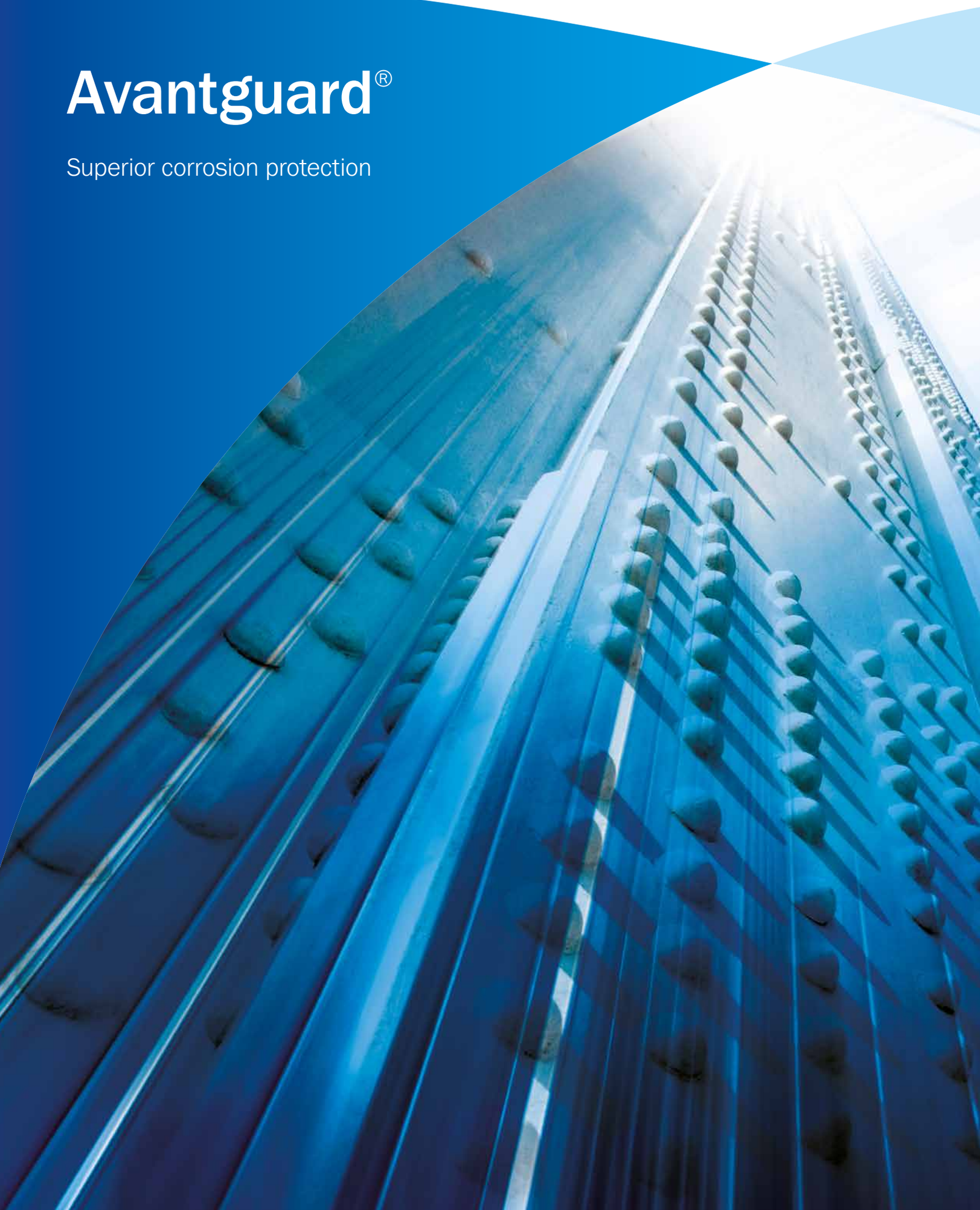
HEMPEL
Trust is earned

Avantguard®

Superior corrosion protection



Avantguard

Redefining anti-corrosion with superior performance

Here at Hempel, we strive to develop coatings that are ever stronger to protect our customers' assets around the world against the corrosive effects of industry and nature alike.

