



# COATINGS AND ANTI CORROSION ENGINEERING REVIEW

December 2025 - January 2026 | Volume 16 Issue 5 | ₹100



## EV paint innovations, and high-performance trends driving global automotive paints market growth



Interview

**Mr Debendra Pradhan**

*Co-founder and CEO,  
Coratia Technologies Private Limited*

Technical Feature

**Technology developed to predict corrosion progression from steel infrastructure images**



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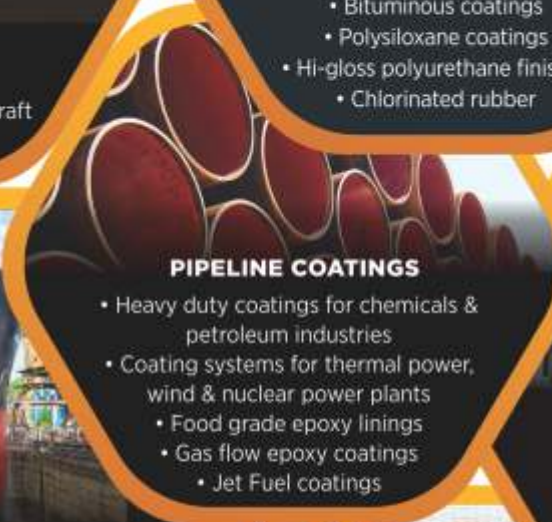
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- Epoxy primers & finishes
- Vinyl ester coatings
- Heat resistant coatings
- Bituminous coatings
- Polysiloxane coatings
- Hi-gloss polyurethane finishes
- Chlorinated rubber



## PIPELINE COATINGS

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



## OEM COATINGS

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



## MARINE COATINGS

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



## Architectural Coatings

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



## FLOOR COATINGS

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



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# COATINGS AND ANTI CORROSION ENGINEERING REVIEW

## Cover Feature

30



EV paint innovations, and high-performance trends driving global automotive paints market growth

## Product Profile

14



Enhancing corrosion resistance with Alleima's Sanicro® 35

## Interview

20



**Mr Debendra Pradhan**  
*Co-founder and CEO,*  
*Coratia Technologies Private Limited*

## Company Profile

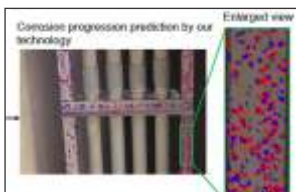
26



Elcometer: Innovations in inspection, spray, blast equipment...

## Technical Feature

34



Technology developed to predict corrosion progression from steel infrastructure images

Editorial

4

New Products &amp; Processes

6

Industry Report

38

Industry News

42

Training Programs

45

Research

46

AMPP News

49

Events &amp; Exhibitions

50

Calendar of Events

56

Classifieds

58

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## From the Editor-in-Chief...



Imagine a paint that does away with the need to ever fuel your vehicle, or one that helps in lower a vehicle's ambient cabin temperature and reduce the energy usage of the air-conditioning system. This is just the proverbial tip of the iceberg to innovations in the future, just when we thought we have seen all there is to see in the paint and coatings sector. Mercedes-Benz is researching a new type of solar modules that could be seamlessly applied to the bodywork of electric vehicles – similar to a wafer-thin layer of paste. An area of 118.4 square feet (equivalent to the surface of a mid-size SUV) could produce energy for up to 7,456 miles per year under ideal conditions. The photovoltaic system is permanently active and also generates energy when the vehicle is switched off.

Nissan's cool paint has shown yields of up to a 12°C reduction in exterior surface temperatures and up to 5°C cooler interior, compared to a vehicle featuring traditional automotive paint. A cooler cabin is not only more pleasant to enter, but also requires less air-conditioning run-time to cool the cabin to a comfortable temperature. This helps reduce load to the engine, or in the case of an electric vehicle, draw on the battery.

Modern automotive paint and coatings is the result of years and millions of dollars spent in R&D, tightly controlled and orchestrated production processes and expectations from customers that leave no margin for miscalculations.

The industry is witnessing robust growth driven by rising demand for eco-friendly, waterborne, and high-performance coatings. Increasing adoption of EV paint technologies, smart nanocoatings, and customized vehicle finishes is transforming the market landscape.

In this edition we discuss some of the latest developments in the automotive paint industry and the factors for its growth. Besides this, we have all our regular features and columns in place for our readers.

As we enter the New Year, let me thank you for your support throughout 2025 and also take this opportunity to wish each one of you – our readers, advertisers and well-wishers a great and fantastic year 2026 ahead!!!

**Jolly Lonappan**  
Editor-in-Chief

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# GOOD BYE CORROSION & ABRASION WEAR

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

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

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## Aluma Coat® - BR

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## Aluma Coat® - TW

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



VERSATILE INDUSTRIAL APPLICATIONS



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## Atlas Copco unveils XAS 58 and XAS 78 small air portable compressors

Atlas Copco, a global leader in compressors, generators, pumps, power tools, and light towers, has announced its compact air compressor range – XAS 58 and XAS 78 – engineered to support construction and industrial applications operating in space-constrained and

Designed for modern job sites, the XAS 58 and XAS 78 power pneumatic handheld tools, sandblasting equipment and multiple industrial applications. Their compact footprint, combined with robust performance, makes them reliable partners across diverse operating conditions.



Designed for modern job sites, the XAS 58 and XAS 78 power pneumatic handheld tools, sandblasting equipment and multiple industrial applications.

demanding environments, notes a press release from the company. Designed to facilitate construction and industrial operations in the most difficult and space-restricted areas, the new product range aims to cater to the increasing requirements of portable and efficient compressed air solutions.

Compressed air maximizes portability in addition to being in charge of running pneumatic tools in cramped spaces and carrying out other crucial activities even in remote and hostile environments. Even on construction sites all throughout the world, compressed air keeps productivity levels high. It is becoming progressively more crucial for workers to use equipment that doesn't interfere with portability due to shrinking task sizes and harsher conditions.

Key features and benefits include:

**High mobility:** Lightweight at under 750 kg and towable by a regular vehicle for easy transport.

**Durable construction:** Shock-resistant HardHat® canopy with reinforced, anti-corrosive metal frame for harsh environments.

**Low maintenance:** Service-friendly access and intuitive controls help minimize downtime.

**Versatile applications:** Suitable for pneumatic tools, cable blowing and abrasive blasting.

**Cost efficiency:** Up to 12% higher fuel efficiency and reduced transport costs lower total ownership expenses.

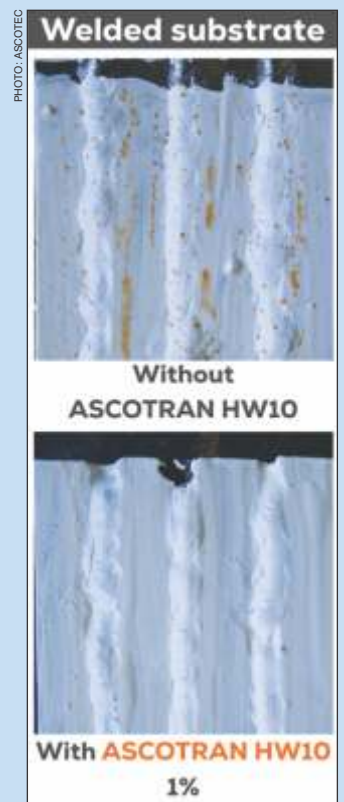
Commenting on the range, Mr Prasanna Kulkarni, General Manager – Power Technique Customer Center,

## ASCOTEC introduces the new ASCOTRAN® HW10, for flash-rusting

Ascotec has launched a tailored protection solution for highly reactive substrates that are very hard to protect from flash-rusting. ASCOTRAN® HW10 provides an appropriate response to the flash rust problems on “sensitive” substrates or in hard conditions, such as reactive substrate by nature (welds, cast iron); alloys, weakened steel (welds, sandblasted surfaces); hard drying conditions (wet atmospheres, confined room); highly corrosive paints, etc., notes a press release from the company.

ASCOTEC's long-standing expertise in the anti-corrosion industry places it in a unique position as a supplier of performance additives to meet the challenges encountered when applying water-based paints onto certain metal.

The ASCOTRAN® technology imparts hydrophobic properties and preserves the water resistance of the paint film. The additive is also optimizing protection with active components



ASCOTRAN® HW10 provides an appropriate response to the flash rust problems on “sensitive” substrates or in hard conditions.

meticulously selected to achieve the best possible synergy and performance. ASCOTRAN® HW10 contains a high percentage of biobased raw materials and is free from heavy metals and VOCs, the press release notes.

Atlas Copco (India) Pvt. Ltd., said, “The XAS 58 and XAS 78 are developed to meet the challenges of the job site while ensuring portability, robustness, and fuel economy with consistent performance. These portable compressors allow our customers to go anywhere and work everywhere, maximizing their working hours with easy control of operating costs.

This product series underpins the commitment of Atlas Copco to deliver air solutions with superior performance and for real operating conditions.”

The XAS 58 delivers 106 cfm and the XAS 78 delivers 160 cfm of free air at 7 bar working pressure, with simplified maintenance that can be completed in under an hour without special tools.



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## All-in-one: Henkel combines metal passivation and pretreatment in a single step for sustainable efficiency

The classic treatment of metal surfaces uses two different lines: one for pretreatment and one for passivation. With the conventional process, the parts go either directly to the user or on to the painting line. The rust preventive (RP) oil used before painting must be removed in the subsequent cleaning and rinsing stage. If a passivation coat is applied, a single rinse prior to the subsequent application of paint is sufficient.



With Bonderite M CR 1405, Henkel has developed an RoHS-compliant agent that provides coils with passivation and pretreatment properties as well as excellent corrosion resistance in a single pretreatment step.

Henkel's new development enables users to substantially shorten their process. Bonderite M CR 1405 has unique properties as it can be used as a passivation for bare substrates and pretreatment for painted substrate, notes a press release from the company. After passivation, the coils are either sent directly to the end user or on for painting. Bonderite M CR 1405 has good recoatability and coils passivated with this product can be used on the color coating line without a cleaning step and can only be rinsed with hot water to remove any contamination. This results in major savings with respect to energy and water usage, since the cleaner that has now been eliminated is typically used in

large tanks at temperatures between 60 and 70°C. The absence of chemical cleaning agents also means that wastewater pollution is significantly lower.

This combination is made possible by a newly developed product: As a chromium III-based passivation pretreatment, Bonderite M CR 1405 combines both processes. "Normally, when paint is

applied to a passivated coil without subsequent treatments, insufficient paint adhesion and corrosion resistance is achieved. Conversely, pretreatment used as

passivation usually fails within one day," says Gerko Odink, Senior Manager PD Metals EU at Henkel Adhesive Technologies. "We have an agent here that combines the best of both worlds and is compatible with both chromium-based and chromium-free primers."

As this is a chromium III-based product, it meets users' performance expectations for high corrosion protection while also being RoHS-compliant. Testing on galvanized and Galvalume substrate shows blank corrosion resistance of more than 96 hours. The salt spray test shows resistance of 800 hours with a chromium primer and 500 hours with a chromium-free primer.

## PPG introduces PPG MIX'N'SHAKE automated stirring technology for body shops

PPG has announced the launch of the PPG MIX'N'SHAKE™ automated stirring technology designed to eliminate traditional manual stirring methods in the automotive refinish industry. The system, which is available globally, improves paint mix consistency, reduces consumable waste and saves time for painters and body shops, notes a press communiqué from the company.

Because the PPG Mix'n'Shake system eliminates manual stirring, it ensures consistent color accuracy, reduces rework and boosts productive work hours by up to 6%, according to company data. The system delivers a fully homogenized, ready-to-spray paint mix in less than 90 seconds through a unique, automated stirring device combined with an exclusive notched cup that attaches directly to the spray gun. The device and cup design are both patent pending.

"The PPG LINQ digital ecosystem and PPG MOONWALK® automated mixing system have transformed color identification and paint mixing in the refinish industry, but the repetitive final step of stirring has remained largely unchanged," said Alban d'Epenoux, PPG global marketing director, Automotive Refinish. "The



PPG MIX'N'SHAKE™ automated stirring technology replaces manual stirring processes to ensure a homogenized paint mix, complete color accuracy, and a better workplace.

PPG Mix'n'Shake system addresses this, ensuring that painters achieve an accurate mix every time without the inefficiencies and inconsistencies of manual stirring, ultimately freeing up time for higher value tasks."

The PPG Mix'n'Shake technology features pre-programmed settings for primers, basecoats and clearcoats. Users insert the notched cup, select a setting and let the device handle the mixing. Once complete, the cup attaches directly to a spray gun, reducing handling and streamlining workflow. "The system also reduces the cost of consumable waste such as stirring sticks, mixing cups, strainers, and other disposables by up to 10%," said d'Epenoux.

The self-contained system eliminates spills and splashes to create a cleaner, more organized and attractive workspace.



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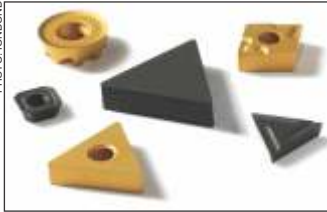
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## Ionbond™ CVD 29 Ultra: Enhanced performance in continuous and interrupted cutting

Ionbond has announced the latest addition to their chemical vapor deposition (CVD) coating portfolio: Ionbond™ CVD 29 Ultra. This coating provides an impressive performance boost in demanding applications, such as high-performance continuous and interrupted machining, notes a press communiqué from the US-based company.



*Ionbond™ CVD 29 Ultra also has high hot hardness and excellent thermal stability, which means it is a good coating for fast, high-productivity machining.*

Kalpaka Shaha, Global Segment Manager Cutting Tools, explains the important structural quality of the coating: “The enhanced toughness and exceptional hardness of Ionbond™ CVD 29 Ultra is a result of its specific Al<sub>2</sub>O<sub>3</sub> crystallographic orientation. It gives the coating a larger capacity to deform before chipping and cracking. This allows the coating to maintain its integrity and to deliver outstanding wear resistance, reducing both crater and flank wear.”

Ionbond™ CVD 29 Ultra also has high hot hardness and excellent thermal stability, which means it is a good coating for fast, high-productivity machining. It can also handle machining of sticky materials well, thanks to a high chemical inertness. “For demanding applications such as turning, milling, peeling and scarfing, this

coating is the smart choice to help you maximize productivity,” summarizes Kalpak.

Ionbond™ CVD 29 Ultra comes in two colors: gold and black. Gold is the standard color for inserts, because it provides good wear indication. However, other cutting tool customers may prefer black rather than gold.

Black is also interesting for forming and molding tools and industrial component applications, such as aerospace, automotive, defense and oil and gas. In those sectors, the coating's chemical inertness is often the most valuable aspect, and the black coating looks better in context. Development projects are ongoing to qualify the coating in these sectors.

## Evonik Coating Additives launches TEGO® Foamex 8051, a highly efficient, long-lasting siloxane defoamer

Evonik Coating Additives has introduced TEGO® Foamex 8051, the latest addition to its TEGO® Foamex line of defoamers. This new, highly efficient siloxane defoamer is specifically designed for use in waterborne decorative



*Evonik's new, highly-efficient siloxane defoamer the TEGO® Foamex 8051 is specifically designed for use in waterborne decorative coatings.*

## Easy to use, minimal maintenance moisture specific analyzer, the Computrac Vapor Pro XL

The Computrac Vapor Pro XL is a (water-specific) analyzer that provides accuracy, precision, and flexibility with an advanced user interface. The Vapor Pro XL is ideal for nearly any application in which Karl Fischer titration is used, notes a press release. It features a premium heater and increased control over testing temperatures. The Vapor Pro XL is completely free of harmful reagents and is compatible with multiple sizes of sample vials. It is also equipped with stepped temperature testing capabilities for enhanced method development.



*The Vapor Pro XL is completely free of harmful reagents and is compatible with multiple sizes of sample vials.*

Easy-to-use with touch screen operations, the compact instrument weighs 8kg and is 17.2cm (W) by 18.5cm (H) by 27.9cm (D) in size and has a memory size to store up to 250 test programs, last 1000 results, and last 100 graphs.

More details from Computrac's distributors in India: [komalscientific.com](http://komalscientific.com)

coatings, notes a press release from the company.

TEGO® Foamex 8051 offers coating formulators several advantages over other available defoamers. It provides a cost-effective solution for high-performance applications while meeting strict environmental regulations.

The additive is a 100% active defoamer concentrate based on polyethersiloxane technology, and it has been designed to be relatively easy to incorporate into formulations. It delivers consistent performance by effectively defoaming high PVC coatings, maintaining strong defoaming persistence under high shear, and working well in the grinding stage.

Additionally, it maintains

its defoaming effectiveness even after storage. The product has broad global registrations (US, EU, China, Japan, etc.), contains no reportable hazardous substances, and complies with Ecolabel 2014/312/EU, with VOC levels at 0.08% and SVOC levels at 0.19% (DIN ISO 11890/2).

“With the launch of TEGO® Foamex 8051, we're offering a product that not only meets our customers' demanding performance requirements but also supports our strategy to enable eco-friendly coatings,” says Katina Kiep, Head of Decorative Coatings at Evonik Coating Additives. “This innovative defoamer exemplifies our strategy of delivering customer-focused products that solve formulation challenges, turning them into outperformances.”



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## New Economy BNC 0-14 pH Probe from GARDCO

Paul N. Gardner Company (GARDCO) – worldwide distributors, producers, and designers of quality physical and inspection instruments for the paint, coatings, and related industries – announces its new offering, the Economy BNC 0-14 pH Probe.

BNC pH probes are precision instruments used to measure pH levels in a wide range of solutions. They feature a BNC (Bayonet Neill–Concelman) connector, which provides a secure, quick, and universally compatible connection with most pH meters. These probes are commonly used in laboratories, water testing, and other analytical applications, notes a press release from the USA-based company. Each probe includes a pH electrode, protective case, user manual, and calibration powders (pH 4.01, 6.86, and 9.18).

