



COATINGS AND ANTI CORROSION ENGINEERING REVIEW

April - May 2025 | Volume 16 Issue 1 | ₹100



India expected to be at the forefront in oil and gas pipeline network additions in Asia



Interview
Ms Valdirene Peressinotto
Executive Director, Gerdau Graphene

Industry Report
Painting a sustainable future: How India's paint industry is aligning with SDGs

Driving a technological *REVOLUTION* in paint and coating Solutions



PLURAL COMPONENT MACHINE

Key Features

Safe & simple operation, Consistent material quality, Processes viscous materials, More Flow capacity, Saves money by using less cleaning solvent, Integrated Automatic Re-circulation system

Applications:

Tanks, Pipes, Marine/shipbuilding, Bridges, Wind towers, Railcars, Water towers, Wastewater treatment, Manhole, Sewer reconditioning, Secondary containment, Structural steel, Refineries, Roof coatings



SMART PAINT KITCHEN

Key Features

Lower waste & downtime, Lower energy use, Smart paint recovery technology, Reduced carbon foot-print, Higher ROI with reduced disposal cost, Minimum contamination

Applications:

Trial paint for new projects, unique/Special colors, Development of custom shades, Production in batches, Color changing



POLYUREA SPRAY MACHINE

Key Features

The innovative ELECTRIC Polyurea & PU foam system, high-quality coating, extreme temperature resistance, fast processing time, high elasticity.

Applications:

Swimming pools, Pond linings, Drinking water reservoirs, Chemical-proof tanks, Wind turbines, Ship decks, Submarines, Loading areas, Construction.



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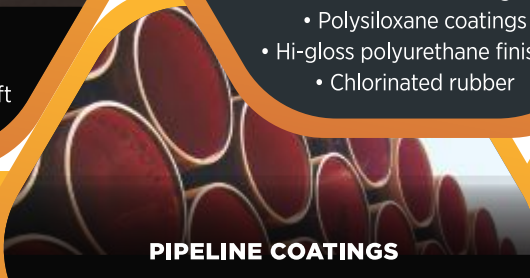
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- BS spec products
- MIL spec products
- Coatings for missiles & aircraft



HIGH PERFORMANCE INDUSTRIAL COATINGS

- Zinc silicate primers • Epoxy primers & finishes
- Vinyl ester coatings • Heat resistant coatings
 - Bituminous coatings
 - Polysiloxane coatings
- Hi-gloss polyurethane finishes
- Chlorinated rubber



PIPELINE COATINGS

- Heavy duty coatings for chemicals & petroleum industries
- Coating systems for thermal power, wind & nuclear power plants
 - Food grade epoxy linings
 - Gas flow epoxy coatings
 - Jet Fuel coatings



MARINE COATINGS

- Marine enamels & epoxy coatings
- Prefabrication primers
- Ballast tank coatings
- Under water coatings
- Antifouling coatings



OEM COATINGS

- Quick drying primer & top coats, low bake & stoving systems
 - Thermosetting acrylics
 - Hi gloss polyester top coats
 - Low bake polyurethane
- Casting sealers & uncoat epoxy chassis black



Architectural Coatings

- External coatings
- Internal coatings
- Hygiene coatings
- Anti carbonation coatings



FLOOR COATINGS

- Penetrating Primer
 - Screed
- Solvent less Epoxy
- Solvent less PU



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From the Editor-in-Chief...



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India is expected to be at the forefront in terms of trunk/transmission oil and gas pipeline network additions in Asia, accounting for more than 40% of the region's total pipeline length additions by 2028, according to GlobalData.

As of 2024, the country has around 43,000 km of pipelines to transport crude oil and petroleum products.

GlobalData's latest report, 'New Build Trunk-Transmission Pipelines Projects by Development Stage, Regions, Countries, Project Type and Forecast to 2028,' reveals that out of 62 projects to commence operations by 2028 in India, gas pipeline projects are likely to account for 48.4%, followed by product pipelines and oil pipelines at 40.3% and 11.3%, respectively.

India is also set to lead in terms of transmission pipeline length in Asia by 2028, with an expected 29,800 km of length additions by 2028. The pipeline development helps the country to enhance its energy infrastructure and meet the growing demand for petroleum from the industrial, domestic, and transportation sectors.

The oil and gas sector is particularly vulnerable due to the harsh operating conditions and the corrosive nature of the materials involved. Preventing corrosion is essential not only for protecting assets but also for ensuring compliance with regulatory standards and maintaining public trust.

Pipe coating along with Cathodic Protection is a critical process in modern infrastructure, ensuring that pipelines—whether they carry oil, gas, water, or other materials—are protected from damage, corrosion, and wear. With the increasing global demand for efficient and long-lasting pipeline systems, the importance of pipe coating cannot be overstated.

The global pipe coating market is projected to reach US\$9.1 billion by the end of 2024 and grow at a CAGR of 4.8% to hit US\$12.6 billion by 2031, according to a press release from Persistence Market Research. This growth is driven by increasing demand from industries seeking corrosion-resistant and durable coatings to enhance pipeline longevity.

In this issue's cover feature, we try and analyze the various types, methods, benefits, the importance of pipe coatings, and the new developments happening within the pipe coating industry. This, plus all our regular columns like the Interview, company profile, case studies, industry reports, etc.

Jolly Lonappan
Editor-in-Chief



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GOOD BYE CORROSION & ABRASION WEAR

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CORROSION, ABRASION & CHEMICAL ATTACKS destroy crores of rupees worth equipment every year. Worldwide research shows that nearly 70%-80% equipment failures are purely due to their surface erosion. The need for effective preventive maintenance therefore is imperative.

The time has arrived for ceramics to finally take centre stage. Jyoti Ceramic Industries has specially developed ceramic filled polymer based coating compounds, "Aluma Coat®-BR" brushable / sprayable and "Aluma Coat®-TW" trowelable.



VERSATILE INDUSTRIAL APPLICATIONS



Motor Shaft
Coated with
Aluma Coat - BR



Butterfly Valve
Coated with
Aluma Coat - BR

Aluma Coat® - BR

A brushable / sprayable easy to apply coating designed to protect surfaces from severe turbulence, corrosion, erosion and chemical attacks. It gives a satin smooth, high-gloss surface finish and can withstand maximum service temperature up to 150°C/302°F



Aluma Coat® - TW

A trowelable, easy to apply protective coating, comprising of sintered sapphire-hard ceramic micro beads, doped in polymer resins designed to resist corrosion, abrasion and moderate surface impact. It gives a rough textured surface finish and can withstand maximum service temperature up to 150°C/302°F.



VERSATILE INDUSTRIAL APPLICATIONS



Mineral Crusher
Coated with
Aluma Coat - TW



Inner Base of Dust
Collector Coated with
Aluma Coat - TW

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Hempel launches Hempafire Extreme 550, its new, market-leading epoxy Passive Fire Protection (PFP)

Hempel A/S, a leading global supplier of coatings and fire protection solutions, proudly announces the launch of its latest PFP solution, Hempafire Extreme 550. This state-of-the-art epoxy PFP coating provides up to four hours of fire protection while delivering exceptional durability and application efficiency. Formulated especially for cellulosic fires, this PFP coating sets new benchmarks for fire safety in commercial and industrial projects.



Hempafire Extreme 550 is suitable for most steel sections and allows building designers to use lighter steel types, reducing overall weight and costs in steel structures.

Certified with Environmental Declaration Program, Hempafire Extreme 550 reduces paint application by up to 40%, resulting in faster, more cost-effective execution, while also having a low embedded carbon value of the paint itself.

"The launch of Hempafire Extreme 550 represents a significant step forward in our mission to provide innovative and market-leading fire protection solutions. Its exceptional durability, loadings efficiency and greater coverage to protect lighter steel buildings for longer make it a game-changer for customers across industries," Roger Soler, Group Product Manager

Cellulosic PFP at Hempel A/S explains. "By addressing the needs of both specifiers and applicators, this product ensures outstanding results at every stage of a project."

Hempafire Extreme 550 is suitable for most steel sections and allows building designers to use lighter steel types, reducing overall weight and costs in steel structures. Providing an architectural-grade finish while meeting aesthetic and functional requirements, it is fully compatible with a wide range of topcoats, offering design flexibility for color and gloss.

Roger Soler adds, "With this latest innovation, we have combined the durability and mechanical strength of epoxy PFP technology with the paint efficiency and easiness-to-apply known from our previous Hempafire products. It underscores our commitment to enhancing both safety and productivity and reinforces our position as a leader in passive fire protection."

For Specifiers, Hempafire Extreme 550 exceeds fire regulations with third-party certification and additional rigorous fire testing, ensuring reliable performance even in harsh climate conditions. This gives specifiers peace of mind that safety standards will be maintained over time. Additionally, the simplicity of specification is a key advantage – this single product protects most steel sections, including lighter structures, offering engineers greater freedom in steel selection. To further streamline the design phase, Hempel's HEET Dynamic estimation software provides powerful support in selecting

Axalta and Dürr partner on automotive digital paint technology

Axalta Coating Systems, a leading global coatings company, and Dürr Systems AG, a leading mechanical and plant engineering firm, have entered into a partnership to provide a digital paint solution, combining Axalta's NextJet™ technology with Dürr's robotics integration, notes a press communique.

Digital paint, also referred to as overspray-free application, is an advanced paint application that allows for precise paint placement. Under the terms of the agreement, Dürr will serve as the robotics integrator for Axalta NextJet™ for light vehicle Original Equipment Manufacturers (OEM).

"The maskless application of paint for tutone and graphics takes collaboration," said Hadi Awada, President, Global Mobility Coatings, Axalta. "Through our partnership with Dürr, we can better serve OEM customers, building on Axalta's coatings know-how and Dürr's robotics integration. Together we are driving the future of digital paint technology."

Dr Lars Friedrich, CEO, Dürr Systems AG, added "We are



Digital paint, also referred to as overspray-free application, is an advanced paint application that allows for precise paint placement.

excited to collaborate with Axalta on the next generation of digital paint. As a pioneer in the field of overspray-free application, Dürr understands the requirements that OEMs demand for individual designs on their vehicles. This agreement will enable our joint technology to come faster to market and meet the needs of our customers."

Demonstrations with Axalta NextJet™ on Dürr robotics have already begun at Dürr's test center in Bietigheim, Germany. OEMs can reach out to their Dürr or Axalta representative for more information.

the optimal fire protection solution, ensuring efficiency and accuracy from the start.

For Applicators, Hempafire Extreme 550 is designed to save applicators time, effort and costs. Its lower DFT requirements mean reduced paint consumption, leading to significant material savings. The product's forgiving nature minimizes stoppages in the painting process, ensuring smoother applications and fewer disruptions. With faster

process times, minimized transport and construction damage, and reduced touch-up needs, applicators can achieve a more efficient workflow. Additionally, its high build capacity protects steel with fewer coats in less time, while its 24-hour readiness at 20°C enables a faster project turnaround. As a solvent-free solution, it also promotes safer and more sustainable working conditions on-site.

High Performance Foam & Polyurea Equipment

For Spray Foam & Polyurea Applications



Reactors



Reactor 3 E-XP2

- **Katalyst** full system communication and control
- **Supply Pump Shut-down** automatically when you run out of material.
- **Power Management** - Select desired heater wattage
- **Independent Hose Control** - Control A and B materials to different temperatures
- Auto pressure balancing
- **Smart Supply**- Automatically monitors and adjusts fluid inlet pressures
- Touchscreen Advanced Display Module (ADM)



Reactor 3 H-XP2

- **Hydraulic System** - Increased yield and high output spraying
- **Reactor Connect** - Communication and Control at Your Fingertips
- **Advanced Control Modules** - Handles power fluctuations
- Quick and Easy Troubleshooting
- **NEW Hydraulic Cooling System** - Powerful fan to maintain optimal oil temperature for longer oil life



E-10 HP

- **Save time** – get smaller jobs done fast without sacrificing performance
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BASF Coatings sets new standard in end-to-end digital color solutions for body shops with Refinity

In its cloud-based platform Refinity, BASF Coatings consolidates a comprehensive suite of digital business solutions for the automotive refinish industry, ensuring body shops worldwide can embrace sustainable digitalization with confidence. With the latest launch of a new color innovation and additional features, automotive refinish customers get access to the most advanced digital color experience, as well as business and training solutions seamlessly, notes a press release from the company.

minimizing errors and saving time. It also features scratch detection and grants access to the industry's largest color database for precise color identification and perfect matching.

The newly designed ImagePLUS feature is also fully compatible with previous-generation spectrophotometers, providing body shops with maximum flexibility. It helps body shop managers and painters to speed up the color identification process with an increased intuitive high-quality visualization and accuracy. With on-screen



In its cloud-based platform Refinity, BASF Coatings consolidates a comprehensive suite of digital business solutions for the automotive refinish industry.

Refinity leverages next-generation color scanning technology with its latest spectrophotometer ScanR. The device is the fastest and most accurate color matching solution for flawless results, ensuring precision and reliability in color measurement. ScanR takes five precise measurements in just 30 seconds and includes automatic Vehicle Identification Number (VIN) and license plate recognition,

visualized color retrieval, complex data interpretation is eliminated, while real-time comparisons reduce spray-outs and boost efficiency. Enhanced by spectral curve analysis and precise detection of effect particles and coarseness, it refines results even further, ensuring the perfect color match with minimal material waste.

"Thanks to our expertise in color technology and sustainability, and

New model 5770 Linear Abraser from Gardco

Paul N. Gardner USA, (Gardco) – worldwide distributors, producers, and designers of quality physical and inspection instruments for the paint, coatings, and related industries – is offering the new Taber® Model 5770 Linear Abraser, notes a press communique from the company.

This versatile tester enables operators to conduct a wide range of physical property tests, including wear and abrasion resistance, scratching, gouging, scraping, rubbing, and color transfer (commonly known as crocking). With optional attachments, the Model 5770 can be customized to assess different types of material damage. Adjustable settings for stroke length, speed, and load allow precise control to match the specific characteristics of each material.

Designed to accommodate



Designed to accommodate specimens of nearly any size or shape, the Linear Abraser is ideal for evaluating both flat and contoured surfaces, making it well-suited for finished product testing.

specimens of nearly any size or shape, the Linear Abraser is ideal for evaluating both flat and contoured surfaces, making it well-suited for finished product testing. Test attachments securely mount to the bottom of the spline shaft, while additional weights can be added to the top. A precision bearing on the spline shaft ensures a "free-floating" test system, allowing the load arm to move smoothly in a linear motion, conforming to the contours of the specimen for accurate testing.

developments with our OEM partners and customers, Refinity is set to enhance body shop performance in all areas. We are now able to offer a state-of-the-art cloud solution providing customers worldwide with a seamless digital color experience," says Chris Titmarsh, Senior Vice President Automotive Refinish Coatings at BASF.

