

Reducing construction and operation costs in the wind energy industry



How Avantguard® activated zinc primers can reduce costs during wind turbine construction and operation by increasing application efficiency and reducing or eliminating coating maintenance.

Wind turbines are exposed to some of the most severe operational and environmental conditions of any industrial asset. Offshore installations are permanently subjected to the corrosive marine atmosphere; both offshore and onshore installations are exposed to high levels of UV radiation and regularly battered by high winds, storms, driving rain, snow and hail. As a result, they require a high durability anti-corrosive protection system. The choice of this system can have a significant impact on both construction and operating costs.

Overcoming the challenges of conventional zinc-rich coatings

Due to the remote location of many wind farms – whether they are out at sea or in isolated inland areas – maintenance work is expensive. Therefore, a high durability system that reduces or completely eliminates coating maintenance requirements will significantly reduce operating costs over a turbine's lifetime. Traditionally, high durability coating systems in the wind industry are based on zinc-rich epoxy primers. However, these coatings are difficult and time-consuming to apply. This impacts applicator efficiency, resulting in a higher construction cost per unit. It also increases the risk of premature coating failure and unforeseen maintenance costs.

Avantguard activated zinc primers overcomes these challenges. Based on patented technology developed by Hempel, Avantguard coatings have been proven to deliver the same or better corrosion protection than equivalent zinc-rich epoxies, but are far easier and faster to apply. The superior anti-corrosion performance of Avantguard activated zinc coatings can increase system longevity by up to 50%, reducing or eliminating coating maintenance costs and extending asset lifetime. In addition, lower dry film thicknesses are required to deliver the same or higher protection, which means less paint is used. As a result, material costs can be up to 15% lower than with systems based on conventional zinc-rich epoxies. At the same time, shorter drying times can reduce application time by as much as 30%. All this lowers the overall cost per unit, both during construction and operation.

Avantguard's unique activated zinc technology

Avantguard coatings are based on activated zinc, which combines the ingredients used in traditional zinc epoxies with two new elements – hollow glass spheres and a Hempel proprietary activator. The technology provides a unique combination of three anti-corrosion mechanisms to effectively protect assets against atmospheric corrosion and slow down the corrosion process if damaged.



Enhanced galvanic protection

In zinc coatings, the zinc is a sacrificial element that reacts before steel in the presence of oxygen, water and salt. The technology in Avantguard activates all the zinc in the coating, which stops steel corrosion more effectively and reduces creep corrosion if the coating suffers mechanical damage during service.

Low water permeability

If mechanical damage occurs, the compounds produced by the unique zinc activation process fill any space within the film, sealing it and enhancing the coating's water barrier properties.

Inhibition of corrosive elements

The zinc salts contain high levels of ions. These are captured within the coating as they diffuse from the environment through the film, reducing the concentration of corrosive agents that can reach the surface of the steel.



The benefits of Avantguard's enhanced performance

Unique zinc activation technology results in a more durable coating. This has two direct benefits for the wind energy industry.

Less paint and fewer coats for lower application costs

The enhanced performance of Avantguard-based coating systems makes it possible to use innovative schemes with reduced thickness or less coats to reach the performance level required in ISO 12944 Part 6. For onshore turbine manufacturers, this lower paint consumption translates into lower construction costs, as well as reduced VOC emissions.

Longer durability for lower operating costs

For owners and operators of wind farms, high coating durability is essential. Maintaining an offshore or isolated asset is both costly and complex, so a robust and durable coating system will significantly reduce risk and operating costs.

Increasing productivity with improved application properties

The superior application properties of Avantguard activated zinc primers also have benefits for the wind industry's asset owners, operators and manufacturers. Zinc-rich epoxies have long drying times and are intolerant of incorrect surface preparation, poor application and unfavourable atmospheric conditions during application. This reduces applicator efficiency – put simply, it takes more manhours to coat one steel section – and increases the risk of premature coating failure.

Faster drying times for higher productivity

Avantguard activated zinc coatings have an overcoating interval of just 45 minutes at 20 C – up to four times better than other zinc-rich coatings. When used with other fast-curing products, they enable manufacturers and maintenance workers to coat more sections in one shift, significantly increasing the productivity of each application team. Once applied, the coatings quickly develop good mechanical properties, making them resistant to scratching and other damage during transport and construction – and reducing the need for onsite touch-up work. All this can have a direct impact on the cost of producing each turbine.

Superior application properties for higher quality

Avantguard activated zinc primers are highly tolerant to unfavourable environmental conditions during application and give applicators good coating stability, edge retention and film formation, even in extreme weather conditions, including low temperatures and high relative humidity values. They can tolerate up to 25% higher dry film thicknesses than conventional zinc-rich coatings without cracking, making them less prone to failure in difficult to apply areas, such as welds and bends. As a result of these tolerances, applicators are less likely to apply the coatings incorrectly. This leads to a higher quality finish and reduces the risk of potentially expensive performance issues further down the line.

Overall efficiency gains for the wind energy industry

The challenging energy market requires that wind turbine manufacturers, operators and owners find ever-more efficient solutions that bring down the total cost of wind energy per kilowatt hour. In this regard, Avantguard activated zinc primers have a role to play. Due to their increased durability, anticorrosive coating systems based on Avantguard can extend wind turbine lifetimes and reduce or eliminate coating maintenance – both of which improve return on investment. At the same time, efficiency gains during application – thanks to the use of lower DFTs, fast-drying systems and more tolerant coatings – increases productivity and reduces the production cost per unit.

As a result of these gains, Avantguard coatings are increasingly attractive to a number of industries, including wind energy.