James Fusco, Product Manager, Paul N. Gardner Company (GARDCO) states, “At Gardco, we understand that accurate pH measurement is essential for quality control and research. Our economy BNC pH probes offer exceptional value – combining reliability, precision, and ease of use at a low cost, giving professionals the confidence that every reading matters.”

Easy to use, all one has to do is ensure the pH meter is calibrated correctly using the provided calibration powder;



BNC pH probes are precision instruments used to measure pH levels in a wide range of solutions.

immerse the pH electrode in the solution to be tested, and monitor and record the pH level displayed on the meter.

Features include:

- Measuring range of 0.00 - 14.00pH delivers precise readings every time.
- The replaceable pH electrode is easy to calibrate, ensuring accurate results with every use.
- The ATC (Automatic Temperature Compensation) makes it easy to measure pH levels in environments with temperatures ranging from 0°C to 50°C.
- Comes with a long cable, approximately 300cm in length, giving you ample room to move around and take measurements. The connection utilizes a 50-ohm BNC socket, facilitating an easy connection to other devices.
- With a 1.2cm probe diameter, this pH meter is sturdy and reliable. The large diameter ensures that the probe stays in place during measurements, providing more accurate and consistent readings.

## Metrohm Multichannel Potentiostats: Accelerating corrosion research

In the critical field of corrosion science, the ability to gather high-quality electrochemical data rapidly is often the difference between a project's success and its stagnation. As industries from aerospace to renewable energy demand more durable materials and more effective inhibitors, the pressure on research laboratories has intensified. To meet this challenge, Khushboo Scientific provides the Indian scientific community with the Metrohm Autolab Multichannel Potentiostat/Galvanostat line, a sophisticated suite of instruments designed to maximize throughput without compromising the precision that is the hallmark of the Autolab brand.

The Metrohm Multichannel series allows researchers to perform independent electrochemical measurements on multiple samples or cells simultaneously. Whether you are screening new corrosion inhibitors, evaluating the protective properties of various coatings, or studying the galvanic corrosion of different alloy pairings, the ability to run up to 12 (or more, depending on the configuration) independent experiments from a single computer is a game-changer for laboratory efficiency.

The Metrohm Autolab multichannel instruments are built on a modular architecture, ensuring that the system can grow alongside the lab's requirements.

Key technical features include:



The Metrohm multichannel series allows researchers to perform independent electrochemical measurements on multiple samples or cells simultaneously.

Electrochemical Impedance Spectroscopy, a cornerstone technique for evaluating the integrity of protective coatings and the formation of passive layers.

On the specific application – such as cathodic protection studies or large-scale electrolytic testing – individual channels can be customized with power boosters to handle higher currents or voltages while maintaining millisecond-scale response times.

To ensure the integrity of the data, Metrohm utilizes advanced galvanic isolation. This prevents cross-talk between cells, even when multiple electrodes are sharing the same electrolyte or grounded environment, a common requirement in complex corrosion setups.

For corrosion researchers, NOVA offers pre-programmed procedures for standard tests like Potentiodynamic Polarization, Linear Polarization Resistance (LPR), and Cyclic Voltammetry. The software's editor allows users to build complex, multi-step experiments – such as an OCP measurement followed by EIS and then a Tafel plot – which can be deployed across all channels with a few clicks.

Contact: [sales@khushbooscientific.com](mailto:sales@khushbooscientific.com)

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# Enhancing corrosion resistance with Alleima's Sanicro® 35

*Setting Sanicro® 35 apart is its proven track record in resisting some of the most aggressive forms of corrosion*

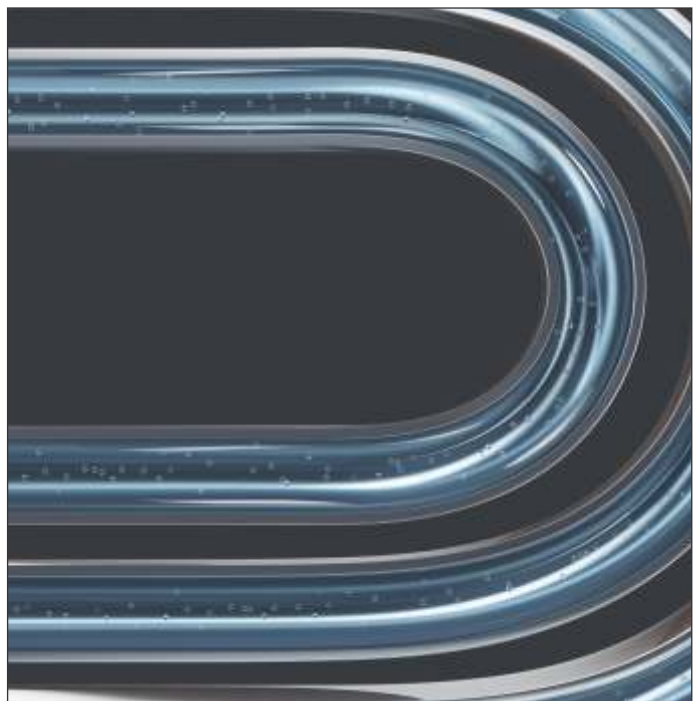
“Efficiency and longevity of equipment are crucial to ensuring operational success in the oil refinery and petrochemical industries,” said Mr Ganesh Prasad, Technical Manager Specialist, Alleima, a global company with over 160 years of expertise in materials technology. “Corrosion is inevitable. However, as the saying goes, ‘prevention is better than cure,’ and this must be considered at the design and material selection stage itself. At present, we often end up conducting a failure investigation only after the component has failed. He emphasized that the selection of materials for equipment depends on a range of service conditions, including operating temperature, pressure, and corrosive environments influenced by sulfur, chlorides, and acids.

India's energy landscape is undergoing a transformative

shift, driven by rapid industrialization, urbanization, and a strong commitment to sustainable development. With energy consumption rising steadily, recording a 7.8% increase in FY 2023 to FY 2024, the nation is expanding its energy infrastructure across both traditional and renewable sources. “The Government of India has given a significant infrastructure boost in the latest Union Budget. Capacities at most refineries are being increased,” said Dr Jyoti Shankar Jha, Senior Lead Scientist at Alleima. “All of this means the industry will inevitably face challenges related to corrosion.”

Many industries still rely on fossil fuels to meet their energy requirements. However, future energy demand will increasingly be met by renewable sources such as SAF, biodiesel, solar, and CBG. “Even a change in the crude feedstock can create problems,” said Dr Jha. “Refineries are typically designed for specific crude characteristics, such as low sulfur content. When the feedstock composition changes – especially toward higher sulfur levels – it can lead to unexpected corrosion challenges.”

Any such shift demands the use of competent materials solutions capable of withstanding harsh operating



PHOTOS: ALLEIMA

Alleima's SAF™ 3006 and Sanicro® 35 high performance alloys offer superior strength and corrosion resistance for demanding industrial applications.

conditions, including high temperatures, corrosivity, and pressure.

Advanced materials play a pivotal role in this context, offering superior resistance to corrosion even at elevated temperatures and under high mechanical stresses.

Alleima, a global manufacturer of high value-added products in advanced stainless steels and special alloys, launched the now highly sought after and field proven Sanicro® 35 grade in 2020 at the Association for Materials Protection and Performance (AMPP) Annual Conference and Expo in Texas, USA. Since its launch,

Sanicro® 35 has become Alleima's most in-demand game-changing product, selected for its outstanding corrosion resistance in the most challenging environments, including bioprocessing, chemical processing, renewable biofuels, and petroleum refining.

Originally designed to address corrosion challenges in crude distillation unit (CDU) overhead condensers, Sanicro® 35 has emerged as a versatile alloy that bridges the performance gap between stainless steels and high-nickel alloys. It offers excellent resistance to general corrosion, pitting, crevice

### Key benefits of Sanicro® 35:

- ❑ Exceptional resistance to general corrosion in both acidic and caustic environments
- ❑ High mechanical strength for demanding operating conditions
- ❑ Superior resistance to pitting and crevice corrosion, even in seawater applications

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## TECHNICAL SPECIFICATIONS

PARAMETERS	DRAGON 1:1	DRAGON 2.28:1	DRAGON 2.33:1	DRAGON 2.35:1	DRAGON 2.5:1	DRAGON 2:1
Pressure ratio	73:1	58:1	58:1	58:1	57:1	57:1
Discharge/cycle (th)	302 CC	377CC	377CC	377CC	395CC	339CC
Pump combination	Ø350 - (151/151)	Ø350 - (145-113/113)	Ø350 - (151-113/113)	Ø350 - (151-113/113)	Ø350 - (169-113/113)	Ø350 - (113-113/113)
Max inlet air pressure	6 BAR	6 BAR	6 BAR	6 BAR	6 BAR	6 BAR
Max output pressure	438 BAR	348 BAR	348 BAR	348 BAR	342 BAR	402 BAR
Mixing ratio	1:1	2.28:1	2.33:1	2.35:1	2.5:1	2:1
Supply	415V/3Ø/50HZ	415V/3Ø/50HZ	415V/3Ø/50HZ	415V/3Ø/50HZ	415V/3Ø/50HZ	415V/3Ø/50HZ
Reference Intumescent material	Jet char 1709, Carboline 3000SP, Carbolinethermo lag-E100, Chartek- 2218	PITT CHAR -NX	PITT CHAR -XP, Chartek 7E, Chartek-1960CSP	Jotun Steel Master 1200HPE	Hempafire XTR 100	Firetex M90/02

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corrosion, and stress corrosion cracking in both acidic and chloride-laden environments.

Its high mechanical strength enables the use of thinner tube walls, improving heat transfer efficiency while reducing weight and material costs.

Sanicro® 35 is a high-performance super-austenitic stainless steel alloy containing 35% nickel, 27% chrome, and 6.5% molybdenum. This alloy is specifically designed for use in highly corrosive wet environments, particularly those containing chlorides, and is positioned as a cost-effective alternative to more expensive nickel-based alloys like Alloy 625 (UNS N06625).

Its key properties include excellent resistance to chloride-induced localized corrosion, including pitting and crevice corrosion, demonstrated by a high Pitting Resistance Equivalent Number (PREN). The alloy offers a combination of high yield strength, excellent ductility, and low hardness, providing superior properties to conventional 316-series stainless steels. Its yield strength is approximately 50% higher than that of standard 300-series austenitic stainless steels. Sanicro® 35 also exhibits good weldability.

The main applications for Sanicro® 35 include heat exchanger tubing, small dimension piping, and hydraulic and instrumentation tubing. It is widely used in refineries, chemical and petrochemical plants, wastewater treatment facilities, offshore installations, and even in certain high-

temperature applications.

One of the most critical areas where performance must be optimized is in crude distillation units (CDUs) overhead condensers, where corrosion is a common yet challenging issue. The harsh environment can cause significant material degradation. Some overhead systems experience severe corrosion and fouling that increase the atmospheric column operating pressure, reduce the distillate yield, or require tube bundle changes at intervals shorter than the usual 4-6-year turnarounds. High concentrations of salts, acids, and chloride compounds in the process stream often result in frequent maintenance, production losses, and costly equipment replacements.

Traditional materials like carbon steel and copper alloys often fall short under the pressure of modern refining processes, leading to corrosion and fouling. These issues can cause refineries to experience unplanned shutdowns, increased maintenance costs, and even safety risks.

Over the years, Alleima has developed high-performance alloys designed to meet the most demanding industrial conditions.

Sanicro® 35 represents a breakthrough in alloy design, combining the best properties of stainless steels and nickel alloys. It provides excellent resistance to a wide range of corrosion, including pitting, stress corrosion cracking, and general acid corrosion. Due to its unique properties, it is particularly well-suited for



Example of corrosion of tube sheet in heat exchanger.



TP316L wet corrosion heat exchanger.

applications in which traditional materials have struggled.

Shortly after its global market introduction, one of the largest oil refiners on the Gulf Coast put it into service for two heat exchangers in their crude unit overhead, and the alloy proved its value of bridging the gap between stainless steels and nickel alloys.

Since then, Alleima has delivered seamless tubes to the market securing millions in orders annually for different industries such as fertilizer production, chemical processing, and renewable feedstock pre-treatment. Most recently, one of the largest orders was signed with a

repeat customer that has upgraded seven crude unit air coolers at a major refinery on the US Gulf Coast. In this application, Sanicro® 35 was selected for its superior corrosion resistance in ammonium chloride salts environment. This marks the first global reference in air cooler type heat exchangers. This year, when a large refinery on the US Gulf Coast chose to upgrade their crude overhead condensers to Sanicro 35®, Brask Inc., a leading manufacturer of tube & shell heat exchangers on the US Gulf Coast, became one of the first fabricators to work with the alloy.

“We are very happy with the performance of Sanicro 35® and the support we have



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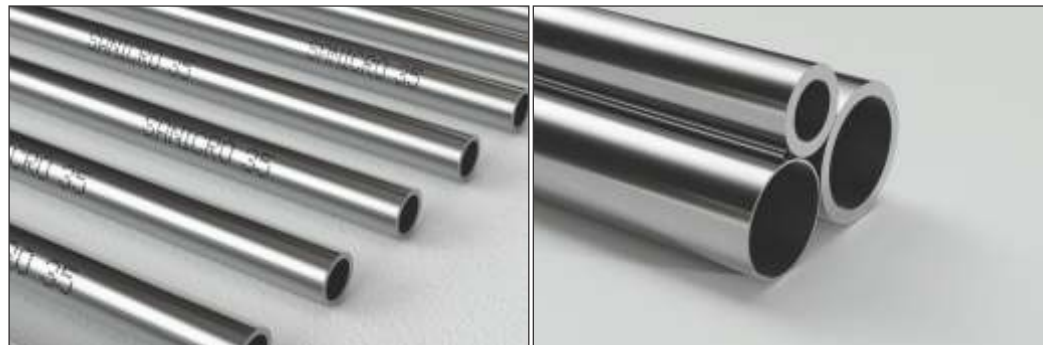
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received from Alleima. From our long-standing collaborative relationship with Sandvik Materials Technology, today known as Alleima, we were confident that we would be able to fabricate successfully with Sanicro 35<sup>®</sup>, knowing we had the support of the Alleima technical marketing team behind us. Alleima provided us with important information such as the code case details, the welding procedure number, and input on filler metal selection, ensuring fabrication went entirely to plan. When the refinery requested expedited delivery, Alleima stepped up, working tirelessly to meet the new deadline, which resulted in us delivering the equipment on time for installation at the refinery,” says Dinesh Bakshi, Vice President of Sales and Marketing at Brask.

“Our mission is to push metallurgical boundaries and provide high integrity solutions for safe operation in critical services all around the world. There are countless opportunities across various industries where we can assist our customers with their technical challenges. The demand for Sanicro<sup>®</sup> 35 has continued to rise since we first launched the product five years ago,” says Carl von Schantz, President of the Tube division at Alleima.

“Despite the relatively short time Sanicro<sup>®</sup> 35 has been in the market, our customers have already understood how Sanicro<sup>®</sup> 35 can solve their challenges for several demanding applications. Alleima continues to support the traditional chemical processing industry, but with



*Originally designed to address corrosion challenges in crude distillation unit (CDU) overhead condensers, Sanicro<sup>®</sup> 35 has emerged as a versatile alloy that bridges the performance gap between stainless steels and high-nickel alloys.*

new alloy development it helps our customers increase their performance even further. Sanicro<sup>®</sup> 35 is one of those developments,” says Tom Eriksson, Executive Vice President and Head of Strategic Research at Alleima.

Within India, Mr Ganesh cites the case of a refinery where they had an instance of 16 leakages within a period of two years. “Imagine the number of shutdowns and the subsequent costs involved to plug these leaks. We suggested using Sanicro<sup>®</sup> 35 and it's around two years now and they have not reported any failures or losses. No maintenance, no shutdowns; it is running very well.”

“At another LNG terminal, the operator had initially installed TP316L stainless steel tubing. Although TP316L offers good general corrosion resistance, the tubes continued to fail. The service provider suggested applying a protective coating, but the failures persisted,” said Dr Jha. “Our investigation revealed that chloride entrapment in narrow crevices was driving the degradation. Once crevice corrosion initiates, it can progress very rapidly through stress-corrosion cracking, further aggravated by fatigue.

We recommended replacing the tubing with Sanicro<sup>®</sup> 35, and the system has performed reliably since then. Ultimately, this was a clear case where improved metallurgy provided the correct solution.”

Setting Sanicro<sup>®</sup> 35 apart is its proven track record in resisting some of the most aggressive forms of corrosion. Tests have shown that it outperforms traditional alloys in environments where hydrochloric acid is present, a common by-product in crude processing. Additionally, it has demonstrated excellent performance in seawater environments, making it a versatile solution for a variety of industrial applications.

**Alleima's commitment to innovation**

For over 160 years, Alleima has been advancing industries through materials technology. Their commitment to innovation continues with Sanicro<sup>®</sup> 35, a solution that drives refineries to optimize their CDU operations by reducing corrosion-related risks. By investing in the right materials, industry can improve efficiency, reduce maintenance costs, and ensure the longevity of critical assets.

Alleima's 900+ advanced steels and alloys help reduce carbon footprint and energy consumption while increasing efficiency. Their production processes use 83% recycled steel and 96% fossil-free energy worldwide.

Customers across India's energy sector are demanding more precision, performance, and local responsiveness. As a trusted partner in corrosion-resistant materials, Alleima is responding with decisive action.

Since establishing their first operation in Pune in 1983, they have expanded their footprint to meet the growing demands of India's energy sector. The Mehsana Mill facility is now a cornerstone of Alleima's operations in Asia, producing advanced corrosion-resistant tubes and pipes for heat exchangers and process equipment across various industries, including chemical, petrochemical, and energy sectors.

