ecospeed®

HIGH PERFORMANCE HULL PROTECTION

Magazine

ecoshield®
THE DIAMOND STANDARD IN RUDDER PROTECTION

Contents

ECOSHIELD® durable, cavitation-damage-proof rudder protection launched

After more than 10 years of strenuous testing, Subsea Industries, a Hydrex company, has launched the ultimate rudder protection coating, Ecoshield, for permanent protection against cavitation damage for rudders. The glassflake reinforced coating protects the rudder for the service life of the ship without need for recoating or major repair and comes with a ten-year guarantee. Ecoshield is also suitable for bulbous bow, stabilizer fins, thruster nozzles and other underwater ship gear which needs special protection from corrosion.

Subsea Industries founder Boud Van Rompay with the new Ecoshield rudder coating.

Until now, the problem of cavitation damage to rudders has remained unsolved, causing erosion, pitting and sometimes complete failure and necessitating very expensive repairs or replacement. The need for repair to rudders, involving welding and resurfacing in drydock has been almost universal. The cost of rudder maintenance and the safety hazards connected with worn and failing rudders are out of proportion to the relatively small surface area involved. Efforts to solve this problem have taken the form of redesigning the rudder, changing its position relative to the propeller, trying various materials including stainless steel, metal facing the surface, cathodic protection and a variety of coatings. But the problem has persisted.

Now a very durable, tough, long-lasting glassflake resin coating is putting an end to these problems. Ecoshield is a specifically reinforced version of the well-known Ecospeed non-toxic underwater ship hull coating which is designed for the entire underwater hull of any ship or boat. Small but significant variations of the Ecospeed formula have been tested on rudders since 2002 with extraordinary results. Ships that were experiencing heavy cavitation damage to their rudders, once the glassflake coating was applied, have seen no further cavitation damage erosion for as long as 10 years after application, with no sign that the coating will need replacement during the life of the ship.

Ecoshield is designed to be applied at newbuild (best) or in drydock for ships already in service. Application is simple. It requires blasting to create a 75µm profile and a surface preparation of SA 2.5 or SP 10 and then the glassflake paint is applied in two coats to a thickness of at least 1000 µm DFT, with an overspray time of about 3 hours minimum and no maximum. A pitted rudder can be repaired using a thick resin paste (a new, soon-to-be-announced product) which is capable of building up the pitted surface to its original form and which is as tough or tougher than the steel it is used to fill. The heavy glass content of Ecoshield insulates the rudder or other part, making cathodic protection systems including sacrificial anodes virtually unnecessary. This is evidenced by the very little wear on the anodes when a ship's rudder, coated in this way, is inspected in dry-dock and by the fact that an impressed current can be turned right down with no ill effect.

Evidence of the success of the new product is the number of companies who began by coating one rudder experimentally and who, after seeing the results in service, have or-

State of rudder of ro-ro ship in 5 years after it was built in 1999. The rudder was blasted and coated with Ecoshield (then Ecospeed) in 2004. Due to time constraints the pitting was not repaired before application.

The same rudder 7 years after the original Ecoshield application. No repair of the rudder has been done during that time. No recoating with Ecoshield was needed. The rudder showed no further cavitation damage in that time. (It has been repainted for cosmetic reasons only.)

"Since painting the rudder with Ecospeed (Ecoshield) in 2004 we have had no more cavitation damage. We went on to coat all four sister ships due to the excellent performance."
Grzegorz Girhat, Superintendent over 5 ro-ro ships, Ernst Russ.

dered this coating for the rudders on other ships with plans to convert their entire fleet. Shipowners who have previously applied Ecospeed to rudders on ships in service are specifying the coating for the rudders and other underwater gear on their newbuilds.

Ecoshield comes with a ten year guarantee. It is the only coating known to fully protect a rudder from all cavitation damage.

Ecoshield is available from Subsea Industries. A White Paper with full details about protecting rudders from cavitation damage is available in the Publications/Papers section of www.shiphullperformance.org for free download.

