

Case Study

TriCem® 3800 surface coating protects Pelamis tidal energy generators in highly corrosive marine environment



Ocean Power Delivery's Pelamis wave power generators convert tidal energy into electricity that powers thousands of households in Portugal and the UK. Pelamis machines use a series of hydraulic components to convert the kinetic energy generated by waves into electricity. Hydraulic components are critical to the Pelamis, which is why Ocean Power has worked closely with Sun Hydraulics - a specialist hydraulics component manufacturer - on the development of the Pelamis.

THE CHALLENGE

As a semi-submerged 120-metre long structure, each Pelamis wave energy converter has a vast surface area that is exposed to the harsh corrosive environment of the splash zone. This presented a significant challenge for Sun Hydraulics.

Barry Lovell of Sun Hydraulics, said: "Because of the highly corrosive salt water environment the Pelamis hydraulic systems have to operate in over many years, we were presented with the challenge of producing custom valve and manifold components with exceptional corrosion resistance and good handling characteristics.

"The large SG iron manifolds, in particular, have several cartridge cavities, ports and tapped holes, that are difficult to handle and potentially vulnerable to corrosion. We therefore have to protect both the external and internal surfaces with a coating that ensures maximum corrosion resistance. In addition, the coating has to be thin to meet the required tolerances, allow bores to be protected from rust during storage and facilitate final assembly without damaging the surface."

As a surface coating specialist with a history of innovation and continuous improvement, Surface Technology was selected as the supplier of choice by Sun Hydraulics.



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Steve Moor

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THE SOLUTION

Working closely with Sun Hydraulics, Surface Technology provided a consultative approach that focused on the company's challenges.

TriCem 3800®, Surface Technology's newly developed electrodeposited multilayer, thin-film coating was proposed as the optimal coating due to its superior anti-corrosion properties.

PROPERTIES AND BENEFITS

- Outstanding corrosion protection - including 2000 hours white corrosion resistance
- UV resistance
- Uniform coating
- Hydrophobic surface
- Uniform thin film deposit less than 20 microns thick
- High bond strength to materials including all steel alloys, sintered metal, aluminium, cast iron, brass and copper

Finishing components with a smooth, lubricious and hydrophobic glossy black film that is less than 20 microns thick, TriCem 3800® is proven to provide more than 2,000 hours salt spray corrosion resistance to aggressive white corrosion.

Available in WEEE/RoHNS and ELV compliant versions, TriCem 3800® does not contain any cyanides, ammonia or arsenic and conforms to current environmental legislation. TriCem's chemical properties make it especially suitable for environmentally sensitive applications like the Pelamis wave power system.

Following rigorous salt-spray and wear tests, TriCem 3800® was selected by Sun Hydraulics as the Pelamis manifold's coating – a critical part of the generator.

Andrew Courtney, Surface Technology, said: "The zinc plated finishes typically used for hydraulic components do not achieve the 100% penetration into blind holes and threaded areas that are achieved with TriCem 3800®, so can leave bare surface areas vulnerable to corrosion attack.

"At Surface Technology we have developed passivation and plating methods for TriCem 3800® that ensures excellent throwing power and a highly uniform surface coverage is achieved – even in deeply threaded areas – important where precise tolerances are essential."

THE RESULTS

- Sun Hydraulics has the optimum surface coating solution for the environment their components operate – TriCem 3800® provides more than 2,000 hours corrosion protection against salt spray and white corrosion
- Surface Technology's application engineering and coating capability was critical in proving the effectiveness of the proposed solution
- The unique anti-corrosion properties of TriCem 3800® together with enhanced processes, has ensured that a highly uniform coating has been achieved right across Sun Hydraulics components' surfaces - including within bore holes and deeply threaded areas
- TriCem 3800®'s chemical properties and availability in WEEE/RoHs and ELV compliant versions is especially suited to environmentally sensitive Part of the applications like the Pelamis wave power generator

For more information on Surface Technology and the services we provide, call us on

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