Backed by local manufacturing, a strong technical support network, and a commitment to sustainability, Alleima is here to empower the next phase of India's energy journey with robust, future-ready solutions.



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# Coratia Tech's submersibles aid underwater corrosion inspection and control

*Equipped with high-resolution cameras, ultrasonic thickness gauges, and specialized sensors, Coratia Tech's ROVs can inspect submerged surfaces to identify corrosion, metal loss, or marine growth before they become severe*

Imagine a future where Indian-made robots and submersibles use AI, ML integrated with advanced sensors such as sonar and LiDAR to enhance underwater exploration and maritime security. That future is unfolding in India's blue economy, already contributing to 4% of India's total GDP.

Underwater robots (Made in India by the Odisha-based Coratia Tech), with dual-use defence and civilian applications, integrated with advanced sensors, aid in scanning the seafloor for minerals, protect critical undersea infrastructure from sabotage, identify defects in dams, bridges, ports as well as ships, and can also rush into action after severe floods or cyclones to aid in rescue operations.

The deep-tech underwater robotics startup is also capable of assisting search & rescue, inspection, and employing AI-powered

predictive studies for critical infrastructure - essential after storms, earthquakes, or tsunamis. Moreover, Coratia employs AI & ML in Non-Destructive Testing (NDT) for real-time defect identification, image and video enhancement, and defect quantification.

While Coratia Technologies recently signed an INR 66 crore deal with the Indian Navy, there are a myriad of civilian use cases as well.

India's underwater robotics industry is propelled forward by India's Deep Ocean Mission (DOM), a ₹4,077 crore government push for self-reliant underwater tech.

Founded by Mr Debendra Pradhan and Mr Biswajit Swain, the startup is incubated at National Institute of Technology, Rourkela's FTBI, STPI Bhubaneswar Electropreneur Park, with support from Startup Odisha and i-Hub, Gujarat.

Coratia Tech's co-founder and CEO Debendra Pradhan in a chat with C&ACER.

**How can Coratia Tech's underwater robots help mitigate corrosion and biofouling issues in the maritime sector (e.g., ships, jetties, ports, offshore structures)?**

Corrosion and biofouling are two of the most persistent problems affecting maritime infrastructure, leading to huge economic losses and safety hazards. Coratia Technologies' Remotely Operated Vehicles (ROVs) are designed to play a critical role in mitigating these issues through early detection, monitoring, and preventive maintenance. Equipped with high-resolution cameras, ultrasonic thickness gauges, and specialized sensors, our ROVs can inspect submerged surfaces to identify corrosion, metal loss, or marine growth before they become severe.

By providing visual and quantitative data, these systems help asset owners plan timely maintenance and reduce the need for costly dry-docking or shutdowns. Our robots can also assess the effectiveness of anti-fouling coatings and cathodic protection systems, ensuring that preventive measures are performing optimally.

**What advantages do these underwater robots offer for the aforementioned opera-**



Mr Debendra Pradhan, CEO, Coratia Technologies.

**tions compared to traditional methods?**

Traditional underwater inspections rely heavily on manual divers, which are a risk to human life, time-consuming, and limited by depth, visibility, and working duration. In contrast, Coratia's ROVs offer a safer, faster, and more data-rich alternative.

Our systems eliminate the need to deploy divers in hazardous conditions, thereby enhancing personnel safety. They can operate for extended hours without fatigue and deliver consistent, repeatable results. Additionally, ROVs capture detailed visual and sensor data that can be stored, analyzed, and compared over time — enabling predictive maintenance and digital record-keeping.

The operational efficiency of ROVs also significantly



Coratia Tech's CEO Mr Debendra Pradhan discussing the company's underwater ROV innovation with the Defence Minister of India, Mr Rajnath Singh.



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reduces inspection costs and downtime. They can be mobilized quickly, navigate tight or confined underwater spaces, and perform inspections in turbid or low-visibility environments where divers may not be effective.

**Can these underwater robots be used for actual descaling and cleaning of underwater assets?**

Yes, Coratia's ROVs can be customized or equipped with tools for light descaling and cleaning operations. We have developed modular attachments such as water jet nozzles and rotating brushes that can be mounted on the ROVs for removing light marine growth, silt, and scale deposits.

For heavier cleaning operations, our robots can work in tandem with other equipment or cleaning systems, providing visual guidance and post-cleaning inspection. This hybrid approach ensures cleaning is done efficiently while minimizing damage to coatings or metallic surfaces. Our ongoing R&D efforts also focus on developing autonomous cleaning modules to

extend the ROVs' functionality further.

**Does Coratia Tech manufacture these underwater robots for sale, for hire, or both?**

Coratia Technologies both manufactures and deploys underwater robots. Our systems are supplied to defence organizations and research institutions that require advanced indigenous solutions for underwater surveillance, inspection, and operational tasks.

In addition to manufacturing, we also utilize our ROVs as a service platform for various public sector undertakings (PSUs) and industries. These services include underwater inspection, monitoring, and maintenance operations for critical infrastructure such as bridges, dams, ports, and industrial tanks.

This dual approach — product sales and service deployment — enables Coratia to support both strategic and commercial sectors, ensuring that our technology contributes directly to India's defence capabilities as well as to



ROVs help asset owners adopt a predictive maintenance approach rather than reactive repair.

civilian infrastructure integrity.

**What is your market outlook for these underwater robots?**



Equipped with high-resolution cameras, ultrasonic thickness gauges, and specialized sensors, the ROVs can inspect submerged surfaces to identify corrosion, metal loss, or marine growth before they become severe.

The global underwater inspection, maintenance, and repair market is expanding rapidly, driven by the growing demand for sustainable and automated underwater solutions. According to recent market analyses, the addressable global market for underwater and offshore robotic inspection exceeds \$11

billion, covering applications in ports, windmills, dams, reservoirs, hydropower, and offshore structures.

The Asia-Pacific region represents one of the fastest-growing markets, with over 520 major dams, 135,000+ bridges, 200+ hydropower projects, and 1,800+ ports. India and Southeast Asia, in particular, are seeing accelerated growth due to infrastructure modernization, hydropower expansion, and offshore renewable projects.

The global offshore inspection, maintenance, and repair market, valued at \$7.19 billion in 2018, is projected to reach \$17.33 billion by 2026, registering a CAGR of 11.9%. Within this, inspection services account for nearly 38% of the market share, indicating strong demand for robotic visual and non-



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FROSIO is a member organisation established in 1986 by the industry to meet a growing demand of qualified and certified personnel on all levels within management, production and inspection of work within corrosion protection and surface treatment. FROSIO acts through formulation of quality requirements for surface treatment and coating inspectors.

### **Training & Certification**

1. FROSIO Surface Treatment & Coating Inspector Course Level 1, 2 & 3
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destructive testing solutions — areas where Coratia's ROVs provide an edge.

Coratia Technologies is strategically positioned to serve this market through indigenous, cost-effective, and customizable ROV solutions that can cater to ports, hydropower facilities, and offshore energy sectors. By focusing on data-driven inspections and modular robotics, Coratia aims to capture a significant share of the South and Southeast Asian underwater inspection market, estimated at over \$350 million.

#### **How do these robots operate, and do they require experienced operators?**

Our ROVs are remotely operated and tethered systems that transmit live video and sensor data to the surface in real time. They are controlled by skilled operators using joysticks and control software from a surface control station. The robots are equipped with multiple thrusters for maneuverability, onboard lighting systems, and sensors that assist in navigation and data acquisition.

While some level of training is necessary to ensure safe and efficient operation, our systems are designed to be intuitive and user-friendly. Coratia provides complete operator training and certification, covering both hardware operation and data interpretation. For clients opting for deployment services, our in-house expert operators manage the entire operation, ensuring accuracy and safety.

#### **What is the economic proposition of owning an underwater robot?**

Owning an underwater robot offers strong economic

returns in the medium to long term. The initial investment is offset by the savings from reduced diver dependency, lower inspection turnaround time, and the ability to perform frequent condition monitoring without major mobilization costs.

Moreover, ROVs help asset owners adopt a predictive maintenance approach rather than reactive repairs. This not only extends asset life but also avoids expensive emergency interventions. Organizations that frequently inspect multiple assets — such as ports, refineries, or hydroelectric plants — can benefit greatly from in-house ROV ownership, as the same system can serve across multiple projects and locations.

#### **Where do you envision Coratia Tech in the next five to ten years?**

Over the next decade, Coratia Technologies envisions itself as a global player in the field of marine robotics and intelligent inspection systems. Our goal is to make advanced underwater technology more accessible, reliable, and affordable.

We plan to expand into fully autonomous systems capable of performing long-duration missions, including offshore surveys and underwater mapping. Additionally, we are working towards integrating AI and data analytics for real-time defect detection and reporting, making underwater inspection smarter and faster.

Coratia also aims to establish a larger manufacturing base and R&D facility in Odisha, positioning it as a hub for indigenous marine technology development in India.

#### **Are there any new technologies or upgrades being**



*ROVs can capture detailed visual and sensor data that can be stored, analyzed, and compared over time -- enabling predictive maintenance and digital record keeping.*

#### **introduced by your company?**

Yes, Coratia Technologies continuously invests in innovation. We are currently developing next-generation ROVs with enhanced endurance, better imaging capabilities, and hybrid power systems. These upgrades aim to reduce downtime and improve performance in complex underwater environments.

Another area of development is autonomous navigation, where our systems can use AI-based path planning and obstacle avoidance to operate with minimal human input. We are also integrating smart data analytics into our software suite, allowing clients to visualize inspection results through digital twins and 3D mapping.

Our recent advancements also include modular payload bays that allow quick swapping of sensors and tools, enabling one ROV to perform multiple types of missions — from inspection to cleaning to surveying.

#### **A brief overview of Coratia Tech...**

Coratia Technologies Private Limited is a marine robotics company based in Bhubaneswar, Odisha, specializing in the design, development, and deploy-

ment of Remotely Operated Vehicles (ROVs) and related underwater systems.

Established with a vision to revolutionize underwater operations through innovation, Coratia focuses on delivering indigenous and affordable robotic solutions for the Indian maritime and infrastructure sectors.

Our R&D and manufacturing facility in Odisha houses a multidisciplinary team of engineers specializing in mechanical design, electronics, software, and underwater operations. From initial design to field deployment, all processes are carried out in-house, ensuring quality and reliability.

In recent years, Coratia has successfully executed numerous underwater inspection projects for dams, bridges, ports, and industrial tanks. The company has also been featured under the Department of Science and Technology's NIDHI program for its technological innovation and contribution to India's deep-tech ecosystem.

With consistent growth, Coratia aims to expand its presence across India and internationally, fostering collaborations with research institutions and industries to advance marine robotics and underwater intelligence.



## All New **2 in 1** Air Preparation Solutions **NEW** **Aftercooler + Air Receiver**

- High Efficient Moisture Removal using built-in aftercooler
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- Easy to Maintain
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- ASME & Non-ASME models available

Available in Custom Configurations

## Air Cooled Aftercooler

Pneumatic

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**NEW**

Blastline Air Cooled Aftercooler are designed to work on most of air compressors. To select the appropriate model, simply determine compressor horse power and select model form the chart.

### Rating

Maximum working pressure : 250psi

Maximum working temperature : 121°C



80% Moisture removal from compressed air

Customizable with double outlet & inlets

Pneumatic Models	Electric Models	Internal Airflow Max CFM	Air Compressor Horsepower
BL-450	BL-450 E	539	50-70 HP
BL-600	BL-600 E	785	100-125 HP
BL-1000	BL-1000 E	1569	150-200 HP
BL-1600	BL-1600 E	2300	225-350 HP

Enquiry Now



# Elcometer: Innovations in inspection, spray, blast equipment...

*India, as one of the fastest growing economies in the world, Elcometer continues to expand their blast, spray and inspection equipment in all sectors of the market*

Elcometer, a global leader in blast, spray and inspection equipment recently launched their updated Elcometer 215 Oven Temperature Profiling System that enables manufacturers in the coatings, automotive and metal fabrication sectors with unmatched visibility into their oven and product cure profiles. “The Elcometer 215 streamlines this critical process with cutting edge thermal analysis that helps users validate performance, guarantee compliance and reduce costly rework and energy costs,” said Mr Alastair Kearton, Global Divisional Manager – Inspection Equipment.

The Elcometer 215 tracks and documents cure cycles providing traceable reports that audits and QA documentation in compliance with key national, international and customer specific require-

ments. By linking to their ElcoMaster® software, results can be downloaded quickly to give a graphical profile of time and temperature. Allowing 8-channel inputs, various parameters can be measured simultaneously using both surface and air thermocouples.

In the Elcometer spray equipment range, the launch of the new Elcometer Tornado Airless Pump offers a breakthrough in high-performance airless spraying technology. “Developed by spray painters, for spray painters, the Elcometer Tornado redefines industry standards with superior quality, reduced maintenance, and extended operational lifespan, ensuring unmatched durability and precision for the industrial and marine protective coatings industries,” notes Mr Kearton.

The Elcometer Tornado



PHOTOGRAPHS: ELCOMETER

*Tested across a wide range of marine and protective coatings, in temperatures ranging from -3°C to 52°C the Elcometer Tornado Airless Pump delivers consistent, high-performance spraying which withstands harsh environments, and resists wear and tear.*

Airless Pump is the result of an exhaustive three-year development process, which included more than 13 million pump cycles and over 3,600 hours of extensive laboratory and field trials.

Tested across a wide range of marine and protective coatings, in temperatures from -3°C to 52°C (27°F to 126°F), the Elcometer Tornado Airless Pump proved its ability to deliver consistent, high-performance spraying which withstands harsh environments, and resists wear and tear.

Elcometer is a world leading manufacturer of high quality coating inspection, blast and spray equipment designed to bring accuracy, reliability and efficiency to all aspects of the coating process.

Elcometer offers products that cover the whole coating process from surface preparation to application of

the coating. These include high quality abrasive blast pots to paint application spray guns and pumps. Especially known for the complete range of testing equipment, Elcometer offers testing instruments that align with all international standards. One can align all the testing with their free ElcoMaster® software that enables fast report generation. “Thus, with Elcometer you can simply BLAST IT, SPRAY IT, INSPECT IT and REPORT IT!” exclaimed Mr Kearton.

“Prior to any product launch, a thorough market study is undertaken to understand exactly what the market requires and we then take this information to our Research and Development department to develop a new instrument that fits with the market requirements yet maintain compliance with worldwide standards,” said Mr Kearton. “With a large R & D Team we



*Elcometer remains a family owned company occupying the same site as the original company in Manchester UK,*



**Saudi Abrasives**  
Steel Shot & Grit

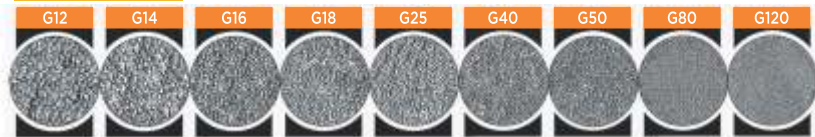


SA GRIT



## Saudi Abrasives: Reducing Costs, Enhancing Efficiency

### STEEL GRIT



### STEEL SHOT



Steel Shot



Steel Grit



Garnet



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Glass Grit

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E-mail: [info@saudiabrasives.com](mailto:info@saudiabrasives.com)

can dedicate many hours to ensuring new instruments offer reliability, accuracy and longevity. Manufacturing the vast majority of instrument components in the UK we have the capability for rapid prototyping and testing.”

Elcometer has nine offices around the world, located in key coating markets. In countries where they do not have their own entity they work through a network of distributors. They now have over 90 distributors around the world including key distributors in both India and China and all developing markets. “Our long-term strategy is to expand our distributor network in all sectors, such as industrial coatings and protective coatings and add distributors in spray and blast sectors to maximize sales of all our product ranges,” said Mr Kearton.

Elcometer prides itself on supplying equipment that offers reliability and efficiency, instruments that have undergone many hours of research and development and use premium materials in their construction. This means that Elcometer products are at

a certain price point in the market. “Convincing customers of the value of the Elcometer products can be difficult as many companies where the procurement is done through their purchasing departments are price driven. Some of these cheaper instruments don't have the longevity of an Elcometer gauge and don't offer the accuracy that is required under many international standards,” noted Mr Kearton.

India is one of the fastest growing economies in the world and through their distributor in India, Aimil, they have grown in the Indian market. “Over the next 5 - 10 years we will continue to push Elcometer in all sectors of the market i. e. industrial coating and protective coating such as construction and oil and gas. We wish to grow our spray and blast range through a range of new products and proven efficiency gains,” said Mr Kearton.

Aimil has been their distributor in India for a number of years and serve well in the market with sales and full after sales service. The have India covered from a geographical



The Elcometer 215 Oven Temperature Profiling System enables manufacturers in the coatings, automotive and metal fabrication sectors with unmatched visibility into their oven and product cure profiles.

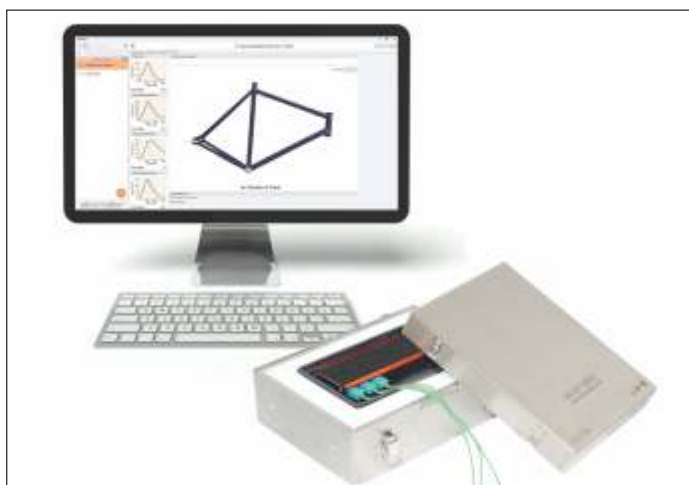
point of view through their network of offices. As they have worked with Elcometer for many years they have a full knowledge of their products which enables them to recommend the correct instrument to satisfy the inspector's requirements. Through their engineers they can offer a repair service in India saving time and costs sending the instruments back to Manchester in the UK for repair.

