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Standards and the adoption of

new technologies in corrosion protection

It's time to **AVANTGUARD**

Introduction

As the construction industry strives to balance traditional, proven methods with innovative and green technologies, the role of standards in supporting emerging practices becomes increasingly important.

Industry standards are essential for ensuring the durability of steel structures by providing valuable guidelines for corrosion protection. However, to truly advance sustainability, there is a need to shift focus from traditional practices towards embracing new technologies that more effectively address environmental challenges.

This paper will guide you on how to fully leverage industry standards such as ISO 12944 to better support the exploration and validation of more sustainable technologies while maintaining the required quality levels.

Balancing tradition and innovation in industry standards

Industry standards are consensus-based guidelines that outline best practices for specific purposes such as ensuring quality, service delivery, and environmental protection. In the field of corrosion protection of steel, these standards provide comprehensive guidelines and set a baseline for quality and performance, ensuring that protective measures meet the required durability for different corrosive environments. However, since they often rely on long-established practices, these standards may reflect traditional technologies and methodologies that do not always represent the latest advancements in anti-corrosion technologies available in the market.

For instance, ISO 12944 is widely recognised as the most commonly used international standard for corrosion protection of steel structures using protective paint systems. The standard outlines specific requirements for materials and methods used in corrosion protection. It is divided into nine parts, covering topics from terminology to specific requirements for different environments and types of structures.

The latest revisions of ISO 12944 brought significant updates, including the introduction of a new durability category for very high durability (>25 years) and a new corrosivity category (CX) for extreme atmospheric conditions in offshore.

However, despite its latest revision, the focus remains largely on the traditional requirements for protective coating systems, rather than encouraging the adoption and use of innovative corrosion protection technologies.

To illustrate, ISO 12944 Part 5 (Protective coating systems) specifies requirements such as a minimum zinc content for zinc-rich primers, a minimum number of coats (MNOC), and a nominal dry film thickness (NDFT). This framework is designed to ensure consistency and reliability in corrosion protection, aiming to meet performance levels that reflect the experience and technology available at the time. However, it unintentionally impacts the flexibility needed in any industry to introduce new technologies in an effective way that can lead to important and beneficial innovations.

Need for a **paradigm shift**

The adoption of new technologies requires a paradigm shift in how the standard is used. The industry should move beyond its heavy reliance on ISO 12944 Part 5, which focuses on the paint and paint system used for corrosion protection of steel structures, and place equally or greater emphasis on ISO 12944 Part 6 (Laboratory performance test methods).

An important step in this direction was already taken with the 2018 revision of ISO 12944, which acknowledged the need for greater flexibility and innovation according to the following statement:

> New innovative coating technologies ... may provide equivalent corrosion protection at lower NDFT and/or reduced MNOC compared to the current coating technologies covered in this standard. Performance of these new coating technologies should be proven by a combination of experience (field applications...) and laboratory testing according to ISO 12944-6 which should be carried out and reported by an independent test laboratory

Source: International Organization for Standardization

This statement is crucial as Part 6 provides rigorous testing protocols to ensure that the performance of the selected coating system meets the standard, without imposing restrictions on new technologies. In other words, part 6 enables the industry to explore and validate new technologies that more effectively address environmental and economic challenges.

There are numerous standards in the industry which have not yet addressed the required paradigm shift. ISO 12944 is an example of a standard that initiated the journey to find the balance between traditional solutions and novel technologies against corrosion contributing to the UN Sustainable Development Goals (SDGs). While still defining the coating types and systems in Part 5, it now stresses the need to meet the performance criteria defined in Part 6.

In summary, while standards like ISO 12944 are essential for ensuring reliable corrosion protection, the current emphasis on Part 5 poses challenges to the adoption of new coating technologies and systems. Shifting more attention to Part 6 can help overcome these challenges and promote the integration of more effective and sustainable solutions.

[1] ISO 12944-6:2018 - Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 6: Laboratory performance test methods

Exceeding existing standards with Avantguard®

Introduction

Enhancing the durability of steel structures is crucial for sustainable construction practices, as it minimises environmental footprints and operational costs.

Avantguard is the first activated zinc primer to use three methods of anti-corrosive protection: Barrier effect, Inhibitor effect and Galvanic effect. It combines zinc, hollow glass spheres and a proprietary activator in our unique patented technology, which triples the activation of the zinc and boosts the galvanic effect. The result is superior corrosion protection with higher durability compared to standard zinc-rich primers.

This innovative patented technology not only reduces the number of coats or the overall thickness needed in a coating system but also aligns closely with the UN Sustainable Development Goals. By lowering CO_2[2] emissions and enhancing the durability of structures, Avantguard supports the creation of more sustainable and resilient infrastructure.

Even in the harshest conditions, Avantguard is proven to deliver superior corrosion protection with extended durability, allowing for less frequent maintenance throughout the asset's lifecycle.

Here are two C5-VH examples of how the Avantguard technology meets the requirements of ISO 12944 Part 6 (Laboratory performance test methods), demonstrating that superior corrosion protection can be achieved with environmental benefits. These examples have been rigorously tested and validated by independent third-party laboratories, further confirming the reliability and effectiveness of the Avantguard technology.

Superior performance for **lower carbon footprint**

The Avantguard technology's enhanced zinc activation optimises zinc utilisation without compromising corrosion protection. With a reduced carbon footprint, a zinc primer performs on the same level as a zinc-rich primer according to ISO 12944-5.

Coating system fulfils requirements in ISO 12944-6
(Laboratory performance test methods)

MNOC	3 coats
NDFT	320 microns
Primer	Zinc primer

18% LESS CO_2e, EMBODIED (gCO_2e/M^2 .YEAR) [2,3]

NOT A ZINC-RICH PRIMER ACCORDING TO ISO 12944-5

Superior performance for **reduced material consumption**

The Avantguard technology's superior anti-corrosive performance allows for the reduction of MNOC and NDFT.

