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COATINGS AND ANTI CORROSION ENGINEERING REVIEW

April - May 2024 | Volume 15 Issue 1 | ₹ 100

Artificial Intelligence / Machine Learning sets stage to better corrosion protection decision making processes in naval and offshore assets

Interview

Mr Andy Waloch

Paints & Coatings - Market Development Manager, ICL

Technical Feature

How to slow down corrosion with MCI® in high temp GCC States

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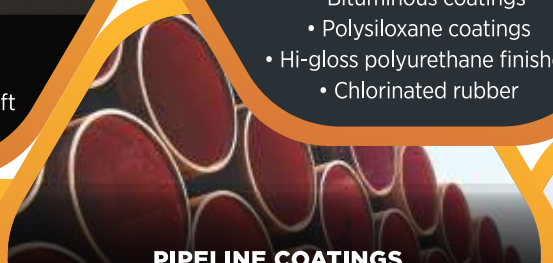

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COATINGS AND ANTI CORROSION ENGINEERING REVIEW

From the Editor-in-Chief...

Volume 15; Issue 1
April - May 2024

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April 24, each year, is designated as the World Corrosion Awareness Day to raise awareness about the impact of corrosion on people's lives. This day is meant to encourage the adoption of corrosion prevention strategies to reduce the economic and social costs associated with corrosion. Estimates vary widely, but it is generally said that the annual cost of corrosion worldwide is US$2.5 trillion (3 to 4% of GDP of industrialized countries) reflecting in part many decision-makers in industry and government not fully understanding the consequences of corrosion and how critical it is to control it. It is our endeavor too to recognize the impact corrosion prevention and control professionals make and promote sustainable management practices for critical industrial assets like energy infrastructure, transportation infrastructure, water/wastewater and waterways, the shipping industry, defense assets, and more. After all, employing corrosion control practices is projected to lower the global cost of corrosion by some 15 to 35 percent, saving $375 to $875 billion per year.

These significant cost reductions are in addition to the many unquantifiable environmental and public safety benefits that result from long-term, predictable asset integrity. The professionals that focus on corrosion control are responsible for preventing catastrophic failures that can result in risks to public safety, lost productivity, environmental degradation, or fatalities. We too celebrate that day!!!

This issue talks about corrosion mitigation in naval and offshore platforms and assets. Besides R&D in more effective paints and coatings, digitization technologies like Artificial Intelligence (AI), Machine Learning (ML), Internet of Things (IoT) are being integrated into marine corrosion mitigating systems to monitor performance in real-time and predict maintenance requirements. In this edition, we talk about some of these latest developments, plus all our regular features and columns. Happy reading!!!

Jolly Lonappan
Editor-in-Chief

Owned, Printed and Published by Franco Lonappan. Printed at Aarya Graphics, Unit No.20, J.K.Indl. Estate, Mahakali Caves Road, Near Paper Box Co, Andheri (East), Mumbai - 400093 and Published from 102, Dattar Mansion, C. S. Marg, Vakola Bridge, Santacruz (East), Mumbai 400055. Editor: Abraham Mathai.
Coatings And Anti Corrosion Engineering Review is Registered with the Registrar of Newspapers of India under No: MAHENG/2010/37489

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VERSATILE INDUSTRIAL APPLICATIONS

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AkzoNobel's Awlgrip brand launches revolutionary 3D Color Visualizer for boaters and professionals

Whether it's a sailboat, sportfish, cruising powerboat, or a superyacht, users can select their vessel type and explore various color options for the hull sides, deck, cabin, boot stripe, and including the fouling control solution for their region.

PHOTO: AKZONOBEL

Through AkzoNobel's in color and utilizing unique algorithms, boaters are now able to gain a visual representation of what their boat could look like in a 3D virtual environment.

Through AkzoNobel's (awlgrip.com/colorsexpertise) in color and utilizing unique algorithms, boaters are now able to gain a visual representation of what their boat could look like in a 3D virtual environment, then download their project scheme to discuss with their retailer or client.

Unlike traditional 'flat' panels, the user can manipulate the virtual boat to view colors from different angles, providing a lifelike impression of how complex curves and angles will appear.

Jemma Lampkin, Commercial Director of AkzoNobel Yacht Coatings, emphasizes that this tool reflects AkzoNobel's commitment to enriching the customer's experience when it comes to the important and often emotive subject of color.

She said: “This technology development is a testament to the digital innovation and passion that AkzoNobel and our yacht team strive to deliver to boaters and professionals every day. We are truly excited to better assist our boaters and applicators in simplifying their journey towards finding the perfect color and Awlgrip topcoat for their boats.”

Matthew Anzardo, Global Segment Manager of AkzoNobel's Yacht Coatings, said: “The introduction of our innovative 3D Color Visualizator signifies another step in the way we use digital technology to support our customer experience. Extensive data analytics, investment in our color portfolio and capability while adapting new trends and technology are key foundations which help us stand out when it comes to color selection and performance in the boating industry.”

Sherwin-Williams offers single-leg spray solution with FIRETEX® FX6010 launch

The new intumescent coating Sherwin-Williams Protective & Marine Coatings enhances the FIRETEX FX6000 range to allow for greater versatility in application, with FX6010 able to be applied by standard single-leg spray equipment, helping applicators to embrace the FIRETEX range with existing equipment.

PHOTO: SHERWIN-WILLIAMS

Once installed, FX6010 also offers up to 120 minutes fire protection and can be exposed to C5 high corrosive environments if installed with correct primers and topcoats.

To enable use of a more standard application method, FX6010 also offers extended pot life and working time, offering greater flexibility in use, while still maintaining durability and quick curing qualities in as little as three hours.

Once applied in shop or on site, FX6010 can be exposed to weather after four hours, while its mechanically toughened qualities ensure reduced damage during installation, and in excess of 25 years in service life with an appropriate topcoat.

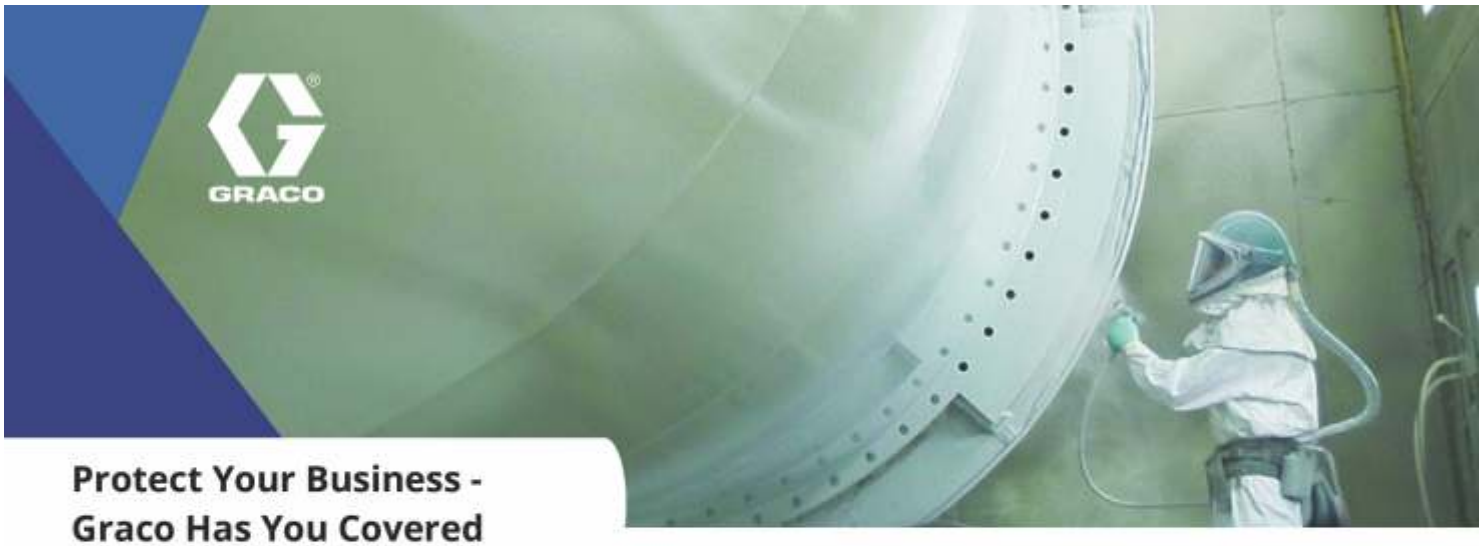
Once installed, FX6010 also offers up to 120 minutes fire protection and can be exposed to C5 high corrosive environments if installed with correct primers and topcoats.

The qualities of FX6010 make it ideal for high value infrastructure projects such as sports arenas, schools, hospitals, transport hubs and office blocks.

Carl Burrell, Global Product Director – Fire, Sherwin-Williams Protective & Marine, said: “Our FIRETEX range is changing the dynamic of passive fire protection and is already being used to protect buildings across Europe.

“By adding our new FX6010 system into the range, we can offer greater flexibility in its use, meaning applicators can use their original single-spray equipment and still benefit from the quick curing, durability and fire protection benefits.

“The benefits of this technology make it ideal for large transport, commercial and public buildings, which require structural fire protection as well as long lasting aesthetics for exposed steelwork, particularly due to its quick curing capabilities for faster project completion and strong durability.”



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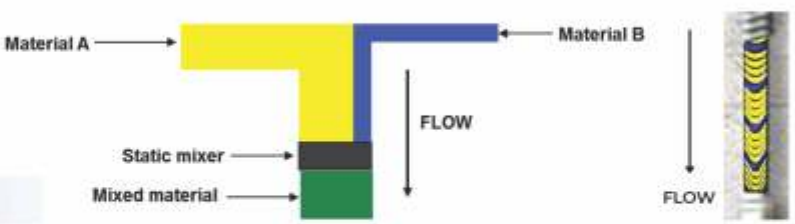

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PPG unveils PPG NEXEON 810 ultra-low-friction, premium copper-free antifouling coating

PPG (ppg.com) has announced the launch of PPG NEXEON™ 810 coating, an innovative copper-free antifouling developed with a strong emphasis on vessel performance, emissions reduction and sustainability. Independent tests confirm that the ultra-smooth surface of PPG Nexeon 810 coating can yield an immediate boost in power of up to 10% and enhance operational efficiency by up to 15% due to improved fouling control performance.

PHOTO: PPG

PPG has unveiled PPG NEXEON 810 marine coating, an ultra-low-friction, premium copper-free antifouling that delivers significant emissions savings.

Using PPG Nexeon 810 coating reduces fuel consumption and significantly lowers greenhouse gas (GHG) emissions, enabling a vessel to sustain higher speeds while helping vessel owners and operators remain compliant with the carbon intensity indicator (CII) requirements of the International Maritime Organization. The coating's unique formula can achieve a total reduction of up to 25% in GHG emissions compared to traditional antifouling coatings and supports 60 days of idle time resistance with minimal speed loss.

The unique binder technology ensures that the coating offers controlled and predictable solubility, guaranteeing strong performance throughout the vessel's operational period. PPG Nexeon 810 coating is also suitable for electrostatic application and offers outstanding color retention throughout the entire service life of the vessel.

"PPG Nexeon 810 coating provides the ultimate combination of advanced coatings technology with improved vessel performance and responsible environmental protection," said Joanna van Helmond, PPG Global Product Manager, Antifoulings, Protective and Marine Coatings. "Thanks to PPG's sustainably advantaged product development process, our customers can enjoy easier application and improved coating performance across the operating life of their vessels."

The copper-free technology in PPG Nexeon 810 coating is characterized by a significantly reduced biocide content. Its unique binder technology enables the gradual release and operation of the biocides near the surface; upon entering the water, the combined effects of sunlight and ocean bacteria kick start the breakdown of these organic biocides.

The potential for electrostatic application is a significant benefit that is not available in conventional antifouling coatings. The excellent transfer efficiency achieved through electrostatic spraying provides a uniform and ultra-smooth film as well as a decrease in overspray and waste, resulting in a significant reduction in paint consumption and improved health and safety benefits when compared to airless spraying.

Evonik's Ancamine® 2844 sets new industry standard in ultra-fast curing for protective coatings

Evonik (crosslinkers.evonik.com) has added Ancamine® 2844, a novel epoxy cure hardener designed for plural component spray applications to its curing agent portfolio. This new high functional aliphatic amine hardener sets a new benchmark with its ultra-fast cure properties and rapid property development in challenging low temperature and high humidity conditions, in marine and protective coating applications, notes a press release from the company.

PHOTO: 123RF

Ancamine® 2844's ultra-fast dry speed allows for operations in temperatures as low as 5°C, making it ideal for winter coatings and cold temperature applications.

"Our focus has always been on innovation and performance and Ancamine® 2844 continues our track record of providing solutions that meet the evolving needs of our customers," said Christian Schmidt, Head of the Crosslinkers business line. "With this latest curing agent we are offering a product that not only enhances productivity for applications that require quick turnaround times, but also maintains the quality of the finish and protection, even in the most demanding environments."

