

SUBSEA

PROTECTION AND PERFORMANCE



Magazine

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ECOLOCK® ultra long-lasting protection for offshore hulls



Ecolock is designed to protect offshore vessels for decades without the need for drydocking. Increasingly, offshore units such as FPSOs, FSOs, FLRSUs and others used for offshore oil and gas exploration, drilling, storage and transport need to stay out of drydock for 15, 25 even 40 years.

The challenge has 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 for UWILD and to reduce weight. Ecolock is the answer to that challenge.

Ecolock is an extremely tough and durable coating designed to remain

in excellent condition for 15 - 25 years without drydocking, repair or replacement. Ecolock can be cleaned underwater as often as needed to meet the UWILD and weight requirements of FPSOs, drill ships and other offshore vessels. Ecolock is the result of continual R&D on offshore hull coatings since the 1990s.

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Editorial: Free *Corrosion Handbook* gaining popularity

Since we announced it last year and made it available on request, the *Corrosion Handbook for Ship Owners and Operators* has been warmly welcomed by many individuals in the shipping and related industries around the world. We have had requests and favorable feedback from Owners, Superintendents and Chief Engineers, Classification Society Inspectors, Professors of Marine Technology, Naval officers, offshore oil and gas consultants, even land-based corrosion engineers in the chemical industry, and many others.

According to the World Corrosion Organization, corrosion around the globe causes damage of \$2.5 trillion USD annually, which is about 3% of the world's GDP. These figures vary somewhat depending on the source but that seems to be the consensus.



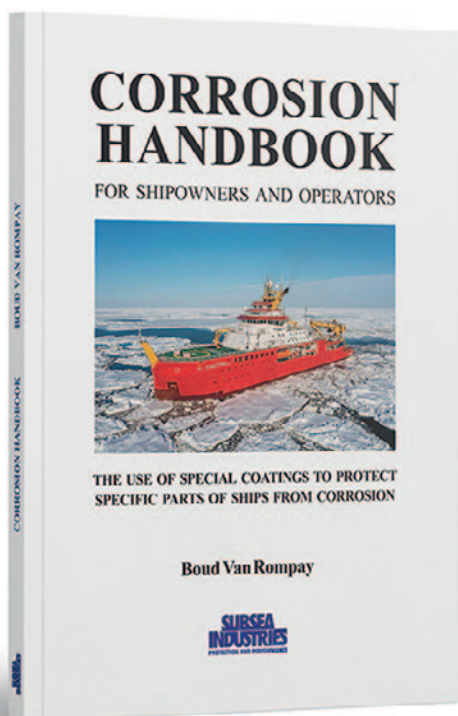
Books about corrosion are usually thick, heavy, learned tomes, full of chemical and mathematical formulae, theories and hypotheses. They are not usually something that a ship superintendent with a ship in dry-dock and a (yet again) badly corroded rudder can just crack open and find useful information that he can at once apply to remedy his situation.

In that regard, the *Corrosion Handbook* broke with tradition. First of all, it is rather thin (54 pages total), attractively and spaciouly laid out with many photos and illustrations. Secondly, there is no theory whatsoever in the book. It is entirely practical. It states problems and gives immediate practical solutions, showing where these solutions have been applied and with what result. It is very easy to read and understand.

The *Corrosion Handbook* has been in considerable demand. We are currently on our third printing. The original handbook was expanded in

the second printing to include a section on protecting propellers from corrosion, a subject which has gone back and forth over the years. There is a way to protect propellers from cavitation damage. We have now included it in the handbook.

The book is divided into two sections. The first part lists and gives examples of specific problem areas on ships. This includes areas prone to cavitation erosion and corrosion, such as rudders and thruster tunnels, parts of the ship subject to chemical corrosion including scrubbers, and those areas that are often the victim of abrasion and wear resulting in corrosion, such as decks and boot-tops. Examples and illustrations of each are given. The second part of the book lays out the solutions we have found for each of the above. These are not theoretical. They are not complicated. They are simple, practical, proven ways to deal effectively with the problem which, from experience, work every time. Again, lots of specific cases are given with



photos and, where available, direct feedback from end users.