Driven by science and color expertise, BASF Coatings empowers manufacturers and designers to address

consumer preferences with precision. Connected with the fully automated mixing machine Alfa CR4/6, the digital color process delivers unparalleled speed and precision, capable of completing up to six mixes simultaneously. This efficiency not only optimizes the workflow of the body shop, but also minimizes waste, reinforcing BASF's commitment to helping its customers reach their individual sustainability goals.

Weathering solutions from Aadarsh technologies

Xenon Test Chamber



**UV Light Accelerated
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Real-world corrosion simulation with environmental chambers from Q-Lab

Understanding how materials degrade in real-world environments is essential for designing durable, corrosion-resistant products. There are multiple advanced Q-Lab environmental testing chambers that simulate natural weathering and corrosion conditions with precision, helping industries improve product reliability and lifespan.

Sunlight, heat, and moisture cause millions of dollars of material damage every year. The QUV accelerated weathering tester exposes materials to alternating cycles of UV light and moisture at controlled, elevated temperatures. In a few days or weeks, QUV testers can reproduce the damage that occurs over months or years outdoors.

PHOTO: Q-LAB



The Q-SUN Xenon Test Chamber uses a full-spectrum xenon arc lamp to reproduce the effects of full sunlight, including UV, visible light, and infrared radiation.

The Q-FOG Cyclic Corrosion Chambers from Q-Lab can perform continuous salt spray, adhesion test, and nearly all cyclic automotive corrosion tests. It closely replicates natural outdoor corrosion processes such as rust creep,

blistering, and coating delamination.

The Q-SUN Xenon Test Chamber uses a full-spectrum xenon arc lamp to reproduce the effects of full sunlight, including UV, visible light, and infrared radiation. Q-SUN xenon arc chambers are available in four different models. Each tester is 100% air-cooled, for extreme reliability and simple, low-cost maintenance.

The QCT Condensation Tester is an excellent entry-level corrosion test method for quality control and material comparison. It simulates rain and dew by condensing liquid water directly onto the test specimen. The QCT condensation tester has an automatic dry-off system, which works by blowing

heated air into the test chamber and can perform standards like ISO 6270-1 that produce continuous, single-sided condensation with specimen backs exposed to cool laboratory air. Using a special accessory, the QCT can meet standards like ISO 6270-2 with enclosed

condensing humidity. Together, these Q-Lab systems provide a comprehensive solution for corrosion and weathering simulation.

More details: khushbooscientific.com

PPG launches clearcoats for value-focused and premium collision repair segments

PPG has announced the launch of new clearcoat products for the value-focused and premium collision repair segments, notes a press communique.

PPG Super Value SC300 Series clearcoats offer a fast-drying, reliable and cost-effective solution.

acrylic urethane clearcoats are available in versions that meet the U.S. EPA National Rule volatile organic compounds (VOC) requirements and the more stringent Rule 2.1 required in states such as California. They are easy to use and provide consistent results for



PPG has launched new clearcoat products for the value-focused and premium collision repair segments.

PPG DELTRON® NXT DC7020 Premium Glamour Speed Clearcoat delivers high-efficiency, high-quality results with significant energy savings thanks to its five-minute bake time.

“PPG is offering the sector options – delivering practical value and advanced performance for today's body shops,” said Nicole Sinclair, PPG segment director, Collision and Allied Products, Automotive Refinish. “These two launches highlight our ability to meet evolving customer needs while continuing to lead the industry in innovation and service.”

PPG Super Value SC300

busy shops that need quality and value. They dry quickly and can be cured using air or baking.

PPG Deltron NXT DC7020 Premium Glamour Speed Clearcoat meets National Rule requirements and delivers fast curing times – five minutes at 140°F or under 60 minutes at room temperature – and a high-gloss finish when applied over PPG ENVIROBASE® High Performance waterborne or PPG Deltron NXT solventborne basecoats. With its ultrafast bake time, it accelerates cycle times and helps bodyshops reduce energy consumption.



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RHEOLOGY VISCOSITY TEXTURE IN-LINE POWDER MOISTURE GAS

Cyclic corrosion test CCT&CRH cabinets from Biuged

For most artificial accelerated tests in laboratory, getting a consistent testing results with outdoor is the most important purpose. Prior to cyclic corrosion testing, conventional salt spray (a continuous salt spray at 35°C), was the most popular way to simulate corrosion in a lab. Because conventional salt spray methods failed to simulate the natural wet/dry cycles of the outdoors, test results frequently provided poor correlation to outdoors. In order to better simulate the complex and changeable external natural environment, cyclic corrosion test has gradually been considered as an important and effective method for the life assessment of industrial products.

The Cyclic Corrosion Test Cabinets is also called CCT&CRH Cabinets. Some industrial products need to be exposed to repeated cyclic salt spray, dry and static environment with high humidity and low humidity. These tests were initially switched between several test chambers manually. The multi-functional CTC cabinets

solve this problem well, and realizes the automatic test of these cycles in a chamber. In a typical cyclic corrosion cabinet, all specimens are exposed to a series of different environments in a repetitive cycle that simulates the outdoors. Simple cycles, such as prohesion, may consist of cycling between salt fog and dry conditions. More sophisticated automotive methods may ask for multi-step cycles that incorporate humidity, dry air or condensation, along with salt spray and dry-off.

Within one chamber, users can cycle easily through a series of the most significant corrosion environments. Even extremely complex test cycles can easily be programmed with the controller. Biuged CCT&CRH Cabinets can perform salt spray, prohesion, and 100% humidity for most cyclic automotive tests. The CCT cabinets developed and produced by Biuged sets and controls various parameters through the touch screen, and combines multiple tests such as salt spray corrosion, humidity (high temperature and high humidity, low

Targeted positioning of the gun on the coating object from Gema

The new Gema ZA17 vertical module in combination with the ZS05 stationary axis precisely positions the gun axes UA05 and UA05-x on the coating object and guarantees perfect coating results for most complex application requirements and difficult part geometries.

over a surface, which enables very precise coating of complex parts and inclined beams.

Gema Switzerland GmbH is a leading supplier in the area of electrostatic powder coating with a worldwide presence. From simple hand



Gema's ZA17 vertical module for precise gun position guarantees perfect coating results for most complex applications.

Up to six ZA17 vertical modules can be mounted on a ZS05 axis, with each module operating independently of the other. The ZA17 modules move the coating guns either into a variable fixed position or oscillate

coating through to fully automated powder coating, this Swiss company offers solutions that meet the high demands and requirements of customers around the world in a wide range of industrial sectors.



Biuged CCT&CRH Cabinets can perform salt spray, prohesion, and 100% humidity for most cyclic automotive tests.

temperature and low humidity), air drying (hot drying and air drying) to simulate a variety of cyclic corrosion tests, notes a write-up from their agent in India, Aadarsh Technologies.

Special cyclic corrosion tests

can also be simulated through the combination of other accessories. The instrument can also conduct neutral salt spray test (NSS), acetic acid salt spray test (AASS), copper accelerated acetic acid salt spray test (CASS), water spray test, damp heat test, drying test and standard atmospheric environment test separately.

More details:
aadarshtech.com

VR Coatings offers Corrosion Protection Painting systems



I' Beam

Suitable for
Manual / Automatic
application,
Factory / Site Location,
Single / Plural
Component Coating
Materials.



Z' Perlin



Motorised portable trolley with rotary attachment



Internal Automatic Pipe Coating attachments and
Boom Track Systems



External Automatic Pipe Coating



Rhino



2K Hot Airless Spray Painting Equipment



VRC Mix HP



External Airless Spray Painting, Varnish
Coating for tubes, Pipes moving on conveyor
with fixed spraying ring

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CorroLogic®: The smart solution for corrosion protection at airport tank farms

While cathodic protection (CP) has long been a go-to for corrosion inhibition, the last two decades of tank protection have seen CorroLogic® Vapor phase corrosion inhibitors become a new industry standard that offers a smart solution for protecting storage tanks at airports and beyond

Airports go through hundreds of thousands of gallons of jet fuel each day, requiring tank farms to store plenty of reserve fuel onsite. These aboveground storage tanks (ASTs) are under strict regulations to ensure physical and environmental safety, including the protection of tank floors from corrosion. While cathodic protection (CP) has long been a go-to for corrosion inhibition, the last two decades of tank protection have seen Cortec Corporation's CorroLogic® Vapor phase Corrosion Inhibitors become a new industry standard that offers a smart solution for protecting storage tanks at airports and beyond.

Why protect airport ASTs from corrosion?

Corrosion protection of

storage tank bottoms has many incentives. Corrosion eats away at the metal floor, ultimately leading to hazardous leaks if left unchecked and unrepaired. Any measures that prevent corrosion and reduce repairs can therefore save time, money, and hassle in the long run. CP is often used to inhibit corrosion by sending an electrical current through the tank pad that offsets the normal electrochemical reaction of a corrosion cell. If the tank floor stays in contact with the electrical current, corrosion is mitigated. However, because tank floors are uneven and can bend and create air pockets as the tank is filled and refilled, some areas of the tank floor will not be in constant contact with the treated sand pad, allowing for patches of corrosion.



PHOTOS: CORTEC

The ASTs are under strict regulations to ensure physical and environmental safety, including the protection of tank floors from corrosion.

Why CorroLogic® makes sense

CorroLogic®, on the other hand, is distributed by vapor action. Once the corrosion inhibitors are present under the tank floor, they begin to diffuse throughout the void space, forming a protective molecular layer on all metal surfaces they reach. This

allows CorroLogic® to protect the bottom of the tank independently or in conjunction with CP. Research suggests these two methods may have a synergistic effect when used together. Further to the user's advantage, CorroLogic® does not require a power source and can be applied at any stage in a tank's lifecycle—during construction or even after the tank is filled

and in service, minimizing the loss of time and money required to drain high volumes of fuel. With positive results seen from the last 20 years of CorroLogic® field trials, the underlying Vapor Corrosion Inhibitor (VCI) technology has recently been codified in industry standards: API Technical Report 655 and AMPP SP21474-2023.

A smart solution for airport ASTs

As with any industry that involves ASTs, the aviation sector needs solutions to corrosion that make sense practically and economically. CorroLogic® measures up to that standard as a relatively non-invasive technology with vapor-phase action that complements the deficiencies of other protective strategies and continues working even when CP power is off.



As with any industry that involves ASTs, the aviation sector needs solutions to corrosion that make sense practically and economically.



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Grauer & Weil (India) Ltd expansion to include international markets

Plans are also afoot to expand production facilities to meet the increased customer demand as part of their long term strategy

With the emphasis on infrastructure growth in India, the future of the paint and coatings markets in the country looks bright. Grauer & Weil (India) Ltd, hopes to ride the crest of this wave! The company has already made a mark with their indigenously developed high performance primers and fluorinated top coats for the Supersonic BrahMos missile and the High Speed Rail under the 'Atmanirbhar Bharat' program of the Government of India. "We have also received the AS:9100 certification which is a quality management system (QMS) standard for companies in the aviation, space, and defense industries," said Mr Sujit Sinha, President, Paints Division, Grauer & Weil (India) Ltd. The AS:9100 standard is issued by the International Aerospace Quality Group (IAQG), which is a collaborative group focused on setting quality

standards specifically for the aerospace industry; essentially, it's an aerospace standard developed and maintained by the IAQG.

The development of fluoropolymer-based paints for the upcoming series of high-speed Vande Bharat is another area, the company is targeting for further growth. The high-speed rail coatings market in India is currently in its nascent stage, experiencing significant growth potential with major drivers including the need for specialized coatings to withstand high speeds, harsh weather conditions, and increased passenger traffic, while also facing challenges related to technology adoption and infrastructure development within the country. Overall, the market is expected to see substantial expansion as more high-speed rail projects are initiated.



Mr Sujit Sinha, President, Paint Division, Grauer & Weil (India) Ltd.

PHOTOS: GRAUER & WEIL (INDIA) LTD.

Infrastructure growth has meant enhanced safety regulations. "Earlier, fire safety factors were selective," said Mr Sinha. "Now, it is a compulsory statutory requirement. Intumescent coatings are now essential. This is one other area we are planning to get into with fire-resistance coatings and these would have a minimum fire rating of two hours."

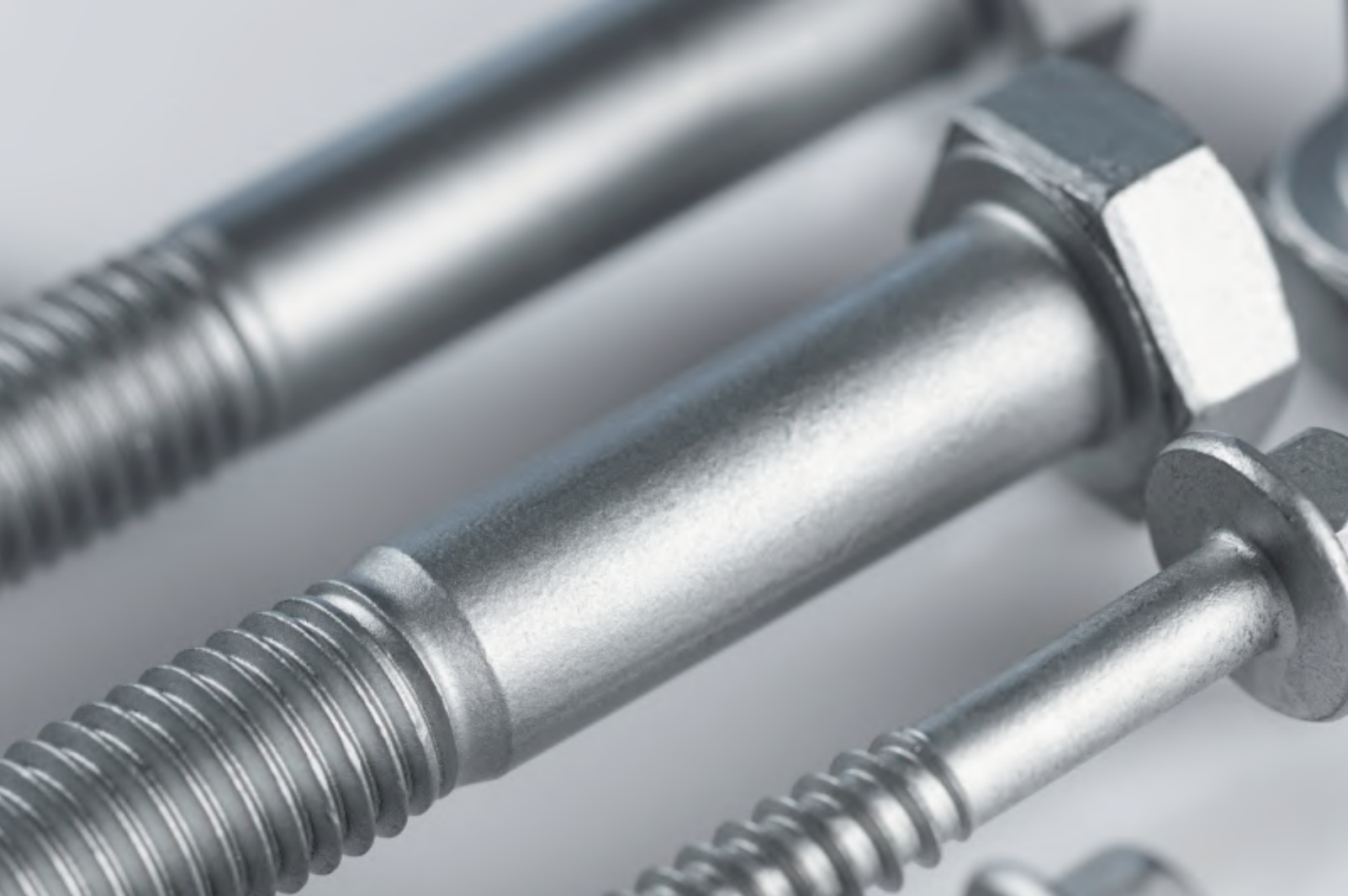
Barotiwala have already been enhanced to factor this in.