Elcometer has a global reputation as a leading coatings inspection company offering instruments for controlling all aspects of the coatings process from surface preparation to coatings thickness inspection to pinhole and porosity inspection aligning instruments with the worldwide different standards. This enables the coating to perform to the expected levels and give the expected life cycle for the asset. In the past 10 years Elcometer has grown into a coatings solution company now offering blast pots for surface preparation through to spray pumps and guns for the application of the paint. Their products use premium raw materials and compo-

nents that give extended life times. Using their free ElcoMaster® software all measurements taken can be rapidly downloaded to instantly generate reports without manual data entry.

The first Elcometer gauge was developed and sold in 1946. The same year saw the first gauge exported overseas from the UK to South Africa. Elcometer remains a family owned company occupying the same site as the original company in Edge Lane, Manchester, UK. In 1978 Elcometer were the first to develop the digital dry film thickness gauge and later were the first to add Bluetooth connectivity to inspection gauges.

Till, today, Elcometer continue to manufacture all their inspection equipment and blast pots at their production facilities in Manchester. In 2020 Elcometer acquired Spanish spray gun manufacturer Sagola, which they have integrated into the Elcometer family but continues to maintain production in Northern Spain. Employing 270 people in their manufacturing units and offices, Elcometer remains a truly global company!



With the ElcoMaster® software, measurements can be rapidly downloaded to instantly generate reports without manual data entry.



# KHANNA PAINT TESTING LABORATORY (OPC) PVT. LTD.

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## NABL ACCREDITED LAB



**Prof. A. S. Khanna**  
Director

As per the new requirements all labs under NABL, must have a Registered Entity. As a result SECC a proprietorship company needed to be changed to a Pvt. Ltd. company. With effect from New Financial Year starting from April 1, 2024, SECC is renamed as Khanna Paint Testing Laboratory (OPC) Pvt. Ltd. We have now 54 different paint standards approved by NABL. These 54 standards include IS, ASTM, DIN, ISO, NACE, and AWWA standards. Details can be see on our website which is now [www.kptllab.com](http://www.kptllab.com) The lab has the most modern, fully calibrated equipment with well-educated and trained staff.



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ASTM G 8, G 42, 95 & ISO 15711



**SALT SPRAY CHAMBER**  
ASTM B 117, ASTM G 85, ISO 9227



**ACCELERATED WEATHEROMETER (QUV)**  
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**AUTOMATIC PULL OFF ADHESION**  
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4. Water Vapor Permeability and % Water Absorption
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  - Zn-Mg-Al alloy coatings
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- Paint Scheme recommendation
- Site Selection and Specifications for Corrosion Protection for Solar Plants

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# EV paint innovations, and high-performance trends driving global automotive paints market growth

*Automotive Paints Market is evolving with rising vehicle production, demand for durable coatings & growing adoption of eco-friendly, advanced paint technologies*

The sleek, glossy, polished and gleaming finish on an automobile is more than just an epitome. It's an affirmation of preciseness, pride and trust – what customers see and what manufacturers reinforce their name on.

Modern automotive paint and coatings is the result of years and millions of dollars spent in R&D, tightly controlled and orchestrated production processes and expectations from customers that leave no margin for miscalculations.

The industry is witnessing robust growth driven by rising demand for eco-friendly, waterborne, and high-performance coatings. Increasing adoption of EV paint technologies, smart nanocoatings, and customized vehicle finishes is transforming the market landscape. Growth in electric vehicles, premium car production, and regulatory

compliance continues to shape the future of the global automotive paints market. Sustainable innovations, advanced coatings, and regional expansion across Asia-Pacific and Europe are key factors fueling market growth worldwide.

According to the Future Market Insights, the global Automotive Paints & Coatings Market is set for a decade of sustained expansion, underpinned by rising automotive production, evolving material standards, and rapid advancements in coating technologies. Valued at US\$ 19.5 billion in 2025, the market is forecast to reach US\$ 32.7 billion by 2035, registering a robust CAGR of 5.3%.

The industry's evolution reflects a decisive push toward durability, aesthetics, sustainability, and functional performance. From scratch-



PHOTOS: 123RF

*From scratch-resistant layers to heat-reflective pigments and electromagnetic-compatible coatings for EV electronics, automotive coatings are being reengineered to meet the next generation of mobility requirements.*

resistant layers to heat-reflective pigments and electromagnetic-compatible coatings for EV electronics, automotive coatings are being reengineered to meet the next generation of mobility requirements.

Some of the major trends in automotive coatings are a strong push toward sustainability (waterborne and powder coatings), the development of advanced "smart" functionalities (self-healing, self-cleaning, thermal management), improved energy efficiency and increased digitalization and customization e.g. longer-lasting finishes with unique haptic and visual effects or special pigments that create deep, chromatic colors and "flip-flop" metallic effects for unique looks, or soft-feel coatings that mimic luxury materials for enhanced interior feel.

The key trends include sustainability and environmental compliance driven by stringent environmental regulations, such as VOC (volatile organic compound) emission limits, and a significant shift towards eco-friendly alternatives. Waterborne coatings are becoming increasingly popular as they use water as the primary solvent, drastically reducing VOC emissions compared to traditional solvent-based paints. Powder coatings and UV-cured coatings are also gaining traction because they produce near-zero VOC emissions and offer enhanced durability and efficiency in the application process. Innovations include bio-based and recyclable coatings which are sustainable and in-mold coating where paint is applied directly into the mold for 100% efficiency, reducing waste and emissions; nano



*The industry is witnessing robust growth driven by rising demand for eco-friendly, waterborne, and high-performance coatings.*

coatings using nanoparticles (silica, zinc oxide, graphene) for superior anti-corrosion barriers and durability; self-healing coatings, usually macromolecule-based coatings that repair minor scratches and dents and more accessible ceramic coating tech that provides long-lasting protection (5+ years).

In the production stage, new chemistries allow lower curing temperatures, saving energy in ovens, or streamlined processes (like 3-coat 1-bake) reduce energy-intensive steps like primer booths, besides

### **New kind of solar paint could generate enough electricity for more than 7,450 miles of driving per year**

Mercedes-Benz is researching a new type of solar modules that could be seamlessly applied to the bodywork of electric vehicles – similar to a wafer-thin layer of paste. At 5 micrometers thin, these are significantly thinner than a human hair, weigh just 50 grams per square meter and are packed full of energy. The active photovoltaic surface can be applied to any substrate. The solar cells have

of shade, intensity of the sun and geographical location. Mercedes-Benz drivers in Stuttgart, Germany drive an average of 32 miles per day. Around 62 percent of this distance would be covered using solar energy. In Los Angeles, there is even a surplus of solar energy. It could be used for 100 percent of their driving, on average, and the surplus of energy could be fed directly into the home network via bidirectional charging.

Solar paint has a high level of efficiency and contains no rare earths or silicon – only non-toxic, readily available

enabling the precise and efficient application of intricate paint designs. The sustainable and resource-saving technology began operation in 2025 as the luxury manufacturer develops new personalized options for its most exclusive models.

“PixelPaint uses an award-winning paint head similar to an inkjet printer that can apply large areas of color as well as precise details with complete accuracy,” said Joerg Reger, Managing Director of ABB Robotics Automotive Business Line. “In an entirely automated process that requires no manual interven-



Increasing adoption of EV paint technologies, smart nanocoatings, and customized vehicle finishes is transforming the market landscape.

use of AI in formulation that simulates pigment interactions, speeding up development.

As manufacturers transition toward aerodynamic designs, multi-material body structures, and environmentally compliant processes, demand for high-performance coatings is strengthening across OEM and aftermarket channels.

This strategic shift is creating new opportunities for coatings manufacturers, chemical suppliers, and refinishing ecosystems worldwide, the Future Market Insights report stresses.

a high efficiency of 20 percent. An area of 118.4 square feet (equivalent to the surface of a mid-size SUV) could produce energy for up to 7,456 miles per year under ideal conditions. The energy generated by the solar cells is used for driving or fed directly into the high-voltage battery. The photovoltaic system is permanently active and also generates energy when the vehicle is switched off. In the future, this could be a highly effective solution for increased electric range and fewer charging stops.

The amount of energy produced depends on levels

raw materials. It is easy to recycle and considerably cheaper to produce than conventional solar modules. The Mercedes-Benz research department is currently working to enable use of the new solar paint on all exterior vehicle surfaces – regardless of shape or angle.

### **ABB's PixelPaint brings exclusive and sustainable paint finishes**

ABB's innovative PixelPaint technology has been deployed at the Mercedes-Benz Sindelfingen plant in Germany, where it complements the site's conventional painting processes by

tion, the technology opens new possibilities for vehicle manufacturers as they look to increase personalization in response to rising consumer demand while also reducing emissions.”

PixelPaint consists of a paint head with more than 1,000 tiny, individually controlled nozzles, mounted on an ABB robot such as the IRB 5500 paint series. Combined with ABB's 3D vision system and coordinated by ABB's RobotStudio® planning and programming software, the head tracks very closely to the vehicle body to ensure that 100 percent of the paint is

applied to the car with no overspray or airborne misting. This eliminates the need for labor-intensive masking and repeat trips through the paint shop, resulting in zero waste, reduced environmental treatment requirements, and lower emissions overall.

The technology can recreate even the most intricate designs with unprecedented precision, while ABB's 3D vision system enables a high degree of repeatability. This ensures that each painted panel appears identical to the next.

“With PixelPaint, we are setting a new benchmark in painting technology,” said Arno van der Merwe, Head of Production Planning at Mercedes-Benz AG. “The combination of the highest design and quality precision with innovative technological solutions is a milestone for the painting of our top-end models at the Sindelfingen site. This forward-looking technology raises us to a new level in individual coatings. It enables exclusive product results for our demanding customers.”

Mercedes-Benz will first use PixelPaint on the Mercedes-Maybach SL 680 Monogram Series. To further enhance the exclusivity of this model, the obsidian black hood is available upon request with an intricate Maybach pattern in contrasting graphite grey. This striking design would be impossible to achieve with a traditional process.

Said Dr Julia Schuchardt, Head of Process Development, Coating Technology & Corrosion Protection at Mercedes-Benz AG. “With an eye on the future, we are already working to develop the application further in order

to offer more color combinations and motifs to our customers.”

PixelPaint is just one example of how ABB's smart technologies are transforming the paint process, completing the final piece of the puzzle in digitalizing automotive manufacturing.

Together with solutions such as the RB1000i-S digitally-enabled atomizer – which achieves up to 99 percent transfer efficiency, meaning less paint and materials are required – ABB is making manufacturers more sustainable, efficient and competitive.

ABB's innovative PixelPaint technology has been selected by Mahindra & Mahindra Ltd (M&M), India's leading SUV manufacturer, for its new electric vehicle paint facility. The technology, which uses an award-winning paint head similar to an inkjet printer, will begin serial production in 2025.

#### **PPG introduces PPG VELOCITY refinish system for body shops**

PPG recently announced the launch of the PPG VELOCITY® refinish system, a line of solvent borne products developed specifically for the automotive refinish industry to help collision repair shops achieve quality results and great value. The system combines durable performance and easy application to meet the demands of today's fast-paced repair environment.

The system includes more



ABB's PixelPaint uses an award-winning paint head similar to an inkjet printer that can apply large areas of color as well as precise details with complete accuracy.

PHOTO: ABB

than 70 toners (featuring pearls, aluminums and xirallics – known for their high-impact crystal-effect pigments), five versatile clearcoats, including the PPG ONEVISIT™ clearcoat application for faster booth cycle times, and a range of undercoats in multiple gray shades. From fast-drying primers to easy-to-apply clears, the system equips technicians to perform a wide range of repairs efficiently and confidently.

“The PPG Velocity refinish system helps independent body shops work faster and more efficiently,” said Brian Osterried, PPG collision product manager, Automotive Refinish. “It's built for busy shops that need to deliver reliable results at a great value, helping them grow their business while driving customer satisfaction.”

The PPG Velocity refinish system meets U.S. EPA National Rule volatile organic compounds (VOC) requirements and delivers lasting durability, strong performance and streamlined application at a competitive price. Other key benefits include:

Color capability: Color-match

technology, like the PPG DIGIMATCH™ spectrophotometer, helps technicians deliver precise finishes while reducing material waste.

User friendly: Straightforward mix ratios and flexible application methods make it easy for painters of all experience levels to achieve professional results.

Durable: Provides a long-lasting gloss, strong adhesion and resistance to harsh conditions.

Cost effective: Delivers exceptional performance without the premium price, helping shops control costs and maintain high-quality results.

#### **Nissan trialing cool paint technology**

Nissan has been trialing an innovative automotive paint aimed at helping lower a vehicle's ambient cabin temperature in summer and reduce the energy usage of the air-conditioning system.

Developed in partnership with Radi-Cool, a specialist in radiative cooling products, the paint incorporates metamaterial, synthetic composite materials with

structures that exhibit properties not usually found in nature.

The project is part of Nissan's pursuit of differentiated innovations that empower journeys and to help create a cleaner more sustainable society.

In November 2023, Nissan commenced a 12-month feasibility trial at Tokyo International Air Terminal at Haneda. In collaboration with Japan Airport Terminal Co., Ltd., Radi-Cool Japan, and All Nippon Airways (ANA) airport service, Nissan's cool paint has been applied to a Nissan NV100 service vehicle operated by All Nippon Airways (ANA) airport services.

With its large, open tarmac, Haneda airport provided the perfect environment to conduct real-world evaluation of the paint's performance under an exposed high-temperature environment.

Although still in testing phase, the results to date have been impressive. Parked side-by-side under the sun, a vehicle treated in Nissan's cool paint has shown yields of up to a 12-degree Celsius reduction in exterior surface temperatures and up to 5-degree Celsius cooler interior,

compared to a vehicle featuring traditional automotive paint.

The paint's cooling performance is particularly noticeable when a vehicle is parked in the sun for an extended period. A cooler cabin is not only more pleasant to enter, but also requires less air-conditioning run-time to cool the cabin to a comfortable temperature. This helps reduce load to the engine, or in the case of an electric vehicle, draw on the battery. In both powertrains, an improvement in efficiency is expected, as well as occupant comfort.

The metamaterial embedded within Nissan's cool paint features two microstructure particles that react to light. One particle reflects near-infrared rays in the sunlight that would typically cause molecular level vibrations within the resin of traditional paint to produce heat.

The second particle enables the real breakthrough. It creates electromagnetic waves that counteract the sun's rays, redirecting the energy away from the vehicle into the atmosphere. Combined, the particles in Nissan's cool paint reduce the transfer of heat into surfaces



The global automotive paints & coatings market is set for a decade of sustained expansion, underpinned by rising automotive production, evolving material standards, and rapid advancements in coating technologies.

such as the roof, hood, doors and panels.

Leading the development is Dr Susumu Miura, senior manager and expert at the Advanced Materials and Processing Laboratory, Nissan Research Center. "My dream is to create cooler cars without consuming energy" explained Miura. "This is especially important in the EV era, where the load from running air-conditioning in summer can have a sizable impact on the state of charge," he said.

While radiant cooling paint isn't new, it is typically used for buildings and structures. It's often very thick, requiring application by a paint roller. Devoid of any clear topcoat, it can leave a chalky residue when touched.

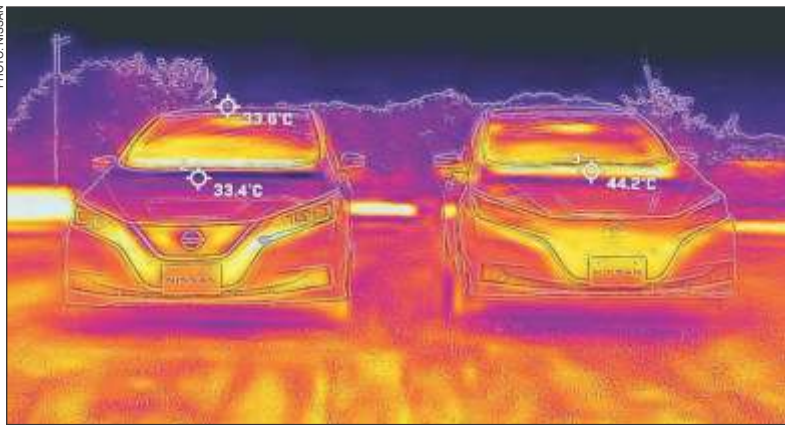
Key challenges Miura had to consider when developing an automotive version, was to ensure it could incorporate a clear topcoat, be applied via a spray gun (not a roller), and meet Nissan's rigorous internal standards for paint quality.

Miura sees strong

potential, particularly for light commercial vehicle applications such as vans, trucks and ambulances that spend most of the day out driving.

It's been a long way since Henry Ford said: "The customer can get the Model T painted in any color he wants, so long as it's black!" The oft-quoted statement above of Henry Ford is humorous today, but Ford was serious when he said it. In 1908, Ford thought that black car paint was the only practical automotive paint for the Model T, as it provided him with a coating that was both durable and cheap in cost. Of course, the black car paint that Ford put on his Model T actually was not "automotive" paint at all, but just the existing paint technology available at the beginning of the 20<sup>th</sup> century: a paint based on natural linseed oil resin as the binder!