One would think, with the corrosion damage running at such a huge cost, and the trillions of dollars that are spent every year attempting to combat the problem, that people would pay well for such a book. This one, however, is on us. We will gladly send out a printed hardback copy or copies of the book, to anyone who has need of it in his or her work, be that on the shipbuilding or ship repair side, or marine education, engineering consultancy, class sur-

veying, marine insurance and other related positions and specialties.

“The best things in life are free,” is the title of a popular song in the 1927 musical *Good News*. Right or wrong, the *Corrosion Handbook for Shipowners and Operators*, hard copy, is free. We believe that the global cost of corrosion should be pared down, that ships and marine structures should last longer, that they should be safer and look better.

If you would like your free copy(ies), simply email us at corrosion@subind.net

and please provide your company name and your position in the company, or a relevant industry affiliation, plus a postal address. We will send the handbook out to you.



Subsea Industries NV
Boud Van Rompay
Founder

Corrosion damage repair made ^{very} easy

Subsea Industries has a product for filling and building up a corroded and pitted steel surface to its original form prior to recoating with Ecoshield. Eco-fix is as tough as the steel itself, machinable, and can be used to repair most pitting or corrosion damage on rudders, stabilizer fins, thrusters and other underwater gear.

Ecofix is used in combination with Ecoshield, the ultimate rudder protection coating. When a rudder or other piece of underwater ship gear has not been properly protected, the surface will become corroded.

Cavitation can cause severe pitting. The steel needs to be restored to its original shape with a smooth surface prior to recoating.

This is where Ecofix comes in. It is a superior, tested and proven filler. Because it uses the same basic resin as Ecoshield, the coating can be applied just one hour after the filler.



The bonding and hardness are extraordinary. This is the effective alternative to very expensive fillers.

And because it is part of the Eco-speed/Ecoshield family, it is fully compatible with our coatings.

Ecospeed coatings: high abrasion resistance

Abrasion resistance is an extremely important property in a marine coating. If the hull, decks, tanks and other parts of a ship or offshore vessel or structure that are exposed to water are not well protected with an abrasion-resistant coating, they can suffer mechanical damage. The underlying steel or other substrate is then exposed to corrosion. This can result in the need for extensive repairs and can shorten the useful life of the vessel.

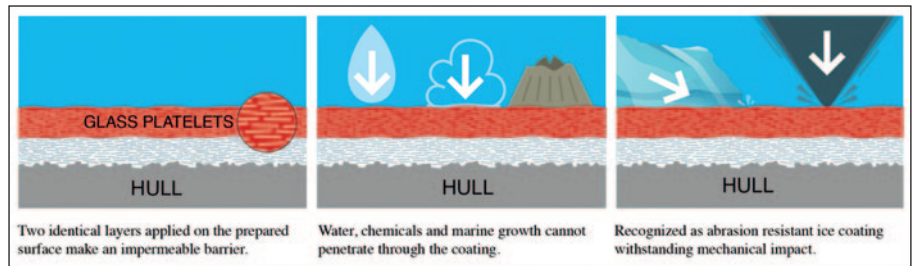
Thus correct choice of marine coatings is vital for a vessel to have a long and trouble-free life.

For this reason, abrasion resistance was built in to the Ecospeed family of coatings – Ecospeed, Ecoshield, Ecolock – from the beginning.

What makes the Ecospeed coatings so abrasion resistant?

It is a combination of several factors that make these coatings so successful in this regard:

- The vinyl ester resin which is the base of the coatings
- The high proportion of large aspect ratio special glass platelets
- Bonding agents added to increase the adherence of the coating to the substrate
- Strict preparation requirements of the surface to be coated, which include a roughness profile of at least 75µm (±3 mil), and a cleanliness of SA 2 ½ (near white steel)
- The thickness of coating applied



which is at least 1000 µm (±40 mil) and in some cases 1500 µm (±60 mil) dry film thickness (DFT).