Besides visions for the domestic market, the company also has plans to increase their visibility and presence in the international sector too! "The initial focus will be in the Middle East," said Mr Sinha. "We have already started the construction of a paint and chemical plant in the UAE and should be commissioned soon." At the moment Grauer & Weil (India) Ltd, is already exporting paints for use within the oil and gas and OEM sectors in the region. "The clients there have found our paints ideal for their use, especially since the paints and chemicals have been adapted for their specific climatic conditions." The geographical location of the plant will also enable them to attend to clients and orders from other areas in the Middle



Grauer & Weil (India) Ltd., offers complete corrosion protection solutions on all types of substrates across various industry segments.

"There are other segments like green energy, powder coatings, etc, which are also huge markets for us, and with these, we could double our turnover in the next five years," said Mr Sinha. The production capacity at their plant at Dadra & Nagar Haveli &



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East, Russia and the African continent. The company will shortly initiate the process of getting approvals from leading Oil & Gas companies like ARAMCO and ADNOC.

Grauer & Weil (India) Ltd, has become an advanced solution provider for protecting a variety of substrates across multiple industrial segments. Over the years, with a customer-focused approach, high focus on R&D, Q&A, technical support and others, they have been able to come up among the top five high-performance coating manufacturers in India.

Grauer & Weil (India) Ltd offers paints and coatings across six segments, namely Protective Coatings; Auto and Non-Auto OEM; Pipe Coatings; Marine Coatings; Decorative Coatings and Aerospace Coatings. "We have a significant presence in the market and with our new water-based high-performance coatings, we are better placed. Our products are approved by major consultants and EPC contractors. Our pipe coating for drinking water is tested and approved by WRAS, UK and NSF, USA." The company has tie-up with Transocean

Coatings, Netherlands for protective coatings and marine paints. The products are manufactured and marketed by Grauer & Weil (India) Ltd in India.

"With our technical tie-ups with international players we have access to the world's latest innovations, and we leverage them and pass the benefit to our customers in the shortest possible time," emphasizes Mr Sinha.

Awards and achievements received include the International Quality Crown Award (2007); the Rajiv Gandhi Awards for Excellence; Eco-friendly Award; Best Paints & Coating Company of India by *CIA World*; and Runner-up National Award to Brahmos for their import substitute of Russian paints.

The paints division since 1948 has been engaged in the manufacturing and supply of high performance coatings for the industrial, marine and OEM use. They are a main supplier of painting systems to the oil exploration rigs, public and private sector petrochemical refineries, pipeline manufacturers, ship building yards, nuclear power plants, war missiles, the



Grauer & Weil (India) Ltd's world class Research and Development Centre and six manufacturing facilities form the very backbone of the company.

aerospace industry, chemical and fertilizer plants, OEMs including the automotive sector and white goods manufacturers to name a few. The products are tailor-made to meet the stringent customer demands and vary in the level of technology from simple application to highly sophisticated coating systems, amongst others.

Grauer & Weil (India) Ltd is focused on the customer and help them with innovative painting solutions, including customer training, application support, and designing paint systems such as rapid cure systems, one coat system and direct to metal coating which help them increase their productivity. The company also makes electroplating chemicals, lube oil, and pretreatment chemicals as part of the surface coating range and is the market leader in electroplating chemicals and making paints for critical defense applications.

A countrywide sales network of over 100 dealers and distributors supported by over

35 branch offices, depots and technical service centers, provide an efficient after sales support to all their valuable customers. Manufacturing facilities are located in Mumbai, Dadra, Vapi, Pune, Jammu, and Barotiwala. Plans are also afoot to expand production facilities at these places to meet the increased customer demand as part of this long term strategy.

Their R&D Centre and six manufacturing facilities form the backbone of the company. "Our excellence in commitment is reflected in their adherence to the most stringent standards for quality assurance and international best practices like continuous product development, backward integration, and the latest technological up gradation," said Mr Sinha.

As part of this strategy, the company is setting up a state-of-the-art 'Innovation-cum-customer support' TechCenter. This will supplement the company's efforts to introduce new environment-friendly technologies alongside showcasing its capabilities to meet both existing and prospective customers' finishing requirements under one roof.



With a customer-focused approach, high focus on R&D, Q&A, technical support and others, Grauer & Weil (India) Ltd has been able to come up among the top five high-performance coating manufacturers in India.



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Asia and the Middle East two of the fastest-growing markets for advanced materials and graphene-based solutions

When incorporated into coatings, graphene creates a dense, impermeable layer that prevents the ingress of water, oxygen, and other corrosive agents to the underlying substrate, notes Ms Valdirene Peressinotto, Executive Director, Gerdau Graphene, in a chat with C&ACER

What is graphene and why is there so much buzz around it?

Graphene is a single layer of carbon atoms arranged in a hexagonal lattice, forming a two-dimensional structure. Despite its minimal thickness, it is approximately 200 times stronger than steel and exhibits exceptional performance enhancements including anti-corrosive properties, electrical and thermal conductivity, flexibility, and transparency. These unique properties make graphene a revolutionary material with potential applications across various industries, including electronics, energy storage, composites, and coatings. The excitement surrounding graphene stems from its potential to transform these sectors by enhancing product performance and enabling new technological

advancements.

How does graphene help with corrosion management?

Graphene's exceptional barrier properties make it highly effective in corrosion management. When incorporated into coatings, graphene creates a dense, impermeable layer that prevents the ingress of water, oxygen, and other corrosive agents to the underlying substrate. This barrier significantly reduces the rate of corrosion, thereby extending the lifespan of metal structures and components. Industries such as marine, automotive, and infrastructure benefit from graphene-enhanced coatings that offer superior protection against environmental degradation.

Can graphene improve the performance of paints and coatings?

Absolutely. Graphene serves as a multifunctional additive in paints and coatings, enhancing several key performance attributes:

□ **Durability and abrasion resistance:** Graphene's strength improves the wear resistance of coatings, leading to longer-lasting surfaces that withstand mechanical stresses.

□ **Thermal and UV stability:** Graphene-enhanced coatings exhibit superior thermal stability and resistance to ultraviolet light, reducing degradation from heat and sunlight exposure.

□ **Electrical conductivity:** The conductive nature of graphene enables the development of anti-static and electrically conductive coatings for specialized applications.

By integrating graphene, coatings become more robust, durable, and versatile, meeting the demanding requirements of various industrial applications.

How fast is graphene being adopted by the paints and coatings industries?

The adoption of graphene in the paints and coatings industries has accelerated over the past decade. Early research demonstrated graphene's potential in enhancing coating properties, leading to increased interest and investment in this area. As production methods have advanced and become more cost-effective, the availability of high-quality graphene has improved, facilitating its integration into commercial products. Companies like Gerdau Graphene have been at the forefront, developing graphene-enhanced additives



Ms Valdirene Peressinotto, Executive Director, Gerdau Graphene.

and collaborating with major paint producers to bring innovative products to market. The trend indicates a growing recognition of graphene's benefits, with more manufacturers exploring its applications to meet industry demands for high-performance, sustainable coatings.

How big is the graphene industry and how fast is it growing?

The global graphene market has experienced significant growth and is projected to continue on this trajectory. In 2023, the market was valued at approximately \$432.7 million and is expected to reach around \$5.2 billion by 2032, exhibiting a compound annual growth rate (CAGR) of 31.8% during this period. This rapid expansion is driven by



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increasing applications of graphene across various industries, including electronics, automotive, energy, and coatings, as companies recognize the material's transformative potential.

How is graphene produced and where does it come from?

Graphene is sourced from graphite, a naturally occurring form of carbon found in various parts of the world. Advancements in production techniques have enabled the scalable and cost-effective manufacturing of graphene, facilitating its adoption in commercial applications.

Graphene is primarily produced through several methods:

□ *Chemical vapor deposition (CVD)*: This technique involves decomposing a carbon-containing gas on a substrate to form a graphene layer. CVD is known for producing high-quality graphene suitable for electronic applications.

□ *Liquid-phase exfoliation*: In this method, graphite is dispersed in a liquid and subjected to ultrasonic energy or shear forces to separate graphene layers. This approach is scalable and

cost-effective, making it suitable for bulk production used in composites and coatings.

□ *Mechanical exfoliation*: Also known as the "Scotch tape method," this involves peeling layers from graphite to obtain graphene. While it produces high-quality graphene, it is not practical for large-scale production.

A brief history of Gerdau Graphene and where do you see the company 10 years from now?

Gerdau Graphene was established in 2021 as a subsidiary of Gerdau, a company with over 120 years of experience in the steel industry. Recognizing the transformative potential of graphene, we embarked on a mission to develop, produce, and market graphene-enhanced products across various sectors, including automotive, construction, and coatings. Our approach leverages Gerdau's extensive industrial expertise and infrastructure to accelerate the adoption of graphene-based solutions.

Our current product portfolio includes industry-first graphene-enhanced products for the paints and coatings industry, plastics industry, and concrete industry.

In the plastics industry, Gerdau Graphene has developed a range of graphene-enhanced masterbatches under the Poly-G brand. These masterbatches are designed to improve the mechanical and thermal properties of various polymers, including polyethylene (PE) and polypropylene (PP). Graphene imparts superior mechanical strength, increased puncture resistance, and improved barrier properties against liquids and gases. These enhancements extend the lifespan of plastic products and broaden their application scope. Graphene's strength also allows for the production of thinner and lighter plastic products without compromising durability. For instance, our collaboration with Packseven led to the development of a graphene-enhanced stretch film that is 25% thinner yet more robust, resulting in significant reductions in raw material usage and waste. The use of graphene enables a reduction in virgin resin consumption by up to 25%, contributing to lower environmental impact and promoting the development of more sustainable plastic solutions.

Looking ahead to the next decade, we envision Gerdau Graphene as a global leader in nanotechnology, driving innovation across multiple industries. Our focus will be on expanding our product portfolio, enhancing production capabilities, and fostering strategic partnerships to deliver sustainable, high-performance solutions that address the evolving needs of our customers and contribute to a more resilient and efficient industrial landscape.

What products catering to paints and coatings does Gerdau Graphene manufacture?

Gerdau Graphene offers a range of graphene-enhanced additives designed to elevate the performance of paints and coatings:

□ *NanoDUR: Enhancing durability* – NanoDUR is a water-based graphene additive engineered to significantly improve the durability of paints and coatings. Its excellent dispersion properties ensure uniform integration into various formulations, leading to coatings that can better withstand wear, tear, weathering, and other external factors. This results in surfaces that maintain their physical and chemical properties over time, including color retention and adhesion, while exhibiting strong resistance to chipping, flaking, cracking, fading, and peeling. Field applications have demonstrated NanoDUR's effectiveness. For instance, in real-world testing, NanoDUR-enhanced paints showed a 33% reduction in paint consumption and application, thereby reducing the frequency of repainting by up to one-third.

□ *NanoCORR Shield: Advanced Corrosion Protection* – NanoCORR Shield is a graphene-based chemical additive specifically formulated to enhance the anti-corrosive properties of solvent-based paints and coatings. The integration of specially engineered graphene creates a dense, impermeable layer within the coating matrix, effectively blocking corrosive elements such as water, oxygen, and chlorides from reaching the substrate. In rigorous salt



Graphene's exceptional barrier properties make it highly effective in corrosion management.



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Instrumentation & Technologies

spray tests, coatings incorporating NanoCORR Shield have demonstrated a remarkable 30% to 70% increase in corrosion resistance. NanoCORR Shield enables a reduction in the nominal coating thickness required to achieve desired protection levels, leading to decreased paint consumption without compromising performance. By extending the lifespan of coated structures and reducing the frequency of maintenance and recoating, NanoCORR Shield contributes to environmental sustainability and economic efficiency across various sectors.

□ **NanoLAV:** Increasing washability and moisture resistance – NanoLAV is a graphene additive specifically formulated to improve the washability and moisture resistance of painted or coated surfaces. Its excellent dispersibility ensures uniform integration into various paint formulations, enabling surfaces to withstand cleaning or washing without degrading, dissolving, peeling, or fading when exposed to water, mild detergents, or other cleaning agents. This makes NanoLAV particularly suitable for environments that require frequent cleaning, such as hospitals, schools, kitchens, and areas prone to stains and dirt. Incorporating NanoLAV does not alter the final pH of the paint, ensuring compatibility with existing formulations and stability of the end product. By enhancing washability, NanoLAV reduces the need for high-alkaline washability promoters, such as sodium silicate, which can harm aquatic life and disrupt ecosystems. This contributes to a more environmentally friendly paint formulation.

Our products are developed to integrate seamlessly into existing manufacturing processes, providing an efficient pathway for producers to enhance their product offerings with advanced graphene technology.

Any new launches by Gerdau Graphene in the recent past?

Our most recent product launch was the NanoCONS line of graphene-based admixtures, launched last summer, which are specifically formulated to enhance the performance and sustainability of cementitious materials. The addition of NanoCONS admixtures can increase the compressive strength of concrete by up to 50%, enabling the construction of more resilient structures. Graphene's incorporation allows for a reduction in cement content without compromising performance, leading to a decrease in CO₂ emissions associated with concrete production by up to 20%. NanoCONS admixtures also contribute to a reduction in water usage by 7% to 10% during concrete mixing, promoting more sustainable construction practices.

In the coming months, we anticipate major additions to both our paints and coatings additives as well as plastic masterbatches.

