data and improved workflow efficiency.
- **Software usability influences adoption:** While functional, the initial software interface limited efficiency. More intuitive mini-lab platforms are being evaluated for future upgrades.

Results: Quantifiable Savings and Better Decisions

The baseline cost for scheduled oil changes across the site exceeded USD 1.5 million per year.

Within the first year:

- Approximately 90% of systems tested were deemed suitable for extended service
- Oil changes were avoided on more than 1,200 systems
- Cost savings, calculated based upon reduced oil consumption, logistics and downtime, approached close to USD 1.25 million in the first year, excluding contractor labour
- The capital investment in hardware and software was recovered early in Year 1

Looking ahead, the site expects to permanently eliminate at least 50% of previously scheduled oil changes through condition-based decision-making. All whilst maintaining a safe sampling environment and with recorded data to verify and provide assurance that oil change driven by oil condition was performed with appropriate risk management.

Operator Experience: Key Takeaways

Reliability and maintenance teams identified several practical considerations:

- In-field testing at the asset offers immediate feedback but exposes equipment and personnel to harsher conditions
- On-site but centrally located testing improves consistency but requires disciplined sample handling
- Sample identification errors are reduced in controlled environments
- Mapping any non-sampled systems creates a clear roadmap for sampling improvements
- Initial pipette sampling worked but lacks repeatability; dedicated sampling values tools are preferred especially where samples can be taken during machinery operation.

Looking Ahead: Expanding Condition-Based Lubrication

Future phases of the program include:

- Refining alarm and condemning limits
- Incorporating asset criticality to drive testing frequency
- Expanding coverage to hydraulic and gear systems
- Evaluating onsite mini-laboratory solutions for more detailed oil condition monitoring
- Extending to include ultrasonic condition-based greasing
- Installing retrofit sampling valves for non-intrusive, live sampling

Conclusion

Whole-site lubrication intelligence is achievable. By combining ultra-low-volume on-site oil screening with a data-driven maintenance strategy, large industrial sites can significantly reduce unnecessary oil changes while improving reliability, safety and asset visibility.

Beyond oil cost and maintenance optimisation, improved control of lubricant condition also supports the health of bearings and mechanical seals, helping to extend component life and improve overall rotating equipment uptime. Together, these outcomes reinforce the wider value of condition-based lubrication practices as a foundation for effective asset reliability management.

This approach represents a practical and scalable pathway toward fully condition-based lubrication, turning oil analysis from a selective activity into a site-wide decision-making tool. ■

Author

Daniel C. Shorten
CRL MLE, SME Asset Condition Management
John Crane Service Solutions

Beyond Numbers: What Single-Digit Logistics Cost Means for India's Global Competitiveness

Logistics in India is rapidly growing into the backbone of India's ability to compete successfully in the global economy. With increased trade volumes and increasingly complex supply chain networks; logistics effectiveness empowers more economic growth than restricts it. The latest data analysis shows that there is a fundamental change happening in the way that logistics costs are measured and handled, based on ongoing infrastructure improvements and increased use of technology. **Atanu Manna, Sr. Manager - Operations & Planning, NLDSL**, emphasizes that this change, is not just about improving appropriate headline figures; but it also reflects the deeper structural reform of India's economy, alignment of national policies related to logistics, and India's increasing position in the global supply chain.

For too long, logistics costs were viewed on a broad level of estimates. The DPIIT/NCAER report and some past studies give much clearer and more exact figures. The compression of the logistics-cost metric reassured all concerned: investors, decision makers and industry leaders.

A boost to Economic Growth through National Transportation Systems

Infrastructure and consistent investment in India have been essential in creating improved performance in logistics. With investments in infrastructure via numerous government-led programmes, including PM Gati Shakti National Master Plan; rapid expansion of the Expressway network; continuously growing freight corridor; and introduction of technology platforms (e.g., Unified Logistics Interface Platform [ULIP]); the efficiency and performance of freight movement across India are improving significantly. Collectively, these new initiatives will provide consumers with greater speed; predictability; and efficiency while turning infrastructure plans into tangible results.

Increasing India's Infrastructure into the Global Logistics Environment

A logistics cost of less than 10 per cent of GDP indicates not only efficient operations but, more importantly, that India is beginning to utilise global benchmarks for logistics performance and the positioning of various organisations within the global logistics environment. Given the current level of logistics costs compared to China; and improving, as compared to United States and European benchmarks, India's positioning in relation to its overall competitive economy is beginning to strengthen. As such, India's increased competitiveness will lead to improvements in its export performance; the level of integration into the global value chain; and an increase in the amount of foreign direct investment received.

Total Inclusiveness in Efficiency across All Parts of Ecosystem

As logistics systems grow in capability and size, efficiencies can be achieved in many sectors and in all regions. Improved connectivity between production centres and consumption markets, and also improved

The Unified Logistics Interface Platform (ULIP) provides a secure platform where both public and private sector logistics providers can integrate their digital systems using API's that allow them to communicate with each other. By providing an integration layer that removes the barriers associated with data silos and lack of interoperability, ULIP allows for much faster decision-making, enhanced coordination, and increased visibility across all the components of the logistics value chain.

connectivity to export gateways will enhance the ability of businesses of all types to more effectively connect with national and international markets. This broader, more ubiquitous effect will support India's inclusive growth vision, where the role of logistics is to facilitate opportunity, instead of being a restriction.