Rolls Royce today offers a vast selection of around 44,000 colors, not just standard options, allowing for incredible personalization through their Bespoke program, where you can choose from existing hues or commission entirely unique shades for their vehicles.



Parked side-by-side under the sun, a vehicle treated in Nissan's cool paint has shown yields of up to a 12-degree Celsius reduction in exterior surface temperatures and up to 5-degree Celsius cooler interior, compared to a vehicle featuring traditional automotive paint.

# Technology developed to predict corrosion progression from steel infrastructure images

*Reduce maintenance costs by optimizing inspection cycles and repair timing through forecasting the future condition of structures such as road bridges*

NTT Corporation, Japan, has developed a ground-breaking technology that accurately predicts the progression of steel corrosion several years into the future using images of infrastructure such as road bridges taken with a digital camera (Figure 1). This is the world's first inspection technology capable of generating predictive images that visualize the future spread of corrosion based on actual photos. By training the system on data from real-world corroded facilities and their environmental conditions, the technology enables high-precision image-based predictions. Verification tests using road bridges and telecommunications conduit facilities<sup>3</sup> installed along roads confirmed that the technology can forecast the future spread of corrosion with a mean error of less than 10% (9.9%).

With this technology, the future state of corrosion can be predicted with high

accuracy, making it possible to optimize inspection intervals and repair schedules. This leads to significant cost savings by fundamentally improving the efficiency of maintenance operations.

The technology is scheduled to be commercialized later this year through its implementation on road bridges managed by NTT Group companies. In addition, expansion to other types of deterioration – such as cracking and tearing – is underway, contributing to the realization of a more sustainable society.

### Background

A large number of steel-structured infrastructure facilities – such as bridges, transmission towers, and guardrails – have been installed across the country. The aging of these facilities has become a major social issue. The primary cause of this deterioration is corrosion

of steel materials. Since most infrastructure is installed outdoors, steel components are exposed to rain, wind, condensation, and other environmental factors, which leads to corrosion. Corrosion progresses gradually over time, weakening the structural strength<sup>5</sup> of facilities, and in severe cases, it may lead to damage or collapse. For this reason, facility managers must regularly inspect corrosion conditions and ensure safe and reliable maintenance.

However, under the current system, inspections are conducted at fixed intervals for all facilities regardless of their condition, resulting in enormous costs every year. Moreover, with the increasing number of aging structures and the shortage of skilled technical personnel, the burden on infrastructure managers is expected to grow even heavier in the coming years.

To address this challenge, it is essential to fundamentally rethink the current uniform inspection cycle and shift toward a system that allows optimal inspections and repairs tailored to the corrosion progression of each individual facility. This requires a method capable of accurately predicting the future corrosion state of every facility.

### Challenges in predicting steel corrosion progression

□ *Field survey on corrosion area growth rates*

Figure 2 shows the measured increase in corrosion area on steel components of actual steel structures. This field survey was conducted by NTT Access Network Service Systems Laboratories, targeting 80 steel components on road bridges and telecommunications conduit facilities attached to road bridges in Ibaraki Prefecture. The study measured the increase in corrosion area after a set number of years had passed. The time spans observed ranged from 3 to 6 years, with 20 facilities analyzed for each year. Ibaraki Prefecture was selected as the survey location because its environmental conditions – such as temperature and precipitation, which affect corrosion progression – are close to the national average, making it suitable for collecting standard reference data.

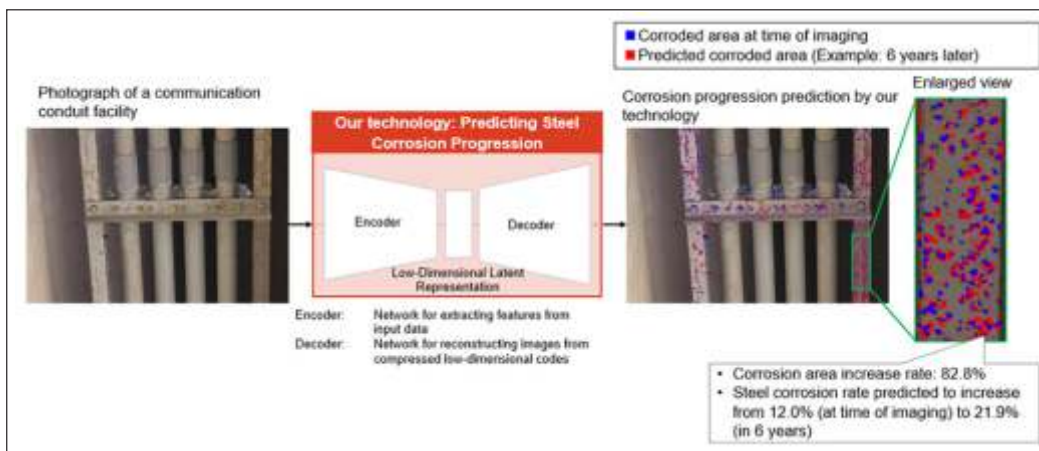


Figure 1: Prediction of steel corrosion progression using this technology.

According to the survey results, the average corrosion area growth rates were 64.4% after 3 years, 146.4% after 4 years, 99.2% after 5 years, and 79.8% after 6 years. These findings indicate that there was no clear trend showing that corrosion area growth consistently increases in proportion to elapsed time. This suggests that it is difficult to accurately predict the corrosion progression of individual facilities based on elapsed years alone.

□ Existing technologies

Several methods have been proposed to estimate the rate of corrosion progression –

steel corrosion several years into the future using images of infrastructure captured by a digital camera. This technology generates predictive data on future corrosion spread by inputting three key elements: an image of the facility, environmental data for the facility's location (such as temperature and precipitation), and the number of years to be forecasted (Figure 3).

The images used in this technology were taken of steel components on road bridges and telecommunications conduit facilities owned by NTT. These images were collected over several

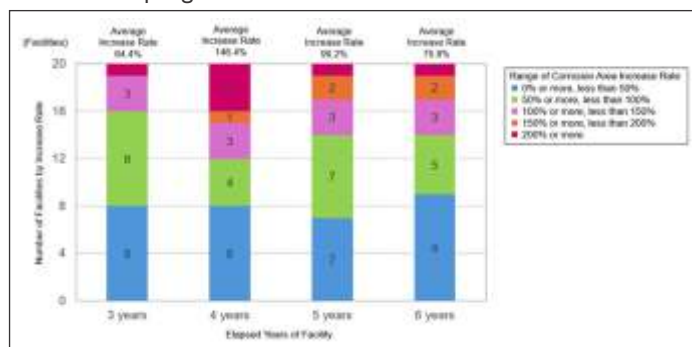


Figure 2: Relationship between facility age and corrosion area growth rate.

which is difficult to predict based on elapsed years alone – by applying statistical or machine learning techniques using environmental factors such as average temperature, precipitation, and sunlight duration.

However, these are macro-level approaches that estimate the average annual corrosion rate across regional units such as prefectures or municipalities. There is currently no method capable of accurately predicting corrosion progression at the level of individual facilities.

Overview of the technology

A new technology has been developed that accurately predicts the progression of

decades during regular facility inspections conducted by NTT. It should be noted that this dataset excludes coastal areas and other salt-damage-prone environments where corrosion typically progresses more rapidly.

Technical highlights

This technology is built upon a deep learning technique known as a Generative Adversarial Network (GAN)<sup>6</sup>. A GAN is a type of generative model that learns features from input data to create realistic, synthetic data.

We developed a custom GAN-based model that incorporates elapsed time and corrosion progression data, along with past and present images of facilities. This enables the model to learn detailed characteristics of corrosion – such as its area, shape, and color. In addition, the model is designed to take in environmental data – such as temperature and precipitation – that are assumed to influence corrosion from a chemical perspective. From multiple environmental variables, the most relevant parameters are selected and input together with the images. As a result, we successfully established a model capable of accurately predicting the progression speed of individual corrosion spots within the image.

Verification overview

□ Verification conditions

The performance of this

technology was verified using images of 20 steel components from road bridges and telecommunications conduit facilities installed in the field. Verification images were collected by re-photographing the same locations using the same angle and composition as images taken several years ago by NTT. The average elapsed time for the 20 steel components used in the verification was 4.4 years.

For evaluation, the increase in corrosion area was first calculated by comparing past and current images. Then, the increase in corrosion area was also calculated using the past image and the prediction image generated by this technology. Finally, the values from the actual corrosion progression and the predicted progression were compared to assess accuracy.

□ Verification results

Figure 4 shows the comparison between the actual corrosion area growth rate (from past to present images) and the predicted growth rate generated by this technology. The correlation coefficient<sup>7</sup> was found to be 0.738, indicating a strong correlation between actual and predicted values. The mean error between actual and predicted

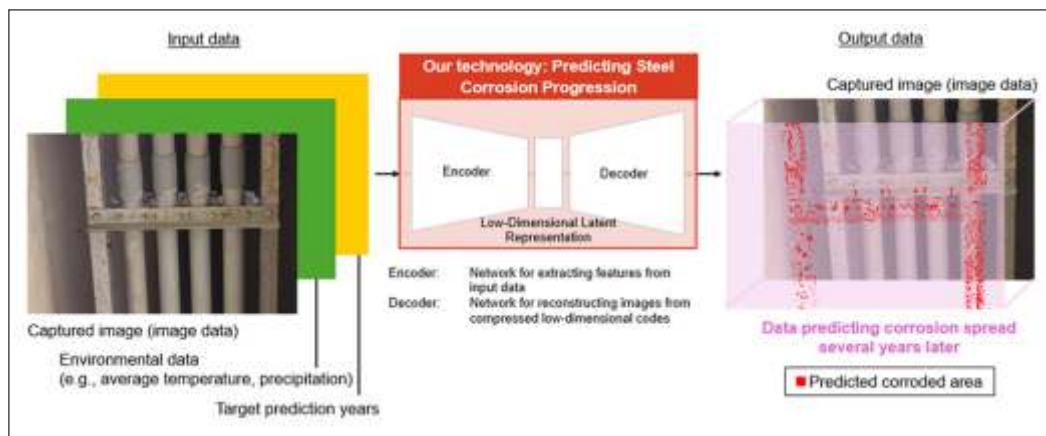


Figure 3: Prediction of steel corrosion progression using this technology.

growth rates was 9.9%, and the variance<sup>8</sup> was 3.7%.

In Figure 4, both Point A and Point B represent facilities with an elapsed time of three years, yet the actual growth rates differ by approximately 40%. Despite this, the technology successfully predicted the corrosion spread for each facility in alignment with their actual conditions.

**Impact and future development of this technology**

□ *Impact of this technology on the infrastructure maintenance market*

➤ This technology enables optimization of inspection intervals for each individual facility, replacing the conventional uniform schedule. As a result, it contributes to both reducing inspection costs and maintaining safe facility management. For facilities with slower corrosion progression, the inspection interval can be extended to reduce costs. For those with faster corrosion, shortening the interval helps ensure safe and reliable maintenance.

➤ Repairs can be scheduled at appropriate times, allowing for cost control while maintaining the safety and functionality of the facility. In addition, by forecasting the required repair volume over several years, it becomes possible to level out construction workloads, which supports stable budgeting for repairs and improved productivity on construction sites.

□ *Outlook*

This technology is scheduled to be commercialized in fiscal

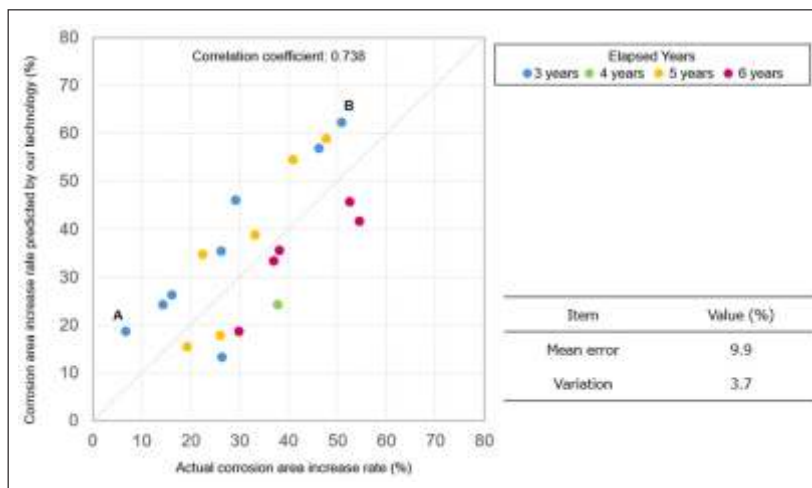


Figure 4: Verification results of this technology.

year 2025 by NTT Group companies, targeting road bridges. Future plans also include expanding the application of this technology to other steel structures such as steel towers, as well as to other types of deterioration phenomena such as cracks and fractures.

NTT has been conducting research and development on image recognition technologies (image recognition AI) to improve the efficiency of infrastructure inspections, and has promoted real-world implementation through joint experiments with local governments. This new technology follows previously commercialized technologies for corrosion detection and corrosion depth estimation, and represents the next advancement: prediction of corrosion progression. Going forward, NTT will continue its research and development efforts to help solve challenges such as rising maintenance costs for social infrastructure, contributing to the realization of a sustainable society.

**Glossary**

1. *Corrosion spread rate: The percentage increase in the corroded pixel area between two images, using*

*the corrosion area in a reference image as the baseline.*

2. *Mean error: The average of the absolute differences between the actual corrosion progression rate and the predicted rate.*

3. *Telecommunications conduit facilities: Pipes used to house communication cables and related infrastructure for attaching those pipes to structures such as road bridges.*

4. *Tsukuba Forum 2025:*

[https://www.rd.ntt/e/as/forum/Open other window](https://www.rd.ntt/e/as/forum/Open%20other%20window)

5. *Structural strength: The ability of a structure to withstand external forces such as its own weight, vehicles, earthquakes, and typhoons.*

6. *Generative adversarial network (GAN): A type of deep learning (neural network) model where two neural networks are trained to compete with each other. This competition enables the generation of highly realistic synthetic data based on a given*

*dataset. The term "adversarial" reflects the competitive nature of the training process.*

7. *Correlation coefficient: A measure of the strength of a linear relationship between two datasets. The closer the value is to 1, the stronger the positive correlation.*

8. *Variance (s): The standard deviation of the absolute error between the actual corrosion progression rate and the predicted rate, indicating the consistency of prediction accuracy.*

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# COATINGS AND ANTI CORROSION ENGINEERING REVIEW

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# Biocides – a necessary tool for managing biofouling

*Questions are being asked about the sustainability of biocides in a world where ESG standards and regulations are forcing operators to think harder about the choices they need to make*

*The prevention of biofouling is a hot topic in shipping generally and for regulators in particular. Biocidal antifouling coatings containing active substances that control the growth of unwanted organisms can and do make a huge contribution to combatting the global issue, but the biocides themselves are under scrutiny even though the industry still considers biocides as a key contributor to sustainable shipping.*

Throughout maritime history ship operators have been engaged in a struggle with nature that has seen them attempting to reduce or eliminate the impact of biofouling on the operation of their vessels. Today there are multiple options available with antifouling coatings containing biocides the most popular

and effective across the shipping industry. But questions are being asked about their sustainability in a world where Environmental, Social, Governance (ESG) standards and regulation are forcing operators to think harder about the choices they need to make.

“Biofouling – the accumulation of marine organisms on the hull of a ship – reduces the efficiency of the vessel causing it to slow down or to use more fuel to maintain operational speed. That is a problem regardless of the owner’s operating strategy. Whether operating directly on the owner’s account, or through charterers, it reduces profitability,” said Morten Sten Johansen, Global Category Director, Jotun.

Controlling biofouling has



PHOTOS: 123RF

*So far only a small number of national governments have enacted laws that require ship operators to keep their ships free of biofouling or risk expulsion from territorial waters.*

become even more important with the IMO EEDI regulations in 2013 for new vessels and the EEXI regulations for existing vessels in 2023 along with the CII operational limits on CO<sub>2</sub> emissions. With these in place, owners are no longer combatting biofouling purely for their own operation and economic reasons but

also to meet mandatory requirements aimed at reducing greenhouse gas emissions across the shipping industry.

To add to the complexity of the problem, protecting biodiversity by way of reducing or eliminating the transfer of invasive species has come on to the radar of many national governments and the IMO. Populations of invasive species in non-native waters can be facilitated in many ways but the most obvious is by way of the biofouling on ships’ hulls.

So far only a small number of national governments have enacted laws that require ship operators to keep their ships free of biofouling or risk expulsion from territorial waters, but the IMO appears to be moving away from its current voluntary recommendations towards a mandatory regime that would encompass shipping on a global scale. At MEPC 83 in April 2025 IMO



*Biofouling – the accumulation of marine organisms on the hull of a ship – reduces the efficiency of the vessel causing it to slow down or to use more fuel to maintain operational speed.*

agreed to a new output on the “Development of a legally binding framework for the control and management of ships’ biofouling to minimize the transfer of invasive aquatic species – a biofouling Convention”. The work will commence in 2026 but how long the process will take is debatable. Work on the AFS convention began in 1990 but it did not come into force until 2008. The Ballast Water Convention took even longer to be developed and come into full effect.

### Increasing pressure from customers

Alongside their own benefits and regulatory compliance from combatting biofouling, some ship operators also face increasing pressure from their direct customers and others further along the value chain to improve both efficiency and protect biodiversity. Often this pressure is the result of public opinion and is more evident for carriers of consumer goods – liner operators and car carrier operators – than in the bulk and tanker segments.

Attitudes of ship operators towards green issues

naturally cover the whole spectrum from actively embracing them to doing the minimum necessary to meet legal requirements to keep their ships operational. Furthermore, across that spectrum budgetary issues mean that ambitions may need to be tempered to which products to combat biofouling are affordable and available.