What do you see as the future of graphene and what trajectory is it going to take to grow?

I see a transformative future for graphene, one where it becomes a standard material in industrial applications, much like steel, aluminum, or plastic today. The trajectory of graphene's adoption will



When incorporated into coatings, graphene creates a dense, impermeable layer that prevents the ingress of water, oxygen, and other corrosive agents to the underlying substrate.

follow an exponential growth curve, driven by advances in production scalability, cost reduction, and integration into mainstream industries.

Graphene's conductivity and barrier properties are paving the way for the next generation of intelligent coatings:

□ **Self-Healing Coatings:**

Graphene-based coatings that repair scratches and damage autonomously.

□ **Anti-Corrosion & Anti-Microbial Coatings:**

Graphene-enhanced surfaces will self-clean, prevent bacteria growth, and resist corrosion better than ever before.

□ **Conductive & Smart Surfaces:**

We will see graphene-infused coatings in electronics and energy systems, enabling new applications in touch-sensitive, lightweight, and flexible displays.

One of the biggest barriers to mass adoption has been cost. However, as production techniques improve—through methods like liquid-phase exfoliation, chemical vapor deposition (CVD), and electrochemical exfolia-

tion—the cost of high-quality graphene will continue to drop. Over the next decade, we anticipate the price of graphene to fall by over 50%, making it even more competitive with traditional materials.

How do you see the market for Gerdau Graphene in Asia and the Middle East?

Graphene adoption is already accelerating in North America, South America, and Europe, but the biggest market expansion will be in Asia and the Middle East, where there is:

□ High demand for advanced materials in infrastructure, electronics, and energy storage.

□ Strong government and industrial investment in nanotechnology.

□ A focus on reducing emissions and improving material efficiency in manufacturing.

At Gerdau Graphene, we are actively exploring expansion opportunities in these regions, collaborating with local partners to bring graphene-enhanced solutions to fast-growing industries.



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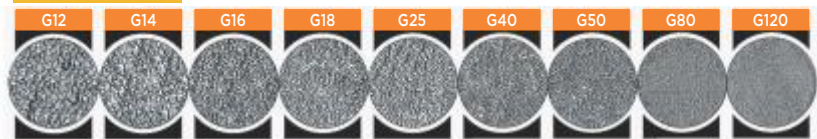


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As production techniques improve the cost of high-quality graphene will continue to drop.

How do you market your products and are you planning any expansion programs in Asia / Middle East?

We take a strategic, industry-focused approach to marketing our graphene-enhanced additives and materials. Given that graphene is still a relatively new industrial

material, education and collaboration are key elements of our marketing efforts. We work directly with major industrial manufacturers in paints, coatings, plastics, and concrete to integrate graphene into their existing formulations. We also prove graphene's impact through certified tests (e.g.,

salt spray tests, durability assessments, tensile strength improvements), to offer scientific validation that strengthens our market credibility.

Asia and the Middle East represent two of the fastest-growing markets for advanced materials and graphene-based solutions. China, Japan, South Korea, and India are leading the world in graphene research and industrial adoption, where the automotive, electronics, and construction industries are eager for lightweight, high-performance materials. Government initiatives in Japan and China are actively funding graphene commercialization and plastic reduction policies in countries like China, Indonesia, and South Korea drive demand for sustainable solutions like

Poly-G masterbatches.

Similarly, GCC nations (UAE, Saudi Arabia, Qatar) are massively investing in sustainable infrastructure and energy-efficient construction. At the same time the oil and gas sector in this region needs graphene-enhanced anti-corrosion coatings to extend pipeline and equipment lifespan. Given the extreme heat, sand, and humidity, graphene-enhanced coatings provide much-needed durability and UV resistance.

As a result, we are identifying local distributors in Asia and the Middle East to scale our product lines. We are also exploring joint ventures with coatings and plastic manufacturers in these regions and engaging with local coatings, plastics, and construction consortiums to drive awareness.

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India expected to be at the forefront in oil and gas pipeline network additions in Asia

With the increasing global demand for efficient and long-lasting pipeline systems, the importance of pipe coating cannot be overstated

GlobalData, citing Bloomberg, has reported that India's state-run refiners are nearing the completion of the world's longest liquefied petroleum gas (LPG) pipeline, which is expected to start operations by June and enhance supply chain efficiency. The project, valued at US\$1.3 billion, is set to replace numerous trucks currently traversing the country, thereby reducing fuel transportation costs and the potential for accidents.

Indian Oil, Hindustan

Petroleum (HPCL), and Bharat Petroleum (BPCL) have jointly established IHB Limited to create the 2,800 km pipeline, which will extend from Kandla in western India to Gorakhpur in the north. Indian Oil director of pipelines and IHB chairman N. Senthil Kumar is reported to have said: "This will be a game changer in the LPG supply chain. It is like putting LPG on a conveyor belt."

The network is designed to transport approximately 8.3

million tons of LPG annually, covering around 25% of India's total demand. Currently around 70% of bottling plants receive their supply via road transport. The Petroleum and Natural Gas Regulatory Board has been advocating for more pipelines to manage increasing volumes and prevent major road incidents.

LPG usage in India, primarily for household cooking, has increased by four-fifths over the past decade, reaching 29.6 million t in the fiscal year ending in March 2024. This growth has outstripped the 47% rise in demand for other refined oil products. The sales boost has been supported by government subsidies aimed at encouraging low-income households to shift away from using polluting biomass for cooking.

The Indian government is focused on expanding the natural gas infrastructure to increase its share in the country's primary energy mix, with plans to develop a "One Nation One Gas Grid."

As of 2024, the country has around 43,000 km of pipelines to transport crude oil and petroleum products.

GlobalData's latest report, 'New Build Trunk-Transmission Pipelines Projects by Development Stage, Regions, Countries, Project Type and Forecast to 2028,' reveals that out of 62

projects to commence operations by 2028 in India, gas pipeline projects are likely to account for 48.4%, followed by product pipelines and oil pipelines at 40.3% and 11.3%, respectively.

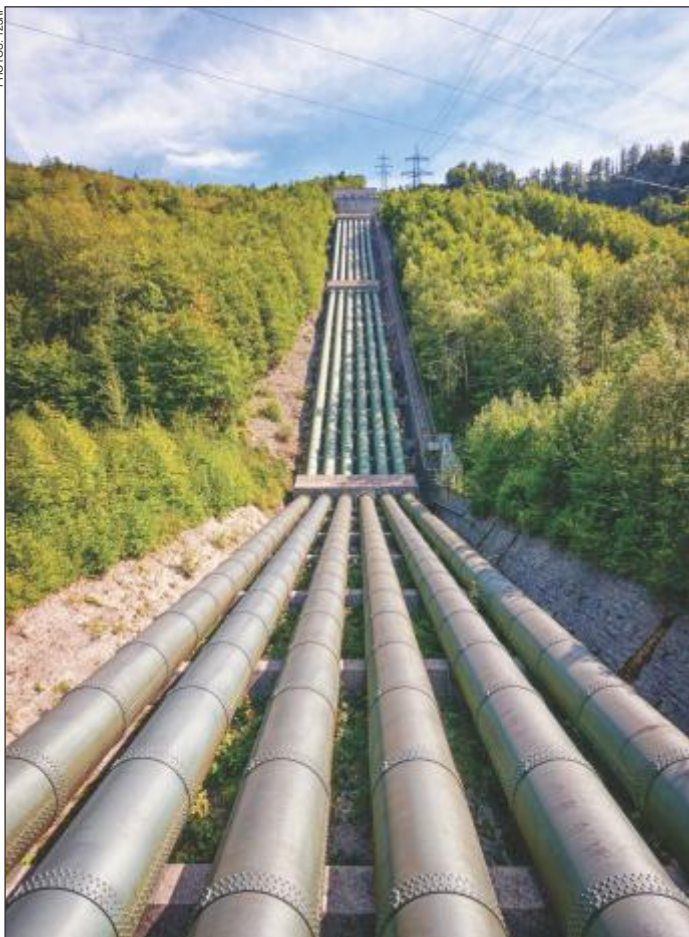
India is also set to lead in terms of transmission pipeline length in Asia by 2028, with an expected 29,800 km of length additions by 2028. Accounting for more than 40% of the region's total pipeline length additions by 2028, according to GlobalData, the pipeline development helps the country to enhance its energy infrastructure and meet the growing demand for petroleum from the industrial, domestic, and transportation sectors.

Notable developments

Some notable pipelines include the Hazira-Vijaipur-Jagdishpur (HVJ) pipeline, and the Kandla-Gorakhpur Pipeline.

A natural gas pipeline connecting the Greenfield 5 million tpy LNG regasification terminal at Chhara in the Gir-Somnath district with the gas grid was commissioned as recent as March 2025. The pipeline has a capacity of 18 million m³/d and was developed by Gujarat State Petronet Limited (GSPL). The pipeline passes from the outskirts of eco-sensitive zone of the Gir National Park & Wildlife Sanctuary, home to Asiatic lions.

PHOTOS: 123RF



This terminal is operated by HPCL LNG Limited, a subsidiary of state-run Hindustan Petroleum Corporation Limited (HPCL).

This project enhances the country's availability of natural gas for use as an energy source in line with the Government of India's target to raise the share of natural gas in the energy mix to 15% by 2030.

"As we all know India which is now rapidly developing and major oil and gas assets are being built – corrosion over time shall be a major concern which could result in significant economic losses, environmental damage, and safety risks. Effective corrosion management is therefore essential to ensuring the integrity and sustainability of these valuable assets," said Mr K. B. Singh, Founder – KBS Associates, while speaking at the Conference 'Corrosion and its Prevention – Oil & Gas Industry,' hosted by AMPP India Chapter in conjunction with the C. V. Raman Global University, Bhubaneswar, Orissa. "As we advance in our technological capabilities, the need to address corrosion more effectively becomes ever

more critical," said Prof Banshidhar Majhi, Vice-Chancellor, C. V. Raman, Global University.

"Corrosion remains one of the most critical issues in the oil and gas sector, posing risks not only to operational efficiency but also to the safety of our personnel and the protection of our environment. The severe impact of corrosion on infrastructure – from pipelines and offshore platforms to storage tanks – underscores the need for continued research, development, and implementation of effective solutions," said Mr N. Manohar Rao, Co-Chairman of the National Seminar on Corrosion and Prevention – Oil & Gas Industry.

"The oil and gas sector is particularly vulnerable due to the harsh operating conditions and the corrosive nature of the materials involved," said Prof N. S. Das, Academic Advisor, C. V. Raman Global University, Bhubaneswar. "Preventing corrosion is essential not only for protecting assets but also for ensuring compliance with regulatory standards and maintaining public trust."

"At the same time, as

technology advances, so must our approach to corrosion mitigation. The integration of artificial intelligence (AI), machine learning (ML), Internet of Things (IoT), advanced materials, and productive maintenance systems is revolutionizing how we detect, analyze, and prevent corrosion in real time," said Prof Ganapati Panda, Former Deputy Director, IIT Bhubaneswar. "With all this, we still require a lot of competent engineers in corrosion mitigation. Special courses should be developed in undergraduate and post graduate levels," emphasized Mr Singh.

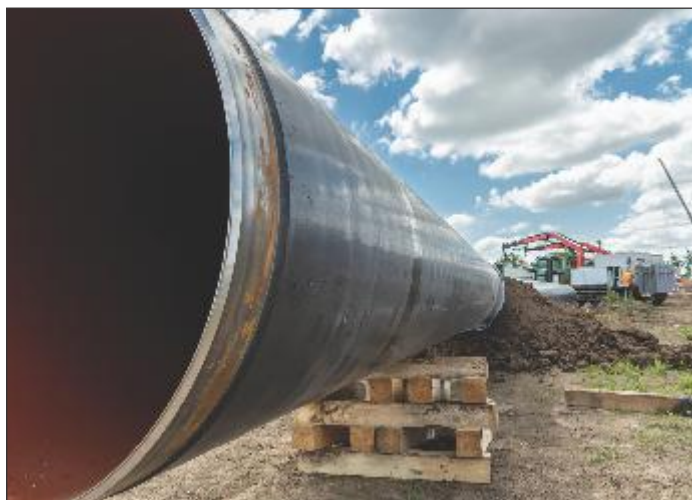
Within the oil and gas sector, the refinery may be located at a particular spot, the network of pipelines traverses through diverse geographies. "At times," said Mr Singh, "trying to locate a corrosion problem in a buried pipeline is like trying to find a needle in a haystack." "This is compounded by the fact that 98 percent of the pipelines passes through third-party land over which the operator has no control," said Mr Pankaj Panchal, CP Specialist Director, Corrosion Protection Specialist Pvt Ltd. These could be digging, parallel pipelines, or high tension electricity lines passing over the underground pipelines.

"While the cost of a typical refinery will be upwards of Rs one lakh crore, the cost of laying a kilometer of pipeline is around Rs 8 crore," said Mr Singh. "So, we have got to ensure the assets lasts a long time. We need a coating system that will last at least 50 years, otherwise, it will not be economical."

Pipe coating along with Cathodic Protection is a critical process in modern infrastructure, ensuring that pipelines—whether they carry oil, gas, water, or other materials—are protected from damage, corrosion, and wear. With the increasing global demand for efficient and long-lasting pipeline systems, the importance of pipe coating cannot be overstated.

Oil and gas fluids contain solid particulates such as sodium chloride, potassium chloride, other salts, carbonates, sulfates, partially polymerized oils, including waxes, silicas, as well as dirt. Some of these particulates dissolves in the oil, while some remain in suspension. Traveling in pipelines at speeds approaching 200 mph, these particulates become aggressive corrosive projectiles. Coatings designed for internal pipelines, must be engineered to withstand the high impact caused by these fast-moving particulates.

The global pipe coating market is projected to reach US\$9.1 billion by the end of 2024 and grow at a CAGR of 4.8% to hit US\$12.6 billion by 2031, according to a press release from Persistence Market Research. This growth is driven by increasing demand from industries seeking corrosion-resistant and durable coatings to enhance pipeline longevity. Key trends shaping the market include rising adoption of sustainable, eco-friendly coatings and growing investment in energy infrastructure and urban development. Companies are also integrating advanced technologies like IoT-enabled



systems for predictive maintenance. Major players such as PPG, AkzoNobel, and Sherwin-Williams are leading innovation in high-performance coatings, while strategic partnerships and acquisitions continue to fuel expansion and technological advancement.

What is pipe coating and why is it important?

There are many types of corrosion: uniform corrosion, pitting corrosion, galvanic corrosion, crevice corrosion, stress corrosion cracking, etc. To mitigate corrosion, various methods can be employed, including material selection, coatings and linings, cathodic protection, corrosion inhibitors, regular inspection and maintenance, etc., emphasized Prof Das.