Enabling a Smarter Supply Chain through Technology and Transparency

Digitized logistics, with integrated data systems and access to real-time data visibility, are key to improving logistics in the country. With better access to data, stakeholders can develop enhanced planning criteria, coordinate more efficiently, and respond dynamically to variations in demand for logistics services. The governmental initiatives directly lead by NICDC Logistics Data Services (NLDS) in digitizing the movement of goods and data in real-time, are key enablers for the move to a data-centric logistics environment.

The Unified Logistics Interface Platform (ULIP) provides a secure platform where both public and private sector logistics providers can integrate their digital systems using API's that allow them to communicate with each other. By providing an integration layer that removes the barriers associated with data silos and lack of interoperability, ULIP allows for much faster decision-making, enhanced coordination, and increased visibility across all the components of the logistics value chain.

The Logistics Data Bank (LDB) also runs parallel with this effort, providing an almost real-time view of the movement of EXIM containers through tracking via RFID at each port, terminal, ICD and CFS location. The ability to have visibility into how long cargo will be moving enables all stakeholders in logistics to better plan for the movement of cargo, resulting in improved predictability for both operational planning and optimization of logistics costs.

Conclusion

India's transition to a single-digit logistics cost is a historic milestone in its economic development. With firm data and forward-thinking policies driving the expansion of infrastructure and digitization, the logistics ecosystem is becoming more established and capable with confidence and alignment with international standards. Continued performance improvement will be a distinguishing strength of its logistics systems, supporting India's status as a competitive, dependable, and future-ready global player. ■

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Critical Role of Vacuum Technology in Safe and Efficient Battery Recycling

As the global demand for lithium-ion batteries grows – driven by electric mobility and renewable energy – so does the need for advanced battery recycling technologies. Among the most critical enablers of safe and efficient battery recycling is vacuum technology. Vacuum technologies play an essential role across several key process steps, from material preparation to solvent recovery and quality assurance. **Bastian Schöchert, Market Coordinator - Batteries and Carbon Capture Technologies, Busch Vacuum Solutions**, in this article, examines how different types of vacuum technology contribute to the performance, safety, and environmental integrity of modern battery recycling. Rather than proposing a one-size-fits-all solution, he highlights the specific vacuum requirements of five different process stages and discusses the advantages and limitations of available solutions.

Vacuum technologies play a key role across several process steps, from material preparation to solvent recovery and quality assurance. This article highlights the specific vacuum requirements of five different process stages.

Process 1 - Enhanced safety in shredding

After the used battery has been fully discharged, it is shredded to break down the components. Shredding used batteries can be hazardous due to the volatile nature of materials like the liquid electrolyte. Sparks

during shredding can ignite the electrolyte, leading to potentially explosive conditions.

Dry Vacuum Pumps: Claw and Screw Technologies

Dry vacuum pumps, such as claw and screw vacuum pumps, are often the first choice for creating an inert and contaminant-free atmosphere in the shredding process. They effectively evacuate ambient air to allow the injection of inert gases like nitrogen, which drastically reduces the risk of ignition. Due to their oil-free operation, they are insensitive to contamination of the operating fluid by process gases, depending on the gases introduced. It makes them ideal where cleanliness and gas purity are essential.

Additionally, dry vacuum pumps are energy-efficient, especially in continuous operation, due to the absence of sealing liquids or oils. However, they come with certain limitations: exposure to corrosive vapors or particulates released during shredding may lead to wear unless corrosion-resistant coatings or materials are used. Furthermore, the initial investment is typically higher than for vacuum pumps running with an operating fluid, such as oil-lubricated or liquid ring vacuum pumps.

Liquid Ring Vacuum Pumps: Robust Handling of Wet Gases

Transitioning from dry gas to vapor handling, liquid ring vacuum pumps become relevant. These vacuum pumps are excellent at managing the wet gases that emerge during the shredding process. Their lack of small gaps and therefore mechanical friction makes them easier to assess in terms of ignition risk.

While liquid ring vacuum pumps generally consume more energy than dry vacuum pumps of comparable size when handling non-condensable gases, they can be more energy efficient when pumping condensable vapors, as the condensation within the liquid reduces the gas volume to be evacuated – allowing for smaller vacuum pump sizing and lower energy consumption. However, they require the management of operating fluids, which can be a drawback in terms of operational efficiency and environmental impact.

Oil-lubricated Rotary Vane Vacuum Pumps: A Compromise Solution

Positioned between dry and liquid-based technologies, oil-lubricated rotary vane vacuum pumps present a pragmatic solution for the shredding process. They are mechanically simple, cost-effective, and capable of handling moderate vapor loads while delivering stable vacuum levels.

However, their reliance on oil introduces the risk of contamination and necessitates additional components like oil mist filters and regular maintenance routines. Moreover, they are less suited for explosive atmospheres or applications demanding absolute cleanliness, limiting their use in direct contact with volatile shredding environments.