A survey by Jotun on shipowners’ considerations when choosing antifouling coatings revealed that over 66% agreed that coatings containing biocides are more effective than biocide-free coatings. Almost 20% had no strong opinion and just 14% preferred biocide-free coatings.

Clearly, biocides are important to achieving the owners’ objective but if it did happen that some, or in the worst case all, biocides are restricted or regulated out, the effect would be an increase in greenhouse gas (GHG) emissions and the environment would lose. It is important for stakeholders/regulators to take a holistic approach.

“We firmly believe in taking a



Throughout maritime history ship operators have been engaged in a struggle with nature that has seen them attempting to reduce or eliminate the impact of biofouling on the operation of their vessels.

holistic view. The best performance is the best for the environment providing that the ingredients comply with relevant local regulations and an environmental risk assessment has been done,” said Petter Andreassen, R&D Chief Chemist in Jotun.

For its part, Jotun manufactures a range of products to cover all operators’ antifouling needs and although it is difficult to determine what the impact on biodiversity may be, for emissions reductions a good estimate can be made. In 2024 DNV Maritime Advisory carried out a technical evaluation for the company which verified that 11.1 million tons of CO<sub>2</sub> was avoided in 2024 for Jotun coated vessels.

### Evolving technology offers multiple solutions

Preventing organisms from attaching to ships is extremely difficult with current technologies so the best way to do it effectively and economically is to use a coating on the underwater part of the hull that contains a biocide – a biocidal active substance that controls the growth of unwanted organisms. Such coatings also protect steel

ships from corrosion in the same way as the conventional coatings used above the waterline. The effect of the biocidal coating can be reinforced by appropriate hull cleaning technologies.

Biocide use is not confined to protecting ships from biofouling, indeed most of the antifouling biocides commonly used today have applications in many other fields including agriculture, cosmetics, cleaning products and more.

Over time, preventing biofouling has involved the use of many different materials and chemicals from sheets of copper on wooden vessels to poisonous compounds. Some of these were very successful but their undesirable side effects attracted the attention of science and the environmental movement which want to see them controlled or in some cases prohibited from use.

Unlike so much IMO regulation which details what ships must do or carry, the International Convention on the Control of Harmful Anti-fouling Systems (AFS) on Ships, which was adopted in



Populations of invasive species in non-native waters can be facilitated in many ways, but the most obvious is by way of the biofouling on ships’ hulls.

October 2001 but only came into force on September 17, 2008, is totally geared to preventing the use of certain products. The convention covers all vessels including FSUs and FPSOs.

Initially the product at which the convention was aimed was tributyltin (TBT), a substance developed through the 1960s and first used in the 1970s and which the IMO itself conceded is probably the most effective biocide so far devised for the maritime industry. Since 2023, the IMO has also banned the use of cybutryne which was used in some antifouling coatings to control algae.

Problems with TBT first surfaced in the 1980s and within a decade several governments became concerned about its impact on a wide range of marine creatures. In 1990 Japan banned its use on Japanese vessels and the IMO took up the challenge. During the development of the AFS Convention, most coatings manufacturers began winding down TBT production and searched for alternatives introducing them long before the AFS Convention reached the ratification stage. Copper compounds used extensively well before TBT was developed appeared to be the best choice, and most antifouling coatings today make use of copper in some form.

### **Biocides best against biofouling but under scrutiny**

Combatting the impact of biofouling is no longer something shipowners can ignore even if they wanted to. Coatings manufacturers have developed an array of options



*Alongside their own benefits and regulatory compliance from combatting biofouling, some ship operators also face increasing pressure from their direct customers and others further along the value chain to improve both efficiency and protect biodiversity.*

most of which make use of biocides although a few are biocide free. The product ranges have been developed and tailored to trades to suit operational profiles of different vessel types, intended regions of operation and operators' budgetary restraints.

“Coatings containing biocides are designed to remain effective for periods of up to five years or more for premium priced products and otherwise to give protection at least between dry-dockings,” said Petter Andreassen in Jotun.

“Although biocides are the most effective weapon against biofouling it has to be acknowledged that they are hazardous chemicals. Therefore, the level in antifouling coatings should be minimized. However, a product with 5 w% of biocide A is not necessarily better for the environment than a product with 50 w% of biocide B. This is because toxicity and the risks involved in their use also needs to be considered. In the above example, biocide A could be 100 times more toxic than biocide B meaning even though the level in the

paint is only one tenth, the toxicity is higher.”

Comparing the toxicity data of different biocides is a pure hazard assessment. For the exposure assessment in marine environments there is a need for reliable chemical fate models. Such models must handle the complex transport and exchange processes in coastal environments.

There are computer models in existence that are intended to measure risks according to various factors such as Estimation of hydrodynamical exchange, Compound properties/processes, Emission estimation based on leaching rates and Environmental / hydrodynamical parameters among others. These models are of use when considering regulations and helpful to coatings manufacturers in developing sustainable and safer products but likely have little of interest for ship operators who only wish to consider effectiveness and legality of their coating choices.

### **Biocides and their benefits**

Copper oxide is by far the most commonly used

antifouling biocide giving protection against most of the 4,000 - 5,000 species associated with biofouling including both hard and soft fouling organisms. Hard fouling is understood as the shell forming organisms, such as barnacles, mussels, oysters and tubeworms. Soft fouling is understood as plants (algae), soft animals (tunicates, soft corals etc) and slime (microorganisms forming a biofilm on the surface). Some algae are quite tolerant towards copper; hence a co-biocide is often used in combination with copper.

Copper oxide is used by all major coatings manufacturers and is found in >90% of all coatings applied for fouling protection of ships at levels ranging from 20 - 50 w%. Copper is a naturally occurring substance and is also a micronutrient. It is essential for life and necessary for all living cells. However, at elevated concentrations, notably on the coating surface during idling periods, the copper ions ( $\text{Cu}^{2+}$ ) are considered toxic. Copper from antifouling will eventually end up in the sea but for

the most part will be confined to the sediment and typically convert to copper sulphide (CuS), which is insoluble and not bioavailable.

There are two alternatives to copper oxide that are effective towards hard fouling organisms, tralopyril and medetomidine. Both are far more potent than copper, hence the volume consumption is lower.

*Tralopyril (Econea®)* was the first alternative to copper with an effect towards hard fouling organisms. It has been on the market since 2007. Due to reactions with copper oxide, it is primarily used in copper-free products. It requires a co-biocide, typically zinc pyrithione, to give full protection including against soft foulings. Tralopyril is 6 - 8 times more potent than copper oxide, hence the use level is 3 - 6 w% in paints. It breaks down very quickly in seawater by hydrolysis.

*Medetomidine (Selektope®)* Antifouling paints with medetomidine were launched around 2014. Medetomidine works selectively towards barnacles and tubeworms. It may be used in copper-free paints, together with co-biocides, but is primarily used in combination with copper oxide as a barnacle fighter. It does not kill the fouling organisms but induces a physiological response that repels them from the surface.

*Zinc and Copper pyrithione (CleanBio®, Omadine®, Pyrion®)* The pyrithiones are primarily used against soft fouling. Both were launched during the 1990s, but currently, copper pyrithione is dominating in volumes,

primarily due to the reaction between zinc pyrithione and copper oxide. Both pyrithiones degrade quickly in seawater, primarily via photolysis.

*Dichloro octyl isothiazolinone (Sea-Nine®)* has a high acute activity towards soft fouling organisms. It was introduced early 1990s to replace TBT. DCOIT works well with copper oxide and are typically used at 2 - 4 w% level in antifouling paints. It also works well in combination with other biocides, in copper-free products. It breaks down rapidly in seawater and sediment, primarily via biodegradation.

*Zineb (Zineb Nautec®, Perozin Marine®)* has high activity towards soft fouling organisms. It works well in combination with copper oxide. It degrades quickly in seawater.

In addition to the relatively small number of biocides mentioned above there are some biocides being used on a smaller scale and in local antifouling coatings only. However, the list is getting shorter every year due to lack of supporting documentation and suppliers.

#### Looking ahead

Even though two very effective biocides have now been banned, restrictions on biocides are expected to progressively tighten, and the expectation is that the current assortment of biocides available for use will reduce in the years to come. The environmental aspect of the six key biocides currently in use is now considered acceptable, as they are all approved by EU.



Combating the impact of biofouling is no longer something that shipowners can ignore even if they wanted to.

The situation is generally complicated by a multitude of national and regional regulations which are not aligned, with demands for different approaches to assure compliance. EU has the strictest regulatory system globally, and it is expected that other markets will follow and implement restrictions should there be any.

There have been suggestions that biocide free options represent the future, but this view is somewhat speculative given the availability of viable alternatives to biocidal coatings. In 2024, Washington State Department of Ecology conducted a thorough evaluation of all the available technologies for fouling protection of pleasure crafts, including copper-free and biocide-free products.

On biocide-free products the report said these mostly use silicone polymers and sometimes fluorinated chemicals which may pose their own hazards and for which scientific information on environmental impact is not yet available. Their conclusion was: "Ecology is not able to determine that safer and

effective alternatives to copper based antifouling paints are feasible, reasonable and readily available."

Other reports have raised questions about the potential for foul release coatings to release PFAS – sometimes referred to as forever chemicals – and to leach persistent silicone oils into the oceans.

"The issue of biofouling and means to combat its impact is high on the agenda of the IMO and regional and national authorities. Given the IMO's ambitions around emissions, efficiency and biodiversity, based on current knowledge it is fair to say that the antifouling coating with the best performance is probably the best for the environment providing that the ingredients comply with relevant local laws and regulations, and an environmental risk assessment has been done. Over time, there will no doubt be improvements with coatings manufacturers at the forefront in this regard," concludes Petter Andreassen.

Feature source: Jotun

# Covestro and Nippon Paint strengthen strategic partnership

China's automotive industry is shifting from rapid growth to structural adjustment and upgrading, while the broader industrial sector is intensifying efforts to tackle climate challenges and accelerate green transformation. As a key enabler for both sectors, the coatings industry supports this transition with

low-carbon, safe and durable solutions. In this context, materials manufacturer Covestro and Nippon Paint have formed a strategic partnership to strengthen collaboration in automotive and industrial coatings. Together, the two companies aim to co-develop efficient, sustainable and high-performance coatings that drive industry innovation and support downstream transformation. Based on deep industry insights, the two companies will focus on automotive and industrial coatings, covering applications such as automo-

tive OEM coatings, components, refinish paints, as well as coil steel, construction machinery, wind power and photovoltaics. The collaboration will encompass low-carbon material development, technological innovation, energy efficiency improvements and VOC emission reduction to drive sustainable



The strategic partnership reflects a shared commitment between Covestro and Nippon Paint to explore new collaborative pathways.

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Based on deep industry insights, the two companies will focus on automotive and industrial coatings, covering applications such as automo-

and high-quality industry development through enhanced supply chain coordination.

This agreement, signed at Nippon Paint's booth during the 8th China International Import Expo (CIIE), reflects a shared commitment between Covestro and Nippon Paint to explore new collaborative pathways. Nippon Paint and Covestro unveiled a pioneering bio-based automotive coatings solution that enables matte-finish gradient colors – a technologically challenging feat that addresses the automotive industry's demand for outstanding performance,

# The new Graco India Technology Center inaugurated at Gurugram



The new Graco India Technology Center inaugurated at Gurugram recently is a significant step forward and promise of long term investment of the company in India.

The new Graco India Technology Center inaugurated at Gurugram recently is built to empower their distributors with hands-on trials, training, demonstrations, and a more immersive experience for their end customers, notes a press communiqué from Graco India Pvt Ltd. "It is a significant step forward and promise of long term

investment of Graco in India," the press communiqué notes.

The Graco India Technology Center offer industry leading innovation through highly engineered products and industry best customer service and support to Graco's channel partners and customers in India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan and Maldives.

distinctive design and sustainability.

"This strategic partnership will fully unlock the synergistic potential of both companies in technology development and resource integration. We look forward to working with Nippon Paint to advance cutting-edge technology development and implemen-

tation, drive green transformation across the industry through innovative material science and circular economy principles, and contribute our technological expertise to China's dual carbon goals and industrial upgrading," said Anand Khot, Head of Coatings and Adhesives Asia Pacific, Covestro.

# BASF Coatings is committed to the UN Sustainable Development Goals

The 17 United Nations Sustainable Development Goals (UNSDGs) set a global plan for peace and prosperity. They were adopted ten years ago, in September 2015, at the UN World Summit. BASF Coatings supports selected SDGs through its own priorities and concrete measures.

On the basis of its business activities, BASF Coatings has defined sustainability focus areas. "Climate protection, eco-efficient solutions with resource-conserving materials, and safe and sustainable products for our customers – these are our priorities," says Dr Markus Piepenbrink, Head of Sustainability at BASF Coatings. "We actively drive these topics and thereby contribute to achieving the UN Sustainable Development Goals."

While the UN treats all 17 SDGs equally, companies select priorities aligned with their core activities. BASF Coatings concentrates particularly on climate protection, quality education, sustainable innovation, clean energy, decent work and economic growth, responsible consumption and production, and gender equality. The company links environmental and social aspects within each target area.

BASF Coatings makes a significant contribution to Goal 13: Climate Action. Across the entire value chain, the company works continuously to reduce greenhouse gas emissions, for example by using renewable energy at

many of its global production sites. The company now sources almost 70% of its global electricity needs from renewable energy. In addition, BASF Coatings supports customers with CO<sub>2</sub>-reduced products, including those based on the biomass balance approach, as well as CO<sub>2</sub>-reducing painting processes and surface solutions.

With its innovations, BASF Coatings addresses urgent future challenges and supports Goal 9: Industry, Innovation and Infrastructure. The company develops new products and optimizes processes and raw material use together with customers and partners. For example, BASF Coatings and Lufthansa Technik introduced the sharkskin technology, an innovative surface film that improves aircraft aerodynamics and thus reduces CO<sub>2</sub> emissions. Another example is VIANT, a novel coating technology that combines conversion coating and primer paint in just one coating layer and can be applied in a single dip, thereby reducing electricity, water and chemical use. A third example is the Overspray-Free Application process (OFLA) for sustainable two-tone coatings. By applying two colors in a single pass during serial production, up to 80% of energy consumption and CO<sub>2</sub> emissions can be reduced. With such



*BASF Coatings actively supports the UN SDGs, driving climate protection, innovation and social impact.*

innovations, which also act as CO<sub>2</sub>-reducing solutions, BASF Coatings offers its customers another powerful lever to achieve ambitious Scope 1 climate targets.

Goal 4: Quality Education is also part of the commitment. This starts with nurturing the company's own young talent through vocational training and dual study programs across a wide range of professions. At the Münster and Würzburg sites, the company currently trains 132 young people. A special emphasis is on lifelong learning. BASF Coatings offers employees modular, continuous development programs throughout their careers to prepare them for constantly changing professional and societal demands. The program already covers topics from technical innovations and system training to digital skills, including training for working with artificial intelligence. In addition to training and further

education for its own employees, BASF Coatings builds bridges between school and work and supports initiatives such as "Jugend forscht." With the R-M Best Painter Contest and support for participation in the global WorldSkills competitions, the company specifically promotes the next generation of vehicle refinish painters.

"Sustainability is both our obligation and our opportunity," says Piepenbrink. "We want to create positive impacts for the environment and society and drive change together, thereby supporting the UN goals." The 2030 Agenda for Sustainable Development, adopted by all UN Member States in 2015, is a shared plan for peace and prosperity for people and the planet. At its core are the 17 SDGs, which call for urgent action by all countries, developed and developing alike, within a global partnership.

PHOTO: BASF COATINGS

# Stahl reopens advanced coatings facility in Ranipet, India

Stahl, the global leader in speciality coatings for flexible materials, has announced the reopening of its advanced coatings facility in Ranipet, India. This milestone marks a significant step in Stahl's transformation journey and reinforces the strategic importance of its presence in India, one of the world's largest and fastest-growing economies, notes a press communiqué from the company.

The reopening reinforces Stahl's commitment to innovation, sustainability, and customer collaboration through locally produced, high-performance speciality coatings.

Originally inaugurated in April 2000, the Ranipet facility remained operational until its closure in 2019. Following Stahl's recent announcement of the divestment of its wet-

end activities, it has officially reopened the site with a future focused on leather finishing, performance coatings, and packaging coatings.

The upgraded Ranipet facility brings together coatings formulations production, R&D, and application lab & testing capabilities - all under one roof. This comprehensive setup accelerates development cycles, strengthens customer collaboration, and enables Stahl to co-innovate with partners. With the enhanced innovation lab, the company can respond swiftly to evolving market needs and scale operations in line with growing demand, driving innovation from within the region. Stahl shall continue to further strengthen its capabilities – manufacturing, R&D and application, at the Ranipet facility in accordance with market needs and opportunities.

## A hub for innovation and growth

India's position as one of the world's largest and fastest-growing economies makes local production a key strategic advantage for Stahl and its customers. The reopening of the Ranipet facility strengthens Stahl's footprint in India, aligning with its customer-centric 'local for global' business model.

India is a key growth market across all three of Stahl's business segments, and the enhanced capabilities of the site enable the company to serve both regional and global customers with greater proximity, agility, and impact.

"The reopening of our Ranipet site is an important milestone in Stahl's transformation journey," said Maarten Heijbroek, CEO of Stahl. "This investment reflects our strategic focus and aligns our capabilities with future market

demands. Being able to produce locally in India – an essential growth market – strengthens our position and enables us to better support our customers with tailored, innovative solutions."

## A modern facility for a sustainable future

Equipped with the latest technology and automated

systems, this future-proof facility is fully compliant with environmental and safety regulations. It features a state-of-the-art wastewater treatment system that recycles all process water, resulting in zero liquid waste – positioning the facility as ideal for sustainable and future-ready manufacturing.