Advanced coatings for oil and gas pipelines are crucial for maintaining operational efficiency and safety. They provide a protective barrier that shields the pipelines from corrosive elements present in the transported fluids and the surrounding environment.

Pipe coating refers to the application of a protective layer over the surface of pipes. This layer serves several key functions, such as preventing corrosion, reducing friction, enhancing durability, and safeguarding the pipeline from physical damage. Given the harsh environmental conditions many pipelines are exposed to—such as extreme temperatures, moisture, and chemicals—the coating acts as a barrier, significantly extending the life of the pipes.

Without proper coating, pipelines are susceptible to



degradation from external factors like rust, abrasion, and chemical exposure, which can lead to leaks, inefficiencies, or catastrophic failures. Therefore, pipe coating is essential in safeguarding both the environment and the infrastructure that serves various industries.

Types of pipe coating materials

Pipe coating materials are available in a wide range of options, each tailored to specific applications and environmental conditions. The most commonly used materials include:

Polyethylene coatings: Polyethylene is one of the most popular materials used for pipe coatings, especially in the transportation of natural gas and water. It provides excellent resistance to moisture, chemicals, and abrasion, making it ideal for underground and underwater pipelines.

Epoxy coatings: Epoxy coatings are widely used for their superior adhesion properties and resistance to corrosion. This type of coating is ideal for both external and internal applications, protecting pipes from rust, scaling, and other forms of deteriora-

tion. Epoxy-coated pipes are frequently used in oil and gas pipelines, water treatment facilities, and other high-demand industries.

Fusion-bonded epoxy (FBE): FBE coatings are a specific type of epoxy coating that is applied as a powder, which then melts and bonds to the pipe's surface. This creates a hard, smooth, and highly durable finish. FBE coatings are known for their resistance to heat, moisture, and chemicals, making them suitable for both offshore and onshore applications.

Polyurethane coatings: Polyurethane coatings are another popular choice due to their flexibility and toughness. These coatings provide excellent protection against UV radiation, chemicals, and physical impact. They are often used in applications where pipes are exposed to harsh weather conditions or environments prone to mechanical damage.

Cement mortar coating: Cement mortar is often used in the coating of pipelines that transport water and sewage. This type of coating provides excellent protection against external corrosion, especially in underground applications. It is often applied in combina-

tion with other coatings for added durability.

Pipe coating methods: How is it applied?

There are several methods for applying pipe coatings, each suited to different types of materials and application environments. Some of the most common methods include:

Extrusion coating: This method involves melting the coating material (often polyethylene or polypropylene) and extruding it over the surface of the pipe. The coating is then cooled and solidified, forming a durable protective layer.

Spray coating spray: This is a versatile method used for applying liquid coatings like epoxy or polyurethane. The coating material is sprayed onto the pipe's surface using specialized equipment, creating a uniform layer. This method is particularly useful for coatings that require a high level of precision.

Powder coating: In powder coating, dry powder is applied to the pipe's surface and then heated to create a strong bond. The process is often used for FBE coatings and other epoxy-based materials. Powder coating is particularly

useful for achieving a uniform and durable finish on large-diameter pipes.

Wrapping: Wrapping involves applying pre-formed coating materials, such as plastic films or fiberglass, around the pipe. This method is often used for retrofitting existing pipelines and offers an effective means of improving corrosion resistance.

The benefits of pipe coating

Pipe coating offers numerous benefits that help ensure the longevity and efficiency of pipelines across various industries. These benefits include:

Corrosion protection: The primary benefit of pipe coating is its ability to prevent corrosion. Corrosion can significantly weaken the structural integrity of pipes, leading to leaks, system failures, and costly repairs. Coatings such as epoxy and FBE provide a robust defense against rust and other forms of corrosion.

Improved durability: Coatings extend the lifespan of pipes by providing a protective barrier against external elements like chemicals, moisture, and physical

impact. This leads to fewer maintenance requirements and longer intervals between repairs or replacements.

Enhanced efficiency: Pipe coatings can reduce friction within the pipe, which can improve the efficiency of fluid or gas flow. This is particularly beneficial in industries like oil and gas, where the smooth transportation of materials is crucial to operational efficiency.

Environmental protections: This is especially important for pipelines that transport hazardous materials, as the coating serves as an additional layer of security to avoid contamination.

Cost-effective solution: While the initial cost of applying a pipe coating may seem high, the long-term benefits far outweigh the expense. With reduced maintenance needs, longer operational lifespans, and fewer pipeline failures, the investment in quality coatings can result in significant cost savings over time.

Applications of pipe coating

Besides oil and gas, pipe coating is used across a wide range of industries. Some of

the other most common applications of pipe coating include:

Water distribution: For water distribution systems, pipe coatings help prevent the deterioration of pipes, ensuring the safe delivery of clean water. Cement mortar coatings are commonly used in these applications for added protection against corrosion.

Sewage systems: Coating materials like epoxy and polyurethane are used to protect pipes in sewage systems, where the pipes are exposed to harsh chemical and biological agents. Proper coating ensures that these systems continue to operate efficiently and safely.

Construction and infrastructure: Coating is also used in construction projects, particularly in the installation of large infrastructure systems like heating and cooling pipes, industrial piping, and more. Coatings provide durability and resistance to wear and tear in these high-demand applications.

Choosing the right pipe coating

Selecting the appropriate coating for a pipeline depends on a number of factors, including the type of material being transported, the environmental conditions the pipeline will be exposed to, and the required lifespan of the pipeline. Some key considerations when choosing a pipe coating include:

Environmental conditions: Consider factors like moisture, temperature, and the presence of chemicals when

selecting a coating.

Pipe material: The type of pipe material (steel, plastic, concrete, etc.) can influence the choice of coating.

Cost and durability: Balance the initial cost of the coating with its long-term benefits and durability.

Regulatory compliance: Ensure that the chosen coating meets industry standards and regulations for safety and environmental protection.

The future of pipe coating

Pipe coating continues to evolve with advancements in materials and application techniques. As industries push for more sustainable and efficient infrastructure, the demand for innovative pipe coatings is expected to grow. With the right coating system, pipelines can last longer, operate more efficiently, and contribute to the overall safety and health of the environment. Whether you're in the oil and gas industry or responsible for a municipal water system, investing in high-quality pipe coatings is essential for maintaining the reliability of your infrastructure and minimizing long-term costs.

By understanding the different types of coatings, their benefits, and how to select the right one for your needs, you can make informed decisions that protect your pipeline investments and ensure their optimal performance for years to come.

References:

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3. CPOG-2025



Epoxy repair mortar cures in clarifier tank despite adverse weather conditions

The case study features an epoxy repair mortar, Belzona 4131 (Magma-Screed), which was used to repair the damaged concrete substrate in a clarifier tank at a Wastewater Plant in the UK. The system achieved a complete cure despite being completely submerged in water due to a rainstorm during the curing period

An epoxy repair mortar was used to repair the damaged concrete substrate in a clarifier tank at a Wastewater Plant in the UK. The system achieved a complete cure despite being completely submerged in water due to a rainstorm during the curing period. In this way, the concrete resurfacing epoxy, Belzona 4131 (Magma-Screed), was an excellent alternative to concrete. It enabled the Customer to bypass the serious problems that would otherwise have arisen had poured concrete been used in the application instead of the epoxy mortar.

Severely damaged concrete in need of repair

The clarifier tank, 18 meters

(59 ft) in diameter, was suffering from severe deterioration on the concrete base. This had been caused by the combined effects of corrosion and abrasion from the scrapers that run around the clarifier, moving sludge to the center of the tank. The damaged concrete in the tank had led to a loss of efficiency of the scrapers and premature wear of the rubber scraper pads. In addition, this had caused the pumps operating downstream to become damaged by the pieces of the broken concrete which had been sucked downstream with the sludge. Repouring concrete onto the base of the tank was considered as a repair solution. However, this was deemed inappropriate as



4,500 kg (9920.8 lbs) of Belzona 4131 (Magma-Screed).

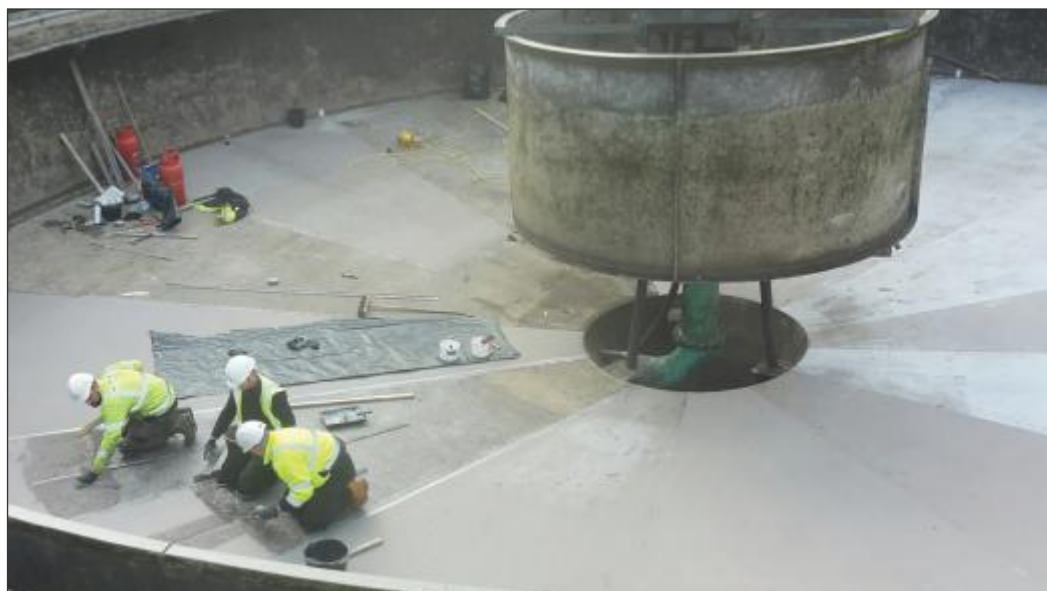
the bond to the original concrete would be insufficient.

Specification of epoxy repair mortar, Belzona 4131 (Magma-Screed)

Following an inspection by Douglas Potts, Senior Fields Solutions Engineer at Belzona UK, the epoxy repair mortar, Belzona 4131 (Magma-

Screed), along with Belzona 4911 (Magma TX Conditioner), were specified. Belzona 4131 (Magma-Screed) was selected due to its excellent mechanical properties as well as its abrasion resistance capabilities. In addition, as this system can be fully cured in just three days in temperatures of 15°C (59°F), this makes it an excellent alternative to concrete which typically takes around 28 days to achieve a full cure.

To accompany this specification, case studies and test data were supplied demonstrating the strength and adhesion capabilities of Belzona 4131 (Magma-Screed) to concrete. This, along with the fact that the Customer had used Belzona technology in successful applications before, further cemented their decision to opt for the polymeric technology.



Epoxy repair mortar used to repair the damaged concrete on clarifier tank.

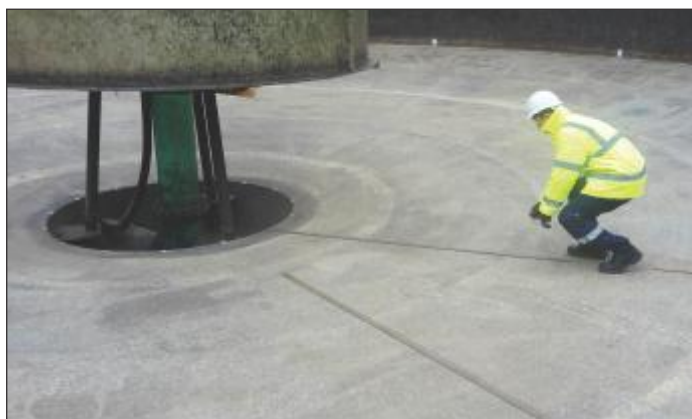
PHOTOS: BELZONA

Application of concrete resurfacing epoxy

Firstly, the surface was power washed, and mechanically prepared using grinders and scabblers. Next, the clarifier was marked into sections and each section was then conditioned with Belzona 4911 (Magma TX Conditioner), using a stiff bristled brush. Screed rails were then used to set the level of the



Belzona 4131 (Magma-Screed) applied using metal floats.



Application of screed rails.



Tank drained one year on and found to be in excellent condition.



Scraper blades after the tank was drained following a year's service.

Belzona 4131 (Magma-Screed). 4,500 kg (9920.8 lbs) of Belzona 4131 (Magma-Screed) was then applied using metal floats to a thickness of 6mm (0.24 in).

During the curing process, a rainstorm hit the site and the tank was submerged in water. After the storm, the tank was drained and destructive testing was conducted, with support from Belzona Limited's Research and Development team, on the patch most recently laid. Other than slight cosmetic damage of surface whitening, the system was found to be fully cured and unaffected. A very different outcome would have been observed had the Customer chosen to use

poured concrete for the repair and such flooding occurred.

An alternative to concrete

The application and cure was completed in eight days. Had the Customer chosen to use the poured concrete method to repair the substrate, the application and cure would have taken weeks to be completed, rather than days. Thus, by opting for the epoxy repair mortar, this ensured that minimal disruption was incurred to the Plant's operations.



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Painting a sustainable future: How India's paint industry is aligning with SDGs

Part I

The industry faces the dual challenge of maintaining growth while reducing its environmental footprint, making SDG alignment not just a responsibility but a strategic priority

Sanjay Chowdhury, Vice President & Business Head, Protective Coating Division, Berger Paints India Ltd.

1. Introduction

SDGs - A global mandate and why it matters in the Indian paint industry

The Sustainable Development Goals (SDGs), adopted by the United Nations in 2015, are a set of 17 global objectives aimed at eradicating poverty, protecting the planet, and ensuring prosperity for all by 2030. These goals provide a framework for nations, industries, and individuals to contribute toward a sustainable future. Covering aspects such as clean energy, responsible production, and climate action, the SDGs emphasize the importance of collaborative efforts to address pressing global challenges. Industries worldwide play a crucial role in meeting these objectives, as they influence resource consumption, environmental impact, and societal well-being. Among these, the paint industry, with its extensive use of chemicals, energy, and water, is particularly significant in the sustainability discourse. The industry faces the dual challenge of maintaining growth while reducing its environmental footprint, making SDG alignment not just a responsibility but a strategic priority.

India's paint industry, valued at over INR 70,000 crore and growing at a compound annual growth rate (CAGR) of 10 - 12%, is among the fastest-growing globally. This growth is fuelled by rapid urbanization, increased

disposable incomes, and a booming infrastructure sector. However, the industry also faces criticism for its environmental and social impacts, including air and water pollution, carbon emissions, and hazardous waste generation. Aligning with SDGs offers the industry an opportunity to address these issues while driving innovation and gaining competitive advantage.