- Choice of coatings is also important. While all of the Ecospeed family of coatings are highly abrasion resistance, Ecoshield is specially formulated to make it even tougher.

It is recommended for certain applications where particularly high abrasion resistance is required.

The following situations illustrate just how abrasion-resistant the Ecospeed coatings are.



Converted semisubmersible rocket launch platform SeaLaunch Odyssey was coated with Ecospeed to solve problems with protection and performance. The hull would foul badly due to long lay-up times, but was cleaned aggressively before sailing for fuel performance. After several cleanings with steel wire brushes, the coating remained in excellent condition. Cleaning was permitted in port because the coating was proven non-toxic.

General hull coating and cleaning

One immediate benefit of having a very abrasion-resistant general hull coating can be observed when it comes time to clean the hull in the water. Sometimes hulls foul quite badly with barnacles and other calcareous fouling, no matter what hull coating is used. If the next drydock visit is still some time away and the hull has to be cleaned under water, it may require quite aggressive cleaning with steel wire brushes. Most hull coatings will be destroyed by such treatment. The Ecospeed coatings have shown that they can be cleaned repeatedly and aggressively without any damage to the paint. Because the coatings are entirely non-toxic, the environment is also not damaged by such cleaning, as it would be if an antifouling or foul release coating were used.

Ice-abrasion resistance

One of the severest tests of abrasion resistance for a coating is when it is used on an icebreaker or ice-going vessel. Ice is a particularly harsh



Page 1 of 1
 Certificate No: LR21476358IC-02
 Issue Date: 01/09/2021
 Expiry Date: 31/08/2026

Recognised abrasion resistant ice coating

The coating system below is recognised as an abrasion resistant ice coating for ships operating in polar regions, the classification of which is noted below.

The coating system is considered as meeting the requirements of 'effective protection' and 'special surface coating', as defined in applicable LR Rules and Regulations and / or Finnish-Swedish Ice Class Rules / Trafi Regulations, for vessels with applicable Polar Class or Ice Class notations.

The use and applicability of such coating systems, as designated by this certificate, may be considered when applying the relevant Rules criteria, for construction and service conditions.

Manufacturer	Subsea Industries N.V.
Address	Noorderlaan 9, Haven 29, Antwerpen, 2030, Belgium
Product	ECOSPEED
Ice Classification	PC1 to PC7
Product Colours	Unspecified
Film Thickness	1000µm
Surface Cleanliness	Minimum Sa 2½ (ISO 8501-1)
Surface Profile	Minimum 75 µm

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 technical datasheets, training and advice, and with the relevant requirements of Lloyd's Register's Rules and Regulations.



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MA102.0

Heather Hughes
 Team Leader - Non-Metallics to Lloyd's Register EMEA
 A member of the Lloyd's Register group

Ecospeed is certified by Lloyd's Register as an ice-abrasion resistant coating, Polar Code 1-7. Ships coated with Ecospeed can sail in any sea, all year around.



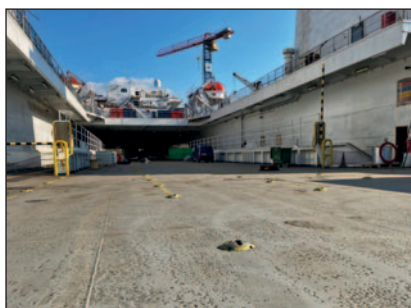
Heavy pitting on the bow of one of the world's most powerful icebreaking cargo ship. The second photo shows the same bow after 3 seasons in the ice, now protected with Ecospeed.

environment for hull coatings, particularly when it contains lava, gravel, sand and other rough material as it often does, for example, in Antarctic waters.