Avantguard is our innovative, award winning[1] anti-corrosion technology. Proven to significantly reduce the effects of corrosion, the activated zinc in Avantguard gives you superior protection.

Avantguard technology uses a new combination of zinc, hollow glass spheres and a proprietary activator. This activates the zinc, increasing its protective capabilities.

Improves full systems
Strengthening the system at its core, Avantguard gives the full coating system enhanced corrosion performance.

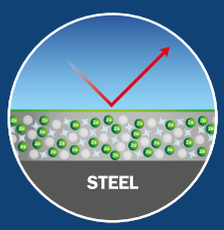
Redefines protection
Avantguard shows superior anti-corrosive performance in salt spray tests (ISO 12944-6), as well as reduced rust creep and better corrosion protection in cyclic corrosion testing (ISO 12944:2018 Part 9) and NORSOK M501 revision 6.

Redefines durability
Avantguard displays improved mechanical strength in the protective coating with significantly improved crack resistance. The NACE cracking test (Thermal Cycling Resistance test) and Hempel's welding test have proved that Avantguard substantially reduces cracking at both low and high DFT.

Redefines productivity
Avantguard is fast drying with best-in-class[2] overcoating intervals. The products are easy to apply, even in high temperatures and humidity as shown in exposure tests. There is less rework due to cracking, as the coating is more tolerant, even with high DFTs.

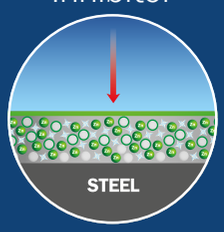
These activated zinc primers reduce the effects of corrosion, offering advanced protection and increased durability for all-round performance. Unlike standard zinc epoxies, Avantguard is effective using all three methods of anti-corrosive protection.

Barrier



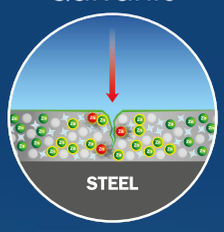
Improved barrier properties
Avantguard displays low water permeability. The salts produced by the unique zinc activation process fill any space within the film, sealing it and enhancing the barrier properties of the coating.

Inhibitor



Inhibition effect for improved protection
The zinc salts formed contain high levels of chloride ions that are captured as they are diffused from the environment through the film. This reduces the concentration of corrosive agents that reach the steel surface.

Galvanic



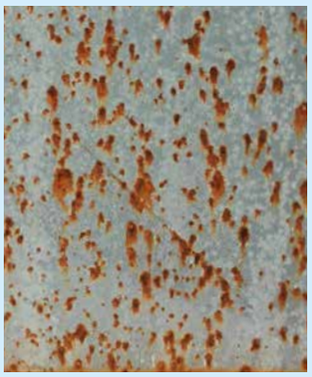
Activated zinc gives excellent anti-corrosive properties
In the presence of oxygen, water and salt, zinc reacts faster than steel. This delays the corrosion process for much longer.

1. Avantguard won the prestigious 2014 European Frost & Sullivan Award for New Product Innovation and NACE's MP Corrosion Innovation of the Year Award 2015.
2. Avantguard's overcoating interval is a minimum of 33 percent faster than competitor zinc-rich epoxies when comparing product data sheets.

Redefines protection

Avantguard shows superior anti-corrosive performance in salt spray tests (ISO 12944-6), as well as reduced rust creep and better corrosion protection in cyclic corrosion testing (ISO 12944:2018 Part 9) and NORSOK M501 revision 6.