Berger Paints India Limited, a leading player in the Indian paint industry, valuing INR 12,000 crore, has emerged as a frontrunner in adopting sustainable practices. With a history spanning over a century, Berger has consistently demonstrated its commitment to innovation and environmental stewardship. Particularly noteworthy is its Protective Coating Division - PROTECTON, which has developed solutions aimed at reducing environmental impact while enhancing durability and performance.

2. Overview of the Indian paint industry

2.1. Growth trends & key players in the industry

The Indian paint industry, is projected to grow at a compound annual growth rate (CAGR) of 8 - 10% over the next decade. This growth will primarily drive by rapid urbanization, increasing disposable incomes, and rising construction activities in



PHOTOS: 123RF

Covering aspects such as clean energy, responsible production, and climate action, the SDGs emphasize the importance of collaborative efforts to address pressing global challenges.

both residential and infrastructure sectors. Additionally, government initiatives like Smart Cities Mission and affordable housing schemes have fuelled demand for paints and coatings. The industry is broadly divided into two segments: decorative and industrial paints. Decorative paints, which account for nearly 70% of the market share, are used for residential and commercial interiors and exteriors. Industrial paints, including protective coatings, automotive paints, and powder coatings, cater to diverse sectors such as automotive, construction, and marine which account for nearly 30% of the market share.

The Indian paint market is dominated by a few large players, including Asian Paints, Berger Paints India Limited, Kansai Nerolac, and AkzoNobel India. Together, these companies account for

the lion's share of the market, supported by their extensive distribution networks, strong R&D capabilities, and innovative product offerings. Several smaller regional and unorganized players also contribute to the industry, particularly in rural markets.

2.2. Challenges faced by the industry

The rapid growth of the Indian paint industry brings with it significant challenges, particularly when viewed through the lens of sustainability. Despite the strides made in recent years, the sector must contend with several environmental, operational, and regulatory hurdles that threaten its progress toward aligning with Sustainable Development Goals (SDGs).

Environmental impact

The environmental footprint of the paint industry remains one of its most pressing chal-

allenges. Solvent-based paints, still widely used in various applications, release high levels of volatile organic compounds (VOCs) into the atmosphere. These VOCs not only contribute to air pollution but also exacerbate health risks for workers and end-users. Furthermore, hazardous waste, such as paint sludge generated during manufacturing processes, poses significant disposal challenges. Inadequate treatment and disposal systems can lead to contamination of soil and water bodies, further intensifying environmental degradation. Additionally, the untreated effluents discharged from manufacturing facilities contribute to water pollution, impacting ecosystems and surrounding communities.

Energy and resource consumption

The paint manufacturing process is highly energy-intensive, requiring substantial amounts of electricity and fossil fuels to operate machinery, control temperatures, and carry out other production activities. This reliance on non-renewable energy sources contributes to carbon emissions, making the

industry a significant contributor to environmental degradation. Compounding this issue is the heavy dependence on raw materials derived from petrochemicals, such as solvents, resins, and additives. These materials are not only finite in nature but also carry their own environmental risks, from extraction to disposal, further complicating the industry's sustainability efforts.

Regulatory pressures

The industry operates within a complex regulatory framework that is becoming increasingly stringent as governments and organizations push for environmental responsibility. Regulations mandating reduced VOC levels in paints, proper waste management, and energy efficiency require continuous adaptation and innovation. Companies must also secure green certifications and eco-labels, such as Green Pro and Ecolabel, to meet consumer and market demands for sustainable products. While these regulatory measures are essential for environmental protection, they add significant pressure on manufacturers to innovate and invest in sustainable

solutions, often at high costs.

Supply chain and raw material constraints

Raw material procurement poses another set of challenges for the paint industry. Fluctuations in the prices of essential materials such as pigments, resins, and solvents affect profitability and financial stability. The reliance on imports for certain chemicals further compounds supply chain risks, making companies vulnerable to geopolitical issues, currency fluctuations, and international trade policies. Additionally, the global push for sustainable materials adds to the complexity, as manufacturers must balance supply chain reliability with the need for eco-friendly and renewable raw materials.

These challenges underscore the need for the industry to adopt transformative measures that integrate sustainability into every aspect of operations. From reducing the environmental impact of manufacturing processes to enhancing resource efficiency and ensuring compliance with evolving regulations, addressing these issues is critical for the paint industry to achieve sustainable growth.

2.3. Regulatory frameworks promoting sustainability

The Indian government has implemented a robust regulatory framework to drive sustainability across industries, including the paint sector. These regulations and initiatives aim to minimize environmental harm, encourage innovation, and ensure the adoption of eco-friendly practices. By addressing emissions, waste management, and product safety, these frameworks play a

pivotal role in shaping the industry's transition toward a sustainable future.

Environment Protection Act (1986)

The Environment Protection Act of 1986 serves as a foundational legal framework for environmental protection in India. It imposes stringent guidelines on emissions, waste disposal, and effluent treatment, all of which are critical to the paint industry's operations. Under this act, manufacturing units are required to treat hazardous waste, including paint sludge and effluents, to prevent contamination of soil and water resources. The act also enforces strict penalties for non-compliance, thereby incentivizing companies to adopt cleaner production technologies and invest in sustainable waste management systems.

Volatile Organic Compounds (VOC) regulations

To address air pollution and health concerns, the government has introduced specific regulations on volatile organic compounds (VOCs) in paints and coatings. These regulations mandate lower VOC levels, particularly in architectural and decorative paints, which are widely used in residential and commercial spaces. As a result, companies are shifting from solvent-based formulations to water-based and low-VOC alternatives. This regulatory push has not only reduced harmful emissions but has also encouraged manufacturers to innovate by developing eco-friendly products that cater to environmentally conscious consumers.

Green building certification programs

The rise of green building



Industrial paints, including protective coatings, automotive paints, and powder coatings, cater to diverse sectors such as automotive, construction, and marine which account for nearly 30% of the market share.



Paints that comply with standards such as those with low VOC emissions, high durability, and reflective properties are preferred for certified green buildings.

practices in India has further driven the adoption of sustainable paints and coatings. Certification programs like the Indian Green Building Council (IGBC) and the Green Rating for Integrated Habitat Assessment (GRIHA) promote the use of environmentally friendly materials in construction projects. Paints that comply with these standards—such as those with low VOC emissions, high durability, and reflective properties—are preferred for certified green buildings. This has created a growing market for sustainable coatings, providing manufacturers with an opportunity to align their product portfolios with the needs of the construction sector.

Extended Producer Responsibility (EPR)

Extended Producer Responsibility (EPR) is another critical regulatory mechanism that promotes sustainability within the paint industry. EPR places the onus on manufacturers to manage the environmental impact of their products throughout their lifecycle. This includes the collection,

recycling, and proper disposal of waste materials, such as leftover paints and used packaging. By encouraging circular economy practices, EPR not only reduces waste generation but also incentivizes companies to design products with recyclability and sustainability in mind.

These regulatory frameworks collectively serve as powerful drivers of change, compelling the paint industry to adopt sustainable practices and align with global environmental standards. While compliance with these regulations can pose challenges, they also offer an opportunity for innovation, differentiation, and long-term value creation. As the government continues to strengthen its focus on sustainability, the paint industry must embrace these frameworks to ensure environmental stewardship and maintain its competitive edge in the market.

2.4. Innovations in sustainability

The Indian paint industry is making significant strides in sustainability by integrating innovative practices and

technologies across its operations. These advancements are not only addressing environmental concerns but also meeting the growing demand for eco-friendly solutions from consumers, businesses, and regulatory bodies. From product development to manufacturing, the industry's commitment to innovation is redefining its approach to sustainability.

Development of water-based and low-VOC paints

One of the most notable innovations in the paint industry has been the shift from traditional solvent-based paints to water-based and low-VOC alternatives. Solvent-based paints, which release high levels of volatile organic compounds (VOCs), have long been a source of air pollution and health concerns. In response, manufacturers are developing water-based paints that significantly reduce harmful emissions while maintaining performance standards. These paints not only improve indoor air quality but also cater to the preferences of environmentally conscious consumers. By aligning with global sustainability trends, this innovation has positioned the Indian paint industry as a leader in adopting greener product formulations.

Adoption of bio-based and recycled materials

Another key area of innovation is the incorporation of bio-based and recycled materials into paint formulations. Companies are

exploring the use of natural ingredients, such as plant-based resins and biodegradable additives, to replace petrochemical-derived components. Recycled materials, such as recovered solvents and pigments, are also being integrated into production processes to minimize waste. These initiatives reduce the industry's dependence on non-renewable resources while lowering the environmental impact of raw material extraction and disposal. This transition to circular economy practices underscores the industry's commitment to sustainable resource management.

Use of renewable energy and energy-efficient technologies

The adoption of renewable energy sources is transforming the way paints are manufactured. Many companies are installing solar panels, wind turbines, and other renewable energy systems at their production facilities to reduce their reliance on fossil fuels. In addition, energy-efficient technologies, such as advanced machinery and process automation, are being deployed to optimize energy consumption. For example, the use of heat recovery systems and LED lighting in manufacturing plants has significantly cut energy usage. These measures not only lower greenhouse gas emissions but also contribute to cost savings, making sustainability a financially viable goal.

Investment in research and development

The paint industry's dedication to innovation is further demonstrated by its significant investments in research

and development (R&D). Companies are focusing on creating products that enhance durability and reduce maintenance needs, such as weather-resistant and anti-corrosive coatings. These high-performance paints extend the lifespan of structures and surfaces, reducing the frequency of repainting and conserving resources over time. Moreover, advanced coatings with self-cleaning and energy-reflective properties are being developed to cater to emerging market demands for smart and sustainable solutions. Through R&D, the industry is continuously evolving to meet environmental, social, and economic objectives.

By embracing these innovations, the Indian paint industry is not only addressing its sustainability challenges but also driving long-term growth and competitiveness. These advancements reflect a deep understanding of the need to balance environmental responsibility with business success, positioning the industry as a model for sustainable practices in the manufacturing sector.

3. Alignment with specific SDGs

The Indian paint industry has made commendable progress in aligning its operations and innovations with several Sustainable Development Goals (SDGs). Through sustainable practices, technological advancements, and community-focused initiatives, the industry is actively contributing to the global agenda for sustainable development. This section highlights the industry's contributions toward specific SDGs.



The Indian paint industry is making significant strides in sustainability by integrating innovative practices and technologies across its operations.

3.1 SDG 12: Responsible consumption and production

The paint industry has embraced responsible consumption and production practices by prioritizing sustainability in product development, manufacturing, and waste management.

Low-VOC and eco-friendly paints

The shift from traditional solvent-based paints to water-based and low-VOC formulations is one of the most impactful initiatives undertaken by the industry. Solvent-based paints release harmful volatile organic compounds (VOCs), which contribute to air pollution and pose health risks. By adopting water-based alternatives, the industry has significantly reduced VOC emissions, aligning with indoor air quality standards and ensuring safer environments for users. Major players like Berger Paints have launched eco-friendly product lines that meet stringent safety and environmental certifications, setting benchmarks for sustainable production.

Waste management and recycling

Paint manufacturing gener-

ates considerable waste, including paint sludge and discarded packaging materials. Companies are innovating in waste management by recycling leftover paints into new products and adopting biodegradable or reusable packaging solutions. Several manufacturers have also implemented zero-waste-to-landfill policies, ensuring that no manufacturing waste ends up in landfills. These initiatives demonstrate the industry's commitment to minimizing its environmental footprint while contributing to the circular economy.

Energy efficiency in manufacturing

The paint industry has made substantial progress in optimizing energy consumption through advanced manufacturing technologies. Energy-efficient machinery, automated systems, and digital monitoring tools have been introduced to reduce electricity and fuel usage. For instance, Berger Paints has deployed energy management systems across its factories, leading to a measurable reduction in energy consumption and operational costs. Such efforts contribute to resource

efficiency and responsible production.

3.2 SDG 9: Industry, innovation, and infrastructure

Innovation and sustainable infrastructure are critical to the paint industry's growth and its alignment with SDG 9.

Innovations in paint formulations

Research and development efforts in the paint industry are increasingly focused on sustainability. Companies are introducing products like antimicrobial coatings, heat-reflective paints, and bio-based formulations derived from renewable resources. These innovations not only enhance product performance but also contribute to the durability of infrastructure, reducing the need for frequent maintenance and lowering environmental impact over time.

Green manufacturing infrastructure

The industry is adopting green manufacturing practices by upgrading factories to include renewable energy systems, energy-efficient equipment, and water conservation technologies. Solar panels, wind turbines, and rainwater harvesting systems have become integral to many production facilities, significantly reducing energy consumption and environmental impact. These green infrastructures align with the broader vision of sustainable industrial growth.

3.3 SDG 13: Climate action

The paint industry recognizes the urgency of climate action and has undertaken several measures to address its contribution to climate change.

Carbon emission reduction

Companies in the paint sector are proactively reducing their carbon footprints by transitioning to renewable energy sources, such as solar and wind power, and implementing energy-efficient manufacturing processes. In addition, efforts are being made to replace fossil-fuel-based raw materials with sustainable alternatives. These measures collectively contribute to lowering greenhouse gas emissions and fostering a low-carbon economy.

Climate-resilient coatings

Protective coatings designed to withstand extreme weather conditions have become increasingly popular. These climate-resilient coatings enhance the longevity of buildings and infrastructure, particularly in regions prone to harsh climatic conditions. By mitigating the risks associated with climate-related damage, such innovations support the resilience and sustainability of urban and rural infrastructure.

3.4 SDG 6: Clean water and sanitation

Water is a critical resource in the paint industry, and its conservation and management are essential for sustainable operations.

Water conservation practices

To address water scarcity and reduce consumption, companies are adopting water-efficient technologies such as closed-loop systems and wastewater recycling. These systems enable the reuse of water within manufacturing processes, significantly reducing freshwater consumption. Such practices not only conserve water



The paint industry has embraced responsible consumption and production practices by prioritizing sustainability in product development, manufacturing, and waste management.

resources but also reduce operational costs.

Effluent treatment and pollution control

The industry has implemented stringent measures to treat wastewater generated during manufacturing. Advanced effluent treatment plants (ETPs) are used to remove harmful substances from wastewater before its discharge, ensuring compliance with environmental standards. By prioritizing pollution control, the paint sector contributes to maintaining the health of local ecosystems and water bodies.

3.5 SDG 8: Decent work and economic growth

The paint industry plays a vital role in promoting inclusive and sustainable economic growth through job creation, skill development, and ethical labour practices.