Consideration of ATEX requirements

In potentially explosive shredding environments, the use of ATEX-certified vacuum systems or vacuum pumps may be required to mitigate ignition risks and ensure compliance with European safety directives. However, ATEX certification is not mandatory per se. The responsibility to perform a comprehensive risk assessment and decide on the necessity of certified equipment rests with the operator. Depending on process-specific hazards – such as the concentration of flammable gases or the potential for spark generation – ATEX-certified solutions can offer an additional layer of safety and legal assurance.

The choice of vacuum pump must align with the specific operational and safety requirements of the shredding step – factoring in gas composition, flammability risk, environmental controls, and cost structure.

Process 2 - Efficient Electrolyte Removal during Drying

The drying phase is crucial for removing the electrolyte following the shredding process. Vacuum drying lowers the boiling points of volatile components, facilitating evaporation at lower temperatures. The achievable base pressure of a vacuum system is fundamentally limited by the pumping principle of the technology used; to reach deeper vacuum levels – especially for removing solvents with low vapor pressure – it is often necessary to combine different vacuum technologies, as individual vacuum pumps tend to lose suction performance near their ultimate pressure.

Oil-lubricated Rotary Vane Vacuum Pumps: Cost-effective Solution

Rotary vane vacuum pumps can typically reach ultimate pressures between 0.1 and 1 hPa (mbar), offering a good balance between performance and

cost for moderate drying requirements. Rotary vane vacuum pumps are available in single-stage or multi-stage versions. Multi-stage versions can reach a lower ultimate pressure, but these versions encounter more problems with condensation because there is less oil per chamber.

Liquid Ring Vacuum Pumps: Vapor-tolerant and Chemically Robust

Limited by the vapor pressure of the sealing liquid (typically water), liquid ring vacuum pumps achieve ultimate pressures around 30 hPa (mbar), depending on operating temperature and fluid management. This makes them suitable for pre-drying or bulk vapor removal.

Dry Screw and Claw Vacuum Pumps: Clean and High Performance

Among all vacuum technologies considered (except dual-stage rotary vane vacuum pumps), dry screw vacuum pumps achieve the deepest vacuum levels, capable of reaching pressures below 0.01 hPa (mbar).

Due to their relatively high ultimate pressure [(10-60 hPa (mbar)] and limited tolerance for condensable vapors, single-stage claw vacuum pumps can be ruled out for drying applications where deep vacuum and solvent handling are critical. However, a two-stage version of the claw vacuum pumps allows for pressures lower than 10 hPa (mbar) and can therefore be considered.

Vacuum Boosters: Extending Vacuum Performance

To overcome pressure limitations of the primary vacuum pumps mentioned and to maintain a defined pressure, vacuum boosters can be added upstream of the main vacuum stage. Vacuum boosters are dry, positive displacement vacuum pumps. Their main task is to increase the pumping speed at working pressure. They increase the available pumping speed in lower pressure ranges where the efficiency of the backing pumps is already decreasing. When properly configured, the combination of booster and backing pumps can significantly enhance pumping speed and enable the system to reach much lower pressures than the backing pump alone – often by an order of magnitude.

However, the achievable performance strongly depends on the specific ratio between the booster and backing pump, which must be carefully matched to process parameters such as gas composition, expected throughput, operating temperatures, and pressure setpoints. The design of the booster separates the gearbox and bearings from the vacuum chamber, allowing oil-free, contactless operation. Single-stage vacuum boosters cannot be used directly against atmospheric pressure, as too-high pressure differences can cause overheating and lobe expansion. To prevent this, booster systems require a bypass control during startup to prevent overload and ensure system protection.

Process 3 - Improved Purity through Vacuum Distillation

Following the drying process, the vaporized electrolyte must be condensed and purified for reuse. Vacuum distillation enables this by separating electrolyte components based on differences in their boiling points – without requiring extreme temperatures that might degrade sensitive substances. This process step requires stable, deep vacuum levels and high chemical resistance, especially when dealing with complex electrolyte mixtures.

Both dry and wet vacuum technologies play critical roles in enabling efficient and precise separation – depending on the specific system design, required vacuum depth, and tolerance to chemical or thermal stresses.

Oil-lubricated Rotary Vane Vacuum Pumps

Rotary vane vacuum pumps can be a viable option for vacuum distillation, offering stable performance and competitive acquisition costs. However, their use is limited by the sensitivity of the operating fluid (oil) to contamination from process media. Chemical compatibility must be carefully evaluated, as exposure to aggressive or condensable vapors can degrade the oil, increase maintenance needs, and compromise vacuum performance. Therefore, their applicability is restricted to media that do not adversely interact with the lubrication system.

Dry Screw and Claw Vacuum Pumps: Clean and Controlled Separation

Dry screw vacuum pumps are the most effective dry technology for vacuum distillation. They achieve deep, stable vacuum levels critical for lowering boiling points and enabling precise separation without thermal decomposition. Their oil-free operation eliminates

the risk of contamination, making them ideal for high-purity recovery of valuable electrolyte components.