Ecospeed has been awarded ice-abrasion classification by Lloyd's Register, rating it Polar Code (PC) 1-7 which is the maximum rating. This means, in effect, that a ship protected with Ecospeed is allowed to sail in any sea at any time of year, no matter the ice conditions.

Decks

The decks of Ro-Ro ships and workboats require special protection due to the heavy traffic and rough treatment they are subjected to.



Ecospeed applied to the badly worn and pitted decks of a Ro-Ro ship. The coating was able to protect them well. The bottom photo shows the main deck after 4 years and a great deal of heavy traffic.

Ecospeed has proved to be very resistant to this type of abrasion and to provide excellent protection.

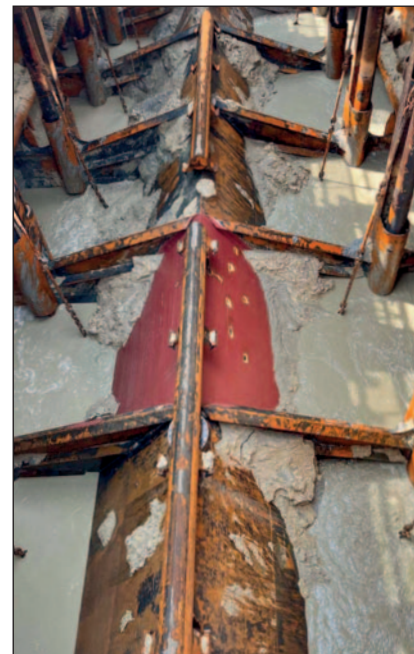
Inside hopper of trailer suction hopper dredger

Ecoshield was applied as a test on the inside of Dutra's trailer suction hopper dredger *Stuyvesant*, where the steel is subject to serious abrasion and erosion. The results even surprised the Fleet Superintendent who had not expected it to last.

On seeing the coating after almost a year in use, Dutra Fleet Manager Iain Searle commented, "To be honest," he said, "I was expecting it to be gone in a few weeks, so I am surprised it is holding up at all."

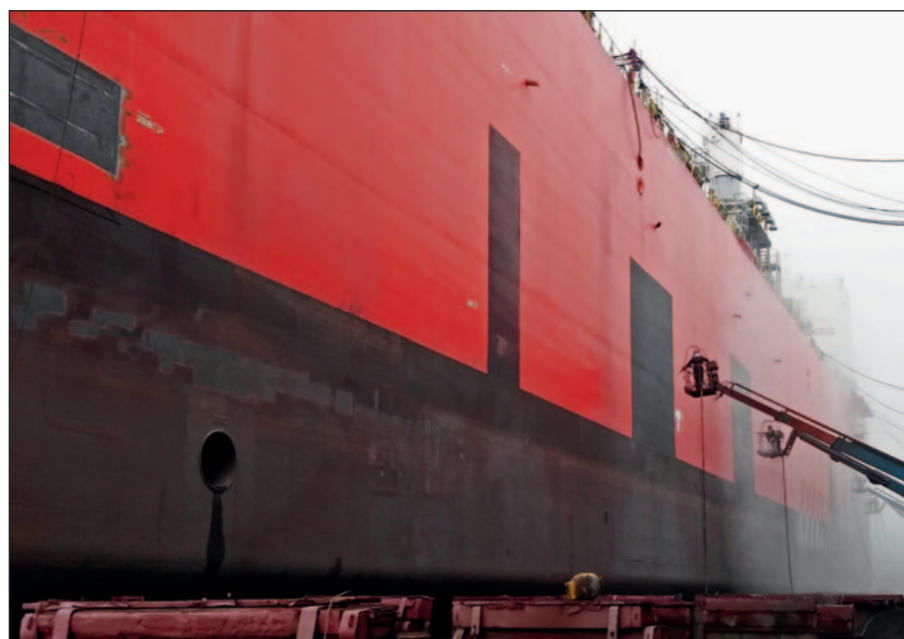
Fender areas of FLNG barge

The fender areas of an FLNG barge are often protected with rubber to save the paint from being removed in the areas of the hull where the barge rubs against the mooring jetty. When the EXMAR *Caribbean* FLNG was coated with Ecolock to protect the hull, we recommended