About Subsea Industries:

Subsea Industries is a Hydrex company, with main offices in Belgium and the USA, has 40 years of experience in all aspects of underwater hull fouling control, hull maintenance and advanced underwater hull cleaning. Dedicated to keeping ships in business with minimum drydocking and to protecting the marine environment, Subsea Industries has developed and tested a system, Ecospeed, which combines a completely non-toxic hard hull coating which lasts the lifetime of the ship, with routine, advanced in-water hull cleaning. The coating is classified as a Surface Treated Composite (STC) which consists of relatively large glass flakes in a resin base. It is applied in two coats on a grit-blasted hull to a dry film thickness of 1000 microns. Once conditioned under water with special tools, the coating provides a very smooth, extremely hard yet flexible protection lasting the life of the ship, requiring only minor touch-ups. The surface improves in hydrodynamic performance with each in-water cleaning. ■

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Ecoshield® rudder applications prevent cavitation erosion damage

In August several rudders were coated with Ecoshield in China and the U.S.A.. In China the rudders of a 261- and a 209-meter container ship were coated in Guangzhou and Changxing Island respectively while a 228-meter vehicle carrier had its rudder coated in Zhoushan. Around the same time Ecoshield was applied on both rudders of a 48-meter tugboat in Mobile, Alabama.

Surface preparation of rudder.

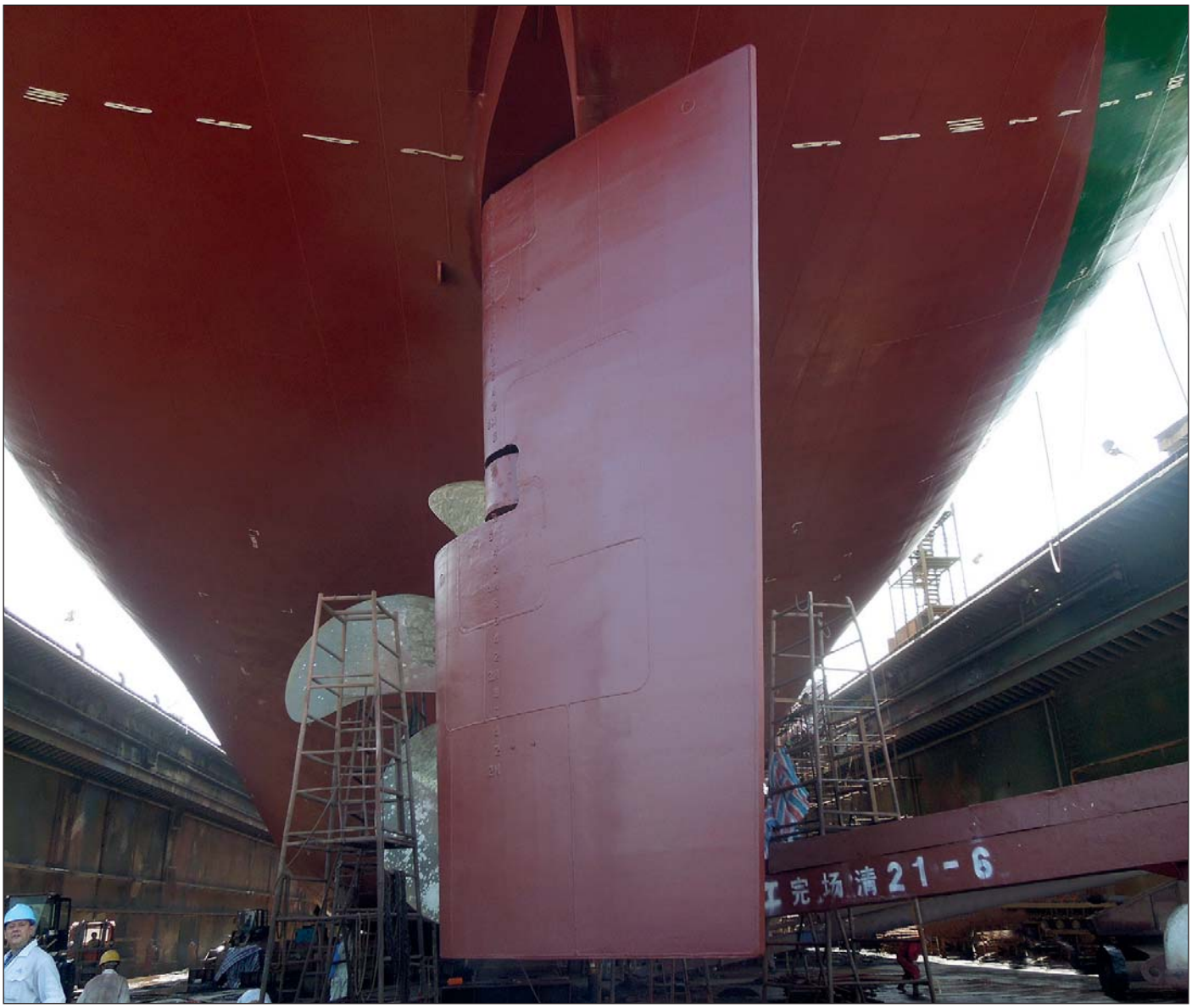
Cavitation erosion damage had appeared on the rudders of these vessels. The owners therefore decided to use Ecoshield because this will prevent similar damage from occurring again.