Ancamine® 2844's ultra-fast dry speed allows for operations in temperatures as low as 5°C, making it ideal for winter coatings and cold temperature applications. Its excellent surface appearance and the combination of low viscosity and low loading at high solid content ensures easy application and a flawless finish. Additionally, Ancamine® 2844's high chemical and corrosion resistance protects surfaces and can withstand salt spray tests with up to 3,000 hours exposure, making it a robust solution for fast cure protective and marine coatings.

"Ancamine® 2844's superior performance at very low temperatures and high humidity levels with no compromise on surface appearance or chemical resistance is a game-changer for our industrial coating industry customers," said Osama Arabi Katbi, Head of Epoxy Curing Agents product line.

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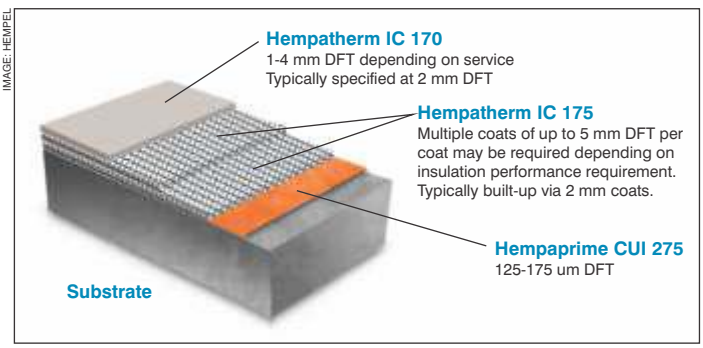
Hempel introduces Hempatherm IC, its first thermal insulation coatings system

As the need to control maintenance costs and manage Corrosion Under Insulation (CUI) increases, leading coatings manufacturer, Hempel A/S (hempel.com) introduces the Hempatherm IC. The seamless coatings system, with one of the market's highest film build capabilities, offers superior protection and mitigation of CUI by significantly reducing the risk of water ingress and retention.

with our customers' need for energy conservation in mind, without the risk of associated CUI. Coatings provide a simple and elegant alternative to meet this requirement, while promoting cost competitiveness, productivity, and sustainability over its service life for all stakeholders across the value chain."

David Hunter, Segment Development Manager, CUI/High Heat & Insulation at

IMAGE: HEMPEL



Layer diagram of a typical Hempatherm IC system.

Made up of Hempatherm IC 170 and Hempatherm IC 175, the system is designed to replace many conventional insulation systems in the critical CUI temperature range. It provides both thermal insulation and mitigation of CUI, thereby maximizing the service life of industrial equipment and assets.

"Process industry operators are constantly looking for solutions that reduce the risk of CUI, while managing their personnel safety and energy consumption in a responsible way. They want robust solutions to minimize disruption and deliver long-term value," says Zechariah Lim, Product Manager CUI/High Heat & Insulation at Hempel. Zechariah continues: "The Hempatherm IC system offers just that. It is designed

Hempel adds: "Hempel is excited to be part of the market shift from mechanical insulation to an advanced insulation coatings system. Insulation coatings have over 25 years of proven performance, but up until now, limitations on coating film thickness have limited thermal insulation coatings as a comparative alternative. Our Hempatherm system provides one of the market's highest film builds per coat, with a material engineered to maintain thermal performance over the service life, often in the range of 15-25 years."

With the Hempatherm system, Hempel provides next level insulation solutions for process control and energy conservation, thereby empowering industries to achieve optimal operational performance.

Rockwool introduces first stone wool insulation with corrosion inhibitor for industrial plant piping systems

Rockwool Technical Insulation (rti.rockwool.com/crtech/) has introduced its ProRox® PS 965 with CR-Tech (Corrosion-Resistant Technology), the industry's first stone wool insulation with built-in corrosion inhibitor, notes a press communique from the company. The latest offering in the company's stone wool insulation portfolio, the

contact with water.

CR-Tech is combined with the proprietary, award-winning WR-Tech™ (Water-Repellent Technology), which minimizes water absorption in the insulation. The result is a state-of-the-art solution that delivers.

ProRox PS 965 with CR-Tech boasts exceptional acoustic and thermal insulation properties for reduced

PHOTO: ROCKWOOL

The proprietary CR-Tech corrosion inhibitor shields plant piping against corrosion under insulation (CUI) by creating a protective barrier between the pipe's outer wall and the insulation's inner surface.

proprietary CR-Tech corrosion inhibitor shields plant piping against corrosion under insulation (CUI) by creating a protective barrier between the pipe's outer wall and the insulation's inner surface.

The next-generation CR-Tech corrosion inhibitor builds on ROCKWOOL's 80-plus years of innovation in stone wool insulation to mitigate against the risks and costs of CUI. CR-Tech is embedded into the inner surface of ProRox PS 965 mandrel wound pipe sections, right where the insulation touches the pipe. When water reaches the inner insulation surface, the inhibitor activates to form a thin protective layer that shields the pipe from

energy consumption and utility costs, fewer emissions, and reduced health and safety impacts.

"CUI creates serious efficiency drains on a plant in the form of increased energy usage, major downtime, higher maintenance costs, and potentially hazardous leaks," says Dan Aiken, Business Unit Director of Americas for ROCKWOOL Technical Insulation. "But with ProRox PS 965 with CR-Tech, CUI may have finally met its match. And with the addition of WR-Tech, we've developed a pipe insulation technology that sets new performance benchmarks in CUI mitigation — with greater efficacy than other industrial insulation."

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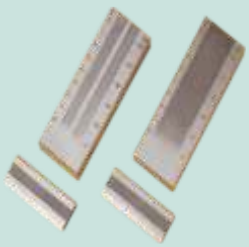
 DVNEXT RHEOMETER	 CTX™ TEXTURE ANALYZER	 FINENESS OF GRIND GAUGES (HEGMAN GAUGE)	 DIGITAL ROTOTHINNER	 AUTOMATIC CUPPING TESTER
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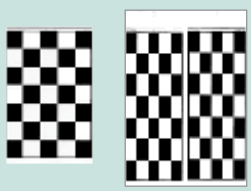
 SKID RESISTANCE TESTER	 TIDAS Automated Grindometer (Hegman Gauge)	 K CONTROL COATER	 CHECKERBOARD CHARTS	 DIGITAL COATING THICKNESS GAUGE (456)
 PULL-OFF ADHESION TESTER POSITEST AT-A	 UV XENON WEATHERING CABINET	 RAL K5 (Matt & Glossy)	 PANTONE FORMULA GUIDE	 ULTRASONIC COATING THICKNESS GAUGE POSITECTOR 200 (FOR PLASTIC, WOOD, GLASS)

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CRISIL Rating : SME 1 'Highest'

PLUSS Advanced Technologies launches Brrf PLUSS Jackets

Pluss Advanced Technologies (pluss.co.in) has launched a cooling wearable technology that can be worn by workers who are outdoors, such as on construction sites, mines, furnaces, shopfloor, in order to prevent heat stress related injuries and fatigue during hot temperatures, notes a press release from the company.

PHOTO: PLUSS ADVANCED TECHNOLOGIES

The Brrf-PLUSS wearable tech uses 'phase change materials,' which work on the principle of 'energy storage and release' to maintain a lower temperature than the ambient temperature.

A study conducted across 70,000 factories in India has estimated that there is a 4% drop in productivity for every 1°C increase in temperature above 27°C, as workers tend to be less productive and be absent more often at higher ambient temperatures. The wearable tech uses 'phase change materials,' which work on the principle of 'energy storage and release' to maintain a lower temperature than the ambient temperature.

The wearable cooling tech have been designed to offer two options:

The first design maintains the optimum thermal comfort for the body for up to 8 hours at an ambient temperature lower than 40°C. The solution consists of an inner vest which houses a pouch containing Phase Change Materials (PCM), and an outer jacket which is connected to pair of small ventilation fans attached that is powered by a portable Li-ion battery pack and the complete kit weighs just under 500 grams.

The second design maintains the optimum thermal comfort for the body for up to 8 hours at an ambient temperature higher than 40°C. The solution consists of an inner vest which houses four pouches containing Phase Change Materials (PCM), and an outer jacket which is connected to pair of small ventilation fans attached that is powered by a portable Li-ion battery pack and the complete kit weighs just under two kilograms.

The Brrf-PLUSS wearable cooling tech is based on Phase Change Materials (PCM) technology that can maintain a temperature gradient of up to 15°C lower than the ambient temperature. The Phase Change Materials' (PCM) pouches for the Brrf-Pluss jackets can be easily recharged by placing it in a refrigerator. A conventional refrigerator or commercial cooler that maintains a temperature of +10°C is sufficient to recharge the PCM packs. The Brrf-Pluss cooling tech themselves are easy to assemble, use and maintain, and come in a number of sizes and colors.

Q-FOG Chambers for cyclic corrosion testing

Traditional salt spray testing, while convenient, its inability to replicate real-world environmental cycles often yields inaccurate corrosion data. This translates to potential product failures and costly rework down the line. The newly introduced Q-FOG chambers, generates highly reliable and relevant corrosion data by meticulously simulating the natural wet/dry cycles materials encounter outdoors, notes a press communique from the company.

The advantages of Q-FOG cyclic corrosion testing include precisely controlled cycles encompassing salt fog, dry-off, humidity, and even condensation (depending on the model), meticulously replicating the environmental challenges products will face. It is versatile to accommodate a wide range of test methods, from simple Prohesion cycles to complex automotive protocols requiring multi-step exposures. Streamlined efficiency elevates the testing workflow by eliminating the need for manual transfers and spraying associated with traditional methods.

Available in two versions, the Model SSP is ideal for standard salt spray (ASTM B117) and Prohesion (ASTM G85) testing. This model is available in two convenient chamber sizes: SSP-600 (640 liters) and SSP-1100 (1103 liters).

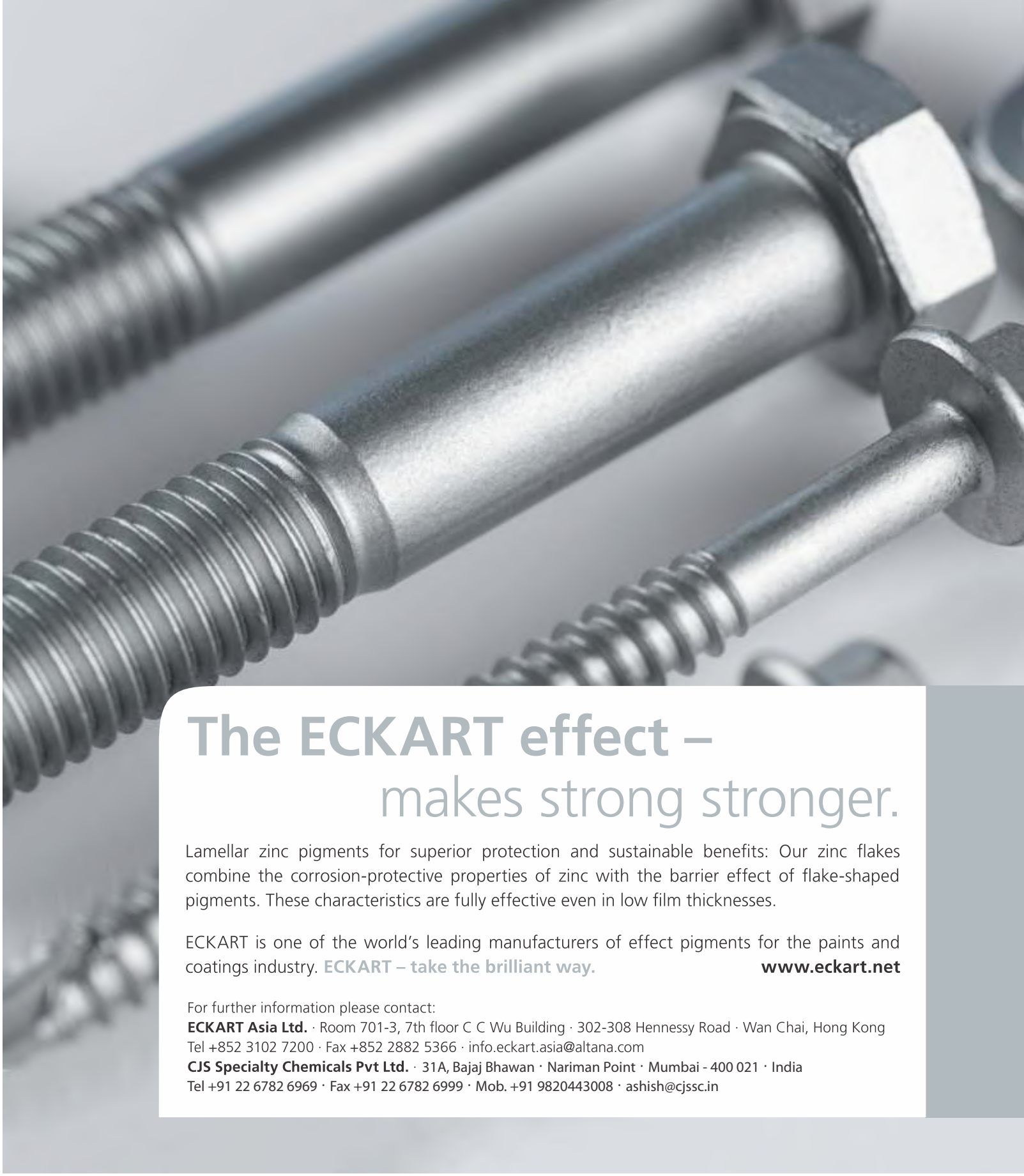
Model CCT, engineered for advanced applications is perfect for scenarios requiring Prohesion, salt spray, and 100% humidity exposure, excels in cyclic automotive testing and comes in two chamber capacities CCT-600 (640 liters) and CCT-1100 (1103 liters) to suit individual testing volume requirements.