Coating system fulfils requirements in ISO 12944-6
(Laboratory performance test methods)

MNOC	2 coats
NDFT	200 microns
Primer	Zinc-rich primer according to ISO12944-5

28% LESS PAINT CONSUMPTION (ML/M^2.YEAR) [2,3]
14% LESS CO_2e, EMBODIED (gCO_2e/M^2 .YEAR) [2,3]

DOES NOT MEET MNOC AND NDFT REQUIREMENTS ACCORDING TO ISO 12944-5

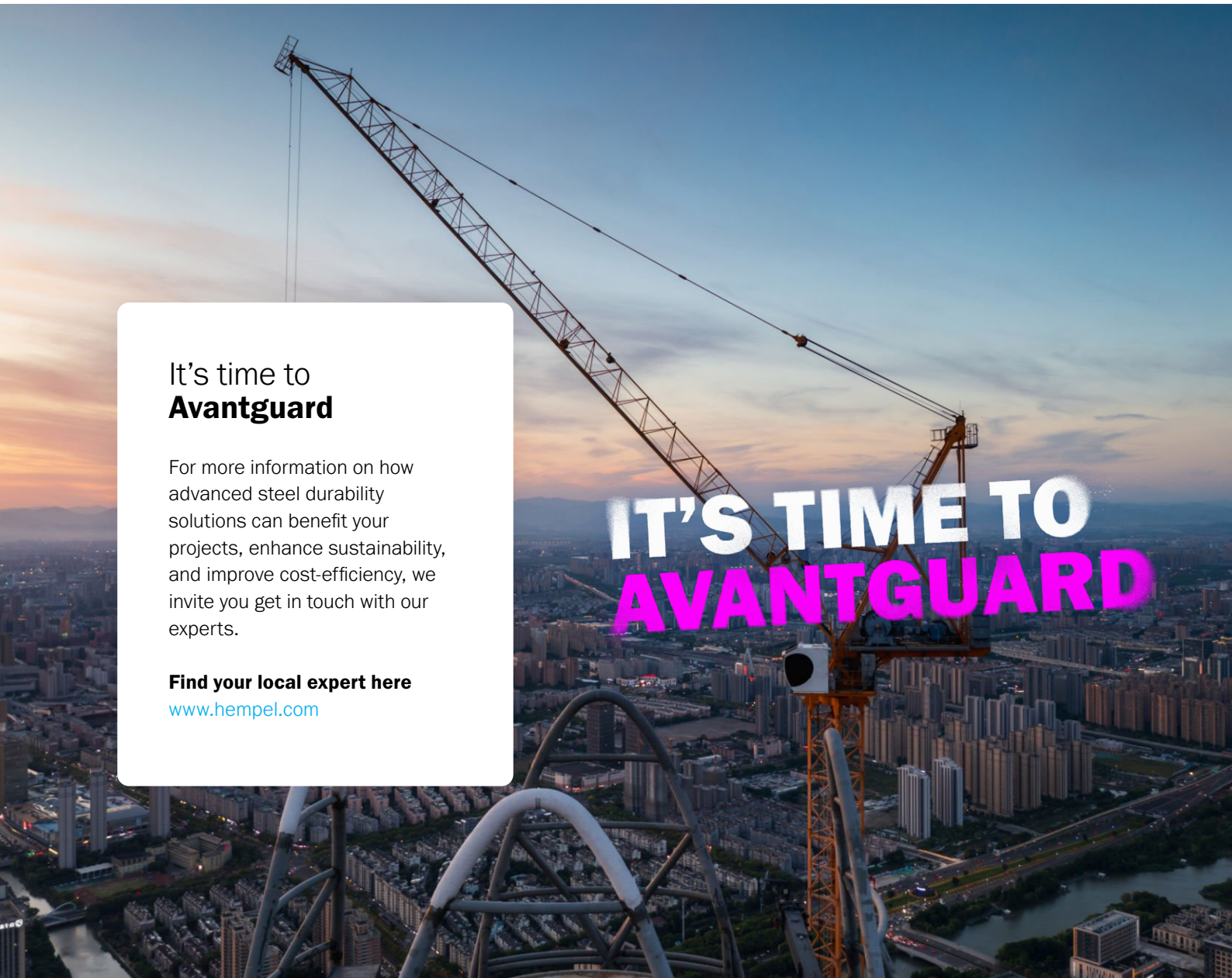
[2] Benchmark is a three-coat system with a traditional zinc-rich primer according to ISO 12944-5 for a C5 corrosion category and very high durability.

[3] The information provided in these examples are prepared by Hempel A/S with reference to available databases and methodologies as described and is based on best available knowledge. Accordingly, Hempel accepts no liability for the accurateness or completeness of the information.

Conclusion

We recognise that ISO 12944 plays a pivotal role in guiding practices for corrosion protection. However, to fully capitalise on new technologies that offer superior environmental benefits, the industry must shift its focus to more adaptive approaches outlined in ISO 12944 Part 6 (Laboratory performance test methods).

By embracing this paradigm shift, the industry can support the development and validation of innovative solutions, such as Avantguard, paving the way for more sustainable and durable steel structures in the future.



It's time to
Avantguard

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

Find your local expert here
www.hempel.com

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

Across the globe, Hempel's coatings protect surfaces, structures and equipment. They extend asset lifetimes, reduce maintenance costs and make homes and workplaces safer and more colourful. Hempel was founded in Copenhagen, Denmark in 1915. It is proudly 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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