Dry claw pumps, while also oil-free and low-maintenance, cannot reach the same vacuum depths as screw vacuum pumps. As such, they are better suited for preliminary vacuum generation or systems where ultimate pressures of around 20 hPa (mbar) are sufficient. Their simplicity and energy efficiency make them a viable option where deep vacuum is not essential, and they still provide contaminant-free operation that supports high process purity.

Liquid Ring Vacuum Pumps: Thermal Buffering and Vapor Tolerance

The general advantages and limitations of liquid ring vacuum pumps have been discussed in the context of shredding and drying. In distillation, their strengths remain relevant – particularly in condensation stages with high solvent content or chemically aggressive media. Their ability to tolerate liquid carryover and stabilize volatile mixtures makes them a practical choice in systems with fluctuating process loads. However, for applications requiring deeper vacuum or higher energy efficiency, their use should be carefully evaluated.

Process 4 - Advanced Process Monitoring in Battery Recycling

Process monitoring is a critical aspect of refining battery recycling methods to ensure efficiency and sustainability – particularly when handling complex chemical reactions within thermal treatment processes such as pyrolysis. One of the key tools in this monitoring is the residual gas analysis (RGA). RGA is a method used to determine which gases are present in a system and in what quantities. It relies on mass spectrometry, where molecules are ionized, and the resulting ions are sorted by their mass-to-charge ratio (m/z) using a quadrupole mass filter. In battery recycling, it is employed to analyze the gas phases emitted during the recycling process. This technology enables real-time surveillance and control by identifying and quantifying the gases released, which are indicators of the chemical reactions occurring within the system.

Process 5 - Ensuring System Integrity through Leak Detection

Ensuring high process integrity plays an important role to prevent hazardous conditions and ensure optimal recovery rates. A key component of maintaining high integrity is rigorous leak testing to confirm the tightness of recycling chambers and equipment. The process begins with pressure decay testing, which serves as an initial indicator for potential leaks. This method involves pressurizing a system, then measuring the pressure decrease over time. If the pressure drops beyond a pre-defined threshold, it indicates a potential leak. For pressure decay testing, vacuum gauges provide accurate and reliable measurements to detect any drops in pressure that could signal a leak.

Following a pressure decay test, tracer gas leak detection is employed to precisely quantify the leak. Tracer gas leak detection is highly sensitive and suitable for detecting even the smallest leaks. A tracer gas such as helium or hydrogen is introduced into the system, and a leak detector with an integrated mass spectrometer analyzer cell identifies and quantifies any escaping gas. The use of helium is particularly effective due to its small molecular size and inert nature, which allows it to quickly pass through leaks without reacting with the materials involved.

Together, these methods provide a comprehensive approach to maintaining high process integrity in battery recycling facilities.

Conclusion

The integration of vacuum technology in battery recycling processes addresses multiple challenges associated with safety, efficiency, and environmental impact. By enhancing process safety through inert atmospheres, enabling efficient material separation via controlled vacuum levels, and ensuring system integrity through advanced leak detection, vacuum technology is at the forefront of driving sustainable practices in battery recycling. As the industry continues to evolve, the role of vacuum technology will expand, further embedding its significance in the sustainable life cycle management of battery technologies. ■

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Occupational Safety & Health and Working Conditions (OSH&WC) Code, 2020 (37 of 2020): Salient Features

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The Code on Occupational Safety & Health and Working Conditions (OSH&WC) has been passed in both houses of the Parliament of India on 22/09/2020. The Code received the assent of the President on the 28th September 2020. It has been notified in the Gazette vide notification No 37 of 2020. The Code has come into effect on 21st Nov. 2025 vide Gazette notification 5145 dated 19th Nov. 2025. The OSH&WC Code proposes replacing 13 Central Acts related to Safety, Health and Working Conditions with a single Code. **H Vishvanathan, Former Dy. Director General, DGFASLI, M/o Lab and Emp. Govt. of India and Proprietor, Meenakshi Safety Consultancy Services, Navi Mumbai**, explains in detail the salient features of the code.

The Preamble of the Occupational Safety & Health and Working Conditions (OSH&WC Code) "is to consolidate and amend the laws regulating the occupational safety, health and working conditions of the persons employed in an establishment and the matters connected therewith or incidental thereto". The Code aims to provide a broader legislative framework to secure just and humane conditions of work with flexibility and to provide enabling provisions for making rules and regulations in tune with emerging technologies.

The OSH&WC Code, 2020 simplifies, amalgamates and rationalizes the provisions of thirteen enactments in the aforesaid areas with certain important changes. It consists of 14 chapters, having 143 sections and three schedules. It enables the Central Government to make Occupational safety and health standards under Sec. 18 for workplaces relating to factory, mine, dock work, beedi and cigar, building and other construction work and other establishments and includes 73 matters specified in the Second Schedule to this Code and

Rules under Section 23 and 24 of the Code relating to health, safety, working conditions and welfare for the employees and the State Government to make Rules under Section 138 relating to safety provisions and for the carrying out the various provisions of the Code.