PHOTO: Q-FOG

The Q-FOG chambers for cyclic corrosion testing, generates highly reliable and relevant corrosion data by meticulously simulating the natural wet/dry cycles materials encounter outdoors.

The features that Set Q-FOG apart include superior fog dispersion that ensures all specimens within the chamber are exposed to a uniform and replicable environment. The optimally designed 120-liter capacity enables extended testing durations, while the optional external tank connection provides even greater flexibility. The fast cycling system expedites the testing process with Q-FOG's unique heating and cooling systems. These systems enable rapid temperature changes and the creation of low-humidity environments, crucial for replicating a broader range of real-world conditions. The user-centric design simplifies the testing experience with the intuitive dual touch-screen interface. This user-friendly system allows for effortless programming and operation in 17 languages. Pre-programmed cycles and self-diagnostics further enhance ease of use, ensuring anyone on the team can conduct reliable corrosion testing.

More details: khushbooscientific.com



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Technical Drying Services celebrates 25 years of empowering industries

This significant milestone is a testament to the hard work, dedication, and vision of the TDS team

Pahwa Group's leading brand, Technical Drying Services (TDS) recently celebrated the completion of 25 years in the industry. On the occasion of the silver jubilee, the company pledged to boost its innovative endeavors to amplify its leadership position in providing quality air solutions.

The brand came into existence in the year 1998 with the vision to enable temporary desiccant dehumidification and deploy air solutions to inhibit the moisture threats impacting a wide range of industries. Under the leadership of Mr Deepak Pahwa, the company has achieved significant milestones by registering growth from a handful of clients in the beginning to expanding to 400+ clientele at present.

Speaking on the occasion, Mr Deepak Pahwa, Director, Technical Drying Services, said, “The team at TDS diligently works towards innovating continuously to provide breakthrough, cutting-edge solutions for guaranteeing customer satisfaction. Discerning that TDS finds application in an inherently vulnerable industrial setup, there is a need to provide immaculate systems devoid of any scope of error to protect the integrity of the company as well as the lives of on-ground employees working there. In this pursuit, we invariably strive to provide best-in-class dehumidification solutions coupled with highly skilled, NACE trained Airgineers to deliver the quality of work necessary for the industries.”

Over the span of 25 years, the brand has successfully provided its services to some of the leading companies across the industries, namely Reliance Industries, ONGC, Tata Steel, Sun Pharma, JK Cement, etc, to list a few. In addition to this, during the rainy season, when various parts of the country suffer from flooding situations, the rental services of TDS play a crucial role in mitigating the national loss with the help of advanced dehumidification solutions. In a recent flood in Chennai, the Water Damage Restoration solution from the house of TDS immensely contributed to safeguarding and restoring the assets damaged in the deluge situation.

Technologically and aesthetically advanced TDS System.

We feel immensely proud of reaching this significant milestone as we celebrate our 25th year. It's a testament to the hard work, dedication, and vision of our team, as well as the trust and support of our valued customers,” said Mr Atul Bansal, Chief Operating Officer, TDS.

Driven by its unwavering dedication to ensuring customer satisfaction, TDS has been continuously upgrading and tailoring its services to meet the perennially changing demands of the industry. Given to its persistence, the company has been establishing a strong foothold in the country, with a presence in Haryana, West Bengal, Maharashtra, Gujarat, Tamil Nadu, and Telangana.

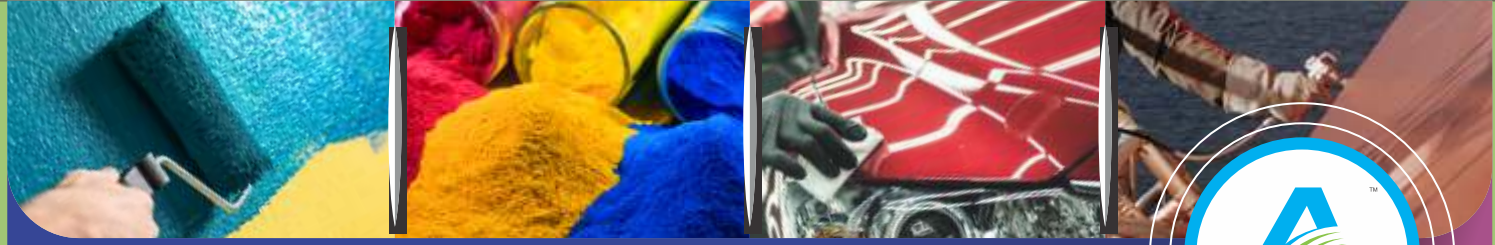
“The idea of starting TDS originated from a deep-seated desire to address the growing need for reliable and effective humidity control solutions. Recognizing the gap in the market, we saw an opportunity to provide tailored services to meet the short-term dehumidification needs and demands,” said Mr Bansal.

PHOTOS: TDS

Mr Atul Bansal, Chief Operating Officer, TDS.

“What sets us apart from others in this line is our focus on providing comprehensive solutions. We understand that industries have dynamic application needs, which is why we strive to build long-lasting relationships with our customers by offering tailored services that address specific challenges.”

TDS' services are categorized into four segments. The first one is the Industrial Project Solution (Dehumidification & Drying). Here, TDS provides desiccant-based dehumidifiers on rent for various short-term applications where humidity is required to be controlled. These could be for controlling humidity and temperature across diversified industries like pharmaceutical, food, defense, power, chemicals,



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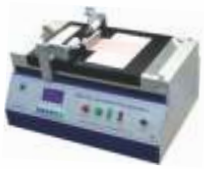

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electronics, leather, oil and gas, steel, cement, and many more. The dehumidifiers are installed for research and development (R&D), preservation, manufacturing, processing, drying, testing, storage, and packaging areas in almost all industries.

Next is the Surface Preparation and Coating segment where they offer engineered solutions for temporary control of humidity and temperature for blasting, coating and painting. Any surface after it is blasted and prepared for any coating is subjected to environmental factors. Presence of high humidity leads to flash rust and condensation resulting in coating failures like blistering, delamination etc.

Climate control is critical during blasting, painting and coating jobs in tank, bullets, columns, reactors, coke drums, vessels, pipelines, etc. High relative humidity causes condensation on the metal surface resulting in coating related problems like blooming or flash rust. An adequately designed and applied dehumidification system during blasting, painting and coating operations will ensure that the RH inside the tank is maintained as per the technical specification, for optimum performance of the coating/painting to enable timely completion of the project.

TDS installation in factory setup.

Industrial coatings require a clean and stable environment where the correct temperature and humidity conditions are favourable. TDS provides desiccant based dehumidification systems to maintain the recommended relative humidity levels. Condensing units and blowers help maintain temperature between 30ºC ~ 35ºC and provides adequate ventilation.

The Safe Confined Area Access segment provides comfortable working conditions inside confined areas. In the confined area, there is high temperate, high humidity and toxic gasses and is difficult for workers to do inspection, maintenance, and repair jobs. TDS provides humidity, temperature and ventilation control services to enable workers to work in a fresh environment in a confined area.


Humidity and temperature control system on rent for quick drying requirement.

TDS' Water Damage Restoration segment is an emergency service to dry and restore water damaged assets. It preserves, protects and secures the assets from further damage and restores the material to its original functionality.

"The unique features (USP) of TDS lie in our personalized solutions, cutting-edge technology, customer-centric approach, and short-term rental service. We pride ourselves on offering customized solutions tailored to each client's unique requirements, providing the flexibility of short-term rentals to meet immediate needs," said Mr Bansal.

"From water damage restoration to surface preparation and coating, safe confined access for maintenance work, and all other short-term dehumidification needs, we have the expertise and resources to deliver reliable and robust solutions that enhance productivity and profitability. Our commitment to understanding and meeting the unique requirements of each industry ensures that our customers receive the best possible outcomes for their operations."

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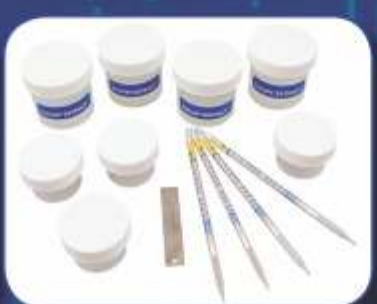



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Since its inception, TDS services have been giving the desired fillip to various companies. The brand comes with the expertise to provide industrial project solutions and quality air solutions for ensuring access to safe confined areas. At the same time, the safe preparation and coating application empower the power plants by minimizing loss incurred due to corrosion and premature coating failure. Likewise, the Water Damage Restoration service contributes to reducing the loss of property and life with the restoration of water-damaged assets.

"Over the years, TDS has experienced significant growth, nationally. We've achieved various milestones and expanded our reach to serve clients across different industries and geographical locations of the nation with our strong customer base, such as IndianOil, Bharat Petroleum, Larsen&Turbo, Hindalco Industries, and many more," said Mr Bansal.

Its products are integral to the operations of a wide range of industries, spanning from oil and gas, power, fertilizer, and sugar to pharma, food, shipping, leather, and defence sectors. One of the critical applications of the solutions lies in corrosion mitigation and coatings, where they play a pivotal role in preserving infrastructure and equipment.

For instance, in the maritime industry, TDS dehumidification solutions are essential for preventing corrosion on ships' surfaces. By maintaining optimal humidity levels, it protects vital components from the damaging effects of moisture, thereby extending the lifespan of vessels and reducing maintenance costs significantly. This not only ensures the safety and reliability of maritime assets but also contributes to operational efficiency and sustainability in the long run.

Similarly, in the oil and gas industry, its products are utilized to safeguard critical equipment and infrastructure from corrosion, ensuring operational integrity and regulatory compliance. In the power sector, TDS' solutions help maintain the efficiency and reliability of power generation facilities by preventing moisture-related damage to sensitive electrical components.

"Across industries such as fertilizer, sugar, pharma, food, leather, and defence, our dehumidification solutions find diverse applications, ranging from preserving product quality and ensuring regulatory compliance to enhancing production processes and protecting valuable assets. In each sector, our focus remains on delivering tailored solutions that address specific challenges and contribute to overall operational excellence and cost-effectiveness," said Mr Bansal. "In fact, we believe there is still significant room for growth. We're committed to educating these industries about the advantages of our services and how they can improve operations, enhance product quality, ensure regulatory compliance, and save costs. We reach out to our customers through a combination of marketing efforts, industry events, and personalized consultations. Our dedicated team ensures that we maintain strong relationships with clients nationally, providing them with the support they need."

"In the next five to ten years, we envision TDS as a global leader in humidity control solutions, serving a diverse range of industries with innovative and sustainable products. We aim to continue expanding our reach, driving technological advancements, and delivering exceptional value to our customers, partners, and stakeholders," said Mr Bansal. "As we celebrate our growth journey, one interesting anecdote is how our founder's passion for innovation and dedication to customer satisfaction paved the way for TDS's success. Their commitment to excellence and continuous improvement has been the driving force behind our evolution into a leading provider of short-term humidity and temperature control solutions on rent for quick drying."

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SCAN ME

HALOX®: Niche solutions for corrosion protection

HALOX® continues to innovate and develop new products aiming to provide solutions to meet the evolving need of customers and industries worldwide, notes Mr Andy Waloch, Paints & Coatings — Market Development Manager, ICL, in a chat with C&ACER on a recent visit to India

Can you briefly tell me something about HALOX®?

Well, yes, HALOX® is a brand of corrosion inhibitors. We're an over 50-year-old company which has been acquired by the ICL Group, a global specialty minerals and chemicals company. HALOX® specializes in the manufacture of anti-corrosion pigments and liquid corrosion inhibitors for various markets across the globe.

They work by forming a protective barrier on the metal surface which prevents the onset of corrosion and thereby extends the asset's lifespan. It also prevents the deterioration caused by exposure to moisture, chemicals, and UV radiation.

Known for its effectiveness, versatility, and durability, the HALOX® product line finds use in various sectors including automotive, marine, industrial, and construction, where protection against corrosion is crucial for maintaining the integrity and longevity of metal structures.

We have a vast array of cutting-edge products. Ours is a niche product and we are a global leader in this line. So, for example, you take a can of paint, say one gallon of around 3.75 liters. Of this, around 5% of the volume could consist of additives. Additives are crucial because they enhance the performance of paints and coatings to extend the life of an asset. And where corrosion inhibition comes in, it is extremely vital because infrastructure like bridges, marine vessels, trains, etc., are very expensive. The annual cost of corrosion is US$2.2 trillion, which is over 3% of the world's GDP. This is huge!