With around 140 employees on-site – many of whom have been with Stahl since the early 2000s – the reopening also represents a return home. Their loyalty, expertise, and energy will be instrumental in ensuring the success of the site's next chapter.

"Ranipet has always been a special place for Stahl, and its reopening is both a homecoming and a new beginning," added Ranganath B. V., Managing Director – India & Bangladesh. "Our dedicated professionals have the expertise and passion to drive customer success both in India and worldwide. This modern, sustainable facility strengthens our ability to serve customers locally while contributing to Stahl's global innovation journey."

The reopening of the Ranipet facility represents more than a return – it reflects Stahl's long-term commitment to innovation, customer proximity, and strategic growth across India and beyond. With its modern infrastructure and highly skilled workforce, the Ranipet facility is set to play a pivotal role in delivering sustainable, high-performance products, while reinforcing Stahl's presence in this vital growth region.



The reopening of the Ranipet facility reflects Stahl's long-term commitment to innovation, customer proximity, and strategic growth across India and beyond.

Date	Course	Place	Conducted by	Contact Details
FEB 02 – 20, 2026	BGAS Grade 2 Painting Inspector	Kochi	Blastline Institute	T: (484) 2408477 E: info@blastlineinstitute.com W: blastlineinstitute.com
FEB 09 – 27, 2026	CSWIP 3.1 Welding Inspector Level II	Kochi	Blastline Institute	T: (484) 2408477 E: info@blastlineinstitute.com W: blastlineinstitute.com
FEB 09 – MAR 07, 2026	BGAS Painting Inspector Course	Hyderabad	Imech Institute	T: (91) 9700008685 E: training@imech.in W: imechinstitute.com
FEB 16 – MAR 06, 2026	CSWIP 3.1 Welding Inspector Level II	Kochi	Blastline Institute	T: (484) 2408477 E: info@blastlineinstitute.com W: blastlineinstitute.com
FEB 16 – MAR 06, 2026	BGAS Grade 2 Painting Inspector	Kochi	Blastline Institute	T: (484) 2408477 E: info@blastlineinstitute.com W: blastlineinstitute.com
FEB 23 – MAR 13, 2026	CSWIP 3.1 Welding Inspector Level II	Kochi	Blastline Institute	T: (484) 2408477 E: info@blastlineinstitute.com W: blastlineinstitute.com
FEB 23 – MAR 13, 2026	BGAS Grade 2 Painting Inspector	Kochi	Blastline Institute	T: (484) 2408477 E: info@blastlineinstitute.com W: blastlineinstitute.com
MAR 01 – 27, 2026	FROSIO Coating Inspector Course	Singapore	HTS Coatings	T: (91) 9176618930 E: info@htscoatings.in W: frosiotraining.com
MAR 01 – 29, 2026	FROSIO Coating Inspector Course	Vung Tau, Vietnam	HTS Coatings	T: (91) 9176618930 E: info@htscoatings.in W: frosiotraining.com
MAR 01 – 31, 2026	FROSIO Coating Inspector Course	Chennai	HTS Coatings	T: (91) 9176618930 E: info@htscoatings.in W: frosiotraining.com
MAR 02 – 20, 2026	CSWIP 3.2 Welding Inspector Level III	Kochi	Blastline Institute	T: (484) 2408477 E: info@blastlineinstitute.com W: blastlineinstitute.com
MAR 23 – APR 10, 2026	CSWIP 3.1 Welding Inspector Level II	Kochi	Blastline Institute	T: (484) 2408477 E: info@blastlineinstitute.com W: blastlineinstitute.com
MAR 23 – APR 10, 2026	CSWIP 3.2 Welding Inspector Level III	Kochi	Blastline Institute	T: (484) 2408477 E: info@blastlineinstitute.com W: blastlineinstitute.com
MAR 30 – APR 18, 2026	BGAS Grade 2 Painting Inspector	Kochi	Blastline Institute	T: (484) 2408477 E: info@blastlineinstitute.com W: blastlineinstitute.com
MAR 30 – APR 24, 2026	BGAS Painting Inspector Course	Hyderabad	Imech Institute	T: ((91) 9700008685 E: training@imech.in W: imechinstitute.com
APR 06 – 24, 2026	CSWIP 3.1 Welding Inspector Level II	Kochi	Blastline Institute	T: (484) 2408477 E: info@blastlineinstitute.com W: blastlineinstitute.com

# New method could monitor corrosion and cracking in a nuclear reactor

MIT (Massachusetts Institute of Technology) researchers have developed a technique that enables real-time, 3D monitoring of corrosion, cracking, and other material failure processes inside a nuclear reactor environment.

This could allow engineers and scientists to design safer nuclear reactors that also deliver higher performance for applications like electricity generation and naval vessel propulsion.

During their experiments, the researchers utilized extremely powerful X-rays to mimic the behavior of neutrons interacting with a material inside a nuclear reactor.

They found that adding a buffer layer of silicon dioxide between the material and its substrate, and keeping the material under the X-ray beam for a longer period of time, improves the stability of the sample. This allows for real-time monitoring of material failure processes.

By reconstructing 3D image data on the structure of a material as it fails, researchers could design more resilient materials that can better withstand the stress caused by irradiation inside a nuclear reactor.

“If we can improve materials for a nuclear reactor, it means we can extend the life of that reactor. It also means the materials will take longer to fail, so we can get more use out of a nuclear reactor than

we do now. The technique we've demonstrated here allows to push the boundary in understanding how materials fail in real-time,” says Ericmoore Jossou, who has shared appointments in the Department of Nuclear Science and Engineering (NSE), where he is the John Clark Hardwick Professor, and the Department of Electrical Engineering and Computer Science (EECS), and the MIT Schwarzman College of Computing.

Studying real-time failure of materials used in advanced nuclear reactors has long been a goal of Jossou's research group.

“We are interested in watching the process as it happens. If we can do that, we can follow the material from beginning to end and see when and how it fails. That helps us understand a material much better,” he says.

For these experiments they studied nickel, a material incorporated into alloys that are commonly used in advanced nuclear reactors. But before they could start the X-ray equipment, they had to prepare a sample.

To do this, the researchers used a process called solid state dewetting, which involves putting a thin film of the material onto a substrate and heating it to an extremely high temperature in a furnace until it transforms into single crystals.



*By reconstructing 3D image data on the structure of a material as it fails, researchers could design more resilient materials that can better withstand the stress caused by irradiation inside a nuclear reactor.*

As the nickel heated up, it interacted with the silicon substrate and formed a new chemical compound, essentially derailing the entire experiment. After much trial-and-error, the researchers found that adding a thin layer of silicon dioxide between the nickel and substrate prevented this reaction.

But when crystals formed on top of the buffer layer, they were highly strained. This means the individual atoms had moved slightly to new positions, causing distortions in the crystal structure.

However, the team was surprised to find that keeping the X-ray beam trained on the sample for a longer period of time caused the strain to slowly relax, due to the silicon buffer layer. After a few extra minutes of X-rays, the sample was stable enough that they could utilize phase retrieval algorithms to accurately recover the 3D shape and size of the crystal.

“No one had been able to do that before. Now that we can make this crystal, we can image electrochemical processes like corrosion in real time, watching the crystal fail in 3D under conditions that are very similar to inside a nuclear reactor. This has far-reaching impacts,” he says.

“With our technique, engineers can use X-rays to tune the strain in microelectronics while they are manufacturing them. While this was not our goal with these experiments, it is like getting two results for the price of one,” he adds.

In the future, the researchers want to apply this technique to more complex materials like steel and other metal alloys used in nuclear reactors and aerospace applications. They also want to see how changing the thickness of the silicon dioxide buffer layer impacts their ability to control the strain in a crystal sample.

# Cooling paint harvests water from thin air

The research team led by Professor Chiara Neto created a porous polymer coating that reflects up to 97 percent of sunlight and radiates heat into the air, keeping surfaces up to six degrees cooler than the surrounding air even under direct sun. This process creates ideal conditions for atmospheric water vapour to condense into droplets on the cooler surface, the way steam condenses on your bathroom mirror.

Professor Neto from the University of Sydney Nano Institute and School of Chemistry said the findings could have far-reaching implications. "This technology not only advances the science of cool roof coatings but also opens the door to sustainable, low-cost and decentralized sources of fresh water – a critical need in the face of climate change and growing water scarcity," she said.

In the six-month long outdoor study conducted on the roof of the Sydney Nanoscience Hub, dew could be collected over 32 percent of the year and so could provide a sustainable and predictable supply of water even in periods with no rain. Under optimum conditions, the coatings can harvest up to 390 mL of water per square metre each day – enough for a 12-square-metre surface to supply the daily drinking needs of one person.

The study, published in *Advanced Functional Materials*, shows that passive cooling and atmospheric water capture can be integrated into a paint-like material for large-scale use.

Larger collection areas mean the paint could be versatile in industry: water for animals, for horticulture of high-value plants, for use in cooling by misting, or for use in hydrogen production. (About nine litres of water per kilogram of hydrogen is needed in electrolysis.)

Unlike traditional white paints, the porous coatings, made of polyvinylidene fluoride-co-hexafluoropropene, or PVDF-HFP, do not rely on ultraviolet-reflective pigments such as titanium dioxide.

"Our design achieves high reflectivity through its internal porous structure, delivering durability without the environmental drawbacks of pigment-based coatings," said Dr Ming Chiu, the study's lead author and Chief Technology Officer of Dewpoint Innovations. "By removing UV-absorbing materials, we overcome the traditional limit in solar reflectivity while avoiding glare through diffuse reflection. This balance between performance and visual comfort makes it easier to integrate and is more appealing for real-world applications."

Over the six-month outdoor trial, the team recorded cooling and water collection data minute-by-minute, confirming robust performance with no degradation under harsh Australian sun. Similar technologies have been shown to quickly deteriorate.

Beyond water harvesting, these coatings could help reduce urban heat island effects, lower energy needs for air-conditioning and provide climate-resilient water sources in regions facing growing heat and water stress.

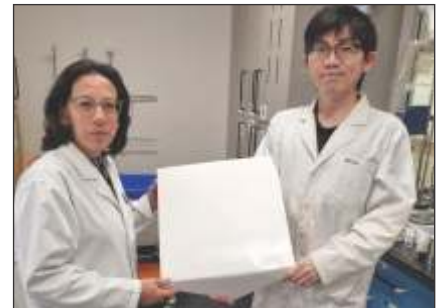
Professor Neto, also a member of the University of Sydney Net Zero Institute, said the research also challenges the assumption that dew collection only works in humid climates.

"While humid conditions are ideal, dew can form even in arid and semi-arid regions where night-time humidity rises. It's not about replacing rainfall but supplementing it – providing water where and when other sources become limited."

To bring the discovery from the lab to rooftops, Dewpoint Innovations is now developing a water-based paint formulation that can be applied using ordinary rollers or sprayers.

"At Dewpoint, we're proud to partner with the University of Sydney to bring this breakthrough in passive atmospheric water harvesting to life through advanced paint-based coatings," said Perzaan Mehta, CEO of Dewpoint Innovations.

"It's a scalable, energy-free solution that transforms



Professor Chiara Neto (left) and Dr Ming Chiu hold one of the experimental tiles with the paint-like substance in their labs at the University of Sydney.



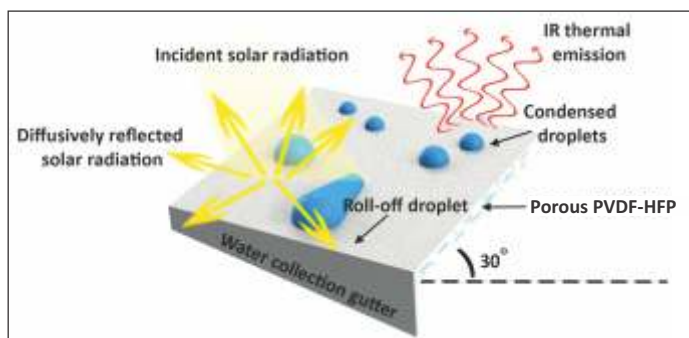
The location where the data collection took place, on the roof of a building on the University of Sydney campus.

rooftops and remote infrastructure into reliable sources of clean water, helping address an urgent challenge of our time."

With more than two million Australian homes already collecting rainwater, Professor Neto said dew-collecting roofs could complement existing systems.

"Imagine roofs that not only stay cooler but also make their own fresh water – that's the promise of this technology," she said.

The Neto group's innovation was licensed from the University of Sydney in 2022 to start-up company Dewpoint Innovations. Its commercial translation represents a significant step toward scalable, environmentally friendly solutions for water harvesting and passive cooling, with potential applications in the built environment, agriculture, remote communities, and urban infrastructure.



Cool roofs, cooler cities: Neto Group's paint innovation combats urban heat.

# New lightweight polymer film can prevent corrosion

MIT researchers have developed a lightweight polymer film that is nearly impenetrable to gas molecules, raising the possibility that it could be used as a protective coating to prevent solar cells and other infrastructure from corrosion, and to slow the aging of packaged food and medicines.

The polymer, which can be applied as a film mere nanometers thick, completely repels nitrogen and other gases, as far as can be detected by laboratory equipment, the researchers found. That degree of impermeability has never been seen before in any polymer, and rivals the impermeability of molecularly-thin crystalline materials such as graphene.

“Our polymer is quite unusual. It’s obviously produced from a solution-phase polymerization reaction, but the product behaves like graphene, which is gas-impermeable because it’s a perfect crystal. However, when you examine this material, one would never confuse it with a perfect crystal,” says Michael Strano, the Carbon P. Dubbs Professor of Chemical Engineering at MIT.

The polymer film, which the researchers describe in *Nature*, is made using a process that can be scaled up to large quantities and applied to surfaces much more easily than graphene.

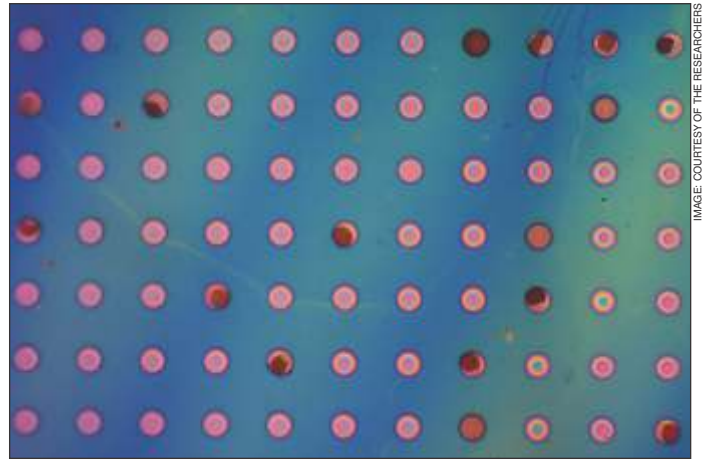
Strano’s lab first reported the novel material – a two-dimensional polymer called a 2D polyaramid that self-

assembles into molecular sheets using hydrogen bonds – in 2022. To create such 2D polymer sheets, which had never been done before, the researchers used a building block called melamine, which contains a ring of carbon and nitrogen atoms. Under the right conditions, these monomers can expand in two dimensions, forming nanometer-sized disks. These disks stack on top of each other, held together by hydrogen bonds between the layers, which make the structure very stable and strong.

That polymer, which the researchers call 2DPA-1, is stronger than steel but has only one-sixth the density of steel.

In their 2022 study, the researchers focused on testing the material’s strength, but they also did some preliminary studies of its gas permeability. For those studies, they created “bubbles” out of the films and filled them with gas. With most polymers, such as plastics, gas that is trapped inside will seep out through the material, causing the bubble to deflate quickly.

However, the researchers found that bubbles made of 2DPA-1 did not collapse – in fact, bubbles that they made in 2021 are still inflated. “The behavior of the bubbles didn’t follow what you’d expect for a typical, permeable polymer. This required us to rethink how to properly study and understand molecular transport across this new material,” says Ritt.



MIT researchers tested the gas permeability of their new polymer films by suspending them over microwells to form bubbles. Some bubbles from 2021 experiments are still inflated. This optical micrograph shows how the films form very colorful spots when suspended over microwells.

IMAGE COURTESY OF THE RESEARCHERS

“The fact that they can pack flat means there’s no volume between the two-dimensional disks, and that’s unusual. With other polymers, there’s still space between the one-dimensional chains, so most polymer films allow at least a little bit of gas to get through,” Strano says.

In addition to nitrogen, the researchers also exposed the polymer to helium, argon, oxygen, methane, and sulfur hexafluoride. They found that 2DPA-1’s permeability to those gases was at least 1/10,000 that of any other existing polymer. That makes it nearly as impermeable as graphene, which is completely impermeable to gases because of its defect-free crystalline structure.

Scientists have been working on developing graphene coatings as a barrier to prevent corrosion in solar cells and other devices. However, scaling up the creation of graphene films is difficult, in large part because they can’t be simply painted

onto surfaces.

On the other hand, the 2DPA-1 polymer sticks easily because of the strong hydrogen bonds between the layered disks. In this paper, the researchers showed that a layer just 60 nanometers thick could extend the lifetime of a perovskite crystal by weeks. Perovskites are materials that hold promise as cheap and lightweight solar cells, but they tend to break down much faster than the silicon solar panels that are now widely used. The films could also be applied to a variety of other structures.

“Using an impermeable coating such as this one, you could protect infrastructure such as bridges, buildings, rail lines – basically anything outside exposed to the elements. Automotive vehicles, aircraft and ocean vessels could also benefit. Anything that needs to be sheltered from corrosion. The shelf life of food and medications can also be extended using such materials,” Strano says.

# AMPP Chennai Chapter organizes Research Scholars Meeting on Electrochemistry, Corrosion and Coatings

The third edition of the Research Scholars Meeting on Electrochemistry, Corrosion and Coatings (RSM-ECC 3.0) was conducted on November 15, 2025 at Holiday Inn, OMR IT Expressway, Chennai, organized by the AMPP Chennai Chapter and hosted by the Metrohm India Pvt Ltd, Chennai.