Factories

- The Special provisions relating to Factories are about the Applicability of this Part of the Code are Approval and licensing of factories, Liability of owner of premises in certain circumstances, Power to apply the Code to certain premises, Dangerous operations, Constitution of site appraisal committee, Compulsory disclosure of information by occupier, Specific responsibility of occupier in relation to hazardous processes, National Board to Inquire into certain situations, Emergency standards, Permissible limits of exposure of chemicals and toxic substances, Right of workers to warn about imminent danger, Appeal against the order of Inspector-cum-Facilitator in case of factory, Power to make exempting rules and order.
- The Chapter XII deals with the procedure regarding the offences and penalties for non-compliance with the various clauses of the Code namely the general penalty for offences, punishment for causing obstruction to Chief Inspector-cum-Facilitator or Inspector-cum-Facilitator, etc., Penalty for non-maintenance of register, records and non-filing of returns, etc, punishment for contravention of certain provisions, punishment for falsification of records, etc, penalty for omission to furnish plans, etc. Punishment for disclosure of information, penalty for wrongfully disclosing results of analysis.

Some of the important new features of the code are:

- It extends to whole of India.
- Applicable to all establishments employing 10 or more workers and includes IT establishments or establishments of service sector except that in respect of factories the threshold is 20 workers with the aid of power and 40 workers without the aid of power.
- It stipulates one registration, one return for all establishments having 10 or more employees.
- Submission of various returns and maintaining of various forms in digital also.
- Mandatory Issue of appointment letter to every employee
- Migrant workers can register themselves in the portal by self-declaring, with Aadhar details.
- In case of death or serious bodily injury to any person, out of the amount so paid as penalty by the employer a part may be given to the victim or the legal heirs of the victim by the Court.
- Constitution of National and State Level Occupational Safety and Health Advisory Board.
- Constituting a Safety Committee in any class of establishment.
- Overriding power of the Central Government to regulate general safety and health of persons in the event of epidemic, pandemic situations.
- Power of the Central Government to make Standards, Rules related to Safety, Health, welfare and working conditions for uniformity in the adoption by the state Governments.
- Provision for Social Security Fund for unorganized workers.
- Third party audit and certification provision.
- Permitting Women to work beyond 7 PM and before 6 AM subject to the safety and security - with their consent for night work, to avoid misuse of the provisions.
- Independent director cannot be an occupier of the Factory.
- The Threshold for applicability made uniform under different Acts in respect of Ambulance Room, Safety officer, Welfare Officer, Safety Committee, Canteen, Crèche, Shelter, Rest Room, etc.

The Code applies to establishments employing at least 10 workers, and to all mines and docks. It does not apply to apprentices and other class of workers. Further, it makes special provisions for certain types of establishments and classes of employees, such as factories, mines, and building and construction workers, ports etc. All establishments covered by the

Code would be required to be registered with the registering officers.

Chapters

- Chapter I deals with the Preliminary, Short title, extent, commencement and application and Commencement and Definitions.
- Chapter II deals with the registration of certain establishments, appeal and notice by employer of commencement and cessation of operation.
- Chapter III deals with the duties of employer and employees, etc. namely duties of employer, duties and responsibilities of owner, agent and manager in relation to mine, duties of manufacturers, designer, importers or suppliers, duties of architects, project engineers and designers, notice of certain accident, notice of certain dangerous occurrences, notice of certain diseases, duties of employees, rights of employee and duty not to interfere with or misuse things.
- Chapter IV deals with the National Occupational Safety and Health Advisory Board, State Occupational Safety and Health Advisory Board, Occupational safety and health standards, Research related activities, Safety and occupational health surveys, Statistics, Safety Committee and safety officers etc. The National Occupational Safety and Health Advisory Board (hereinafter in this Code referred to as the National Board) shall be notified by the Central Government to discharge the functions conferred on it by or under this Code and to advise to the Central Government on the matters relating to—
  - Standards, rules and regulations to be framed under this Code;
  - Implementation of the provisions of this Code and the rules and regulations relating thereto;
  - The issues of policy and programme relating to occupational safety and health referred to it, from time to time, by the Central Government; and
  - Any other matter relating to this Code referred to, from time to time, by the Central Government.
- Chapter V deals with the Responsibility of employer for maintaining health and working conditions the employer shall be responsible to maintain in his establishment as may be prescribed by the Central Government.
- Chapter VI deals with the welfare facilities, the employer shall be responsible to provide and maintain in his establishment such welfare facilities for the workers as may be prescribed by the Central Government.
- Chapter VII deals with hours of work and annual leave with wages namely weekly and daily working hours, leave, etc., weekly and compensatory holidays, extra wages for overtime, night shifts, prohibition of overlapping shifts, restriction on double employment in factory and mine, notice of periods of work, annual leave with wages, etc.
- Chapter VIII deals with maintenance of registers and records and filing of returns these returns and registers could be filed online and maintained in soft.
- Chapter IX deals with Inspector-Cum-Facilitators and other authority namely, appointment of Inspector-cum-Facilitators, powers of Inspector-cum-Facilitators, powers and duties of District Magistrate, third party audit and certification, special powers of Inspector-cum-Facilitator in respect of factory, mines and dock work and building and other construction work, secrecy of information by Chief Inspector-cum-Facilitator or Inspector-cum- Facilitator, etc., Facilities to be afforded to the Inspector-cum-Facilitator, Powers of special officer to enter, measure, etc., in relation to mine and Medical Officer.
- The Chapter X deals with the Special Provision Relating to Employment of Women namely Employment of women in night subject to such conditions relating to safety, holidays and working hours or any other condition to be observed by the employer as may be prescribed by the appropriate Government.
- Chapter XI deals with Special Provisions for Contract Labour and Inter-State Migrant Worker, etc. in respect of Contract Labour and Inter-State Migrant Worker, Audio-Visual Workers, Mines, Beedi And Cigar Workers, Building And Other Construction Workers and Factories.
- Chapter XII deals with the procedure regarding

