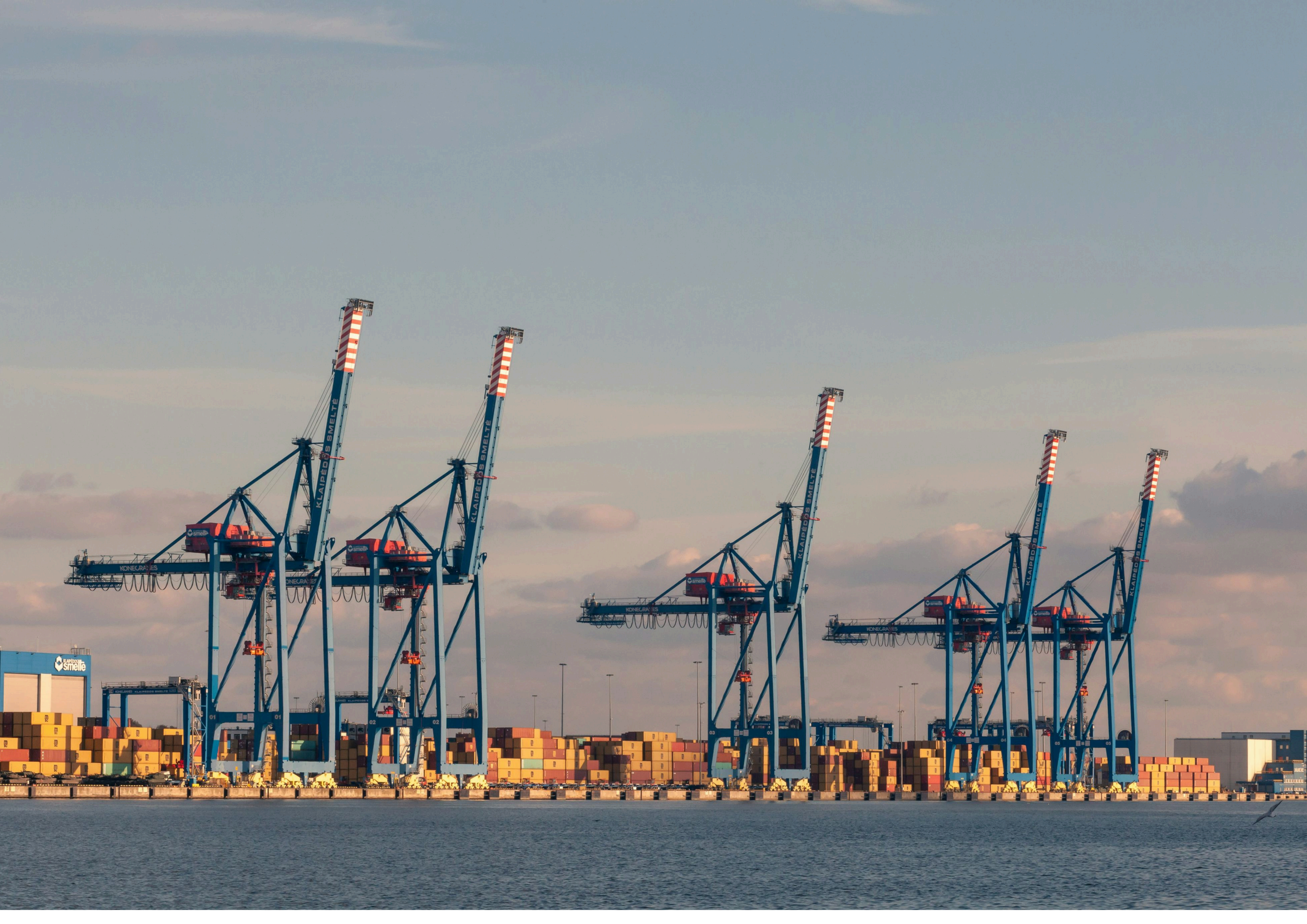
HEMPEL
Trust is earned

Crane protection guide

Adoption of new technologies to protect port cranes

It's time to **AVANTGUARD**



Introduction

Port cranes are the beating heart of global trade. Every container lifted, every shipment transferred, and every vessel turned around depends on their reliability. Yet they face accelerated degradation due to constant exposure to harsh marine environments.