Labor welfare and ethical practices

Companies in the paint industry are committed to ensuring safe and equitable working environments for their employees. This includes adhering to labour laws, providing protective gear, and conducting regular safety training. Organizations like Berger Paints have also

introduced gender-inclusive policies and support workforce diversity, fostering a culture of equality and respect.

Skill development initiatives

The industry actively contributes to skill development through partnerships with government and non-governmental organizations. These initiatives aim to upskill workers, particularly in rural and underserved areas, creating employment opportunities and enhancing economic mobility. Such programs not only benefit individuals but also strengthen the industry's talent pool.

3.6 SDG 11: Sustainable cities and communities

The paint industry contributes to the sustainability of urban and rural communities by providing innovative solutions that enhance infrastructure and promote energy efficiency.

Durable and protective coatings

High-performance coatings that protect structures from corrosion, weathering, and pollution are essential to sustainable urban development. These coatings extend the lifespan of buildings and infrastructure, reducing the

need for frequent repairs and maintenance. By enhancing the durability of structures, the industry supports the creation of sustainable cities and communities.

Energy-efficient paints

The introduction of heat-reflective paints has had a transformative impact on energy efficiency in buildings. These coatings, designed for rooftops and walls, reduce indoor temperatures, thereby decreasing the reliance on air conditioning. This innovation not only lowers energy consumption but also makes housing more affordable and sustainable, particularly in urban areas with high energy demand.

Through its alignment with these SDGs, the Indian paint industry demonstrates how sustainable business practices can drive meaningful contributions to global development. By leveraging innovation, resource efficiency, and community engagement, the sector is setting a strong example for other industries to follow.

To be continued in the next issue...



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TPU scientists develop fluoropolymer anti-corrosion coating technology for chemical reactors

Scientists at Tomsk Polytechnic University (TPU) have proposed a novel approach to the protection of metal chemical reactors, which are widely used in various industries. This approach entails the direct application of coatings at the facilities of potential client companies, notes a press communique from the TPU News Office. The first batch of reactors with such anti-corrosion coatings has already been manufactured and handed over to an industrial partner.

Metal chemical reactors find application in a variety of industries, including oil refining, biochemical, petrochemical, food, perfumery, paint and varnish, and pharmacology. However, these reactors are constantly exposed to corrosion due to their operation in conditions of aggressive media, high temperatures, and pressure. This phenomenon poses a significant threat, as it can lead to the depressurization of the reactors, the release of hazardous toxic substances, and the occurrence of man-made accidents. These events can have detrimental consequences for both human health and the environment.

Furthermore, the quality of manufactured products is adversely affected by corrosion, which results in the ingress of impurities, such as ions or iron particles, into the product during the synthesis process, particularly in pure

and very pure chemical processes. To mitigate the effects of corrosion, a common practice is the implementation of enamel coatings, which are utilized to safeguard metal chemical reactors against the detrimental effects of corrosion. However, in a joint project of the Research School of Chemistry and Applied Biomedical Sciences and the Center for Additive Technologies of the TPU Advanced Engineering School, scientists applied coatings made of fluoropolymers, i.e., fluorine-containing polymers.

As Marina Trusova, director of the TPU Research School of Chemistry and Applied Biomedical Sciences, asserts, "Fluoropolymers offer elevated chemical resistance to the effects of mineral and organic acids, alkalis, organic solvents, and mineral oils at temperatures reaching 120°C."

According to the developers, the technology involves the use of polymers that are inert to aggressive, alkaline environments, such as hydrofluoric acid (HF). The durability and versatility of fluoropolymer coatings make them suitable for a wide range of industrial applications. These coatings are particularly in demand in low-tonnage chemistry.

"The spray coating method is our know-how. The technology has been successfully developed, and the ability to produce coatings on products

up to six cubic meters in volume directly at the customer's premises has been demonstrated. This will result in a reduction of installation and logistics

costs," explains Evgeniy Bolbasov, one of the technology developers and head of the Center for Additive Technologies.

The first batch of chemical reactors with corrosion-resistant fluoropolymer coatings was commissioned by an industrial entity in Novosibirsk. The developers have indicated that the technology can be adapted to the tasks of other production in the future.



PHOTO: TOMSK POLYTECHNIC UNIVERSITY

"Fluoropolymers offer elevated chemical resistance to the effects of mineral and organic acids, alkalis, organic solvents, and mineral oils at temperatures reaching 120°C."

"This accomplishment is attributed to the collaborative efforts of scientists from the Research School of Chemistry and Applied Biomedical Sciences and colleagues from the Center for Additive Technologies. This collaboration exemplifies a remarkable synergy between academic departments, demonstrating the potential for significant advancements in addressing pressing technological challenges," emphasizes Marina Trusova.

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Rice scientists develop coating for enhanced thermal imaging through hot windows

A team of Rice University scientists has solved a long-standing problem in thermal imaging, making it possible to capture clear images of objects through hot windows. Imaging applications in a range of fields – e.g. security, surveillance, industrial research and diagnostics – could benefit from the research findings, which were reported in the journal *Communications Engineering*.

“Say you want to use thermal imaging to monitor chemical reactions in a high-temperature reactor chamber,” said Gururaj Naik, an associate professor of electrical and computer engineering at Rice and corresponding author on the study. “The problem you’d be facing is that the thermal radiation emitted by the window itself overwhelms the camera, obscuring the view of objects on the other side.”

A possible solution could involve coating the window in a material that suppresses thermal light emission toward the camera, but this would also render the window opaque. To get around this issue, the researchers developed a coating that relies on an engineered asymmetry to filter out the thermal noise of a hot window, doubling the contrast of thermal imaging compared to conventional methods.

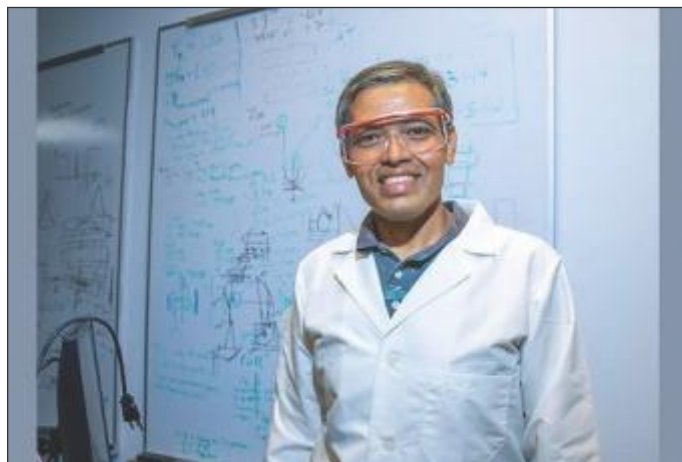
The core of this breakthrough lies in the design of nanoscale resonators, which function like miniature tuning forks

trapping and enhancing electromagnetic waves within specific frequencies. The resonators are made from silicon and organized in a precise array that allows fine control over how the window emits and transmits thermal radiation.

“The intriguing question for us was whether it would be possible to suppress the window’s thermal emission toward the camera while maintaining good transmission from the side of the object to be visualized,” Naik said. “Information theory dictates a ‘no’ for an answer in any passive system. However, there is a loophole – in actuality; the camera operates in a finite bandwidth. We took advantage of this loophole and created a coating that suppresses thermal emission from the window toward the camera in a broad band but only diminishes transmission from the imaged object in a narrow band.”

This was achieved by designing a metamaterial comprised of two layers of different types of resonators separated by a spacer layer. The design allows the coating to suppress thermal emissions directed toward the camera while remaining transparent enough to capture thermal radiation from objects behind the window.

“Our solution to the problem takes inspiration from quantum mechanics and non-Hermitian optics,” said Ciril



Mr Gururaj Naik, associate professor of electrical and computer engineering at Rice and corresponding author on the study.

Samuel Prasad, a Rice doctoral engineering alum and first author on the study.

The result is a revolutionary asymmetric metawindow capable of clear thermal imaging at temperatures as high as 873°K (approximately 600°C).

The implications of this breakthrough are significant. One immediate application is in chemical processing, where monitoring reactions inside high-temperature chambers is critical. Beyond industrial uses, this approach may revolutionize hyperspectral thermal imaging by addressing the long-standing “Narcissus

effect,” where thermal emissions from the camera itself interfere with imaging. The researchers envision applications in energy conservation, radiative cooling and even defense systems, where accurate thermal imaging is essential.

“This is a disruptive innovation,” the researchers noted. “We’ve not only solved a long-standing problem but opened new doors for imaging in extreme conditions. The use of metasurfaces and resonators as design tools will likely transform many fields beyond thermal imaging from energy harvesting to advanced sensing technologies.”

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Corrosion Defender: Solutions on surface preparation and coating technology

Corrosion Defender is a comprehensive guide to the often-overlooked process of surface preparation, vital for achieving durable and high-quality coatings. Written by Mr Anirudha Dighe, a distinguished professional with over 30 years of hands-on experience in surface preparation and coating applications across various industries, it highlights the risks of neglecting this step, such as adhesion failures, premature corrosion, and costly rework. Tailored for a wide audience – from beginners to seasoned professionals – the book provides practical advice and real-world solutions.

This paperback spread over 200 pages is a culmination of the author's experiences, lessons learned and a desire to share the knowledge he has gained over the past years.

"For over three decades of vast experience in the surface preparation and coating field, I've seen many fascinating, and sometimes frustrating incidents into the world of surface preparation and coating technology. From the smooth and high-gloss finishes of automotive components to the rugged, protective coatings on industrial machineries, pipelines, barrels and many more, I've witnessed the transformative power of paint systems and paint. Throughout my career, I've encountered a recurring music of importance of surface preparation which is the often neglected or overlooked.

Most industries, such as automotive Tier I and Tier II (except OEMs), general industry, heavy engineering and mostly metal processing industries prioritize primary manufacturing over surface preparation and painting, which is often seen as a lesser importance process. This oversight can lead to a list of problems, including poor adhesion, premature failure, costly rework, lot of rejections, loss of business, process time, painting material and manpower," writes Mr Dighe in the Preface of the book.

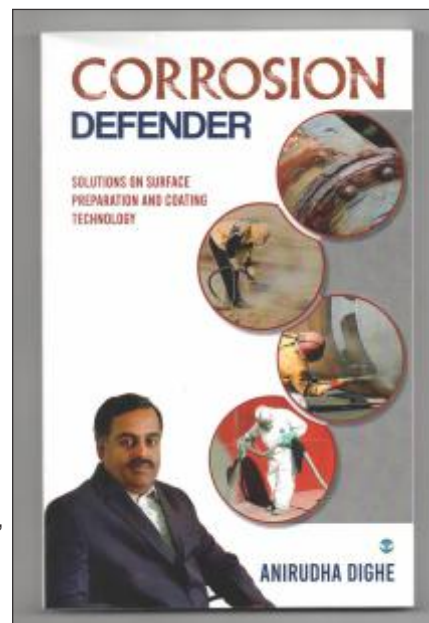
"It's a common story. A company invests heavily in high-quality paints, latest technology spray equipment, and skilled painters and results are – only to see their finished product spoiled by premature peeling, blistering, or simply a lackluster finish. The most common reason is nothing but lack of or sometime absolutely no knowledge and awareness about surface preparation before coating. One of the companies I visited, seen facing tons of rejections and heavy penalties from customer due to corrosion started observed in transit and before reaching material at customer end. Even after painting but as the foundation built on shaky ground – inadequate surface preparation results in heavy loss. This oversight leads to a host of problems, including poor adhesion, premature failure, and costly rework, product rejections, lost business, wasted materials, and

frustrated employees and management.

"Imagine building a house on a decaying foundation – it simply won't stand the test of time. Surface preparation is that vital foundation for your coating projects."

Spread over nine chapters, topics covered include selecting the right coatings, mastering application techniques, addressing common paint defects, and ensuring safety in the paint shop. Published by Wings Publication International, it also offers actionable insights into industry standards like ISO, ASTM, and SSPC. *Corrosion Defender* is both a resource and a call to elevate awareness, setting a new benchmark for excellence preparation and coating practices.

Anirudha Dighe is a distinguished professional with over 30 years of hands-on expertise in surface preparation and coating applications across various industries. His exceptional educational background includes a degree in Mechanical Engineering as well as an advanced qualification in Software Engineering where he was recognized as a topper and awarded the Best Student Award. Adding to his impressive credentials, Dighe earned his MBA with distinction, further enriching his



Corrosion Defender
 Author: Mr Anirudha Dighe
 Published by: Wings Publication International
 214 pages
 Paperback
 Price: Rs 550 / \$7

ability to address complex challenges with strategic insights.

Throughout his illustrious career, he has established himself as a trusted mentor, consultant and educator, dedicating his knowledge to supporting and empowering paint shop professionals and his colleagues. His passion for sharing practical expertise has made him a respected authority in his field, committed to helping industry professionals achieve excellence in coating processes and surface preparation. Mr Dighe's unique combination of technical mastery, academic achievement, and dedication to mentoring makes him a true leader in his domain.

Hexigone and Alfaa Chem join forces to bring advanced anti-corrosion technology to the GCC market

Hexigone Inhibitors Ltd, a UK-based innovator in smart corrosion inhibitors, has entered a strategic partnership with Alfaa Chem, a leading chemical distributor in the Middle East. The collaboration aims to deliver high-performance anticorrosion technologies to the Gulf Cooperation Council (GCC) region, offering coating manufacturers the ability to differentiate their products as well as reduced formulation costs, notes a press release from the company.

This partnership marks a major step forward in the supply of advanced materials to the region's anti-corrosion coatings sector, particularly targeting applications in construction, oil and gas, and infrastructure maintenance. Hexigone's unique Intelli-ion® technology can be used at very low loadings alongside traditional inhibitors like zinc phosphate, significantly reducing the total inhibitor content required in a formulation. This co-blending approach maintains high corrosion protection while enabling a reduction in overall film thickness—helping to streamline application processes and, in many cases, eliminate the need for brush blasting during structural steel maintenance.

Founded in 2004, Alfaa Chem is a well-established chemical distribution company with a strong presence across the UAE, Saudi Arabia, and



The collaboration between Hexigone Inhibitors Ltd., and Alfa Chem, aims to deliver high-performance anticorrosion technologies to the Gulf Cooperation Council (GCC) region, offering coating manufacturers the ability to differentiate their products as well as reduced formulation costs.

beyond. The company has built a solid reputation for delivering international-quality raw materials to industries such as adhesives, sealants, construction chemicals, paints, coatings, and more.

"Partnering with Hexigone represents a forward-thinking move for both our companies and for the region's coatings industry," said Richard D'Souza, Technology Director at Alfaa Chem. "Their smart inhibitor technology addresses multiple industry challenges—ranging from performance under severe environments like C5+ conditions to improving adhesion on galvanized and thermally sprayed steel. Together, we aim to support formulators in transitioning away from zinc-rich and chromate-based systems toward more sustainable and

cost-effective solutions."

