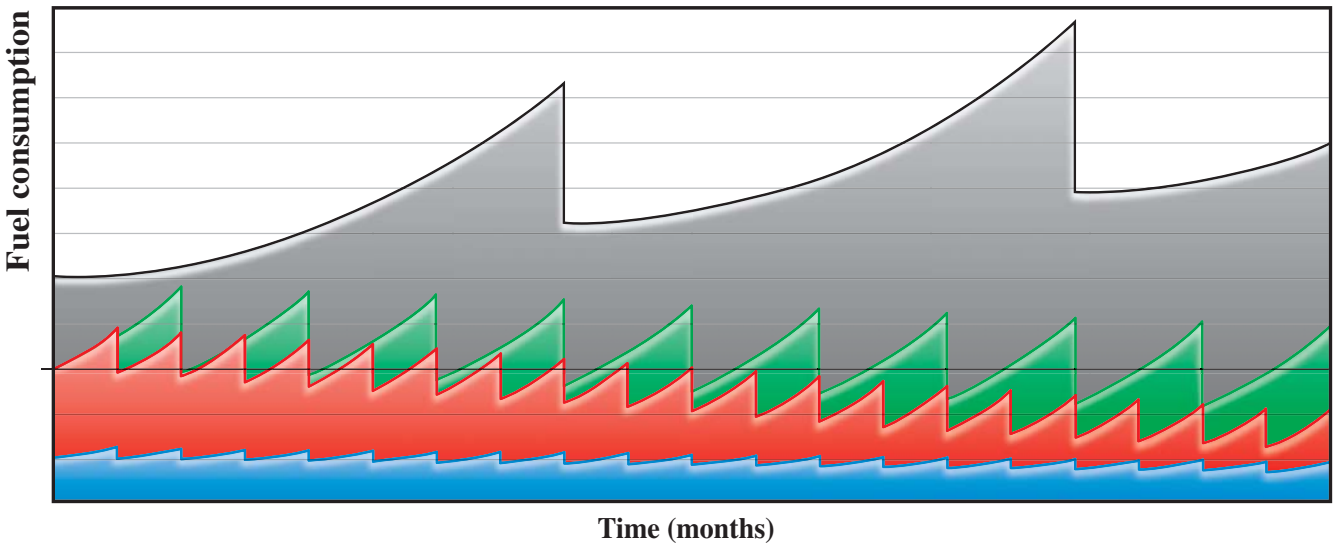
ECOSPEED®

SHIP HULL PERFORMANCE TECHNOLOGY

Magazine

Millions in fuel savings

Development of additional fuel consumption over time



Ecospeed with 2 cleanings per year
Ecospeed with 4 cleanings per year
Ecospeed with optimum cleaning intervals
Active antifouling paints

Most ships sail with a chartering contract that includes a penalty clause if fixed distance/fuel consumption ratios are not met. However, this is unpredictable with regular paint systems and will also worsen over the years. The ship becomes more expensive and profits are reduced.

The protective Ecospeed ship hull performance technology however not only keeps the ship's performance stable but even improves it with repeated underwater maintenance. The coating is designed to be cleaned routinely with specially designed underwater hull cleaning tools. These simultaneously clean and improve the smoothness of the paint surface. This avoids penalties as well as producing enormous fuel savings.

One major cruise line has been quoted as saying that they are saving 10% on fuel costs with Ecospeed compared to the earlier TBT coating which they replaced. Another cruise ship found that they gained 1.5 knots over sea trials speed when they replaced their hull coating with Ecospeed.

Contact us to find out how Ecospeed can help you achieve major fuel savings.

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Ecolock wins QinetiQ 2014 Maritime Innovation Award

The 2014 Maritime Innovation Award – given jointly by the Royal Institution of Naval Architects (RINA) and technology-based services and solutions provider QinetiQ – has been presented to Subsea Industries for the product Ecolock. Now in its second year, the Award recognises outstanding scientific or technological research in hydrodynamics, propulsion, structures and material which offers the potential to make significant improvements in the design, construction and operation of marine vessels and structures.


QinetiQ

Royal Institution of Naval Architects

THE 2014 MARITIME INNOVATION AWARD

is presented to

Subsea Industries NV

in recognition of the innovative research and development leading to the introduction of the Ecolock hull coating system.

The result of over 20 years' research and development of underwater coatings for the marine industry, Ecolock has met the challenge of extending the docking requirements of FPSOs, drill ships and other offshore vessels.