With port cranes designed to operate uninterrupted for 20-30 years, downtime is costly and poorly tolerated. Protective coating technologies are therefore required to ensure long-term structural integrity and operational continuity, while also preserving visual appeal for investors and stakeholders.

This guide outlines how port owners can specify next-generation protective coatings — such as Avantguard® — **to safeguard crane operations economically, sustainably, and with proven performance advantages.**

What you need to know when **specifying protective coatings**

As a port owner, your role is multifaceted — and specifying protective coatings can easily seem like a minor part of your broader responsibilities.

But here's the thing: corrosion is often underestimated because its impact is gradual — but its consequences are profound. Left unaddressed, corrosion can compromise structural integrity, drive up maintenance costs, shorten asset lifespans, and ultimately erode profitability. Protecting cranes from corrosion is therefore both a business imperative and a sustainability obligation — ensuring they remain safe, efficient, and reliable year after year.

Additionally, expectations for fully operational, compliant, and visually appealing port cranes are growing. This makes it more important than ever to understand the parameters that matter when specifying protective coatings.

Three things to consider before specifying protective coatings:

1 Be careful about relying on old specifications

Stay informed about the latest industry standards and technological developments to future-proof your specifications. Specifications based on old standards or outdated manufacturer recommendations risk overlooking advancements in materials or compliance requirements.

2 Know the relevant standards – ISO 12944

One critical benchmark is the internationally recognised ISO 12944, which outlines performance requirements for protective coating systems in corrosive environments. It offers a baseline to ensure specifications meet global expectations, while local standards and regulatory requirements must also be considered. However, beyond ISO 12944, real-world validation remains a key consideration.

Learn more about the ISO standard here ›

3 Seek proven, field-tested technologies

Coatings that exceed the ISO 12944 standard can offer added assurance. ISO testing does not reflect real-world operational wear, so consider solutions backed by long-term field performance data aligned with modern port demands.

Trends happening in **the port industry right now**

Ports today face a new set of challenges. With rising pressure to stay efficient, sustainable, and investment-ready, it's more important than ever to understand what's shaping the industry — and how it impacts your coating decisions.

Zero tolerance for downtime

In today's just-in-time supply chains, even short periods of crane downtime can have a cascading effect on operations, causing vessel delays, congestion at the terminal, dissatisfied customers, and significant financial losses. Every hour a crane is idle translates directly into lost throughput and reduced competitiveness.

Sustainability pressure

Ports are under increasing scrutiny to decarbonise and reduce environmental impact. Cranes are highly visible assets, and premature replacement or frequent repairs due to corrosion undermines sustainability goals by increasing resource use, waste, and carbon emissions across the lifecycle.

Growth and expansion

Global trade volumes continue to rise, and ports are expanding to meet demands. Investors and stakeholders increasingly prioritise terminals that demonstrate operational resilience and asset longevity. A well-protected fleet of cranes signals both stability and forward-thinking asset management, making ports more attractive for long-term investment.

Reputation and compliance

Beyond efficiency and sustainability, ports must adhere to regulatory standards and maintain a reputation for reliability. Corrosion-related failures not only increase costs but also risk damaging the port's credibility in the eyes of shipping lines, investors, and regulators alike.

By understanding what's driving change, you can make more informed decisions about corrosion protection that supports both operational goals and long-term asset value.

Make your port cranes look **good for longer**

With investors keeping a close eye on future-ready ports, it's important that your hard-working cranes not only perform seamlessly — but also look good. A clean, professional appearance signals reliability, care, and long-term thinking. To get there, it all comes down to what's underneath the surface. True, lasting protection requires a full coating system:

1.

Primer

A primer sticks firmly to the metal surface, creating a solid base for the next layers of coatings to attach to. One corrosion protection approach involves the use of an activated zinc-rich primer, in which the zinc corrodes preferentially to protect the steel, acting as a barrier that prevents rust formation on the metal surface.

2.