HALOX's superhero "The Inhibitor" with Mr Waloch while on a recent visit to India.

What do you think of the market in India?

I would say, the market in India is booming, and especially one of the most growing segments is the automotive refinish sector. I think that's because of the high number of vehicles and the duration of time people hold their vehicles. Traditionally, that's 15 to 20 years. So, if I buy a vehicle, I may use it for five years and it's in good shape. But between six and ten years, corrosion sets in, especially in a coastal climate like that of Mumbai. With the long coastline that India has, you see a lot of corrosion that happens because of salt spray and the humid environment.

Between years six and ten a car's painted surface will start degrading. This is when a lot auto refinishing will take place. Additionally, accidents will occur requiring new coats of paint and that is also a significant part of the auto refinishing market.


PHOTOS: HALOX
Mr Andy Waloch, Paints & Coatings — Market Development Manager, ICL

Talking with some of our customers here, they say this is a booming industry, in addition to the architectural market segment. A lot of the companies here work with top-notch Western OEMs, so not only do they have to use products that are eco-compliant, and performance driven, but they must also be aesthetically pleasing both for general industrial and

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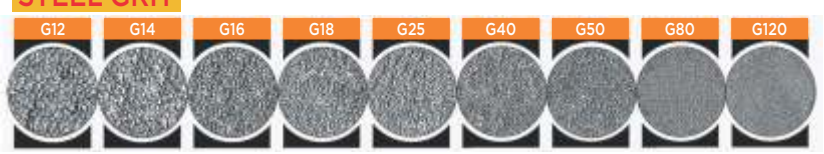

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PHOTOS: 123RF

The HALOX® product line finds use in various sectors including automotive, marine, industrial, and construction, where protection against corrosion is crucial for maintaining the integrity and longevity of metal structures.

architectural use as well.

Any new product launches recently?

Yes, well, something we are proud of and well received is the HALOX® CW-314, a non-toxic, heavy metal-free anti-corrosive pigment designed for use in waterborne and solventborne protective coating systems. It is very effective in enhancing the infrared (IR) reflectance and thermal emissivity of elastomeric roof coatings. It increases the total solar reflectance (TSR) while maintaining the dirt pick-up resistance (DPUR) and prevention of mildew growth. It's an ideal product with a climate that you have here in India. A coating that goes on a roof is extremely important because in very hot and arid climates like this, you will be able to save a lot of money on air conditioning. So not only is it good for the wallet and it saves you money, it's very good for the environment as well.

It can be used alone or in combination with other non-toxic corrosion inhibitors and mineral pigments in the formulation of environmentally friendly specialty paints. HALOX® CW-314 is especially suited for systems where 21 CFR 175.300 approval or conformance to ANSI/NSF standards are required.

It is also used in potable water tank linings and pipe coatings. It has a shelf life of 36 months.

Another product, HALOX® 570 LS is a ready-to-use liquid version of our popular organic corrosion inhibitor HALOX® 570 which requires no dilution. HALOX® 570 LS is designed for use in water based industrial and decorative coatings to provide flash rust and long-term corrosion protection on metal surfaces. This product is especially effective along weld seams to prevent galvanic corrosion and may be used in formulations based on water based acrylics, epoxy esters, 2 component epoxy, water reducible alkyds and water based polyurethanes.

HALOX® 570 LS may be used in both water based primers and direct-to-metal topcoats. In direct-to-metal coatings HALOX® 570 LS has minimal effect on gloss reduction.

How is your company different from other companies making similar products?

Absolutely. First of all, we are a niche company, a niche business. Sure, we do have many competitors, but I think the difference lies in the people that we have. We are on the cutting edge of R&D development and very much focused on delivering high performing, sustainable products. One of the many ways we approach customers involves the use of “new product blueprinting.” Using this process, we approach customers in a collaborative way to determine what their real unmet needs are. Such “voice of customer” sessions give us key insight into what's really important in a given market segment. A lot of other companies will produce a product thinking they know what the customer wants. They begin marketing the product and when they try to sell it, they start wondering why it's not moving. That's when they realize they have wasted so much of their time and effort in R&D for really no reason. Our approach is entirely different. We look at what the customers truly want in the marketplace, where the markets are growing, find out what their unmet needs are, and then we go through the R&D process to develop something that they can actually use. This is one of the reasons why HALOX® has grown very well over the last several years.

How important is sustainability in your company's scheme of things?

As a responsible international supplier of specialty chemicals, we are committed to advancing the principles of sustainability in the industries in which we operate. We incorporate quality, health, safety and environment management systems into all phases of the chemical life cycle, and pledge continuous improvement to provide the highest quality of products while protecting the safety of our people, our business partners, and the environment.

Our company is ISO 9001, ISO 14001 and RC 14001 certified. We are committed to our Responsible Care initiatives and consistent with the Responsible Care® code of Product Stewardship. We remain fully engaged in the implementation of the European Union's Registration, Evaluation, Authorization and Restriction of Chemicals legislation (REACH). The impact it will have on the

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PHOTO: 123RF

"The market in India is booming, and especially one of the most growing segments is the automotive refinish sector."

future availability of chemicals is of vital importance for us, our customers and the entire global chemical industry.

Any market share statistics?

This depends on you who ask. The corrosion inhibitor market is currently at US$800M and growing at a CAGR of 6%. Since the market is divided into organic/inorganic corrosion inhibitors and flash rust inhibitors and by global regions, I can confidently say that HALOX is in the top ten list of all global suppliers. Ours are very niche products and you will get different numbers from different people, but our customers will tell you right away that we are one of the preferred companies that they want to do business with because of the quality and performance HALOX delivers.

Where is your manufacturing base?

The primary manufacturing plant where we produce corrosion inhibitors is located in Hammond, Indiana, about an hour's drive from Chicago, Illinois in the Midwest, USA. The other location is in Ladenburg, Germany, where we make the dispersants, defoamers and stabilizers.

How do you intend tapping the Indian market?

Well, we market our products exclusively through our distributor partner, CJS Specialty Chemicals Pvt Ltd. They are headquartered in Mumbai with offices and highly qualified personnel strategically located throughout the country so that they can support our customers most efficiently. CJS Specialty Chemicals has many years of experience in the Indian market offering excellent service and innovation to end customers in every industry. We are proud to partner with them!

Any plans for manufacturing activity in India?

Not yet, but if the opportunity arises, of course, why not?

***Mr Andy Waloch** is ICL's Global Market Development Manager for the HALOX® specialty additives product line that focuses on corrosion inhibition in all industrial and architectural applications for paints and coatings with around 30 years of experience in various business development and marketing leadership roles. Mr Waloch is responsible for key growth initiatives that include innovative approaches in bio-based formulations and heavy metal free alternatives to meet and exceed the challenges of matching performance with sustainability.*

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ASTM D 2247, ISO 6270

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1. Paint Characterizations, Specific gravity, % NVM, % Vol Solids, VOC, Viscosity & Drying time.
2. Flexibility Test, Pencil Hardness Test, Cross Hatch Adhesion Test, Shore Hardness D & A .
3. Chemicals Immersion Test.
4. Water Vapor Permeability and % Water Absorption
5. Anti Carbonation Test .
6. Aluminium Composite Panels (ACP).

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Artificial Intelligence / Machine Learning sets stage to better corrosion protection decision making processes in naval and offshore assets

Digitalization technologies, such as IoT (Internet of Things) sensors and predictive analytics, are being integrated into marine corrosion mitigating systems to monitor performance in real-time and predict maintenance requirements

Corrosion is a major problem for naval and offshore platforms due to the prevalent harsh marine environment. Corrosion occurs in three corrosive zones on the platform: the atmospheric zone (above water), the splash zone (tidal), and the subsea zone (underwater and sea bottom). Corrosion also occur on naval vehicles and structures due to the continuous or intermittent exposure to seawater or moisture in the air.

"Approximately 40% of annual demand for steel worldwide is used to replace products that have failed," said Mr Prashant T. Rojatkar, Outstanding Scientist and Director, Naval Materials Research Laboratory, DRDO, Government of India, while recently speaking at the Technical Workshop on Advance Corrosion Control Technologies for Naval Platforms on the occasion of the World Corrosion Awareness Day at their premises in Ambernath, near Mumbai. "If we calculate the figures, this means, five tons of steel disintegrate daily and mainly due to corrosion. Also, 25% of the budget kept for maintenance is spent on managing corrosion. A lot of this can be saved if we can extend the service life of the assets." This percentage is expected to increase, and extending the lifespan of steel in products could also help reduce demand and carbon dioxide emissions from steel production.

PHOTOS: 123RF

It has long been recognized that seawater is the most corrosive natural environment towards engineering materials, particularly many metals and alloys.

Corrosion also occur on naval vehicles and structures due to the continuous or intermittent exposure to seawater or moisture in the air.

With reference to naval and offshore platforms, it has long been recognized that seawater is the most corrosive natural environment towards engineering materials, particularly many metals and alloys. Seawater is a complex mixture of chemical, physical and biological species whose characteristics can be influenced by geography, temperature, depth and ocean currents. "With our vast coastline and the large Indian Ocean around us, we face many issues. Whatever has been done, there is always something more that has to be done!" said Dr Y. Srinivas Rao, Distinguished Scientist, Director General, Naval Systems & Materials (NS&M), Government of India.

Use data to predict suitability or longevity of a coating system

A primary program focus is to create a science-based understanding of corrosion and protective options through damage evolution mechanisms, corrosion-informed materials concepts, and surface protection and modification sciences. “We already have a large amount of data. With this, we need to generate a model that can predict the suitability or longevity of a particular coating or system,” said Dr Srinivas Rao.

“For example, there are portable corrosion detection systems that can be put to good use. After all you cannot take a ship or naval platform to a laboratory. You need to identify small problems right at the start itself and tackled immediately so that it does not grow into a larger issue later on.”

“The growing capacity and capability of computations and data repositories, corrosion modelling and simulations, multiscale, multi-physics-base analysis, and artificial intelligence (AI)/machine learning (ML) has set the stage for automated decision-making processes to accelerate materials discovery and predict material behavior and life under various environmental conditions,” noted Mr Ajaykumar Patil, in a press note from Persistence Market Research Pvt. Ltd. “Digitalization technologies, such as IoT (Internet of Things) sensors and predictive analytics, are being integrated into marine corrosion mitigating systems to monitor performance in real-time and predict maintenance requirements. This proactive approach helps to prevent costly downtime and unplanned repairs.”

“Another objective is research leading to development of corrosion-resistant alloys and coatings, corrosion-control and prevention technologies, sensors and electrochemical characterization methodologies, and processes to mitigate corrosion and its effects when immersed in seawater, sea-influenced atmospheric conditions or other marine environments experienced by naval authorities,” noted Patil.

State-of-the-art aerial drones are used to conduct comprehensive outdoor and indoor inspections of vessels and offshore structures.

By utilizing advanced formulations and application methods, industry stakeholders can enhance protection against corrosion, fouling, and environmental damage while minimizing maintenance requirements and environmental impact.

“One should also take ideas from nature to develop more advanced products, especially to detect corrosion in hard to reach places. For example, you can have a stent-like device to clear blocked pipelines, just like one does to a heart block. There are many more, one only has to look around…,” said Dr Srinivas Rao. “At the same time,” he said, ”one has to calculate not only the repair costs, but also the downtime costs like non-utility of a particular asset which could have been earning money, rather than idling in a dry dock. It is also essential that researchers and product developers go down to the repair facilities and get a firsthand experience where a problem starts. These are places where you can learn a lot and come up with practical solutions.”

“Marine paints and coatings play an important role in protecting assets and ensuring the longevity and performance of vessels, offshore structures, and marine equipment,” noted Dr Subhash Srivastava, Managing Director, K-Tech India Ltd., a rapidly emerging professionally managed company with core competence in specialty chemicals and specialty coating additives. By utilizing advanced formulations and application methods, industry stakeholders can enhance protection against corrosion, fouling, and environmental damage while minimizing maintenance requirements and environmental impact. These coatings are designed to withstand the unique challenges posed by immersion in saltwater, fluctuating temperatures, and mechanical stresses associated with marine operations. Continued research and innovation in marine coatings will drive further improvements in performance, sustainability, and cost-effectiveness, supporting the long-term viability of the maritime industry.

Surge expected in the global marine coatings market

The global marine coatings market is dynamic, driven by the expansion of maritime trade, regulatory compliance

requirements, and advancements in coating technologies. According to Persistence Market Research's projections, the Global Marine Coatings Market is expected to surge ahead at a CAGR of 8.2%, thereby increasing from a value of US$ 1.7 billion in 2023 to US$ 3.68 billion by the end of 2033.

Recent advancements in marine coatings have focused on improving durability, environmental sustainability, and performance. Some notable advancements include nano coatings, environmental friendly formulations, and smart coatings.