Chief Executive
Royal Institution of Naval Architects

30 April 2015

Increasingly, offshore vessels such as FPSOs, FSOs, FLRSUs and others used for offshore oil & gas exploration, drilling, storage and transport need to stay out of drydock for 15, 25, or even 40 years. The challenge has therefore increasingly been to protect the underwater hull from corrosion and to provide a cleanable surface so that the biofouling that accumulates can be removed successfully and safely without the need for docking.

In the early 2000s, after more than 10 years of research, Subsea Industries developed a glassflake-reinforced coating system: Ecospeed. The solution combines a hard coating with rou-tine in-water cleaning. Ecolock, which is a continuation of that research & development, is also a glassflake-reinforced coating, but one intended specifically to meet the challenging hull protection requirements of offshore vessels. Ecolock can be cleaned underwater as often as needed to meet the requirements of FPSOs, drill ships and other off-shore vessels.

Ecolock provides a hard, impermeable coating which even the toughest barnacle will not penetrate. Barnacles, coral and other fouling organisms can be removed completely by divers, leaving no trace and restoring the coating to its original condition. And because it is non-toxic, it is sensitive to the environment.

ECOLOCK®
LIFETIME CORROSION PROTECTION FOR OFFSHORE UNITS

Mr. Manuel Hof, Subsea Industries' Production Executive and Mr. Bruce S. Rosenblatt, Chairman of the board of trustees of the Royal Institution of Naval Architects.

Ecolock is the result of continuous R&D on offshore hull coatings since the 1990s.

"The maritime industry today is facing many challenges as it responds to the increasing demands of operators, regulators and society for greater efficiency, safety and the protection of the environment. Meeting these challenges will require innovative thinking in all sectors of the industry," said RINA Chief Executive Trevor Blakeley. "However, in an industry which is highly dependent on technology, it is in technological and scientific research and development that innovation will have perhaps the greatest impact, in providing ships and marine structures which cost less to design, build and operate, are safer, and are more sensitive to the environment.

"Ecolock is a fine example of the ongoing technological innovation needed to address industry's challenges of today, and one worthy of the Maritime Innovation Award," he added.

This year's RINA – QinetiQ Maritime Innovation Award was presented to Manuel Hof, Subsea Industries' Production Executive at the Institution's 2015 Annual Dinner on 30th April. ■

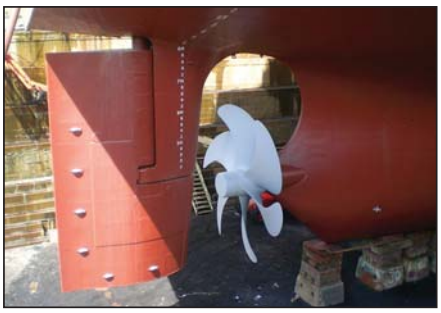
The award was presented at RINA's 2015 Annual Dinner on 30th April.

The only coating that offers lasting rudder protection









Ecoshield 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 rudder 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.

By removing the existing paint layers and applying Ecoshield on the rudder 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 Ecoshield application no full repaint will be needed during drydocking. Ecoshield is guaranteed for ten years. At the most, minor touch-ups will be required.

ECOSHIELD®

THE DIAMOND STANDARD IN STEEL PROTECTION

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The benefits of Ecospeed, Ecoshield and Ecolock

- An interview with Production Executive Manuel Hof

In 1993 research begun on developing a new, long-lasting, non-toxic method of protecting ship hulls. The coating system was introduced into the market in 2002. In 2013, after more than 10 years of strenuous testing, Ecoshield was launched for permanent protection against cavitation damage for rudders. Last year a third member of the family was introduced. Ecolock is designed to protect offshore vessels for decades without the need for drydocking.

We sat together with Mr. Manuel Hof, Production Executive for Subsea Industries, to discuss the benefits each of these three coating systems has for their specific targeted audience.

The Staten Island ferry John Noble was coated with Ecospeed in 2011.

No need to repaint Navy underwater hulls after sailing with Ecospeed for 5 years.