The coating provides the rudder with an impenetrable protective layer. At the same time its toughness and flexibility enables absorption of the forces that are produced by cavitation. This prevents the damage normally caused by this phenomenon. Without proper protection against cavitation and the resulting erosion and corrosion damage, the financial consequences can be severe.

Ecoshield is guaranteed for ten years. With an Ecoshield application

Application of first layer of Ecoshield.

Thruster tunnel application on container vessel



Ecoshield is applied in only two identical layers.

Ecoshield protects rudders for the rest of a vessel's service life.

The rudder and the nozzles of a tug boat were coated in Mobile.

All areas prone to cavitation erosion can be protected by Ecoshield.

no repaint will be needed during drydocking. At most, minor touch-ups will be required. Planning the maintenance of the vessel's stern area therefore becomes much easier. The smoothness attained by the coating also provides optimum hydrodynamic conditions. This allows rudders to operate at maximum efficiency. The ship's performance therefore remains stable and the owner's investment is secured.

Ecoshield is also ideally suited for other areas prone to cavitation erosion or other damage, such as propeller nozzles, thruster tunnels, the bulbous bow or stabilizer fins. For this reason the tugboat also had both its nozzles coated and both container vessels had Ecoshield applied to their thruster tunnels.

Thanks to the Ecoshield application, these areas will be safeguarded together with the rudders for the remainder of the vessels' service life. ■

A 100% non-toxic underwater hull coating for an ecofriendly newbuild research vessel

Earlier this year the underwater hull of the newbuild research vessel *MYA II* was given a lasting Ecospeed protection. The application was carried out at the Fassmer shipyard in Berne, Germany, where the vessel was launched on August 12.

The newbuild research vessel MYA II during its first tour. Foto: Florian Lange, Alfred-Wegener-Institut.

The vessel was handed over to the coastal researchers at the Alfred Wegener Institute (AWI), Helmholtz Centre for Polar and Marine Research at the Wadden Sea Station on the island of Sylt, Germany.

In a brief speech, AWI director Prof. Dr. Karin Lochte emphasized the importance of the ship for research into the Wadden Sea, which is a world heritage site. She also referred to the benefits for young scientists who, in future, will use the *MYA II* as a marine research platform on the doorstep. "Whilst this is our smallest research vessel, it is extremely modern and ideally equipped for coastal research", said Prof. Dr. Karin Lochte. She is impressed by the modern technology on board which is reminiscent of the equipment on large research vessels.

Application of first layer of ecospeed.

The head of AWI logistics, Dr. Uwe Nixdorf, underlined the positive cooperation with the shipyard and suppliers which, bearing in mind the demanding requests of scientists, was impressive. The order to build a research ship around 20 meters in length for up to twelve researchers was supplemented by wishes such as: shallow draught, possibility of falling dry in the mud flats, various winches, plumb lines, measuring instruments, a crane and a speed of ten knots. After all, the new ship ought to be able to outperform its predecessor, the now 35 year-old *MYA*.

Lasting protection for vessel sailing in UNESCO world heritage site

The interaction of flora and fauna in the food web is one of the biological key issues examined at the AWI

The topside of the research vessel during building.


The stern of the MYA II after application of the first layer.