Nano coatings utilize nanotechnology to create ultra-thin protective layers with enhanced properties such as scratch resistance, self-cleaning capabilities, and improved adhesion. These coatings offer superior protection against corrosion and fouling while reducing maintenance requirements.

Environmentally friendly formulations: With increasing concerns over environmental pollution, there has been a shift towards developing marine coatings with reduced environmental impact. Bio-based resins, low-VOC (volatile organic compound) formulations, and biodegradable additives are being used to minimize the release of harmful chemicals into the marine environment.

Smart coatings incorporate sensors or responsive materials that can detect changes in environmental conditions and adjust their properties accordingly. For example, self-healing coatings can repair minor damage autonomously, prolonging the lifespan of the coating system and reducing maintenance costs.

Marine paints and coatings play an important role in protecting assets and ensuring the longevity and performance of vessels, offshore structures, and marine equipment.

Cdr Pankaj Grover, IHQ, Indian Navy, DNA, Naval HQ, New Delhi, noted that the paint manufacturing companies need to develop paints and coatings that for example, do not need surface preparation, or coatings that last say up to 30 years, self-healing coatings, omniphobic coatings, superhydrophobic coatings, fire proof composite materials, improved coatings application systems like HVAF, thermal spray coatings, and better additives.

Other practices could also involve diver reparable anodes, AI/ML enabled corrosion management systems, sofrware for fatigue life assessment of ships, automated and related survey techniques like drone surveys and painting, he said. The challenges, he said, were the labor intensity of deck painting, reduced maintenance periods, constraints in reaching hard to access areas for paint and touch up or maintenance, etc.

Cdr Banti Singh, IHQ, Indian Navy, Naval HQ, New Delhi emphasized that, due to limited access to structures and the environmental and situational conditions, periodic inspections would not be possible at times.

Standards for tropical climates a must

Mr Pankaj Panchal, Founder and Director, Corrosion Protection Specialist Pvt Ltd, Ahmedabad, was emphatic that standards be developed for Indian conditions too. “Standards are Western oriented. Most of the standards committees are full of members from Western countries with only a handful of Indians in them. So, obviously standards are created for Western environments. The situations in tropical climates such as ours are entirely different!”

He also emphasized that a lot of problems are taken care of at the design stage itself. “You must design for the worst case scenario. Once a project is completed you cannot go on changing the design often. After all, initially things will work well, but problems will start showing up after 10 – 15 years.”

Highlighting the loss due to corrosion, Mr Panchal said, assuming the cost of corrosion is US$3.46 trillion and the world population is over 8 billion, the annual cost of corrosion works out to a whopping US$450 per head. Having worked extensively in the Middle East region, Mr Panchal also emphasized that the Middle East has a highly corrosive environment due to its high temperatures, humidity, salt spray, saline water tables, and chloride deposits in the soil.

Dr. B. P. Mallik, a leading R&D expert and technical advisor in the industry, noted that the cost of marine corrosion in the maritime industry is estimated to be around $80 billion annually and does not including indirect costs. “New regulations, for example TBT prohibition in antifouling coatings, stringent IMO regulations, etc., see new developments happening,” said Dr Mallik.

Organizations are constantly introducing new materials and technologies to fight anti-fouling and corrosion and do not include only paints and coatings, but also methods like using drones and underwater robots to check out the status and restore the infrastructure in hard to reach environments.

Ultrasonics device for anti-fouling on warships and submarines

For example, Mike Semens-

Delegates at the Technical Workshop on Advance Corrosion Control Technologies for Naval Platforms on the occasion of the World Corrosion Awareness Day organized by NMRL - DRDO and AMPP India Chapter.

Flanagan, Global President of Marine at IMI, said: “Marine biofouling poses significant challenges for the naval industry. IMI Truflo Marine is proud to introduce a biocide-free system, particularly as legislation increasingly restricts the use of metallic biocides in existing antifouling systems.”

Submarines are prone to biofouling, especially when undergoing maintenance or refits in dockyards, where stagnant water often accelerates the build-up and ingestion of biomaterial into ballast and cooling systems.

Sonihull's ultrasonic antifouling solution, coupled with IMI's deep domain understanding and qualification capabilities for the naval marine market, is designed for fit-and-forget ease, and is suitable for any solid surface exposed to raw seawater, including hulls, shafts, propellers, waterjets, sea-chests, tanks, keel-coolers, box-coolers, pipework, intakes, and valves. Unlike biocidal coatings and impressed-current systems, this low-power solution is a low-cost, low-maintenance, and non-toxic solution to marine growth and fouling.

WEG develops innovative coating for highly corrosive environments

WEG has developed an innovative coating for use in highly corrosive environments, providing greater durability to assets and increasing the lifespan by up to four times compared to current technologies. This coating technology, already being tested and applied in some offshore platforms, replaces traditional coatings, simplifying equipment and structure maintenance where applied and offering significantly greater resistance compared to currently adopted protective plans.

The WrapX® line uses high-performance elastomeric coatings that extend the integrity of the asset. In the case of valve and flange maintenance, which require constant interventions, the products can be easily removed and reapplied. According to Rafael Guerreiro Torezan, WEG Tintas Managing Director, WrapX® "allows the release of large areas where it will be applied in a few hours, unlike current processes where asset maintenance extends over several days."

Jotun Hellas groundbreaking aerial drone inspection service

Jotun Hellas has introduced its groundbreaking Aerial Drone Inspection Service. This cutting-edge service involves certified and experienced Jotun Coating Advisors utilizing state-of-the-art aerial drones to conduct comprehensive outdoor and indoor inspections of vessels. With the capability to access even the most challenging areas, including decks, accommodation, funnels, lifeboats, cranes, cargo holds, hatch covers, and the external hull above the waterline, this service ensures the most thorough assessment possible.

The Aerial Drone Inspection Service empowers ship operators with accurate and detailed information about the state of their vessels. The service analyses the vessel's paints and coatings condition, documented with high-resolution photos and videos, enabling data-driven decisions for maintenance and repair works. The inspection material, including a complete Drone Inspection Paint Condition Report, is prepared by Jotun Coating Advisors having assessed each inspected area, ensuring that every aspect is considered, and every detail reported.

By identifying and addressing corrosion at an early stage, drone inspections support the prevention of deterioration and enable data-driven decision-making for safety on board. With access to reliable inspection information, ship operators can proceed with confidence in their improvement initiatives.

Diving robot to check state of underwater infrastructure

Maintaining underwater infrastructure is anything but trivial. Industrial divers have often been deployed in dangerous environments. Based on the underwater robot BlueROV2, Fraunhofer researchers now want to develop a technical solution that can support and simplify these operations. The underwater robot is equipped with a new wheel drive (crawling skid) in order to be able to move directly on the object to be examined. This approach offers various advantages in terms of flowability and precision.

However, the research group's approach goes far beyond upgrading the ROV (Remote Operated Vehicle) with a landing gear: with an optronic system for visual and geometric environment detection, an exact recording of the current state of the underwater infrastructure to be examined is possible in a relatively short time.

Furthermore, so-called sensor cuffs are intended to significantly simplify the monitoring of weld seams. These can be regularly approached and read by the ROV. In order to enable precise navigation without the use of an expensive inertial system, which would involve additional costs in the six-figure euro range, a cost-effective alternative is to be developed using visual route determination, a MEMS inertial system, pressure sensors and the rotational position information of the wheel drive. In a further expansion stage, it should finally be possible to carry out direct maintenance work on the underwater infrastructure - such as the large-scale application of corrosion protection.

Hardide® coated HVOF copper nozzle extends life by up to 40x

The extremely hard and homogeneous properties of the Hardide coating minimize pickup inside the nozzle when spraying metallic materials

Hardide Coatings, the provider of advanced surface coating technology, has launched the first in a new range of ready coated and enhanced components with a JP-5000 4" copper nozzle used in High-Velocity Oxy Fuel (HVOF) thermal spray coating, notes a press release from the company.

The tungsten/tungsten carbide-based Hardide® chemical vapor deposition (CVD) coating is proven to extend the operational life of HVOF thermal spray copper nozzles by 5 to 40 times when spraying carbide or metallic-based powders. The ready coated nozzles include O-rings suitable to withstand the higher temperatures generated in longer periods of service.

Steve Paul, Interim CEO of Hardide Coatings commented: "This is an extremely exciting new product development which offers significant performance, cost and environmental advantages to users of HVOF equipment. By Hardide® coating the internal diameter of copper nozzles used in thermal spraying, our enhanced component offers superior wear resistance and reduced pickup. This significantly extends the working life of the part thus improving productivity and reducing the spraying cost. We have had a lot of interest from OEMs and thermal spray companies in transforming the performance and durability of their HVOF spray equipment and we were pleased to ship our first production orders this week.

"The coated JP-5000 4" nozzle is the first in a range of Hardide® ready coated copper nozzles of varying sizes and other OEM equipment which we intend to launch on an ongoing basis."

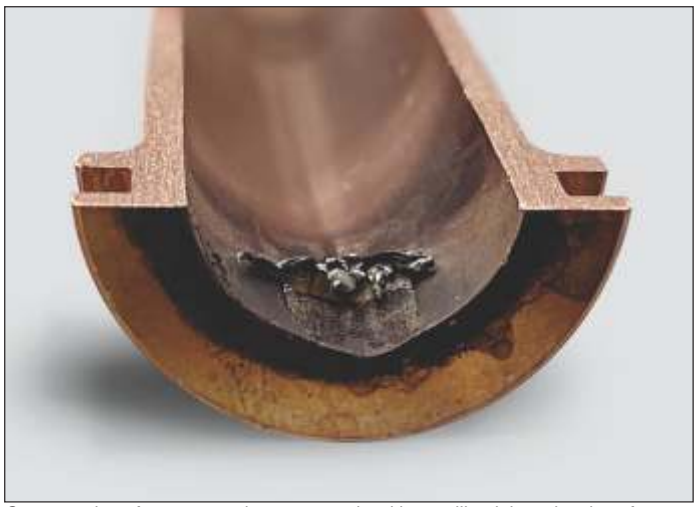
PHOTOS: HARDIDE COATINGS

Hardide® ID coating with high surface finish.

Cross section of a Hardide® coated copper nozzle after 22 hrs+ service with Stellite 6 Powder showing no pickup present.

Hardide® Ready Coated JP-5000 4" Copper Nozzle for HVOF Spray Gun.

The extremely hard and homogeneous properties of the Hardide coating minimize pickup inside the nozzle when spraying metallic materials. This prevents material dislodging and forming a defect in the HVOF coating, therefore improving coating quality, reducing downtime and the cost of spraying. The life of the ready coated nozzles spraying metallic materials is extended up to 40 times compared to uncoated nozzles. When spraying carbide powders, the Hardide coating extends the life of the nozzles by five times.



Cross section of an uncoated copper nozzle with metallic pickup showing after 1.5 hrs service.

Loading a Hardide® coating reactor.

Moreover, the nozzle has to be exchanged less often which decreases the risk of breaking the water circuit, while lack of nozzle clogging reduces the likelihood of spits or unmelted agglomerations of powder becoming embedded in the spray coating thereby eliminating the need for rework.

The Hardide coating is compatible with a wide range of coating materials used in HVOF processes, allowing for seamless integration with existing coating systems.

The company has been trialing the product with a global OEM in the US and coating services companies in Germany and Italy. The copper nozzles will be manufactured in Germany and coated at Hardide Coatings' UK manufacturing facility for shipping globally.

The Hardide coated JP-5000 4" copper nozzles are being sold in fully recyclable packaging.

About Hardide Coatings

Hardide Coatings (hardide.com) develops, manufactures and applies advanced technology tungsten carbide/tungsten metal matrix coatings to a wide range of engineering components. Its patented technology is unique in combining in one material, a mix of toughness and resistance to abrasion, erosion and corrosion; together with the ability to coat accurately interior surfaces and complex geometries. The material is proven to offer dramatic improvements in component life, particularly when applied to components that operate in very aggressive environments. This results in cost savings through reduced downtime and increased operational efficiency. Customers include leading companies operating in the energy sectors, valve and pump manufacturing, industrial gas turbine, precision engineering and aerospace industries. The company has manufacturing facilities in the UK and USA.

Rezitech combats tank corrosion under insulation with Belzona composite wrap system

Within a space of 24 hours, the 9.5 meter dia tank with a height of 2 meters was repaired and protected against future corrosion with the industrial composite wrap system, Belzona SuperWrap II

At a major global blue-chip nickel Mine in Australia, authorized Belzona Distributor, Rezitech, provided a full turnkey solution to combat corrosion under insulation on an ammonium sulphate feed tank. Within the space of 24 hours, the 9.5 meter (31.2 ft) diameter tank {with a height of 2 meters (6.6 ft) from ground level} was repaired and protected against future corrosion with the industrial composite wrap system, Belzona SuperWrap II.