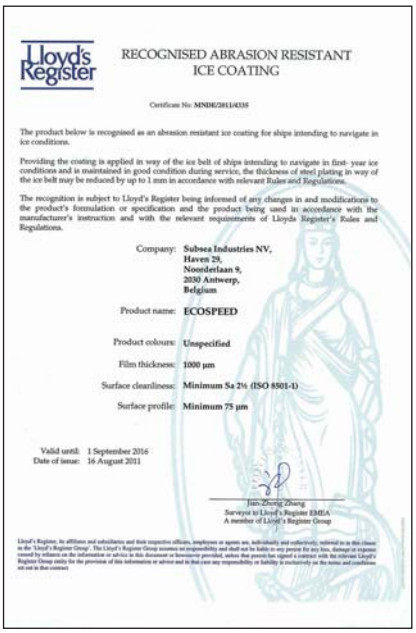
ECOSPEED®
SHIP HULL PERFORMANCE TECHNOLOGY

Manuel Hof: Ecospeed is an environmentally safe underwater hull coating system that improves a ship's performance and provides it with long-term protection. It consists of a unique, entirely original and thoroughly proven system that combines the advantages of an easy-to-apply superior coating, a surface treatment for hydrodynamic optimization and a long term underwater maintenance service system. Ecospeed can be applied to all types of vessels, but our focus right now lies on ice-going vessels and cruise ships and ferries. Both newbuild and existing vessels.

Ice-going vessels

Manuel: The benefits for ships facing harsh icy conditions are durability, corrosion protection of the steel and resistance to impact with ice. In short: protecting the asset, the hull of the ship. Ecospeed is a certified abrasion resistant coating. This allows ships to reduce the thickness of the steel of the ice belt if this area is coated with Ecospeed. This gives owners a significant financial benefit during newbuild projects. Ecospeed is one of only a few coatings that have received this certificate. received this certificate.

An Ecospeed application will protect a vessel against damage from impact with ice.



Lloyd's Register

RECOGNISED ABRASION RESISTANT ICE COATING

Certificate No: MNDE/2011/0335

The product below is recognised as an abrasion resistant ice coating for ships intending to navigate in ice conditions.

Providing the coating is applied in way of the ice belt of ships intending to navigate in first- year ice conditions and is maintained in good condition during service, the thickness of steel plating in way of the ice belt may be reduced by up to 1 mm in accordance with relevant Rules and Regulations.

The recognition is subject to Lloyd's Register being informed of any changes in and modifications to the product's formulation or specification and the product being used in accordance with the manufacturer's instruction and with the relevant requirements of Lloyds Register's Rules and Regulations.

Company: **Subsea Industries NV, Haven 29, Noorderlaan 9, 2030 Antwerp, Belgium**

Product name: **ECOSPEED**

Product colours: **Unspecified**

Film thickness: **1000 µm**

Surface cleanliness: **Minimum Sa 2½ (ISO 8501-1)**

Surface profile: **Minimum 75 µm**

Valid until: 1 September 2016
Date of issue: 16 August 2011

Jian-Sheng Zhang
Surveyor to Lloyd's Register EMEA
A member of Lloyd's Register Group

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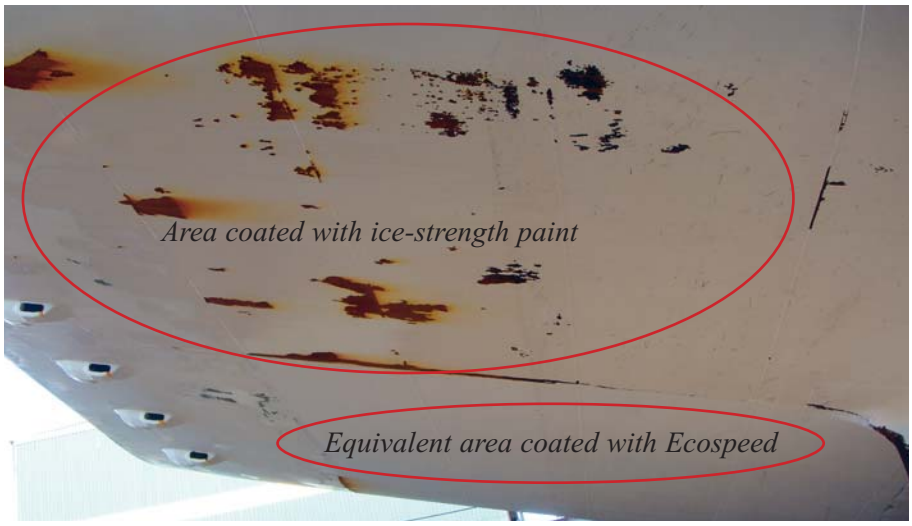
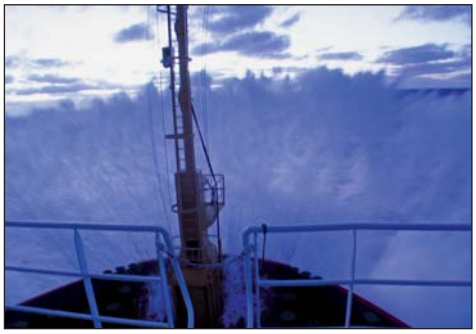


The idea to market Ecospeed as a coating for ice-going vessels grew organically as a consequence of the excellent results obtained with ice-going vessels. The coating system had been applied on some ice-going ships when we got the request to test Ecospeed on an ice-breaker. We went ahead and coated one half of the hull while the other half was coated with a traditional ice-going paint, a leader in the field. The ship docked again six months later and Ecospeed was still in perfect con-



The RRS Ernest Shackleton in Antarctic ice up to 2.5 m thick during the 2009/2010 seasons.

dition, especially compared to the other coating. This showed us that Ecospeed was suited for ice-breakers as well an could withstand even the harshest conditions.