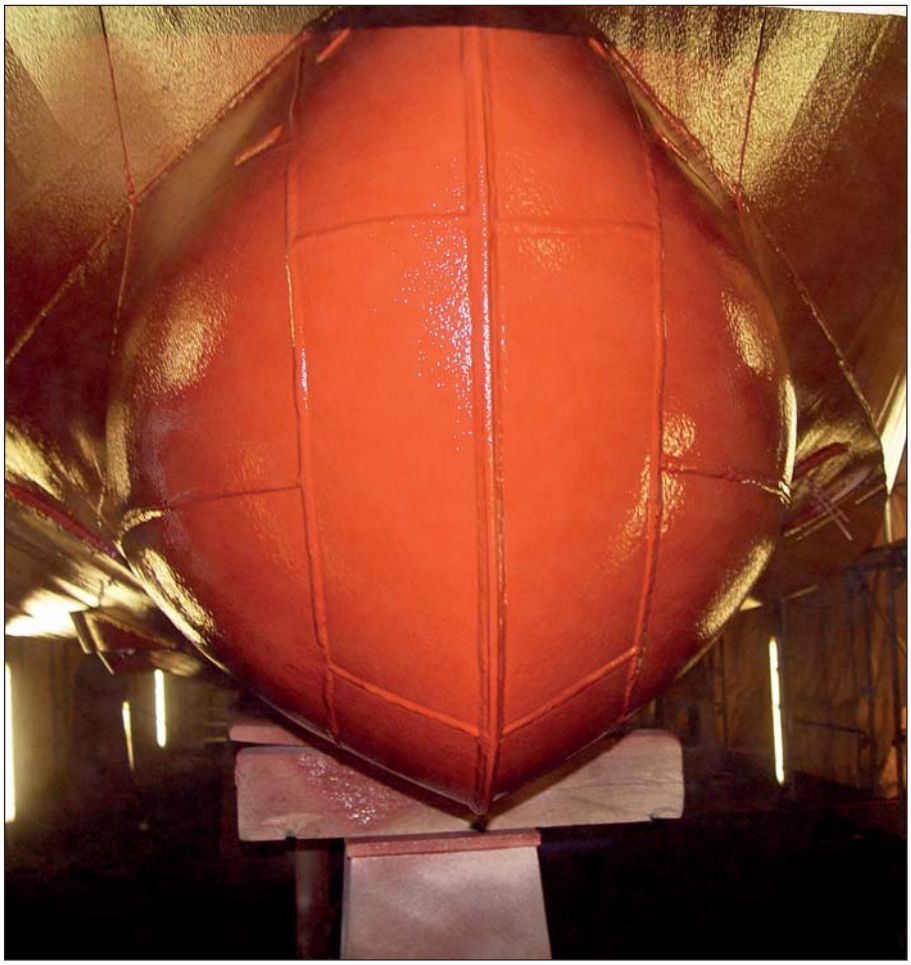
Wadden Sea Station. Scientists are now able to investigate the demands of individual species and their interaction without a need for intervention in the ecosystem. This provides them with the basis for a responsible use of the Wadden Sea, which is a UNESCO world heritage site.

MYA II was also awarded the "Blue Angel" eco label for its environmentally friendly design. "We placed great value on environmentally friendly technology when building the *MYA II* in order to minimise disturbance to the Wadden Sea caused by research activities," says Prof. Dr. Karin Lochte. The new ship has a particulate filter as well as a waste gas purification system, which removes nitrogen oxide (NOx) from engine exhaust fumes. As a result, the NOx emissions of the *MYA II* are around 85 % below the current limit.

Ecospeed ties in perfectly with the ecological ideas behind the design of the research vessel. The coating offers a TBT-free, copper-free, biocide-free and silicone oil free solution for the protection of the underwater hull. The Ecospeed hull protection and performance system is today's Best Available Technology for reduction of fuel consumption, GHG and other emissions through hull hydrodynamics and fouling control.

In 2008, stringent tests were carried out within the framework of an EU LIFE demonstration project to provide scientific data and to authenticate the non-toxicity of the Ecospeed hull performance technology. This research proved that the coating is 100% free of toxic substances and that there is no negative effect on the water quality or the marine environment at any point of its application or use. Moreover, the massive amounts of VOC and zinc


An Ecospeed inspector is present to guarantee the quality of the application.



The bow of the vessel after the second and final layer was applied.

anode emission associated with conventional hull coating systems are reduced to almost zero.

Preventing the spread of Non-Indigenous Species

Over the last several years, there have been concerns that non-indigenous species (NIS) are transported by fouled hulls just as much or even more than in ballast water. Once a hull becomes heavily fouled, a situation occurs where there is an increased risk of transporting NIS that needs to be remedied by defouling activities, either by out-of-water removal or by underwater cleaning. In this respect, underwater cleaning has come under some scrutiny out of fear that viable NIS are released and spread, rather than contained and disposed of by the operation. Several ports and countries have banned underwater cleaning out of concerns about pulse release of biocides and/or an increased risk of transferring NIS. Taking into account the delicate environment *MYA II* will be sailing in, this is an especially important issue for the researchers.