Echoing this enthusiasm, Ella Newington, Marketing Director at Hexigone, commented: "We're incredibly excited to be launching our technology in the GCC market for the very first time. Entering a new region is a key part of our global growth strategy, and this partnership with Alfaa Chem allows us to deliver innovative, high-performance solutions to a market that's

clearly ready for change."

With growing demand for zinc-free protective coatings, particularly among multinational oil and gas companies, this partnership positions both companies to meet rising performance expectations while promoting safer, more environmentally conscious technologies—all while helping manufacturers achieve meaningful reductions in formulation costs.

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Covestro to open automated laboratory for developing coating and adhesive formulations

Coating and adhesive manufacturers are under pressure: They compete for market share, optimize their products in rapid succession, and must focus on efficiency while ensuring sustainability and regulatory compliance. At the same time, products need to become increasingly circular – without compromising the properties of a coating or adhesive. A critical factor in all of this: The right binders and crosslinkers. Their development takes place at material manufacturers like Covestro. The German company is now addressing these requirements by announcing that in the course of 2025, it will open a specifically developed, automated laboratory for optimizing coating and adhesive formulations to provide even better support to its customers.

"With our automated laboratory, we can work together with our customers on the future of coatings and adhesives. Because it operates almost completely autonomously and learns from our existing knowledge and data lake as well as newly generated data, it makes the process of optimizing and developing formulations many times more efficient and precise. This allows us to optimize existing formulations faster or even develop completely new formulations for and together with our customers. We can say: We

are reaching a new level of modern research," says Thomas Büsgen, head of the laboratory.

Testing formulations with Covestro binders and crosslinkers

Specifically, the new laboratory will test formulations with Covestro binders and crosslinkers for coatings and adhesives. Their clever selection ensures properties such as hardness, adhesion, opacity, gloss, or durability. Such formulations typically consist of seven to 15 components, whose combination determines the properties of the final product. The resulting high number of possible combinations means that standard formulations are usually used. The new laboratory now enables more extensive test series, also thanks to the computer-aided design of test series and the use of automation.

"Our new automated laboratory gives us more possibilities for testing formulations. It relieves our specialized laboratories of their standard tasks and can analyze samples more systematically. This allows us to focus our expertise and experience even more on customer-specific topics or try approaches we couldn't have implemented otherwise," says Martin Merckens, Head of Sales & Market Development EMLA in Covestro's Coatings and Adhesives business



PHOTO: COVESTRO

Networked robotics at Covestro's new automated laboratory allows more efficient data generation for even more segment-specific application testing.

entity. "This will particularly help us in the area of circular economy: Alternative raw materials, for example bio-based or recycled materials, can be tested faster and evaluated for their properties in the final product."

Facility to run tens of thousands of tests annually

The new facility can operate 24 hours a day, 7 days a week. The goal is to run tens of thousands of tests annually. This sets a new standard in terms of number, variety, precision, and testing speed. Another advantage: The automated laboratory generates a large amount of structured data. The knowledge about formulation possibilities and influencing factors thus will grow rapidly. The collected data, combined with measurement data from existing studies, is evaluated using special machine learning algorithms to further improve formulations. Artificial

intelligence is also used to predict new experiments based on property goals and simultaneously verify them in the automated laboratory – creating a self-learning system.

In addition to formulating water- and solvent-based 1K and 2K systems, the automated laboratory also performs numerous material tests on the raw materials themselves, their formulations, and applied films. Application can even take place in different climates in the lab to simulate product use under application conditions. The progressing laboratory digitalization across Covestro also enables easy forwarding of generated samples to more specialized testing laboratories. This makes it possible to supplement the datasets with market-specific test results and identify relevant dependencies more quickly.

Atlas Copco Group launches new state-of-the-art facility In Pune

Atlas Copco Group has launched a new manufacturing facility in Talegaon, Pune. Spanning approximately 270,000 sq ft, the new state-of-the-art plant will manufacture air and gas compressors and systems including CNG (compressed natural gas), biogas, hydrogen compressors, air dryers, N2 and O2 generators and medical filters and accessories. The launch, communicated in 2023, reinforces the Group's commitment to advancing innovative solutions while delivering high-quality products tailored to the local market.

The manufacturing facility is built on Industry 4.0 principles, integrating smart manufacturing technologies and sustainability. Approximately 80 percent of the energy required for plant operations will be sourced from a 1.3 MW rooftop solar system and grid supply. The facility also includes rainwater harvesting and advanced

cooling systems. With a strong focus on support for research and development by Atlas Copco Group, the facility is equipped with multiple testing capabilities to meet both current and future production and product development needs. The company is certified with ISO 9001, ISO 45001, ISO 14001 and ISO 50001 certifications, ensuring the highest quality, safety, environmental and energy standards, supported by a robust internal audit system, quality management systems and Six Sigma methodologies that help improve business processes by reducing errors and increasing efficiency.

Philippe Ernens, President of Compressor Technique Business Area, commented on the announcement of the new facility, "This new facility is equipped with cutting-edge technology to cater to local demand, ensuring shorter lead times and greater capacity. This enables us to



PHOTO: ATLAS COPCO

(Left to right) Mr Philippe Ernens, President, Compressor Technique Business Area, Atlas Copco; Mr Marcelo Kabilio, Vice President - Engineered Solutions, Atlas Copco; Mr Thierry Monart - Vice President Holding India and Bangladesh, Atlas Copco (India) Pvt Ltd; Mr Kamlesh Panchal – General Manager, Product Company Talegaon, Atlas Copco; and Ben Van Hove – President Oil Free Air Division, Atlas Copco, lighting the lamp during the launching ceremony of the state-of-the-art facility at Talegaon, Pune.

offer a wider range of products, meet market expectations, and provide better lifecycle support, further strengthening our commitment to delivering high-quality solutions."

Thierry Monart, Vice President - Managing Director, Atlas Copco (India) Pvt Ltd., said, "The launch of our new manufacturing plant marks a

significant milestone in Atlas Copco Group's growth journey in India. This facility not only strengthens our commitment to localization but also plays a vital role in driving job creation and skill development in the region. By fostering local talent and innovation, we aim to contribute meaningfully to India's manufacturing ecosystem."

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EcoVadis silver medal highlights Synray's commitment to shared sustainability goals

Synray Corporation, a U.S.-based manufacturer of alkyd resins, polyesters, and specialty chemical materials, has earned a Silver Medal from EcoVadis, placing it among the top 15% of over 100,000 companies assessed worldwide in 2025.

EcoVadis is the world's leading provider of business sustainability ratings. This upgraded recognition reflects Synray's strong performance across critical ESG pillars — environmental impact, labor & human rights, ethics, and sustainable procurement.

"At Synray, sustainability isn't

just a checklist — it's a strategic imperative," said H. Peter Tepperman, CEO of Synray Corporation. "We're proud to be recognized for our progress and honored to align with other EcoVadis-rated companies working toward shared, measurable impact."

Synray specializes in developing and toll manufacturing high-performance alkyd resins, polyesters, and chemical intermediates that are used in a variety of coatings, inks, adhesives, and sealants. As a trusted supplier to the paint and coatings



industry, Synray's products play a vital role in enabling customers to formulate differentiated, high-performing, and environmentally conscious solutions.

The EcoVadis Silver Medal reinforces Synray's position as a value-adding partner to companies that prioritize

sustainability within their supply chain.

Whether producing custom chemistries under confidentiality or supplying standard resins for industrial and architectural coatings, Synray supports customers in meeting compliance, innovation, and ESG performance goals.

With new insights from the 2025 assessment, Synray is committed to expanding its sustainability roadmap and forging partnerships grounded in environmental stewardship, transparency, and long-term value creation.

FORM IV

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I, Franco Lonappan, hereby declare that the particulars given above are true to the best of my knowledge and belief.

-sd/
Franco Lonappan
Date: March 1, 2025

International Antifouling Conference 2025 to host global coatings experts for a two-day deep dive into marine biofouling prevention

I-Tech, developers of the antifouling biotechnology for marine coatings, Selektape will host a third edition of the International Antifouling Conference in September this year following its establishment as one of the key platforms for antifouling coating experts, academia, and ship operators to discuss current and future biofouling prevention strategies and technologies.

The event will assemble the best minds in the antifouling coatings industry, ship operators and academia in Gothenburg, Sweden to explore collaborative pathways and novel approaches towards sustainable marine biofouling prevention, notes a press communicate from the organizers.

Since marine biofouling has an extremely detrimental impact on increasing a ship's fuel use and associated GHG emissions, the performance of antifouling coatings as the first line of defense against biofouling, is more important than ever before. Today, commercial vessels in the global shipping fleet are facing mandatory regulations to significantly reduce their

GHG emissions, set by the industry's regulator, the International Maritime Organization (IMO). Therefore, to support the reduction in GHG emission from ships, antifouling coatings must continue to provide continuous, antifouling performance that meets the needs of ships sailing now, and in the future.

During the last International Antifouling Conference, held in 2023, the unanimous conclusion of participating experts was that collaboration between technology providers, researchers in the field and industry stakeholders such as paint companies and ship operators is key to ensuring that antifouling coating solutions continue to offer the best protection against biofouling. For this reason, it is essential that key experts in this technology sector regularly meet in a neutral forum to discuss current research and development progressions, future technology trends,

explore new avenues of collaboration and receive end-user insights.

Dr Markus Hoffmann, Technical Director at I-Tech comments: "This highly important conference for the antifouling technology sector will once again provide a much-needed platform for the R&D community, academia and end users to meet and discuss marine biofouling. Since the first conference in 2022, this forum has evolved into being a unique fusion of scientific insight with practical feedback from use of coatings and biofouling prevention methods in the field. As the organizers of this forum, I-Tech looks forward to welcoming the marine

coatings community back to Gothenburg after the summer for what is set to be the best edition yet of the International

Antifouling Conference."

The International Antifouling Conference 2025 will be held on September 10 - 11 in the iconic Eriksberg ship repair building in Gothenburg, Sweden. The Gold sponsor of the conference is Stena Bulk. Keynote addresses will be delivered by representatives from Fraunhofer IFAM, Sultan Qaboos University, Samsung Heavy Industries, South China University of Technology and Guangdong Heavy Advanced Materials Co. Ltd. The full agenda will be released after final abstract submissions.

In addition to the full two-day conference program, a limited number of delegates of the International Antifouling Conference 2025 have the option of attending a pre-conference antifouling tutorial with the highly reputed antifouling coatings expert, Dr Alistair Finnie. Additionally, delegates can sign up to attend a half day field trip to RISE/SSPA research center.



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PHOTOS: I-TECH



Keynote speakers at the International Antifouling Conference 2025.



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- Corrosion Awareness Awards function
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IMPORTANT DATES

Abstract submission opens	15 May 2025
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Full Text Paper due	31 July 2025
Presentation upload due	31 August 2025



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JUN 25 – 27, 2025	COATINGS EXPO VIETNAM 2025	SECC, Ho Chi Minh City, Vietnam	VEAS	E: info@veas.com.vn W: coatings-vietnam.com
JUL 02 – 04, 2025	WEST AFRICA COATINGS SHOW	Landmark Centre, Lagos, Nigeria	dmg events	T: +971 44453773 E: paddyoneill@dmgevents.com W: westafricacoatingsshow.com
JUL 17 – 19, 2025	CII SURFACE & COATING EXPO 2025	Chennai Trade Centre, Chennai, India	CII	T: (91-44) 42444555 E: surface.coating@cii.in W: ciise.in
SEP 03 – 05, 2025	ASIA PACIFIC COATINGS SHOW	Bangkok International Trade & Exhibition Centre, Bangkok, Thailand	dmg events	T: +971 44453773 E: paddyoneill@dmgevents.com W: asiapacificcoatingsshow.com
SEP 23 – 25, 2025	ABRAFATI SHOW 2025	São Paulo Expo, São Paulo, Brazil	Vincentz Network	E: matthias.janz@vincentz.net W: home.abrafatishow.com.br
SEP 25 – 27, 2025	PAINT BANGLADESH 2025	International Convention City Bashundhara (ICCB) Dhaka, Bangladesh	BMPA and REEMS	E: cs2@reemsbd.com W: paintbangladesh.com
OCT 01 – 03, 2025	PAINTEXPO EURASIA	Istanbul Expo Centre, Istanbul, Turkey	Artkim	E: sales@artkim.com.tr W: artkim.com.tr
NOV 03 – 06, 2025	ADIPEC	Abu Dhabi, UAE	dmg events	E: enquiry@adipec.com W: adipec.com
NOV 12 – 13, 2025	USA COATINGS SHOW 2025	MeadowLands Exposition Centre, New York, USA	United Expo	E: unitedexpo@gmail.com W: usa-coatings-show.com
NOV 24 – 26, 2025	GULF COATINGS SHOW 2025	Expo Centre, Sharjah, United Arab Emirates	NürnbergMesse GmbH	E: matthias.janz@vincentz.net W: www.gulf-coatings-show.com
NOV 25 – 27, 2025	CHINACOAT 2025	Shanghai New International Expo Centre (SNIEC), Shanghai, China	Sinostar	E: info@sinostar-intl.com.hk W: www.chinacoat.net
JAN 27 – 29, 2026	5th MECOC EXPO	Abu Dhabi, UAE	Aldrich	T: +971 4 837 4300 E: register@mecocmiddleeast.com W: mecocexpo.com
FEB 19 – 21, 2026	PAINTINDIA	Bombay Exhibition Centre, Mumbai, India	NürnbergMesse India Pvt. Ltd	T: (+91 22) 62165323 E: paintindia.expo@colorepub.in W: nm-india.com
MAR 15 – 19, 2026	AMPP ANNUAL CONFERENCE + EXPO	Houston, Texas, USA	AMPP	W: ace.amp.org
APR 14 – 17, 2026	PAINTEXPO	Karlsruhe, Germany	Leipziger Messe	M: +91 9166565118 E: b.verma@leipziger-messe.de W: paintexpo.com
MAY 05 – 07, 2026	AMERICAN COATINGS SHOW AND CONFERENCE	Indiana Convention Center, Indianapolis, Indiana, USA	American Coatings Association	E: cmatthews@paint.org W: american-coatings-show.com
MAY 05 – 07, 2026	SURFACE TECHNOLOGY GERMANY 2026	Stuttgart Exhibition Centre, Stuttgart, Germany	Deutsche Messe	E: info@messe.de W: messe.de
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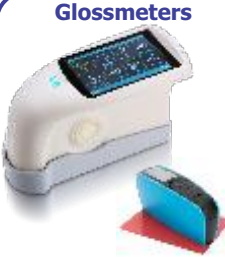
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