Intermediate coat

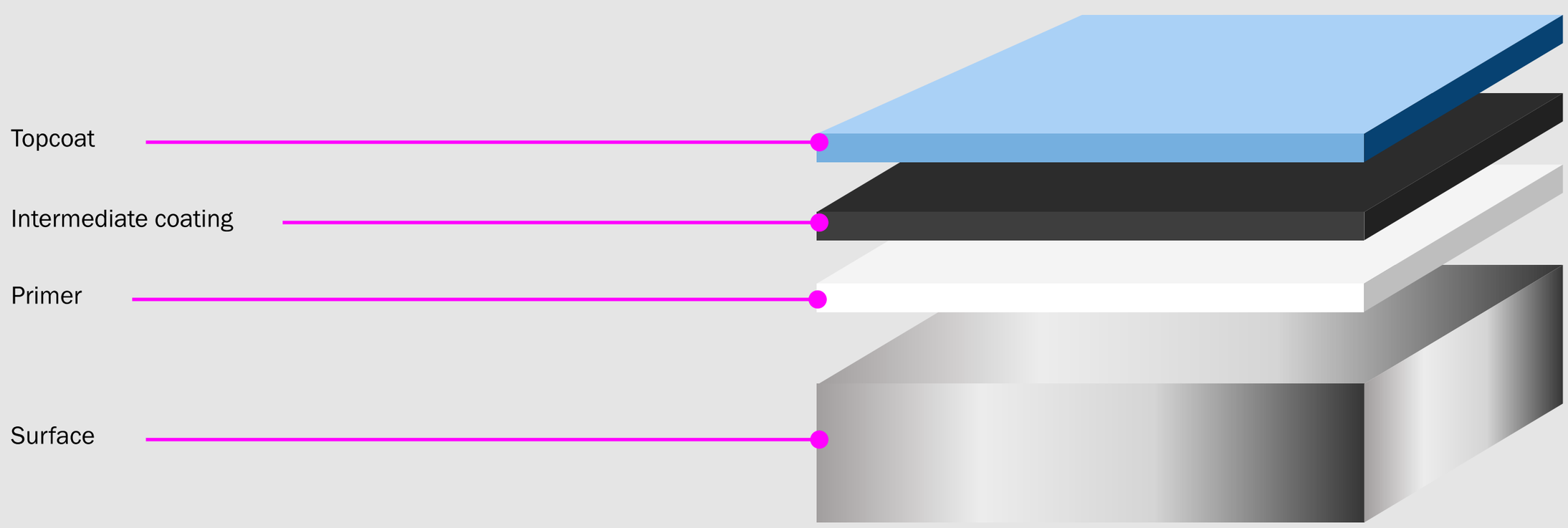
A high solids epoxy midcoat ensures excellent intercoat adhesion between the primer and topcoat layers, contributing to the overall corrosion resistance and longevity of the protective system. Midcoats with a high-solids formulation enable the specified film thickness to be achieved with reduced paint consumption, supporting more sustainable coating practices.

3.

Topcoat

A polyurethane topcoat provides long-term UV resistance to prevent chalking and fading, maintaining colour and gloss retention in exposed environments. It serves as the final protective layer, offering an aesthetic finish while safeguarding the system against weathering and environmental degradation.

Here's what a coating system could look like:



As we like to say: a great finish starts with a solid base. The primer is the foundation that ensures everything above it works as intended.

And when it comes to primers, not all are created equal — each type brings its own unique protection mechanisms.

The different **types of primers**

Zinc-free primers

Zinc-free epoxy primers protect by forming a dense, impermeable barrier that blocks moisture, oxygen, and contaminants — but unlike zinc-rich primers, they offer no sacrificial protection if the coating is damaged.

Zinc-rich primers

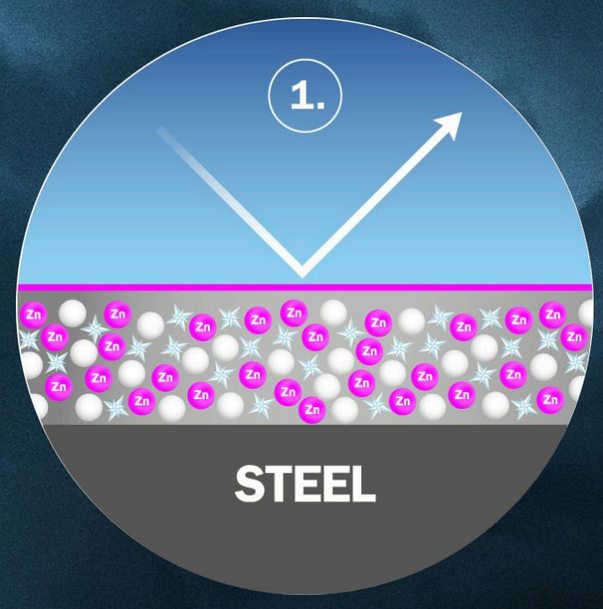
In contrast, zinc-rich epoxy primers offer a distinctive advantage: they provide sacrificial protection, meaning the zinc corrodes preferentially, shielding the underlying steel from damage.