The OSH&WC Code, 2020 simplifies, amalgamates and rationalizes the provisions of 13 enactments in the aforesaid areas with certain important changes. It consists of 14 chapters, having 143 sections and three schedules. It enables the Central Government to make Occupational safety and health standards under Sec. 18 for workplaces relating to factory, mine, dock work, beedi and cigar, building and other construction work and other establishments and includes 73 matters specified in the Second Schedule to this Code and Rules under Section 23 and 24 of the Code relating to health, safety, working conditions and welfare for the employees and the State Government to make Rules under Section 138 relating to safety provisions and for the carrying out the various provisions of the Code.

the offences and penalties for non-compliance with the various clauses of the Code.

- Chapter XIII deals with the miscellaneous provisions namely relating to Delegation of powers, Onus as to age, Onus of proving limits of what is practicable, etc., Common licence for contractors, factories and to industrial premises and person, Effect of law and agreements inconsistent with this Code.

Repealed Acts

With the enactment of this Code, the following Safety and Health and Working Conditions Acts would be repealed

1. The Factories Act, 1948.
2. The Mines Act, 1952.
3. The Dock Workers (Safety, Health and Welfare) Act, 1986.
4. The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996.
5. The Plantations Labour Act, 1951.
6. The Contract Labour (Regulation and Abolition) Act, 1970.
7. The Inter-State Migrant workmen (Regulation of Employment and Conditions of Service) Act, 1979.
8. The Working Journalist and other News Paper Employees (Conditions of Service and Miscellaneous Provision) Act, 1955.
9. The Working Journalist (Fixation of rates of wages) Act, 1958
10. The Motor Transport Workers Act, 1961
11. The Sales Promotion Employees (Conditions of Service) Act, 1976
12. The Beedi and Cigar Workers (Conditions of Employment) Act, 1966
13. The Cine Workers and Cinema Theatre Workers Act, 1981.

For any Enquiries on Conducting of Training or Gap Analysis Study on the OSH&WC Code 2020 and Rules made thereunder you may kindly contact us.

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The author presented a paper on OSH Code during Health Safety & Environment Conference on 3rd February 2026, held during Chemtech 2026, in Mumbai, during 3-6 February 2026.■

ELECTRONICS MANUFACTURING

Henkel Launches Advanced Application Center in Bengaluru for Electronics Manufacturing Sector

The new Customer Application Center in Bengaluru, will serve as a collaborative innovation hub where Henkel experts and customers can co-develop, test, and validate advanced adhesive and thermal management solutions for next-generation electronics manufacturing.

The new facility represents one of Henkel's most significant application engineering commitments in the India Middle East and Africa (IMEA) region, and is designed to address a critical gap in India's electronics value chain: the absence of localized, world-class application testing and validation infrastructure that allows manufacturers to develop, qualify, and scale advanced materials solutions without the time and cost of sending work overseas.

India's electronics manufacturing sector has grown nearly six-fold over the past decade. The momentum is accelerating, driven by the rapid build-out of data center and AI computing infrastructure, 5G and fiber network expansion, electric vehicle charging systems, industrial automation, and advanced medical devices. Each of these sectors depends critically on high-performance adhesives, thermal management materials, and protective coatings, and each demand faster, more localized application engineering support than India's ecosystem has traditionally been able to provide.

Bengaluru was a natural choice. The city's concentration of semiconductor design talent, electronics R&D centers, and global OEM engineering teams makes it the single most important node in India's electronics innovation ecosystem. Locating the center here puts Henkel's application expertise directly alongside the engineers and manufacturers who need it most.

Customers along with team members of Henkel Adhesive Technologies inaugurating the Customer Application Center in Bengaluru

The 5,000 sq. ft. facility, of which approximately 2,400 sq. ft. is dedicated laboratory and testing space, is built to replicate actual electronics manufacturing conditions, allowing customers to evaluate and optimize materials and processes before committing to production scale. Around 60-65 per

Advanced electronics lab bridging materials and applications at Henkel Adhesive Technologies' Customer Application Center in Bengaluru.

cent of the investment has gone into advanced lab and testing equipment, with 20-25 per cent directed at customer co-development infrastructure.