Salt spray test



Zinc epoxy without Avantguard technology (986 hours)

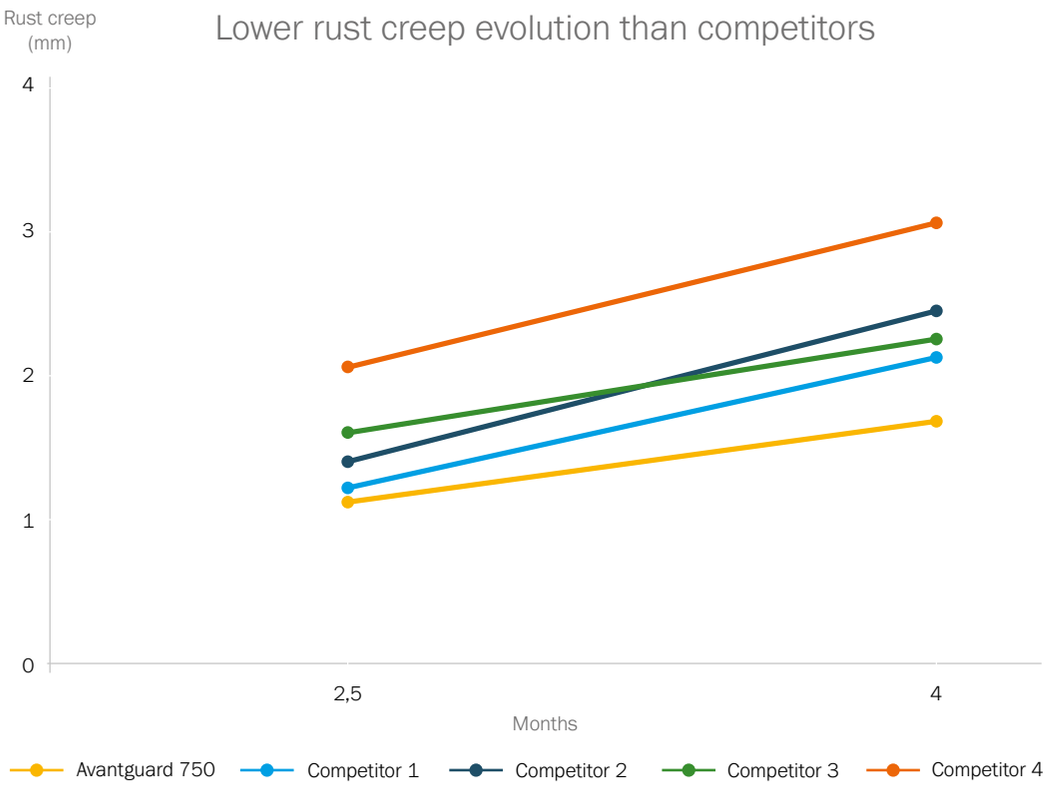
Zinc epoxy with Avantguard technology (986 hours)

Full system without Avantguard technology (1440 hours)

Full system with Avantguard technology (1440 hours)

Superior corrosion protection

Based on activated zinc technology, our patented Hempadur Avantguard coatings have been proven to deliver superior corrosion protection compared to competitor zinc rich epoxy products[3].



3.This superiority has been independently proven by third party laboratory neutral salt spray tests according to ISO 9227. In this test, steel protected with Avantguard produced a lower evolution of rust creep compared to the competitors, assessed according to ISO 12944-6, when tested up to 3x the duration for C5 high environments.

Redefines durability

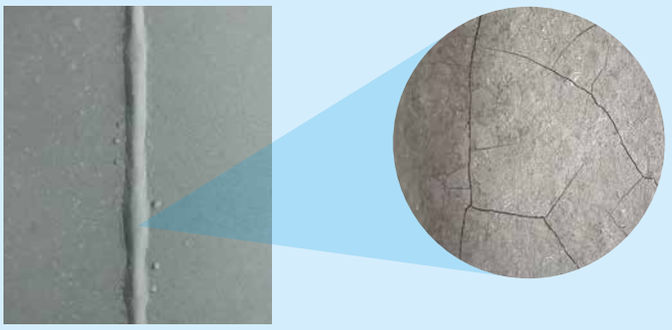
Improved mechanical strength
Avantguard has been engineered to release the internal stress of continual expansion and contraction of the surface and its coating. Low cracking tendency was displayed during the NACE cracking test and Hempel's own welding test with both low and high DFT.