The program served as a dedicated platform for young researchers working in corrosion science, electrochemistry, materials characterization and coatings technology. This edition saw the participation of 60 registered research scholars and students, along with professors, invited speakers and coordinators from Metrohm India, bringing the total strength to around 75 attendees, reflecting the growing interest in corrosion-related research in academic and industrial communities.

The event commenced with the welcome address by Dr S. C. Vanithakumari, followed by an overview of the symposium presented by Ms Athulya V. The presidential remarks were delivered by Prof M. Kamaraj, Chair, AMPP Chennai Chapter. The Chief Guest, Shri Deepak Parab, CEO & MD, Metrohm India shared his insights on the importance of industry-academia partnerships. Prof U. Kamachi Mudali, AMPP India Area Representative & AMPP Chennai Chapter Delegate joined the inaugural session online and addressed the gathering with a special message. The program also featured the virtual presence

of two distinguished experts Dr Sanjay Namdeo, Director of India Operations, AMPP and Prof Etsuro Ishigami, Researcher, Research Institute for Economics and Business Administration (RIEB), Kobe University, Japan whose remarks offered a global perspective and added significant value to the discussions.

Following the inaugural session, the program continued with a series of expert lectures delivered by eminent speakers.

□ Prof Radhakrishna G. Pillai, Dept of Civil Engineering, IIT Madras, Chennai, delivered the lecture on “Pursuing Purpose-Driven Research.”

□ Prof Srinivasa Rao Bakshi, Dept of Metallurgical and Materials Engineering, IIT Madras, spoke on “Futuristic Technologies for Materials Protection and Performance.”

□ Prof T. M. Sridhar, Dept of Analytical Chemistry, University of Madras, delivered a detailed lecture on “The Rise of MOFs: Designing Advanced Coatings for Superior Corrosion Resistance.”

□ Prof K. G. Pradeep, Dept of Metallurgical and Materials Engineering, IIT Madras, discussed “Emerging Trends in Novel Materials for Advanced Corrosion Protection.”

□ The final lecture of the morning session was delivered by Prof S. Ramanathan from the Department of Chemical Engineering, IIT Madras, who provided practical insights



Participants at the Research Scholars Meeting on Electrochemistry, Corrosion and Coatings held in Chennai recently.

through his talk on “Do's and Don'ts in Electrochemical Testing and Analysis.” His session was followed by a live demonstration of electrochemical experiments, which offered hands-on learning for the participants.

After the expert lectures and live demonstrations, the meeting proceeded with the technical presentation session, where research scholars from various institutions presented the outcomes of their ongoing work, including machine-learning-assisted corrosion prediction, galvanic protection modelling, superhydrophobic coatings for marine applications, smart bio-ceramic coatings for implants, corrosion behaviour in reinforced concrete, molten-salt corrosion studies, advanced super-capacitor materials, and corrosion initiation mechanisms in galvanized rebars. The diversity and quality of the presentations demonstrated strong research activity across participating institutions such as IIT Madras,

IGCAR, University of Madras, Sathyabama Institute of Science and Technology and BSA Crescent Institute of Science and Technology.

The program concluded with remarks from senior AMPP members, followed by certificate distribution to all attendees and presenters. The organizing committee expressed gratitude to Metrohm India for their technical coordination and support throughout the event. The dedicated involvement of faculty mentors and student volunteers contributed significantly to the smooth and successful conduct of the meeting. RSM-ECC 3.0 created an engaging environment for scientific interaction, peer learning and collaboration among emerging researchers. The event strengthened AMPP Chennai Chapter's mission to promote corrosion education, research and professional development, and set the stage for more extensive and impactful programmes in the future.

# CHINACOAT2025 records rising attendance!

A Global Platform for Future Tech CHINACOAT2025 successfully concluded on November 25 – 27, 2025 at the Shanghai New International Expo Centre (SNIEC), Shanghai, P.R. China. Recording rising attendance as well as exhibiting figures once again this year, the exhibition reinforces its position as a global platform for cooperation, knowledge exchange and business opportunities.

□ Exhibition Scale: The exhibition covered 105,100 m<sup>2</sup>, making the largest edition in its 29-year history.

□ Visitor population: A total of 45,024 from 125 countries / regions, including 37,719 from Chinese Mainland and 7,305 from overseas, setting a new attendance benchmark.

□ Exhibitor figures: 1,464 Exhibitors from 30 countries / regions participated, representing a 10.5% increase compared with 2024, among which 257 were new exhibitors (17.6% of Total).

□ Onsite technical programs: 1,378 attendees took part in 30 technical seminars and 2 country presentations

exploring Thailand and Vietnam coatings markets.

The exhibition drew enthusiastic participation from a global audience. Compared with the 2024 Guangzhou edition, total number of visitors rose by 7%, while overseas attendance surged by an impressive 39.6%. In addition, the concurrent Technical Programmes offered attendees first-hand opportunities to explore industry trends and exchange knowledge.

Findings from onsite visitor surveys further underscored that the exhibition was highly acclaimed:

□ 96.5% acknowledged the exhibition's significant scale;

□ 96.4% reported a positive overall impression of the event;

□ 96.4% praised the high technical level of the concurrent technical programs;

□ 95.1% found the products and technologies on display attractive;

□ 92.7% agreed the exhibitor mix was comprehensive and reputable.



CHINACOAT2025 also received strong endorsements from exhibitors, who recognized it as a global business platform. The total number of exhibitors grew by 10.5% year on year, reflecting the exhibition's expanding appeal. Many exhibitors highlighted that the exhibition enabled them to effectively introduce their products and technology innovations, while also facilitating peer networking. Survey findings further confirmed exhibitors' satisfaction with the event:

□ 100% affirmed the exhibition was one of their important marketing activities in China and Asia;

□ 98.7% endorsed its role in strengthening brand or corporate image;

□ 98.2% expressed it helped consolidate existing sales channels and customer relationships;

□ 97.9% agreed it served to develop new markets, find new customers and build relationships with prospects;

□ 96.1% opined it was an effective platform for promoting new products or services.

This year, CHINACOAT

concurrently held the Technical Program which featured 30 technical seminars & webinars and 2 country presentations, both of which drew strong participation.

The 2 Country Presentations were delivered by Mr Sucharit Rungsimuntoran, Committee Advisor to Thai Paint Manufacturers Association (TPMA) and President & CEO of Colossal International Co., Limited, and Mr. Vuong Bac Dau, Vice Chairman of Vietnam Paint - Printing Ink Association (VPIA). Both sessions achieved attendance rates exceeding 150%, demonstrating the strong demands for enterprises to go overseas. Looking ahead, the CHINACOAT series of exhibition will continue to bring similar high-value activities to the global coatings community.

The next CHINACOAT exhibition is scheduled to take place from November 11 – 13, 2026 at Area A of the China Import and Export Fair Complex, Guangzhou, P.R. China. Visit [www.chinacoat.net](http://www.chinacoat.net) for more details.



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# HANNOVER MESSE 2026: How industry masters change

HANNOVER MESSE, Germany, runs from April 20 – 24, 2026. As the world's leading trade fair for manufacturing, it presents all key technologies for industrial transformation – from automation and digitalization to energy systems and research and development.

Technology transfer is essential for manufacturing companies to remain competitive, because research enables new digital tools, innovative material and scalable production processes, notes a press release from the organizers. HANNOVER MESSE brings theory and practice together, promoting cooperation between industry, science and politics.

Industry is facing a historic transformation – driven by global competition, rising costs and artificial intelligence. HANNOVER MESSE 2026 shows how companies can turn these challenges into opportunities. With a new thematic structure, optimized visitor navigation, expanded networking options, and a strong focus on artificial intelligence, the show provides even greater value

and a more targeted experience for exhibitors and attendees alike.

Global competition, rising cost pressure and the dynamics of artificial intelligence (AI) present industry with its biggest transformation challenge yet. In this phase of change, companies in the manufacturing sector need a platform to showcase innovation, share knowledge and highlight best practices. HANNOVER MESSE 2026 takes on precisely this role, demonstrating how automation, digitalization, energy systems, and research can work together to ensure competitiveness.

A new thematic area focuses on production technologies for the defense sector, with exhibitors showcasing specific solutions to help defense manufacturers scale up production in the shortest possible time without compromising on security.

“At HANNOVER MESSE, attendees from industry learn how companies can succeed in this phase of rapid industrial transformation,” says Dr Jochen Köckler,

Chairman of the Managing Board of Deutsche Messe AG. “From mechanical engineering to the automotive and electrical industries, decision-makers find solutions here that drive efficiency, sustainability, resilience, and competitiveness. In short: HANNOVER MESSE highlights the path to the automated, digital, and AI-driven factory.”

Over 3,500 exhibiting companies from the electrical engineering, mechanical engineering, digital, and energy sectors come together there to present solutions for competitive and sustainable industry. The main exhibition areas are Automation & Digitalization, Energy & Industrial Infrastructure, and Research & Technology Transfer. A diverse conference program enhances the fair.

The exhibiting companies include global tech giants such as AWS, Microsoft, SAP, Schneider Electric and Siemens, as well as technology leaders from the SME segment, for example Beckhoff, Festo, HARTING, ifm, LAPP, Phoenix Contact, Rittal, Schaeffler, and SEW. Prominent research institutes such as the Fraunhofer and KIT (Karlsruhe Institute of Technology) outline the industrial solutions of tomorrow, while more than 300 startups from various technology fields showcase innovations with disruptive potential.

A key innovation is the realigned thematic structure and new hall layout. For attendees, this means more direct orientation; for exhibitors, greater visibility in the

relevant environment.

Besides the new hall layout, HANNOVER MESSE 2026 offers new knowledge-sharing and networking formats, delivering even greater depth of content. This allows experts and users to exchange ideas on specific challenges and their solutions in a hands-on way. From master classes and expert forums to matchmaking and the Center Stage, the new offerings cement the show's role as a central hub for business, innovation and networking.

The Center Stage brings together leading minds from industry, politics and science. Through keynotes and panel discussions, it addresses the major questions of our time: How can we achieve the breakthrough to carbon-neutral production? What role does AI play in industrial value creation? And how can Europe and its partners secure their technological sovereignty?

On stage, companies from the automotive, food, furniture, and chemical industries, among others, provide insights into their factories – demonstrating how they conceptualize and successfully implement automation, digitalization and energy efficiency in their manufacturing operations.

Brazil is Partner Country at HANNOVER MESSE 2026. The country offers vast potential – from green energy and raw materials right through to a fast-growing industrial market. More than 1,500 German companies are already active there, accounting for around ten percent of Brazil's industrial output.





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# EuroBLECH 2026 gains momentum as exhibitors commit early and new features launch

EuroBLECH 2026, organized by RX, the 28<sup>th</sup> edition of the exhibition, will take place October 20 – 23, 2026, continuing its legacy as the world's leading exhibition for sheet metal working technology.

For the first time, at-event rebooking was introduced, enabling exhibitors to secure their stand space for 2026 while still at the 2024 show. As a result, a substantial portion of space has already been allocated across the nine halls of the Hanover Exhibition Grounds, notes a press release from the organization.

“The enthusiasm we saw from exhibitors rebooking at EuroBLECH 2024 was a strong signal of confidence in the event,” said Evelyn Warwick, Exhibition Director for EuroBLECH on behalf of RX.

“While the broader market remains challenging, EuroBLECH remains the most important global platform for showcasing sheet metal innovation. With new features launching and continued demand for cutting-edge, sustainable, digitalized and AI-enabled solutions, the event is evolving alongside the industry itself.”

The EuroBLECH 2026 theme, 'For a Stronger Future – Smart & Sustainable Production,' reflects the industry's ongoing transformation as it pursues greater efficiency, flexibility, and resilience. From AI-enabled workflows and robotics to laser innovations and circular manufacturing,



*EuroBLECH remains the most important global platform for showcasing sheet metal innovation.*



PHOTO: EUROBLECH

the 2026 edition will spotlight the technologies, tools, and strategies shaping a stronger, more sustainable future for sheet metal working worldwide.

EuroBLECH 2024 welcomed 1,317 exhibitors and 38,946 trade visitors from 114 countries, occupying a gross exhibition space of 160,000sqm. These figures reinforce the event's continued importance as a truly global meeting point for sheet metal working professionals.

With 81% of visitors involved in purchasing decisions and a high proportion actively seeking new suppliers or partners, the exhibition continues to deliver measurable business value for participants.

EuroBLECH 2026 introduces several new and enhanced features to deepen engagement and support more targeted business opportunities:

**Innovation zone** – A dedicated space spotlighting emerging

technologies, applied research, and system-ready concepts that are shaping the future of sheet metal working.

**Job shop & subcontractors' market** – A dedicated space for fabrication centres and subcontracting manufacturers to connect with visitors from OEMs and other manufacturing sectors to discover flexible, high-quality partners for outsourced production needs.

**Automotive guided tours** – Structured routes tailored to the automotive sector, helping Automotive OEMs connect with relevant technologies and suppliers. These complement the returning Guided Tours, which support focused, high-value visitor journeys.

**NextGen Technology Stage & EuroBLECH Awards** – The NextGen Technology Stage will once again host expert-led sessions on automation, digitalization and sustainability, and AI.

Alongside, the EuroBLECH Awards return with six

categories celebrating standout achievements, with Award Trails guiding visitors to shortlisted exhibitors.

The revamped Visitor App has been updated to assist visitors in navigating the show, bookmarking exhibitors, and planning their day more effectively.

**Careers Day** – A dedicated day to connect students, apprentices and young professionals with hiring businesses. The initiative supports workforce development and provides insights into careers across the sheet metal working industry.

These additions reinforce EuroBLECH's role not just as a marketplace, but as a platform for progress, connecting today's buyers with tomorrow's solutions.

Companies looking to exhibit at EuroBLECH 2026 can now explore stand options and packages, including the popular myEuroBLECH Easy Package and the First-Time Exhibitor Package for newcomers to the show.

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JAN 26 – 27, 2026	MARITIME MAINTENANCE AND COATING CONFERENCE & EXPO	Kempinski Al Othman Hotel Al Khobar, Saudi Arabia	Aldrich International	E: marketing@marinecoat.com W: marinecoat.com
JAN 26 – 29, 2026	5 <sup>th</sup> MECOC EXPO	Rixos Marina, Abu Dhabi, UAE	Aldrich International	T: +971 4 837 4300 E: register@mecocmiddleeast.com W: mecoexpo.com
FEB 03 – 06, 2026	SURFACE ENGINEERING COATING & CORROSION WORLD EXPO 2026	Bombay Exhibition Centre, Mumbai, India	Chemtech Foundation	T: (+91 22) 40373636 E: sales@jasubhai.com W: chemtech-online.com
FEB 19 – 21, 2026	PAINTINDIA	Bombay Exhibition Centre, Mumbai, India	NürnbergMesse India Pvt. Ltd	T: (+91 22) 62165323 E: paintindia.expo@colorpub.in W: nm-india.com
MAR 15 – 19, 2026	AMPP ANNUAL CONFERENCE + EXPO	Houston, Texas, USA	AMPP	W: ace.ampp.org
APR 06 – 08, 2026	INDIA PAINT & COATING EXPO	Bangalore International Exhibition Centre Bengaluru, India	Media Day Marketing	E: expo@mediaday.co.in W: paintandcoatingexpo.com
APR 08 – 09, 2026	MOBILITY MANUFACTURING & MATERIALS EXPO (3ME)	Autocluster Exhibition Centre, Pune, India	Threefold	T: (+91) 9910760143 E: islam@threefold.in W: 3mexpo.com
APR 14 – 16, 2026	MIDDLE EAST COATINGS SHOW	Dubai Exhibition Centre, Expo City Dubai, UAE	dmg events	T: +971 4 4453773 E: paddyoneill@dmgevents.com W: asiapacificcoatingsshow.com
APR 14 – 17, 2026	PAINTEXPO 2026	Karlsruhe, Germany	Leipziger Messe	M: +91 9166565118 E: b.verma@leipziger-messe.de W: paintexpo.com
APR 20 – 24, 2026	HANNOVER MESSE	Hannover, German	Deutsche Messe AG	T: (91) 9920018008 E: divya.lad@hmf-india.com W: hannovermesse.de/en/
MAY 05 – 07, 2026	AMERICAN COATINGS SHOW AND CONFERENCE	Indiana Convention Center, Indianapolis, Indiana, USA	American Coatings Association	E: cmatthews@paint.org W: american-coatings-show.com
MAY 05 – 07, 2026	SURFACE TECHNOLOGY GERMANY 2026	Stuttgart Exhibition Centre, Stuttgart, Germany	Deutsche Messe	E: info@messe.de W: messe.de
JUN 11 – 13, 2026	EXPO PAINT AND COATINGS 2026	Chennai Trade Centre Chennai, India	Toredo Fairs India Pvt Ltd	T: +91 9341928011 E: info@expopaintcoating.in W: expopaintcoating.in
JUN 17 – 19, 2026	PAINTISTANBUL 2026	Istanbul Expo Center, Türkiye	CNG Expo	M: +90 (0) 549 749 55 05 E: info@cngexpo.com W: paintistanbul.net
AUG 26 – 28, 2026	ASIA PACIFIC COATINGS SHOW	Jakarta International Expo, Indonesia	dmg events	T: +971 4 4453773 E: paddyoneill@dmgevents.com W: asiapacificcoatingsshow.com
SEP 06 – 10, 2026	Eurocorr 2026	Convention Centre, Dublin, Ireland	European Federation of Corrosion	T: +44 (0) 2074517303 E: eurocorr2026@iom3.org W: eurocorr2026.org

*Please note, schedules are subject to last minute changes.*

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