Another ice-breaker, British Antarctic Survey's RRS (Royal Research Ship) Ernest Shackleton is one of our biggest references. It was applied six years ago in 2009. Since then the ship as docked twice. Only a few liters were required for small touch-ups. The second docking took place after operating for four years in severe ice conditions. Last year we did part of the hull of another vessel owned by the same owner. Budget restrictions prevented them from doing the entire hull at once. The second part of the hull will be coated in the beginning of July.

Next week we are starting application on a non-combatant Navy vessel that operates mainly from the Falklands in the Antarctic region.

Cruise and ferry

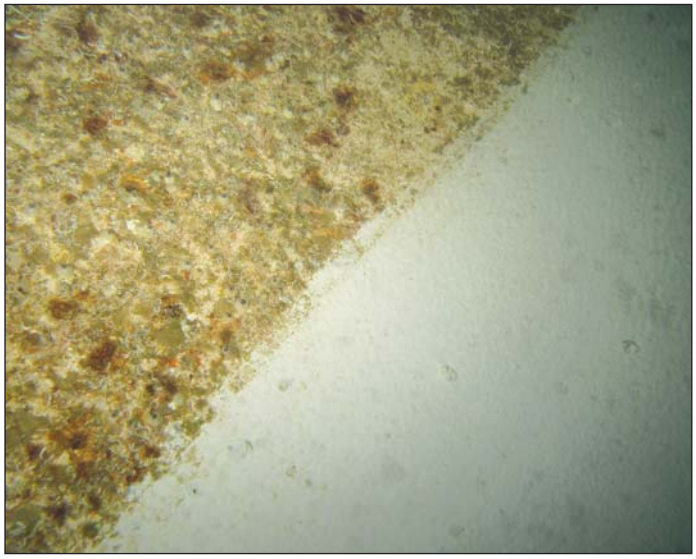
Manuel: A second focus is on cruise ships and ferries. While these vessels also benefit greatly from the corrosion protection Ecospeed offers, the efficiency of hulls treated with the coating system is maybe even more important. Ecospeed is applied once and can be cleaned as often as needed without restrictions and without damage to the coating. Even long stationary period of six months or longer in tropic waters offer no problem. Ecospeed is designed to be cleaned. Other products also have to be cleaned, but were not designed for this. Foul-release coatings are not meant for cleaning, but to keep their speed they have to be cleaned anyway.

Ecospeed's non-toxicity makes it the ideal coating for a company that takes its environmental responsibilities seriously.

Cleanings are easy to organize because these ships are sailing on a fixed route. Ferries go from a to b and back and cruise vessels also go to fixed points with a schedule that is know well in advance. We can therefore easily implement a cleaning schedule. This allows owners to keep the friction of the hull low.

One major cruise line has been quoted as saying that they are saving 10% on fuel costs with Ecospeed compared to the earlier TBT coating which they replaced. Another cruise ship found that they gained 1.5 knots over sea trials speed when they replaced their hull coating with Ecospeed.

Thick layer of fouling on cruise ship after laying idle in the Caribbean for seven months.



Fouling removal from cruise ship without damage to the Ecospeed coating.

Ecospeed can be cleaned as often as needed without restrictions and without damage to the coating.

Winner of Seatrade AWARDS 2014 Innovation in Ship Operations Award

The rudder of m/v Deva *when the vessel came into drydock five years ago, showing multiple damages.*

Rudder of m/v Deva *after five years of service with Ecoshield.*

No steel repairs or repaints are required during future drydockings.

ECOSHIELD®

THE DIAMOND STANDARD IN STEEL PROTECTION

Manuel: Ecoshield is an enhanced version of Ecospeed. Small but significant variations of the Ecospeed formula have been tested on rudders since 2002 with extraordinary results. We have done quite a few rudders with Ecospeed in the very beginning. With really good results. So we started to enhance the coating with corrosion protection as the main idea. After years of testing (initially under the name Ecospeed Strong) we then launched the product in 2013.