The facility serves five high-growth sectors: telecom and 5G infrastructure, data centres and AI computing, power electronics and EV systems, industrial automation, and medical electronics. Its key capabilities span advanced thermal management testing, precision dispensing systems, electrical characterisation tools, and rapid-cure chambers, supporting the full journey from prototyping and material validation through to production readiness.

The center directly supports India's Make-in-India and Production-Linked-Incentive objectives by bringing application engineering, process optimization, and reliability validation onshore. A substantial share of activities that Indian electronics manufacturers previously had to route through overseas facilities, or simply defer, can now be conducted locally, compressing development cycles and accelerating time to market.

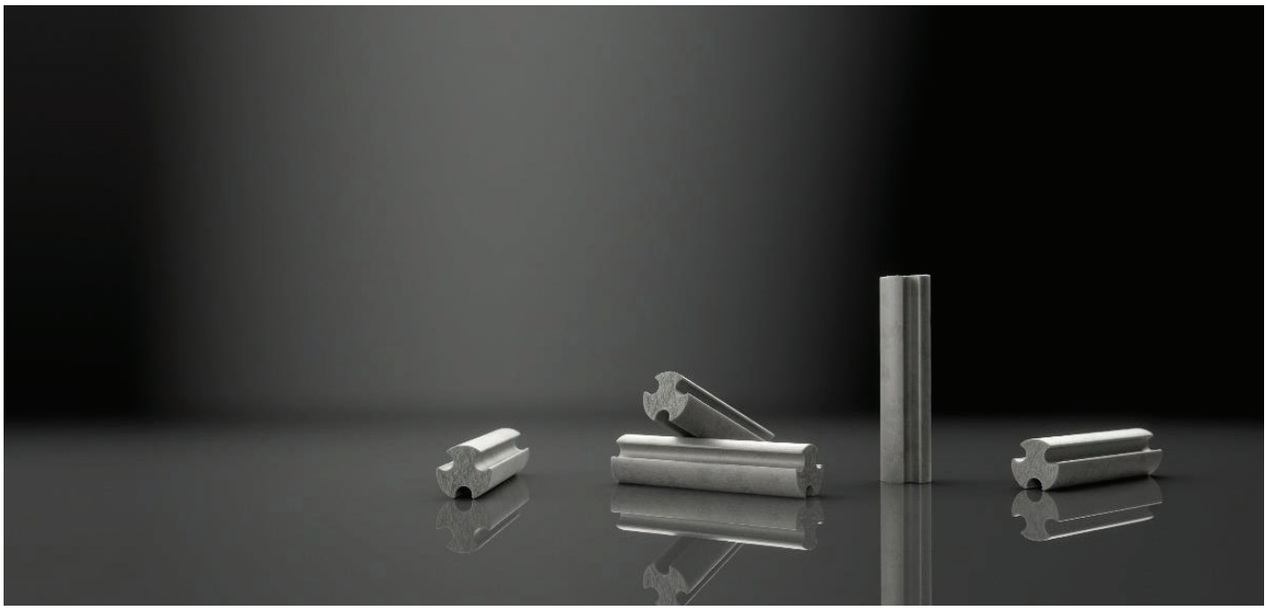
Henkel application experts will work side-by-side with customer engineering teams at the facility; co-developing solutions tailored to specific device architectures and manufacturing requirements.

This collaboration model is central to the center's design and is what distinguishes it from a conventional testing laboratory.

"India's electronics manufacturing ecosystem is at an inflection point, and Bengaluru is at the center of it," said S. Sunil Kumar, Country President – India, Henkel. "What manufacturers across our focus sectors increasingly need is not just world-class materials, but a local partner who can co-develop, test, and validate those materials under real production conditions, and help them move from concept to market faster. That is precisely what this center is designed to do. It is our most tangible expression yet of Henkel's long-term commitment to India's electronics future," he added. ■

SPECIALITY CHEMICALS

Clariant Demonstrates Advanced Pyrolysis Oil Upgrading Technology for Circular Plastics with Borealis and SINTEF



HDMax: Enabling the circular economy through proven pyoil upgrading technology. © Clariant

Clariant's HDMax™ catalyst successfully achieves complete conversion of plastic waste-derived pyoil to cracker-grade feedstock at pilot facility in collaboration with Borealis, meeting all quality specifications in a key test.

Clariant, a specialty chemical company, announced the successful completion of a collaborative pilot-scale project with Borealis, a leading provider of advanced and circular polyolefin solutions, and SINTEF, one of Europe's largest independent research organizations.

The partnership successfully demonstrated Clariant's pyrolysis oil (pyoil) upgrading technology, marking a significant milestone in advancing circular economy solutions for the plastics industry.

Breakthrough in Plastic Waste Recycling

The collaboration centered on upgrading pyoil derived from plastic waste to steam cracker-compatible feedstock that fully meets cracker-grade quality specifications. Using Clariant's proprietary HDMax catalysts, the pilot-scale testing conducted at SINTEF's research facility in Norway delivered excellent results, successfully transforming plastic waste-derived pyoil into high-quality feedstock suitable for virgin polyolefin production.