Protective coatings and epoxy repair systems support transition to net zero

The Mine refines granulated nickel matte from their smelter into premium-grade nickel powder and briquettes containing 99.8% nickel. Nickel powder is further processed into nickel sulphate at a Refinery in Australia. Nickel sulphate is an essential ingredient in the lithium-ion batteries that drive electric vehicles (EVs). It could be argued that the increase in sales of EVs is one of the biggest climate wins of 2023. Indeed, according to the 2023 Report from Climate Action Tracker, of the 42 sectors which need to achieve net zero status by 2050, the only sector which is on track is the share of EVs in light-duty vehicle sales. Considering how road transport currently accounts for 11% of global greenhouse gas emissions, EVs play a vital role in reducing these emissions. As such, the polymeric technology required to repair and improve assets within the EV industry equally plays a vital role in supporting the transition to net zero. By repairing damaged assets instead of decommissioning and sending them to landfill, this significantly reduces the climate impact that would otherwise be incurred in this process.

Tank Contents	
Amsul	218 - 666g/L (average = 530g/L)
Chlorides	0.1 - 0.6g/L (average = 0.3g/L)
pH	3.0 - 9.0 (average = 6.6)

Figure 2. Tank contents.

Case study: feed tank suffering from corrosion under insulation and SCC

The Customer's stainless steel feed tank was suffering from corrosion under insulation and chloride induced stress corrosion cracking. They required a solution that would not only restore the integrity on the substrate, but also protect the asset against future corrosion damage. Not only this, but as the tank operates at elevated temperatures of approximately 70°C (158°F) and processes highly corrosive medium, the repair solution would need to be able to withstand these harsh conditions.

Rezitech specifies Belzona composite wrap solution

Having worked with Rezitech over the course of five years, the Customer had complete confidence in the range of Belzona metal epoxy repair composites and industrial repair coatings the Distributorship offers. As such, they decided to contact them again for their advice and system recommendation. Following an inspection by Heath Westell, Sales Engineer at Rezitech, the composite wrap system, Belzona SuperWrap II, was specified. Commenting on this specification, Heath said: “This composite wrap system is comprised of a fluid-grade resin system, a bespoke hybrid reinforcement sheet, based on fiber glass and carbon fiber, as well as a release film to compact and consolidate the application. The system is specially formulated to restore the strength of holed, weakened and corroded pipe and tank

PHOTOS: BELZONA

Figure 1. Composite wrap system curbs corrosion under insulation at nickel mine.

Figure 3. Stainless steel feed tank repaired and protected with Belzona SuperWrap II.

Figure 4. Mitigate the need for replacement with polymeric technology.

walls, making it the ideal solution for protecting the asset against corrosion under insulation for the long term. In addition, thanks to the cold-curing properties of the composite wrap system, this mitigates the need for hot work, making it a reliable alternative to welding."

Application procedure:

Firstly, all traces of oil and grease contamination were removed using a suitable Rezitech Degreaser. Following this, the surfaces were grit-blasted to provide a surface cleanliness compliant with ISO 8501-1 SA 2½ (ASNZ 1627.4 class 2.5) with a minimum 75 μm (3 mil) rough angular profile. Once the surface was prepared, the Belzona 9381 reinforcement sheet was measured out and then wetted out with the Belzona resin system. The resin was then systematically applied to the areas to be repaired. Following this, the Belzona reinforcement sheets were then applied to the tank in three layers. The compression film was then added to the top of the application area. Next, using a roller, the Belzona SuperWrap II composite wrap system was then spread, rolled and compressed to the surface of the tank. The system was then left to cure for approximately eight hours.

Bypass the need for replacement with polymeric technology

By investing in the Belzona composite wrap solution, this enabled the Customer to successfully bypass the need to replace the corroded asset, and instead prolong the lifespan of the asset for years to come. Thus, this enabled the Customer to make significant savings in both time and money. In addition, given the important role EVs play in reducing global carbon emissions, it could be argued that polymeric technology also plays a fundamental role in supporting this transition by safeguarding the integrity of key assets within this industry.

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How to slow down corrosion with MCI® in high temp GCC States

Cortec's MCI® Technology offers a cost-effective alternative to extend structural service life in high temperature areas

Some climates such as those in GCC (Gulf Cooperation Council) countries make it extremely difficult to build structures with long service lives. Hot temperatures and other harsh elements make corrosion a constant threat to the durability of reinforced concrete. Rather than default to expensive options such as epoxy coated rebar and extra thick concrete cover, Cortec's MCI® Technology offers a cost-effective alternative to extend structural service life in high temperature areas.

PHOTOS: CORTEC CORPOTATION

Hot temperatures and other harsh elements make corrosion a constant threat to the durability of reinforced concrete.

Why is corrosion such a problem in GCC States?

The higher the temperature, the faster corrosion can occur. Every time the temperature rises by 10°C (50°F), corrosion activity can double. Since temps in the GCC frequently exceed 38°C (100°F) in the summer, the processes at work to rust rebar in reinforced concrete structures are in full force. Add to this the proximity of salt-laden air in coastal areas and the presence of chlorides in 'sabkha' soil or high water tables, and the risk for structural deterioration is even higher. At the same time, a strong cultural desire exists to create sustainable structures that will last for the next generation.

Since temps in the GCC frequently exceed 38°C (100°F) in the summer, the processes at work to rust rebar in reinforced concrete structures are in full force.

How MCI® can help

Migrating Corrosion Inhibitors (MCIs) are an excellent antidote to corrosion in reinforced concrete structures. By specifying MCI®, engineers can significantly extend the expected service life of the structure at a small percentage of the construction cost. These amine-carboxylate based inhibitors affect both the anodic and cathodic portions of a corrosion cell and can be applied in many forms, including concrete admixtures and topical treatments. MCI® can migrate through the concrete matrix as a liquid via capillary action and as a vapor throughout the pore structure. An affinity to metal allows MCI® molecules to adsorb on the surface of metal reinforcement, forming a protective layer that delays time to corrosion and significantly reduces corrosion rates once started. It is the one of the easiest and most cost-effective methods of protecting metal reinforcement from corrosion when compared to epoxy coated rebar, cathodic protection, and calcium nitrite.

The only answer is to build structures in a way that will slow down the corrosion process and thereby extend service life.

New construction or facility maintenance?

Adding MCI® from the start is an excellent way to protect against corrosion in high chloride, high temperature GCC coastal environments. MCI® Technology can be applied to new structures as a concrete admixture such as MCI®-2005, a USDA Certified Biobased Product that does not accelerate set time (unlike calcium nitrite, which can make the concrete mix extremely difficult to work with in hot weather). However, existing structures never enhanced with MCI® can still benefit from an MCI® surface applied corrosion inhibitor (SACI) applied during repair or routine application of a water repellent. MCI®-2020 offers the highest concentration of MCI® SACIs and should be followed by the application of a water repellent or other sealing material (be sure to check compatibility). For the convenience of two-in-one application, MCI®-2018 combines MCI® with a 100% silane water repellent for dual protection against the elements.

Where has MCI® been used in the GCC?

MCI® Technology has been used in countless structures exposed to the GCC climate. Most notable is the Burj Khalifa, the tallest building in the world to date built with a 100-year design life. Due to harsh groundwater conditions, MCI®-2005 was added to the substructure for extra protection. The application was similar for the Princess Tower, where the service life prediction doubled with the addition of MCI®-2005 at less than 1/10 of a percent of total construction costs. MCI®-2005 has also been specified in medical and hospitality facilities in the region.

The logical choice to extend service life

The high temperatures and corrosive environments of the GCC are unavoidable. The only answer is to build structures in a way that will slow down the corrosion process and thereby extend service life. MCI® makes the most economical and practical sense for that purpose and has a long track record of use in the GCC.

The evolution and dynamics of the paints and coatings market

The paints and coatings market is projected to witness steady growth, with an estimated CAGR of 5.1% from 2023 to 2033, reaching a valuation of $263.3 billion by 2033

The paints and coatings market is a dynamic sector within the broader chemical industry, deeply intertwined with various sectors such as construction, automotive, aerospace, marine, and industrial machinery. Paints and coatings serve not only aesthetic purposes but also provide protection, durability, and functionality to the surfaces they cover. This industry has witnessed significant evolution over the years, driven by technological advancements, regulatory changes, sustainability initiatives, and shifts in consumer preferences.

Historical perspective

The history of paints and coatings can be traced back to ancient civilizations, where natural materials such as plant extracts, minerals, and animal fats were used for decorative and protective purposes. However, it was during the Industrial Revolution that the modern paints and coatings industry began to take shape. The development of synthetic pigments, binders, and additives revolutionized the industry, enabling the production of more durable, weather-resistant, and versatile coatings.

Market overview

The paints and coatings market is vast and diverse, encompassing a wide range of products tailored to specific applications and end-users. These products can be broadly categorized into decorative coatings (used in residential and commercial buildings) and industrial coatings (applied in various industrial settings).

Decorative coatings: This segment includes paints used for interior and exterior surfaces of residential and commercial buildings. Decorative coatings come in a variety of formulations such as emulsions, enamels, varnishes, and stains, offering different finishes and functionalities. Factors such as color trends, ease of application, durability, and environmental impact influence consumer preferences in this segment.

PHOTO: 123RF

Rapid urbanization, particularly in emerging economies, fuels demand for decorative coatings for new construction and renovation projects.

Industrial coatings: Industrial coatings find applications across diverse industries such as automotive, aerospace, marine, oil and gas, and machinery manufacturing. These coatings are designed to protect against corrosion, abrasion, chemicals, and extreme temperatures. Industrial coatings can be further classified based on their specific functions, including primers, topcoats, and specialty coatings for unique requirements.

The paints and coatings industry serves as a cornerstone of various sectors including construction, automotive, aerospace, and industrial applications. This market provides not only aesthetic enhancements but also crucial protection against corrosion, weathering, and environmental degradation. According to the latest survey conducted by Persistence Market Research, with global construction activities, automotive production, and industrial expansion, the paints and coatings market is projected to witness steady growth, with an estimated Compound Annual Growth Rate (CAGR) of 5.1% from 2023 to 2033, reaching a valuation of $263.3 billion by 2033.

Key drivers and trends

Several factors drive the growth and evolution of the paints and coatings market:

Urbanization and infrastructure development: Rapid urbanization, particularly in emerging economies, fuels demand for decorative coatings for new construction and renovation projects. Infrastructure development initiatives further contribute to market growth, creating opportunities for industrial coatings used in bridges, roads, and public utilities.

Automotive and transportation: The automotive industry is a significant consumer of coatings, utilizing them for both aesthetic and functional purposes. Increasing vehicle production, coupled with rising consumer demand for customized finishes and advanced coatings with enhanced durability and performance, drives innovation in this segment.

Technological advancements: Advances in materials science, nanotechnology, and formulation techniques continue to drive innovation in the paints and coatings industry. Manufacturers are developing eco-friendly coatings with reduced VOC (volatile organic compound) emissions, self-healing properties, and enhanced resistance to environmental degradation.

Regulatory landscape: Stringent environmental regulations aimed at reducing VOC emissions and promoting sustainable practices are reshaping the paints and coatings market. Manufacturers are increasingly investing in R&D to develop low-VOC formulations and adopt eco-

friendly production processes to comply with regulations and meet consumer demand for environmentally responsible products.

Shift towards waterborne and powder coatings: Growing concerns about environmental sustainability and health hazards associated with solvent-based coatings are driving the adoption of waterborne and powder coatings. These formulations offer lower VOC emissions, improved durability, and easier cleanup, making them increasingly popular in both decorative and industrial applications.

Digitalization and customization: Digital technologies are transforming various aspects of the paints and coatings industry, from color matching and formulation to distribution and marketing. Customization tools allow consumers to create personalized color schemes, while digital platforms streamline supply chain management and enhance customer engagement.

Focus on sustainability: Sustainability has emerged as a key priority for both consumers and manufacturers in the paints and coatings market. Companies are investing in sustainable sourcing practices, recyclable packaging, and product innovations that minimize environmental impact throughout the lifecycle, from production to disposal.

Regional insights

The paints and coatings market exhibits regional variations influenced by factors such as economic development, construction activity, regulatory frameworks, and cultural preferences.

North America: The North American market is characterized by steady growth driven by robust construction activity, automotive production, and technological innovation. Regulatory initiatives aimed at reducing VOC emissions are driving the adoption of eco-friendly coatings in the region.

Europe: Europe is a mature market for paints and coatings, with stringent environmental regulations driving innovation in sustainable coatings technology. Waterborne and powder coatings are gaining traction in Europe due to their environmental benefits and regulatory compliance.

PHOTO: 123RF

The automotive industry is a significant consumer of coatings, utilizing them for both aesthetic and functional purposes.

Asia-Pacific: The Asia-Pacific region dominates the global paints and coatings market, driven by rapid industrialization, urbanization, and infrastructure development. China, India, and Southeast Asian countries are key growth markets, fueled by investments in construction, automotive manufacturing, and industrial expansion.

Latin America: Latin America offers significant growth opportunities for the paints and coatings industry, supported by infrastructure development projects, urbanization, and a growing middle class. Brazil, Mexico, and Argentina are among the key markets in the region.

