

Offshore

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Windmill Protection



Photo Courtesy of Stiftung Offshore-Windenergie

The Environmental Solution

One of the core products of Dutch based Corrosion & Water-Control B.V. is the Impressed Current Cathodic Protection (ICCP) system. The system has been successfully protecting ships against corrosion for decades. A more recent development is the use of the ICCP system to protect (offshore) windmills against corrosion. An interview with Bart Wessels, Vice Chief Executive of Corrosion & Water-Control B.V.



The huge steel structures of windmills are often located near or in the sea, exposing them to the harsh marine environment. In order to survive decades of service life, the steel needs to be protected against the corrosive effect of seawater. "Traditionally, corrosion protection of offshore windmills is achieved by means of sacrificial anodes", Bart Wessels explains. "A major disadvantage of sacrificial anodes is their negative effect on the environment as thousands of tons of zinc or aluminium are released into the marine environment every year to preserve the steel on which they are mounted. This does not fit the 'clean energy' label that windmills are representing." A perfect alternative for sacrificial anodes is the use of Impressed Current Cathodic Protection, which is already in use on ships for decades. "Wind energy is a cost effective way of achieving future CO₂ reduction. We all realize that this is the time to change our behaviour in order to avoid a dramatic climate change. We are very proud to

be able to make a valuable contribution to the development of wind energy with our core technology", Bart Wessels adds.

Shifting Potentials

The ICCP system from Corrosion & Water-Control B.V. durably protects submerged steel structures against corrosion by using the principle of shifting the natural potential of metals. When the natural potential of steel, which is measured in millivolt (mV), shifts to a more negative value, it will act from a certain mV value as a cathode. Corrosion never occurs at a cathode, only at an anode. Therefore if this level can be maintained, the steel will simply never corrode. To make this negative swing in potential, electrons must be added to the steel structure. These electrons could be generated by sacrificial anodes, which are sending out (dissolving) positively charged metal-ions, leaving negatively charged electrons behind. A more environmentally sound way of making this shift is to generate these electrons by

What's in a Name?

Corrosion & Water-Control B.V. is a well respected company in the field of corrosion protection and marine growth protection. The company supplies systems to protect sheet piling walls, windmills, yachts, supply vessels, tugs, cruise vessels, dredgers, container liners, trawlers, FPSOs, VLCCs, RIGs, ferries, product carriers, etc. Corrosion & Water-Control B.V. is headquartered in Moerkapelle, the Netherlands. Subsidiaries are located in Zhejiang, China and Ha Noi City, Vietnam. To guarantee easy access to technical support and services, the company has service engineers located in Australia, Brazil, China (North, South and Middle), Cyprus, Greece, Denmark, Finland, India, Italy, Iran, Korea, Malaysia, Norway, Singapore, Spain, Taiwan, UK, the Netherlands, Turkey, United Arab Emirates, Australia, USA and Vietnam.



Photo Courtesy of OWT GmbH



Advantages of ICCP Power Unit:

- Touch display operation.
- History of all data, saved in digital memory log.
- SD card interaction with auto-start function once inserted; download data or upload software updates.
- Off and On Potential measurement function.
- Remote monitoring and controlling from any computer.
- Connectable to management system.



means of a DC power supply and using an inert anode material. This special anode material consists of Mixed Metal Oxide (MMO) coated titanium plate.

Stable Measurement

The protection level of the steel structure (a mV value) can be achieved by a reference electrode, which assures a perfectly stable measurement. This signal is interpreted by the microprocessor in the power unit, supplying more or less current via the anodes to the structure. The major advantage of the fully automated system is the so called 'Off Potential Controlled' function. A steel structure will slowly raise its protection level in time, which is called the polarisation level. This polarisation level can never be determined while measuring when the anodes are active, because the electromagnetic fields will disturb the



Photo Courtesy of Stiftung Offshore-Windenergie

measurement of the reference electrodes. Therefore these anodes must be switched off to make a precise measurement.

Management System

The system is characterized by the extensive control and steering options, which can be connected to the management system. The specially designed controlling programme constantly processes the flows of data received from the sensors that are installed on the steel structure. Together with the high-grade keramox® coated titanium anodes and the reference electrodes, the power unit ensures the correct degree of protection in any situation. Even if the electrolytic effects of the water vary considerably, the system quickly adapts itself and continues to offer correct and optimum protection. This performance can never be achieved by the sacrificial anodes. The ICCP system offers many additional benefits compared with the use of sacrificial anodes. Bart Wessels elaborates: "The ICCP system is much cheaper to operate in the long-term, the system is almost maintenance free and has a long lifetime of more than 25 years."

Effective Protection

Even though the benefits of the use of the ICCP system on windmills are obvious, it is still not

commonly known in the industry that windmill protection can easily be achieved by any other system but sacrificial anodes. "As our company has decades of experience in the field of corrosion protection, the step to the windmill market was quite easy. The highly sophisticated ICCP system is environmentally friendly and it provides easy and effective protection against corrosion. Our specially made ICCP anodes give constant protection to the windmills and have a lifespan of more than 25 years, without releasing any material to the environment. Together with our state-of-the-art software, the whole process can be closely monitored from any location, ashore or offshore. This could never be achieved with the old-fashioned sacrificial anodes."

The ICCP system can be used on any kind of steel foundation; whether a tri-pod or mono-pile is used. The first systems for tri-pod structures have already been delivered for two projects. To further illustrate the success of the system, Bart Wessels proudly adds: "In addition to the two earlier projects, we are now working on a substantial order for a huge wind farm off the British coast. With the global crisis going on, we feel privileged to play a role in an industry that is showing tremendous growth."

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