The HDMax catalyst achieved full conversion across all critical parameters: complete saturation of dienes without gum formation — a crucial requirement for downstream processing — along with complete conversion of contaminants like oxygenates, nitrogenates, and halogenides. All product quality

By completing the entire hydrotreating process in one reactor rather than the multiple units used in alternative approaches, the new solution cuts capital requirements and operational complexity substantially.

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specifications were met, validating the technology's readiness for industrial application.

Industry-Leading Efficiency through Single-Step Processing

A key differentiator of Clariant's HDMax technology is its ability to achieve all required specifications in a single multi-layer hydrotreating reactor, compared to alternative technologies that require three to four reactors. This streamlined process significantly reduces capital investment, operational complexity, and energy consumption. Additionally, the technology enables subsequent hydrocracking to produce naphtha-like hydrocarbon fractions, further enhancing process efficiency and product flexibility.

The three-party partnership leveraged the unique strengths of each organization:

- Clariant provided a tailored catalyst design and commercial samples of its specialized catalysts: HDMax catalyst for pyoil upgrading and HYDEX™ for hydrocracking.
- Borealis defined the required target quality of the pyoil and contributed industry expertise as a leading European polyolefin producer offering chemically recycled polyolefin solutions under the Borcycle™ C portfolio.
- SINTEF conducted comprehensive pilot-scale testing and validation at their state-of-the-art research facility in Norway.

Advancing the Circular Economy

The successful demonstration validates a proven pathway for reintegrating recycled plastic-derived materials into industrial production of high-quality materials. By converting plastic waste back into high-quality feedstock, this technology supports the transition to a more circular economy where plastic materials can be recycled without compromising on quality. The partners' combined expertise in specialty chemicals, research capabilities, and industrial production knowledge has created a foundation for further development and potential commercial implementation. ■

SAFETY

Hikal Observes National Safety Week 2026, Reinforcing Philosophy - See It, Own It, Fix It

Hikal Ltd. observed Corporate Safety Week 2026 across all its locations from March 4 to March 11, 2026, reinforcing its commitment to workplace safety and operational excellence.

The campaign, themed "From Responsibility to Ownership – Engage, Educate, Empower People to Enhance Safety," featured a series of structured initiatives designed to deepen employee engagement, strengthen digital safety systems, and embed a culture of ownership across the organisation.

The week commenced with a Leadership Kick-off reinforcing the Five Principles for Safety Culture Transformation, where senior leaders addressed employees across sites through a unified virtual platform. This was followed by site-level inaugurations, Safety Pledge ceremonies, Safety Flag hoisting and ceremonial lamp lighting, and the unveiling of Leadership Safety Commitment Boards, reinforcing visible leadership commitment to safety.

Key Highlights of the Event

- A key focus of Safety Week 2026 was strengthening Hikal's digital safety governance platform, SunBPM.
- Through incident learning and system training sessions, employees were guided on reporting near misses, unsafe acts, and unsafe conditions, along with understanding approval and responsibility workflows.
- The initiative reinforced a simple but powerful philosophy: "See it. Own it. Fix it."
- By strengthening reporting culture and system adoption, Hikal aimed to move from reactive correction to proactive prevention.
- Leadership Gemba Walks and cross-functional safety audits further underlined the company's hands-on approach.
- Trained employees conducted plant rounds to identify hazards and log observations in SunBPM, enabling timely corrective action and reinforcing accountability at the ground level.

"Safety transformation requires more than policies and procedures — it requires ownership. Through this campaign, we are empowering our people with the right systems, leadership support, and emotional connection to make safety a personal commitment. Our goal is to build a culture where every individual feels responsible not only for their own safety but also for the well-being of their colleagues."

- Ratish Jha, President – HR, Hikal Ltd

- To promote workplace discipline and hazard prevention, all sites organised the *"Chaka Chak – Clean Site, Safe Site Contest"*, alongside 5S evaluations and visual safety reviews. These activities focused on maintaining high standards of housekeeping and embedding safety into daily operational practices.

Creating Awareness through Programmes

Engagement-driven initiatives such as Safety Quizzes, Hazard Hunt competitions, Personnel Protective Equipment (PPE) awareness programmes, and mock drills were also conducted to strengthen knowledge retention and emergency preparedness.

Adding an emotional dimension to the campaign, the "Safety & Family" session encouraged employees to reflect on the deeper purpose of safety through the theme "Why We Go Home Safe." Employees were invited to share personal commitments beginning with "I work safely because...", helping shift the mindset from compliance to ownership.

Closing Ceremony

The week concluded with closing ceremonies across all locations, where safety champions were recognised and leadership teams outlined measurable safety goals for the year ahead. A consolidated Safety Week report will be submitted to Corporate EHS to further strengthen enterprise-wide learning and continuous improvement. ■

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- **9** TECHNICAL **CONFERENCES**
- **1500+** BUSINESS **DELEGATES**
- **250+** GLOBAL **SPEAKERS**
- SCALE@ CHEMTECH World Expo: **100+ GLOBAL CLIMATE TECH STARTUPS** FROM 20 COUNTRIES; **40 TECHNICAL PRESENTATIONS**
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