Activated zinc-rich primers

Activated zinc-rich primers are advanced protective coatings that combine zinc, special activators, and barrier materials to deliver three layers of corrosion defence.

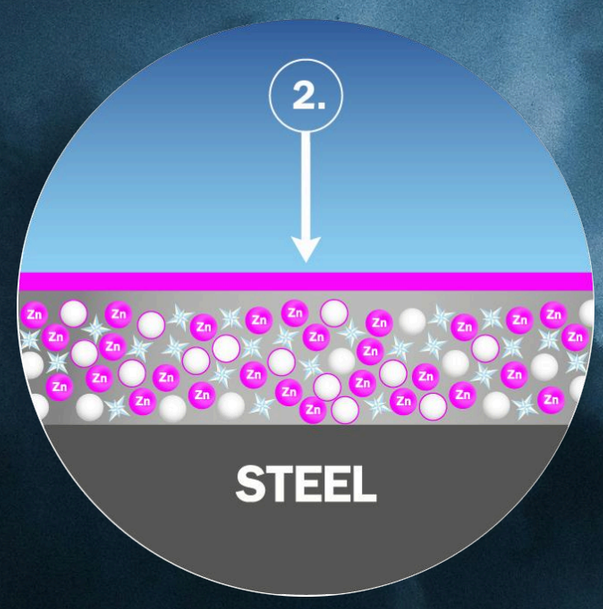
Withstanding the harshest **conditions with Avantguard®**

Port cranes operate in some of the toughest environments on earth — constant exposure to saltwater spray, heavy humidity, abrasive cargo, and high mechanical stress. To withstand these conditions, we recommend Avantguard as a primer, due to its triple-activated protection technology:



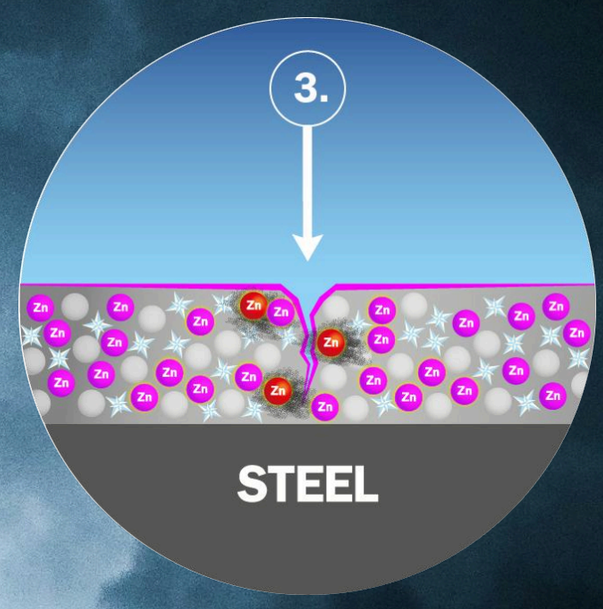
Barrier effect

Creates a physical shield against moisture and oxygen, preventing them from reaching the steel surface.



Inhibitor effect

Actively slows down corrosion reactions by chemically neutralising corrosive agents.



Galvanic effect

Provides sacrificial protection by allowing zinc to corrode preferentially, safeguarding the underlying steel.

What makes Avantguard® unique is its patented formulation, which combines zinc, hollow glass spheres, and a proprietary activator. This design achieves triple zinc activation, meaning more of the zinc is actively engaged in protecting the steel.

As a result, the galvanic effect is dramatically boosted, ensuring far greater durability than conventional zinc-rich primers while also reducing raw material demand and minimising waste.

This leads to a step-change in performance: steel structures stay intact for longer, with the option for fewer coats needed and less material consumed — supporting both economic efficiency and sustainability goals.

Performance benefits **for port cranes**

For port owners, this innovation translates into clear operational advantages:

Extended durability in marine conditions

Avantguard is proven to withstand salt-laden air, high humidity, and abrasive port activity without premature degradation.