Middle East and Africa: The Middle East and Africa region witness steady demand for paints and coatings driven by construction projects, oil and gas infrastructure development, and automotive manufacturing. Investments in sustainable coatings technology are on the rise in response to environmental concerns.

Challenges and opportunities

While the paints and coatings market presents numerous growth opportunities, it also faces several challenges:

Raw material volatility: Fluctuations in raw material prices, particularly petrochemical-based ingredients, pose challenges for manufacturers in terms of cost management and pricing strategies.

Competitive landscape: The paints and coatings industry is highly competitive, with numerous global and regional players vying for market share. Differentiation through product innovation, branding, and customer service is critical for maintaining competitiveness.

Environmental concerns: Environmental regulations and consumer preferences for eco-friendly products are driving the transition towards sustainable coatings. However, achieving sustainability goals while maintaining product performance and cost competitiveness remains a challenge for manufacturers.

Supply chain disruptions: Global events such as the COVID-19 pandemic highlighted vulnerabilities in supply chains, impacting raw material availability, transportation logistics, and production operations. Manufacturers are implementing measures to enhance supply chain resilience and mitigate risks.

Despite these challenges, the paints and coatings market presents significant opportunities for growth and innovation. Technological advancements, expanding application areas, and evolving consumer preferences are reshaping the industry landscape, driving manufacturers to adapt and innovate to stay competitive in this dynamic market.

The paints and coatings market is a vital component of various industries, providing both aesthetic appeal and functional performance to surfaces across residential, commercial, and industrial applications. Evolving consumer preferences, regulatory changes, technological advancements, and sustainability initiatives are reshaping the industry landscape, driving innovation and market growth. As manufacturers navigate challenges and capitalize on opportunities, the paints and coatings market is poised for continued expansion and transformation in the years to come.

Feature courtesy: ***Ajaykumar Patil,*** *Marketing Executive, Persistence Market Research Pvt. Ltd.,*
E: ajaykumar@persistencemarketresearch.com

AMPP unveils new guide to enhance pipeline safety through corrosion control

The Association for Materials Protection and Performance (AMPP)(amp.org), the global authority in materials protection and performance, recently published "Guide 21569-2024, Guidance on Implementing Corrosion Control Methodologies to Align with New PHMSA Regulatory Procedures," a comprehensive document developed by Standards Committee SC 15 - Pipelines and Tanks, aimed at bolstering the safety and integrity of onshore gas transmission pipelines.

In response to the United States' Department of Transportation Pipeline and Hazardous Materials Safety Administration (PHMSA)'s revised Federal Pipeline Safety Regulations, AMPP's Guide 21569-2024 offers a detailed roadmap for pipeline operators to implement corrosion control requirements for onshore gas transmission as required in Part 2 of the PHMSA Gas Mega Rule. The PHMSA revisions encompass an array of enhanced safety measures, including improved repair criteria, integrity management, cathodic protection, and management of change, all intended to mitigate risks associated with pipeline corrosion and ensure compliance with the most current safety standards.

"I'm very proud to have served as Document Project Manager for this development team comprised of an incredible group of industry pipeline subject matter experts across the country," said Kimberly-Joy Harris, a retiree from Enbridge Pipelines with more than 30 years leading pipeline integrity and corrosion programs and vice chair of the AMPP Board of Directors. "Our main goal was to assist U.S. natural gas pipeline companies with a guidance document that aligns with the new PHMSA Regulatory Mega Rule requirements related to integrity management, repair criteria, cathodic protection, and management of change, all to prevent and reduce failures. In addition, this document will be very useful globally to assist pipeline companies with improving their integrity programs and reducing failures."

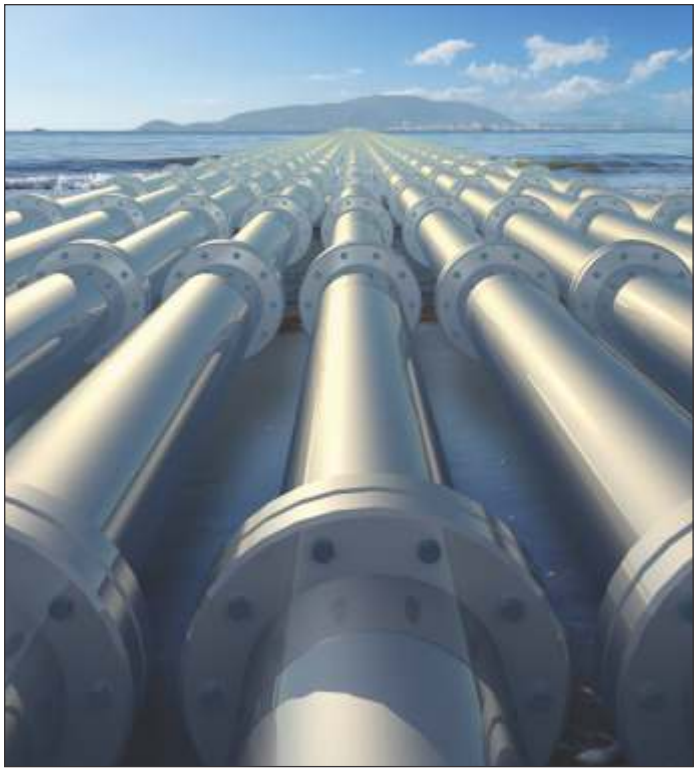

PHOTO: 123RF

Guide 21569-2024 caters to U.S. gas transmission pipeline operators while providing critical insights for international counterparts aiming to improve their corrosion control measures. This guide emerged from the industry's need for a cohesive approach to comply with the new corrosion control, operations, maintenance, and integrity management PHMSA regulations that went into effect for transmission pipelines placed into service after February 24, 2024. It presents practical strategies for incorporating these requirements and leverages established practices to protect pipeline assets.

Harris added, "Our project committee members and AMPP staff members did an amazing job working with the team through this process, and we were pleased to complete this project in record time, less than one year from initiation to publication."

For further details on Guide 21569-2024, visit the AMPP store at AMPP Store - "AMPP Guide 21569-2024, Guidance on Implementing Corrosion Control Methodologies to Align with New PHMSA Regulatory Procedures."

Big data technology predicts realized vessel performance over five years

International® Marine Coatings has published a new whitepaper which reveals the high degree of accuracy of its predictive Intertrac® Vision tool to real life vessel operations by correlating to the speed loss of a globally trading VLCC vessel over a five-year docking period, in line with the principles of the ISO 19030 standard. International® used the forecasting tool to project a 1.4 percent speed loss over a 60-month in-service period which proved to be in line with actual vessel performance, notes a press release from the company.

In effect demonstrating that use of the tool through close partnership with International® can raise the certainty on vessel performance and provide greater confidence on economic and sustainable value achieved through the operational cycle – which is a key challenge for the industry whilst regulations are driving higher efficiency.

This was also highlighted by the vessel in the example case maintaining a Carbon Intensity Indicator (CII) 'A' grade rating throughout the study which resulted in the customer achieving both performance and decarbonization objectives.

In the real life validation exercise, the hull performance team at International® collaborated with the vessel operator to monitor and report any significant performance deviations, ensuring optimal vessel performance was maintained. The application of Intercept 8500 LPP also resulted in a reduction of vessel carbon emissions of roughly 8,500 tons over the five years.

International® states that the findings in this whitepaper reinforce the pivotal role tailored fouling control coating recommendations and real-time monitoring have in optimizing vessel performance and advancing decarbonization efforts within the maritime industry.

Shipowners and vessel operators are facing increasing pressure to decarbonize. Last year the International Marine Organization (IMO) announced new carbon targets for the fleet, which include a 20% reduction in emissions by 2030, a 70% reduction by 2040, compared to 2008 levels, and the ultimate goal of net-zero emissions by 2050.

Fouling control coatings are widely considered by shipowners to be an effective strategy for decarbonizing their fleets in line with regulatory requirements such as the Efficiency Existing Ship Index (EEXI), and EU Emissions Trading System (ETS)2.

PHOTO: AKZONOBEL

The Intertrac Vision tool was also utilized in the study to recommend the ideal coatings selection for the vessel. This was done by providing predicted benefits on the operational profile of the vessel from its extensive database that includes insights from more than 200,000 drydock events.

Dr Barry Kidd, Vessel Performance Manager at AkzoNobel, said: “Through our International® coatings brand, we are committed to supporting our customers to meet their decarbonization goals and complying with changing regulatory requirements, while also reducing the environmental impact across the maritime industry.

“The research published today demonstrated that our industry-first Intertrac Vision tool can provide a clear picture of vessel performance and the contribution of the Intercept 8500 LPP coating, all while being in line with the ISO 19030 standard.

“It proves that data-driven decision making, focused on performance and combined with the knowledge of International® paints experts is more important than ever when it comes to anti-fouling coating selection and to ensure compatibility with operational profiles and performance expectations.

“Accurate and reliable forecasting will increasingly play a pivotal role for our customers who now place more trust on their investment decisions.”

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Researchers identify promising ceramic materials for metal coatings to boost gas turbine efficiency

Skoltech (Skolkovo Institute of Science and Technology, Russia) researchers have identified promising ceramic materials for metal coatings that would boost gas turbine efficiency. If further experimental tests prove successful, the coatings will enable power plants to produce more electricity and jet planes to consume less fuel. Meanwhile, with the material discovery technique tried and tested, the researchers intend to continue the search and find more candidates with perhaps even better properties, notes a press communique.

PHOTO: SKOLTECH

Industrial power plant gas turbine generating electricity.

Thermal barrier coatings are used to protect turbine blades at power plants and in jet engines. The blades themselves are made of nickel-based superalloys. These offer a great combination of high-temperature strength, toughness, and resistance to degradation. However, as things get really hot, the superalloy softens and may even melt. Protective coatings make it possible to operate turbines at higher temperatures without compromising their integrity. And in this case, higher temperature means greater efficiency.

“Thermal barrier coatings are nowadays made of yttria-stabilized zirconia, but if a material with better properties were used instead, that would allow you to get more useful power out of the turbine,” says study co-author Professor Artem R. Oganov, who heads the Material Discovery Laboratory at Skoltech. “To find such materials, you first have to come up with candidates whose properties you predict computationally. We have tested a range of methods and determined the best of them for calculating the relevant material properties, particularly thermal conductivity. In the paper, we list some promising candidates, and we'll keep on looking.”

A material for thermal barrier coatings has to meet several requirements. It must have a very high melting point and a very low thermal conductivity. The latter property is particularly hard to compute because it depends on the intricate “anharmonic” effects in crystals. Also, when heated, the material should expand at about the same rate as the superalloy, or else it will flake off the surface. The material should not undergo any phase transitions between room temperature and the operating temperature of the turbine, which would cause the coating to crack. It should also withstand the effects of dust particles and oxygen at high temperatures and prevent oxygen ions from reaching the underlying metal and oxidizing it.

“While we did calculate the other properties, the crux of the problem is predicting thermal conductivity,” says study co-author, Skoltech PhD student Majid Zeraati. “We showed such predictions are computationally feasible and reasonably accurate with homogeneous nonequilibrium molecular dynamics simulations. This proves somewhat unexpected, as such simulations involve a massive amount of computations and extensive statistics, resulting in high computational complexity. Nevertheless, we managed to simplify the method by supplementing it with machine learning potentials: That is, the interactions between the atoms were predicted using artificial intelligence, rather than being directly calculated.”

The Skoltech study already highlights a number of materials that promise to surpass yttria-stabilized zirconia, the current champion. Among them are yttrium niobate (Y_3NbO_7), the perovskite structures $BaLaMgTaO_6$ and $BaLaMgNbO_6$, and seven more materials. That said, the team plans to continue its computational search to identify possible backup options and the potentially better candidates still out there.

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Bacteria found in desert pave the way for paint that produces oxygen whilst capturing carbon

An innovative paint that contains oxygen-producing bacteria capable of capturing carbon dioxide (CO_2) has been created by scientists from the University of Surrey. Researchers suggest this paint, known as 'biocoating,' could be used in extreme environments, such as space stations.

Biocoatings are a type of water-based paint that encase live bacteria within layers. Besides capturing carbon, they can also serve as bioreactors or as biosensors.

Surrey's creation, named 'Green Living Paint,' features Chroococcidiopsis cubana, a bacterium that undergoes photosynthesis to produce oxygen while capturing CO_2. This species is usually found in the desert and requires little water for survival. Classified as an extremophile, it can survive these extreme conditions.

Dr Suzie Hingley-Wilson, a Senior Lecturer in Bacteriology at the University of Surrey said: “With the increase in greenhouse gases, particularly CO_2, in the atmosphere and concerns about water shortages due to rising global temperatures, we need innovative, environmentally friendly, and sustainable materials. Mechanically robust, ready-to-use biocoatings, or 'living paints,' could help meet these challenges by reducing water consumption in typically water-intensive bioreactor-based processes.”

To investigate the suitability of Chroococcidiopsis cubana as a biocoating, researchers immobilized the bacteria in a mechanically robust biocoating made from polymer particles in water, which was fully dried before rehydrating. They observed that the bacteria within the biocoating produced up to 0.4 g of oxygen per gram of biomass per day and captured CO_2. Continuous measurements of oxygen showed no signs of decreasing activity over a month.