Ecoshield is designed to protect rudders and other underwater running gear against the cavitation phenomenon: against pitting, corrosion, erosion and so on. We have a constantly growing number of new customers and the old ones keep returning. We have vessels sailing with the coating system on their rudders for up to ten years and counting. When they come into drydock, the coating is always in very good shape. We recently had a customers who said that 'the coating simply works'. This was when one of his vessels docked five years after application.

Ecoshield is not only used on rudders, but also on thrusters, thruster tunnels, Kort nozzles and other running gear. We are also in communication with manufacturers of for instance thrusters to include Ecoshield in the newbuild plans of their products. This would allow them to offer their customers a complete package with lasting protection.

ECOLOCK®

LIFETIME CORROSION PROTECTION

Manuel: The final product in the family is Ecolock and was launched

Rendering of the Caribbean FLNG (left). A hull section being coated with Ecolock (right) at Wison shipyard in Shanghai.

just last year. Ecolock is used on stationary offshore units. Ecolock is the result of continual Research and Development on offshore hull coatings.

The main benefit of Ecolock is corrosion protection and the possibility to clean it. These units are designed to stay on location for 15, 20 and even up to 30 years. Hull integrity and corrosion protection is a major thing. Class demands an underwater inspection twice every five years to see if the hull is in good shape. So the hull must be cleaned to allow these inspections. If the hull is cleaned on a frequent basis, say every two years, this offers no problems at all. We are also in the early stages of developing ROV systems to clean Ecolock, which would allow us to offer a full package.

The standard warranty is ten years, but for Ecolock this can be extended to 15 or 20 years. The difference is the number of layers. Two coats give you ten years, three coats 15 and four coats give you 20. This is really a guarantee, not just a commercial promise.

Over the last couple of years alone we have done several big offshore projects, including a project for Exmar NV. Exmar, headquartered in Antwerp, Belgium, introduced the world's first floating LNG liquefaction barge, the Caribbean FLNG, in 2013. The main reason for choosing Ecolock was to protect the underwater hull from corrosion for at least 15 years without having to drydock or repair or replace the hull coating. Another key factor in choosing the hull coating system was the need for a clean, environmentally safe hull to facilitate the required class inspections. We are now preparing the application of the second Exmar project. The material is already on its way to China and the application is scheduled to start mid-June.

Environmentally safe

Manuel: All three members of the coating family are totally Ecologically safe. When we started to develop Ecospeed back in 1998, this was one of our main goals. It still is.

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

One of our Ecolock projects was planned to be deployed in Colombia where there is a lot of fishing activity. So besides durability and the knowledge that the coating would stay on for long enough, the owner and the local authorities wanted to be absolutely sure that no toxic elements would be leaching into the aquatic environment. Not during regular activity and not during cleaning.

In 2013 Ecospeed was applied on a newbuild research vessel called MYA II. The vessel is used by the coastal researchers at the Alfred

Fouling can be removed underwater or in drydock without damaging the Ecospeed coating.

Wegener Institute (AWI) at the Wadden Sea Station on the island of Sylt, Germany. The interaction of flora and fauna in the food web is one of the biological key issues examined at the station. With the MYA II, Scientists are 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. Ecospeed ties in perfectly with the ecological ideas behind the design of the research vessel.

Summary

The purpose of Ecospeed, Ecoshield and Ecolock is to offer a long-lasting, non-toxic protection to all types of ships and units. This is done by providing a system that keeps the hull very smooth and free of fouling for the service life of the vessel with minimal repair and no replacement. ■

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

Save millions in drydock expenses and off-hire time

Hull of cruise ship after 5 years with Ecospeed coating with no replacement or major repair. This is the state of the hull when the ship came out of the water, without any cleaning or touch-up in drydock.

When your hull coating never needs replacing or major repair, you can save a lot of money in drydock fees, off-hire time, materials and labor.

Most hull topcoats are designed to be replaced once or twice every five years. The full hull coating scheme has to be fully replaced every 10 - 15 years down to bare steel. Over that time period, the coating degrades and becomes rougher until it's no longer worth trying to patch it up. And it costs you a fortune in fuel to compensate for the additional hull friction.

Imagine a coating that's guaranteed for 10 years and is expected to last 25 without replacement or major repair. A coating that gets smoother over time, not rougher.

Imagine coming into drydock after 3 or 5 years and finding that your hull coating only requires a few minor touch-ups and doesn't even need to be washed off.

Just think how much money you will save.

Call us today for a quote to convert your hull to Ecospeed or start off right, with Ecospeed, on a new build.

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