Protection for a crane's full lifetime

OEM warranties usually cover 5-7 years, but Hempel offers extended warranties on Avantguard*, which delivers protection that can last for the crane's full service life of around 20-30 years.

Reduced maintenance and downtime

Fewer repainting cycles mean less crane downtime and lower lifetime costs.

Superior handling and transport resilience

Avantguard demonstrates excellent performance under mechanical stress, ensuring coatings endure through transport, assembly, and heavy handling.

Flexibility across crane fleets

Avantguard strengthens both new cranes at procurement stage and aging cranes requiring refurbishment, extending their service life.

Compliance and reputation

By exceeding industry standards and demonstrating performance through extensive data, Avantguard ensures port assets meet rigorous safety and quality expectations, building confidence with shipping lines and investors.

* Extended warranties for Avantguard apply only when used in approved systems and meet Hempel's warranty conditions.

Lifetime crane quality-checks

Protective coatings deliver the best results when combined with proactive asset management from new build through the full service life. Through application support and supervision during construction, as well as lifetime crane quality checks, we help ensure coatings are correctly applied and continue to perform under evolving port conditions. This enables early risk identification, timely intervention, and maximised return on protective investments.

Avantguard 750 Pro
– tailored for port environments

Within the Avantguard line, Avantguard 750 Pro has proven particularly effective in marine and industrial environments with high corrosion risk. For port operators, this coating provides:

1 **A robust solution for new crane investments, ensuring long-term protection from day one.**

2 **A reliable upgrade path for existing cranes, helping extend their operational lifetime without costly structural replacements.**

3 **3-coat performance in just two layers, reducing material use, speeding up application, and lowering total project costs.**

By safeguarding cranes at all stages of their lifecycle, Avantguard 750 Pro enables port owners to protect throughput, efficiency, and reputation.

Decarbonise your port with **better crane protection**

Protecting port cranes from corrosion is central part of building sustainable and future-ready port operations. Every repair, every premature replacement, and every additional layer of coating carries a carbon cost.

How advanced protective coatings reduce environmental impact:

REDUCING MATERIAL USE

Traditional zinc-rich systems often require multiple coats and frequent touch-ups. Avantguard® delivers superior protection with fewer coats and less frequent repainting cycles, cutting the amount of steel preparation, paint, and other resources consumed over the crane's lifetime.

OPTIMISED ZINC UTILISATION

Zinc is a finite and resource-intensive material. Thanks to its patented activator technology, Avantguard® achieves triple zinc activation, meaning more of the zinc is actively engaged in protecting the steel. This optimisation reduces raw material demand and minimises waste.

SIMPLER APPLICATION PROCESSES

Avantguard®'s wide application temperature window and surface tolerance reduce the need for intensive surface preparation, strict application conditions, and corrective rework. By simplifying each coating operation, it lowers the supporting resource and energy demand associated with the application process itself.