In contrast, researchers conducted similar experiments with the bacterium Synechocystis sp., another cyanobacterium usually found in freshwater. Unlike its desert counterpart, it was unable to produce oxygen within the biocoating.

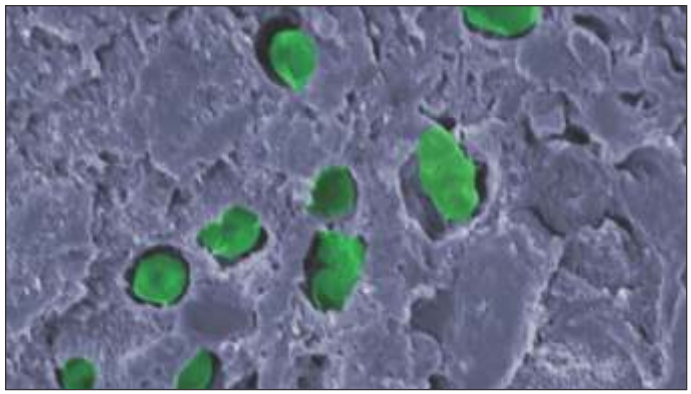

PHOTO: UNIVERSITY OF SURREY

Biocoatings are a type of water-based paint that encase live bacteria within layer; besides capturing carbon, they can also serve as bioreactors or as biosensors.

Simone Krings, the lead author and a former Postgraduate Researcher in the Department of Microbial Sciences at the University of Surrey, said: “The photosynthetic Chroococcidiopsis have an extraordinary ability to survive in extreme environments, like droughts and after high levels of UV radiation exposure. This makes them potential candidates for Mars colonization.”

Professor Joseph Keddie, Professor of Soft Matter Physics in the School of Mathematics and Physics at the University of Surrey, said: “Our research grant from the Leverhulme Trust enabled this interdisciplinary project. We envision our biocoatings contributing to a more sustainable future, aligning perfectly with the vision of our Institute for Sustainability, where both Dr Hingley-Wilson and I are fellows.”

This study was published in the journal *Microbiology Spectrum*.

CORSYM 2024: "Networking for Success"

The 8th International Corrosion Prevention Symposium for Research Scholars (CORSYM 2024) held at The Maharaja Shivajirao University of Baroda (MSU Baroda), Vadodara, Gujarat, February 17 – 18, 2024, was a significant event that brought together students and young research scholars to explore the fundamental principles and practical aspects of corrosion, its effects, and protective measures. In other words, CORSYM 2024, short for "Corrosion Symposium 2024," is an event that brings together students, professionals, and experts in the field of corrosion and materials science. This symposium aims to foster knowledge exchange, networking, and collaboration in an environment that encourages learning and growth.

"It was a very successful event with over 50 paper presentations and attended by over 200 delegates," said Mr Urvesh Vala, Chairman, CORSYM 2024. "This symposium provided a unique platform for networking and collaboration between aspiring research scholars and corrosion scientists from around the world who are dedicated to combating corrosion through innovative approaches."

Hosted by the AMPP West Zone Student Chapter, participants at the event comprised a wholesome mix of research scholars from diverse academic, research and development, and industrial laboratories, including those pursuing their doctorate, masters, or undergraduate studies in corrosion-related fields.

Normally held at IIT Bombay, or IIT Madras, this time it was decided to hold the event at the MSU Baroda. Established in 1949, MSU Baroda has consistently been at the forefront of education and research. Its commitment to academic brilliance made it an esteemed host for an event of this magnitude.

While delivering the keynote address, Dr Amir Eliezer, Chair, AMPP Board of Directors, emphasized that events like this provide students with networking opportunities. "Connect with professionals and peers in the corrosion science community. CORSYM 2024 provides a unique environment for networking, fostering collaborations, and building relationships that extend beyond the symposium," he said. "It's not just attending this symposium just because the professor may have asked you to. It's the value that you get where you get to engage with industry leaders and experts who are at the forefront of implementing corrosion prevention strategies. Corrosion is big business and networking helps in the path to success! Learn from real-world case studies and discover how research can be translated into practical applications."

Dr Eliezer said, India has a lot of potential. "Look at the number of CEOs, scientists, coming from India," he said. "The corrosion management fraternity needs to reach out to the CEOs and explain to them in terms of how much money they can save by using corrosion mitigation techniques. Managements have no idea about corrosion. Corrosion management also helps in the sustainability mission, as also is a critical safety issue."

"There are not many Institutes offering courses in corrosion, not only in India, but around the world," said Dr Eliezer. "Corrosion is a pervasive issue affecting industries, infrastructure, and technology worldwide. It leads to massive economic losses and poses significant safety risks. Hence, research and innovations in corrosion control and materials science are vital." He emphasized on the fact that AMPP offers a lot of technical courses in corrosion in various fields like oil and gas, refineries, cathodic protection, marine and offshore, etc., and these courses help students further their careers. One can enhance skills and knowledge through hands-on workshops and technical sessions and delve into specific aspects of corrosion prevention, gaining practical insights that can be applied in your research and projects. Dr Eliezer also noted that with artificial intelligence and the like, the way one studies is also changing. You need not learn a lot by memorizing things. Instead, you need to work smart!."

Interesting keynote talks included one on 'Understanding high temperature corrosion, its detection and mitigation,' by Mr Ketan Upadhayay, General Manager, (Reliability Engineering), TCR Advanced Engineering Pvt Ltd., 'Challenges and opportunities of corrosion in industry,' by Mr Girish V. Katkoria, Chairman, Heeru Corrosion Protection Services (I) Pvt Ltd., besides symposia on cathodic and anodic protection, corrosion in oil, gas and refineries; high temperature corrosion; environmental assisted cracking; corrosion in concrete structures; digitization and artificial intelligence in corrosion control; new trends and innovation in corrosion controls; corrosion in ships and marine structures; and microbiological influence corrosion.

Dr Eliezer noted that there are around 20 student chapters around the world and advised the students to engage with them, exchange ideas, work together and collaborate. "You can then make a big difference!"

PaintExpo 2024: Strong visitor turnout, great atmosphere and more international than ever before

With excellent visitor numbers and a very busy atmosphere in three exhibition halls as well as countless highly qualified professional conversations and new customer contacts, the ninth edition of PaintExpo held April 9 - 12, 2024 was a tremendous success. At the world's leading trade fair for industrial coating technology in the German city of Karlsruhe, 431 exhibitors from 25 countries filled 31,500 square meters of exhibition space with their presentations of new, groundbreaking technologies for the sustainable, energy-efficient coating processes of tomorrow. The event was attended by 10,400 visitors. The number of countries they represented increased from 57 to 76, making this year's PaintExpo more international than ever before. International exhibitors constituted 45 per cent of the total.

As the world's most important international platform for industrial coating technology, PaintExpo once again impressed exhibitors and visitors alike. “We're very pleased with the strong visitor turnout, which was even better than at the previous edition of the trade fair. PaintExpo was a powerful and innovative event – and more international than ever before. For four days, it was the nerve center of industrial coating technology, underlining the position of PaintExpo as the most significant driving force in the industry worldwide,” says Markus Geisenberger, Chief Executive Officer of Leipziger Messe.

Michael Müller, CEO of WAGNER International, for instance, was very satisfied with the world's leading trade fair for industrial coating technology: “Our stand was very busy from the moment the doors opened. Half the visitors we welcomed were from outside Germany. From Argentina to Japan – they came from all over the world. As a global corporation, that was especially important for us.”

Oliver Zanner, Head of Marketing at FreiLacke, also had words of praise for this year's event: “Even before PaintExpo got started, the tremendous interest among the visitors was palpable. The dynamics this year were intense – really different from last year. We were able to exchange ideas with a lot of visitors, and the quality of the conversations was excellent. As a system coatings specialist and manufacturer, we meet our target customers from a wide range of industries when we come to PaintExpo. It's the most important industry get-together in our diary.”

Even though the industry is currently facing a challenging market, the four days of PaintExpo was full of optimism. “The past year posed considerable challenges for our industry, and we had to postpone quite a few projects or abandon them altogether. However, we've seen signs of recovery since the middle of the first quarter of 2024 and investments in sustainable technologies and innovative automation solutions are clearly gaining momentum. I could sense this positive development at PaintExpo too, where a lot of interested

PHOTO: LEIPZIGER MESSE

parties and existing customers explored the latest developments in those areas. I'm convinced that a wealth of fascinating projects and state-of-the-art facilities will emerge from these discussions and am feeling good about how the rest of the year will go. We're already looking forward to the next PaintExpo and are committed to participating again,” explains Thomas Rippert, Managing Director at RIPPERT.

Visitors also gave PaintExpo very good marks. In the follow-up survey, nine out of ten respondents said they would recommend PaintExpo and intend to return to the next edition of the trade fair. The number of top decision-makers, specialists and managers was also very high, with 83 percent of visitors having an influence on investment decisions in their companies.

As Sergey Guskov, Sales and Service Manager Central and North Europe Industrial Coating Systems at Nordson Deutschland, points out, “PaintExpo offers excellent opportunities to make new contacts and initiate business. Networking is very important here. Participation in the trade fair was very successful for Nordson. We are very happy to be back at PaintExpo.”

PaintExpo was also very international when it came to visitors, with more than one in three attendees having travelled from abroad. In addition to Germany, an especially large percentage of visitors came from Switzerland, Italy, France and the Netherlands.

Ulrich Tautz, Senior Manager Sales Industrial Products at Dürr Systems, was also pleased that PaintExpo 2024 attracted a large number of international visitors: “One of our employees who joined us had 25 years of trade fair experience – and he said that the second day of PaintExpo was the best he'd ever experienced. My colleagues from different countries spent a lot of time talking with trade fair visitors in their respective national languages. That shows how international PaintExpo is.”

The next edition of PaintExpo will take place from 14 to 17 April 2026 in Karlsruhe. Rebooking has already begun and the first stand spaces for PaintExpo 2026 have already been sold.

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SEP 19 – 21, 2024	EXPO PAINT AND COATINGS 2024	ICCB Dhaka, Bangladesh	Toredo Fairs India Pvt Ltd	T: (91) 98453 63225 E: info@expopaintcoating.in W: expopaintcoating.in
SEP 23 – 25, 2024	EUROPEAN TECHNICAL COATINGS CONFERENCE	Palace of the Popes of Avignon, Avignon, France	AFTPVA	W: etcc2024.org
NOV 11 – 14, 2024	ADIPEC	Abu Dhabi, UAE	dmg events	E: enquiry@adipec.com W: adipec.com
DEC 03 – 05, 2024	CHINACOAT 2024	China Import & Export Fair Complex, Guangzhou, China	Chinacoat Exhibition Ltd	W: chinacoat.net
FEB 17 – 19, 2025	SAUDI ARABIA COATINGS SHOW 2025	Dhahran Expo Damman, Saudi Arabia	dmg Events	W: saudiarabiacoatingsshow.com E: andrewgathercole@dmgevents.com

Please note, schedules are subject to last minute changes.

CORCON 2024

20th - 23rd November
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AMPP India Chapter is organizing CORCON 2024 International Corrosion Conference and Exhibition during 20–23 November 2024 at Chennai Trade Centre, Tamilnadu Trade Promotion Organisation, CTC Complex, Nandambakkam, Chennai, India.

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CORCON-2024 HIGHLIGHTS

- Talks by eminent speakers from around the world
- Exhibits of Latest products and technology
- New ideas and innovations during Technical Sessions
- Networking opportunities (1000+ Delegates)
- Latest corrosion challenges and mitigation resources
- Technical Interactive Forum (TIF)
- Jung Se Jung
- Corrosion Awareness Awards function
- Cultural Program

IMPORTANT DATES

Abstract submission opens	30th June 2024
Abstracts due	31st July 2024
Full Text Paper due	31st September 2024
Presentation upload due	15th October 2024

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FORM IV

Statement about ownership and other particulars about COATINGS AND ANTI CORROSION ENGINEERING REVIEW to be published in the first issue every year after the last day of February.

1.	Place of publication:	Mumbai
2.	Periodicity of its publication:	Bi-monthly
3.	Printer's name: Nationality: Address:	Franco Lonappan Indian 102, Dattar Mansion, C. S. Marg, Vakola Bridge, Santacruz (East), Mumbai 400055. Maharashtra
4.	Publisher's name: Nationality: Address:	Franco Lonappan Indian 102, Dattar Mansion, C. S. Marg, Vakola Bridge, Santacruz (East), Mumbai 400055. Maharashtra
5.	Editor's name: Nationality: Address:	Abraham Mathai Indian 3, Questend Apt., I.C. Colony, Cross Rd No. 1, Borivali (West), Mumbai 400103, Maharashtra

6. Names and addresses of individuals who own the newspaper and partners or shareholders holding more than one percent of the total capital:
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I, Franco Lonappan, hereby declare that the particulars given above are true to the best of my knowledge and belief.

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