The underwater cleaning of Ecospeed can be regarded as a safe measure that prevents, rather than remedies, the spread of NIS. Firstly, Ecospeed can be cleaned on a regular basis without damaging the coating's surface. The cleaning interval is optimized to minimize fouling and the associated increase in fuel consumption. In other words, regular cleaning prevents macrofouling from building up and at the same time presents an opportunity to inspect so-called niche areas. Secondly, Ecospeed is a very durable coating that withstands abrasive cleaning for which very effective

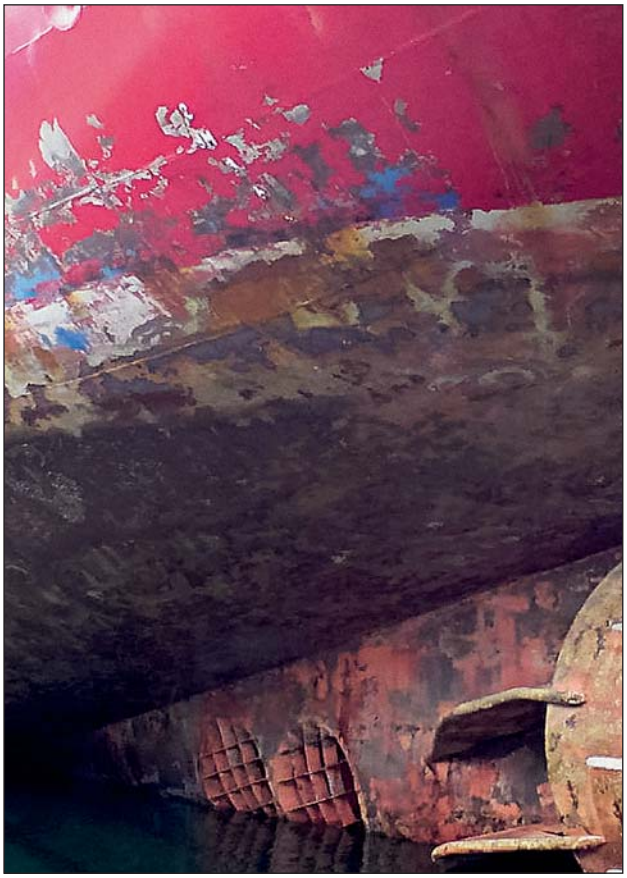
The newbuild research vessel MYA II during its first tour. Foto: Florian Lange, Alfred-Wegener-Institut.

specialized tools have been developed. As a result, many of the fouling organisms will be destroyed during cleaning. As long as only microfouling or locally acquired macrofouling is cleaned off the hull and niche areas, the risk of translocation of NIS via hull fouling is minimal. Standard use of Ecospeed is the key to resolving the hull-borne NIS issue.

Summary

The use of an environmentally safe underwater ship hull coating was essential in fulfilling the ecological goals of the Alfred Wegener Institute. During research in the Wadden Sea it needs to be ensured that the ecosystem being studied is not disturbed. Ecospeed offers a perfect lasting solution for any individual or company that takes its environmental responsibility seriously. ■

Condition after years of use



After two years then

After two years now

Ecospeed is an environmentally safe underwater ship hull coating system which provides the vessel with long-term protection and dramatically improves the ship's performance. The coating gives a very thorough and lasting defense against cavitation and corrosion damage for a ship hull's entire service life.

Ecospeed provides the underwater vessel with an impenetrable protective layer while its flexibility enables absorption of the forces that are produced by cavitation. This prevents the damage normally caused by this phenomenon. Without proper protection against cavitation and the resulting erosion and corrosion damage, the financial consequences can be severe.

Ecospeed comes with a 10 year guarantee and is expected to last the lifetime of the vessel. This is in strong contrast to traditional anti-fouling paints where a new application is necessary during each drydocking. With an Ecospeed application no repaint will be needed. At most, minor touch-ups will be needed. Planning the maintenance of the vessel therefore becomes much easier.

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Ecospeed gives a very thorough and lasting defense against cavitation and corrosion damage for a ship hull's entire service life.

The coating equally provides the underwater hull with an impenetrable protective layer while its flexibility enables absorption of the forces that are produced by cavitation. This prevents the damage normally caused by this phenomenon.

By removing the existing paint layers and applying Ecospeed on the hull we can break the never ending cycle of painting, suffering damage, having to perform extensive repairs in drydock followed by a full repainting, again and again.

With an Ecospeed application no full repaint will be needed during drydocking. Ecospeed is guaranteed for ten years. At the most, minor touch-ups will be required.

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