NACE cracking test

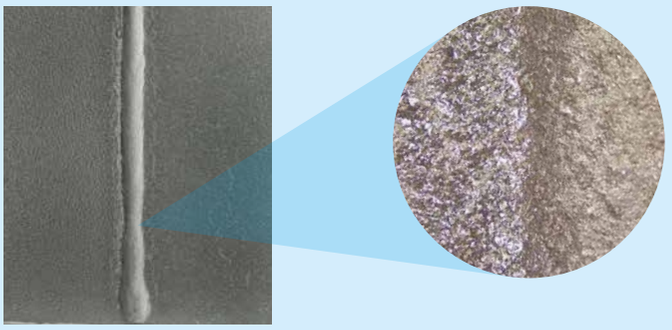
Zinc epoxy without Avantguard technology

Zinc epoxy with Avantguard technology

Hempel welding test



Zinc epoxy without Avantguard technology



Zinc epoxy with Avantguard technology

"You can obtain a very good film formation by using the Avantguard system. We were very surprised by the mechanical properties and strength even at higher DFT and on irregular surfaces like welding seams."

Mr Schomers, Production Manager
Schneider + Co. GmbH
Oberflächentechnik

"Avantguard has a self-healing effect on micro cracks, which is something that we've never seen before. The insoluble salts which are created in the unique zinc activation process actually occupy the space left by the microcrack, further preventing the development of a more serious crack."

Josep Palasi
Hempel Strategic Technology Director

Redefines productivity

"The short drying times will help us in the future to optimise our production processes."

Mr Schomers, Production Manager
Schneider + Co. GmbH
Oberflächentechnik

Avantguard is fast drying for increased productivity. Substantially reduced overcoating intervals make Avantguard best-in-class[2].

Benefits during application include:
- excellent coating stability
- great spray ability
- great film formation

Avantguard is easy to apply using standard application equipments and techniques, even in high temperatures and humidity. And, there is less rework resulting from cracking due to the coatings tolerance at high DFT.

Products and performance

Hempadur Avantguard 550

Anti-corrosive performance in compliance with ISO 12944 C5 high, which is fast curing and easy to apply.

Complies with the requirements for Level 3, type II in SSPC Paint 20, 2002.

Utilises ASTM D520, type II zinc dust.

Parameters	
DFT range (min and max)	50 – 100 micron
Min. overcoating intervals with epoxy (20°C)	1hr
Through drying (20-25°C)	1hr 30min
VS%	65
VOC (g/L)	319
Pot life (20°C)	3hrs
Application equipment	Airless spray, air spray, brush

Hempadur Avantguard 750

Anti-corrosive performance in compliance with NORSOK M-501 which is fast curing, easy to apply and retains it's properties even at excessive application.

Complies with NORSOK M-501 Ed. 6 (ISO 12944:2018 Part 9) and Level 2, type II in SSPC Paint 20, 2002.

Utilises ASTM D520, type II zinc dust.

Parameters	
DFT range (min and max)	50 – 100 micron
Min. overcoating intervals with epoxy (20°C)	1hr
Through drying (20-25°C)	1hr 30min
VS%	65
VOC (g/L)	316
Pot life (20°C)	4hrs
Application equipment	Airless spray, air spray, brush

2. Avantguard's overcoating interval is a minimum of 33 percent faster than competitor zinc-rich epoxies when comparing product data sheets.

ZPMC makes the shift to Avantguard

ZPMC's super-post-Panamax container cranes are used for loading and unloading containers onto carrier vessels. They need a heavy-duty anti-corrosive coating system to protect them from the harsh saltwater atmosphere and heavy impacts that come with the job. Hempadur Avantguard 750 was the ideal solution with reduced application times, longer asset life-cycles and reduced maintenance.