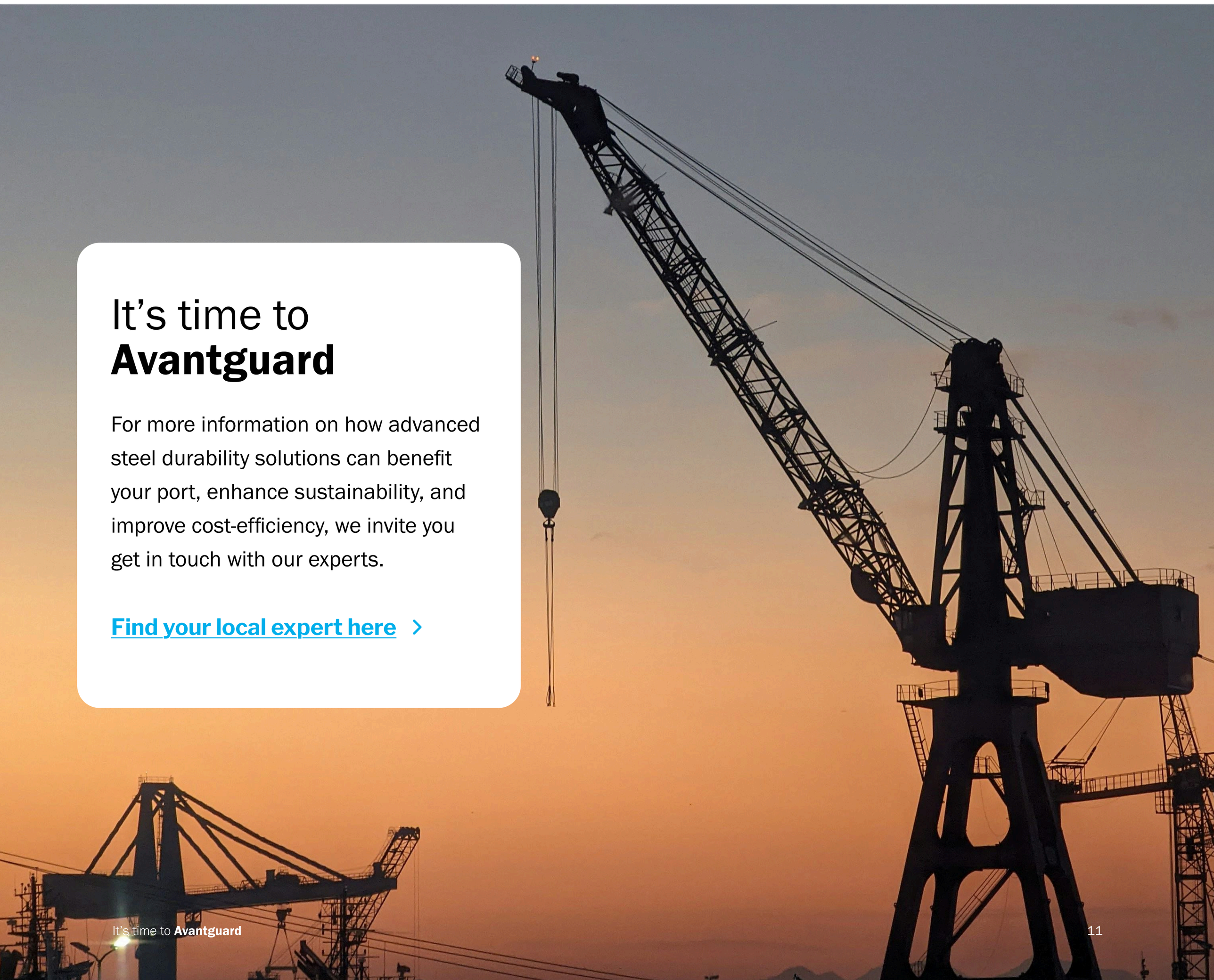
REDUCED VOC EMISSIONS

Ports play a key role in ensuring safe and sustainable operations. By specifying Avantguard® primers, they help protect applicators' health and reduce air pollution during coating application. This proactive approach supports compliance and demonstrates responsible leadership in port development.

Conclusion

For port owners, specifying protective coatings for cranes is about more than corrosion resistance — it's about avoiding costly downtime, prolonging asset life, meeting sustainability commitments, and making your cranes look good for longer.

Avantguard represents the next generation of corrosion protection technology, exceeding existing standards by activating three proven methods of defence. By specifying advanced protective coatings, port owners position their port to meet the growing pressures of global trade.



It's time to **Avantguard**

For more information on how advanced steel durability solutions can benefit your port, enhance sustainability, and improve cost-efficiency, we invite you get in touch with our experts.

Find your local expert here ›

About Hempel

As a world-leading supplier of trusted coating solutions, Hempel is a global company with strong values, working with customers in the decorative, marine, infrastructure and energy industries. Hempel factories, R&D centres and stock points are established in every region.

Across the globe, Hempel's paints and coatings can be found in almost every country of the world. They protect and beautify buildings, infrastructure and other assets, and play an essential role in our customers' businesses. They help minimise maintenance costs, improve aesthetics and increase energy efficiency.

At Hempel, our purpose is to shape a brighter future with sustainable coating solutions. We firmly believe that we will succeed as a business only if we place sustainability at our heart. Not only is it the right thing to do, it will strengthen our competitive position, make ourselves more resilient and reduce our risk.

Hempel was founded in Copenhagen, Denmark in 1915. It is majority owned by the Hempel Foundation, which ensures a solid economic base for the Hempel Group and supports cultural, social, humanitarian and scientific purposes around the world.

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