At a glance	
Customer	Shanghai Zhenhua Heavy Industry Co. Ltd. (ZPMC)
Location	Shanghai, China
Date	January 2015
Product	Hempadur Avantguard 750

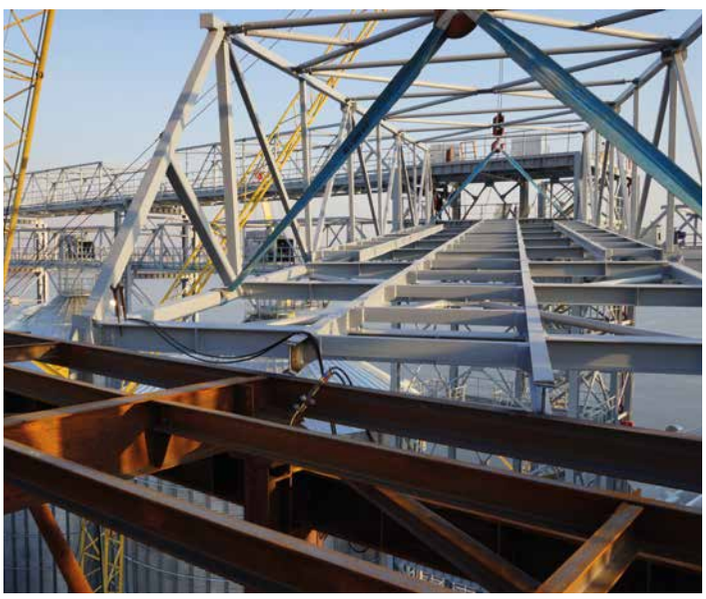
Avantguard, proven in the field for VTB Arena, Russia

The exciting VTB Arena Park reconstruction in Moscow, VTB Arena – Dynamo Central stadium, is a multi-functional sports and entertainment complex built under one roof. CJSC 'UK' Dynamo chose Hempadur Avantguard 750 to ensure long-lasting protection against the extremes of the Moscow climate and city environment.

At a glance	
Customer	CJSC "UK" Dynamo
Location	Moscow, Russia
Date	2016
Product	Hempadur Avantguard 750
Total litres	240,000

ArcelorMittal relies on Avantguard

ArcelorMittal Kryvyi Rih, Ukraine's leading steel manufacturer, protects the structural steel in its new building for pulverised coal handling at one of it's blast furnaces, with Hempel coatings. The coating system, with Hempadur Avantguard 550 at its core, meets the tough C4 environmental conditions of the plant, and combines mechanical strength with easy application to give advanced protection against corrosion in this aggressive industrial atmosphere.



At a glance	
Customer	ArcelorMittal Kryvyi Rih
Location	Ukraine
Date	2016
Product	Hempadur Avantguard 550
Total litres	10,000+

Elco chooses Avantguard

Redefining protection for new onshore facility

Elco is carrying out fabrication work for the British Petroleum (BP) Project at Oman where BP have signed a long term contract with the government of Oman to develop a major new gas processing facility to serve the Khazzan & Makarem gas fields.

Elco identified Hempel as the right coatings supplier to ensure the structural steel pipe racks within the facility benefit from the most advanced corrosion protection.

The system that Elco is using includes Hempadur Avantguard 750. Fast curing and easy to apply, it gives the facility the most advanced, long lasting corrosion protection, with time and cost saving benefits available during application.

At a glance	
Customer	Elco International Engineering Co. L.L.C.
About	Elco is a leading engineering and fabrication company offering manufacturing solutions to the Oil, Gas & Construction industries
Coating system	Hempadur Avantguard 750 Hempadur MIO 47950 Hempathane HS 55610
Application	Air spray gun

"The Khazzan project is of strategic importance to us. We are fully aware of the benefits offered by activated zinc technology, hence our choice of Avantguard over conventional zinc epoxy."

Anil Kumar
Project Manager for Elco

hempel.com

About Hempel
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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