Inside the hopper of the Dutra trailer suction hopper dredger Stuyvesant showing the Ecoshield test (red) after 10 months in service. Dutra's Fleet Manager's comment was, "I was expecting it to be gone in a few weeks."

to the owner that instead of the rubber, he simply extend the Ecolock coating on the hull to protect those areas where rubber is normally required. This was done and the coating successfully resisted the abrasion. Later, when the barge was moved to a new station with a differ-



The fender area of an FLNG barge being coated with Ecolock for abrasion protection of the fender areas.



Bulbous bow of a Baltic ice-trading cargo ship in drydock in very poor condition after sailing with conventional antifouling, and same ship after a year of sailing in the same conditions after Ecospeed was applied.

ent jetty, new patches were coated with Ecolock to fit the new jetty requirements. These also held up exceptionally well.

Bulbous bow

The bulbous bow of a ship, particularly an ice-going ship, can take quite a beating. Traditional hull coatings are rapidly damaged and removed, exposing the hull to corrosion. Ecospeed stands up very well to this rough treatment.

Boottops

Recently a major shipping company that was using Ecoshield to protect rudders and thruster tunnels from cavitation damage, asked us if we could protect the boottops of their ships which were being damaged by tugs. So far we have successfully coated the boottop of several of these ships.

Compared to any of the traditional antifouling or foul release coatings

and even the conventional specialized ice-abrasion resistant paint, the Ecospeed family of coatings have proved to be in a different league when it comes to abrasion resistance. While our coatings are not completely impervious to mechanical damage, they are so much tougher and more abrasion-resistant than the alternatives that they are well worth considering as protection for any areas of ships, boats and marine structures that are prone to this kind of stress. ■



Boottop of container ship being protected with Ecospeed, chosen for its toughness and abrasion resistance.

Eliminate cavitation damage: the ultimate protection for running gear

Cavitation damage on running gear is a persistent and costly problem for shipowners. The repeated cycle of painting, suffering erosion and corrosion, conducting expensive repairs, and repainting again is an ongoing battle. There is, however, a tried and tested solution that eliminates this issue once and for all. Ecoshield, an advanced protective coating, has seen hundreds of applications in the past year alone, safeguarding rudders, bow thruster tunnels, nozzles, and other energy-saving devices from cavitation damage and corrosion. This article explores the benefits of Ecoshield and why more and more shipowners turn to it as their preferred long-term solution.

The growing need for protection

The rise in demand for underwater rudder repairs has highlighted the need for a durable, cost-effective, and lasting protective solution. Rudders



Severe pitting in rudder as a result of cavitation. Ecoshield can prevent this from happening again.

are a crucial part of any vessel, and when they are poorly protected with the same conventional coating that is used on the rest of the hull, they are highly susceptible to cavitation erosion. This leads to longer stays in drydock for repairs and underwater interventions, resulting in substantial financial losses for shipowners.

By applying Ecoshield, shipowners can break free from the cycle of damage and repairs. The coating forms a robust, impenetrable layer on the rudder or other running gear, ensuring complete protection against cavitation erosion and subsequent corrosion. With Ecoshield, rudders and running gear do not need to be repainted at every drydocking as is usually the case with conventional coatings. This saves time in drydock as well as the labor and material costs which are commonly incurred in the maintenance of these parts of the ship.

Ecoshield and Ecofix: a perfect match

Ecoshield is particularly effective in cases where the rudder has already suffered from cavitation damage, often showing up as eroded and pitted steel plating. In such instances, it should be used in combination with Ecofix, another innovative product



Surface preparation on energy saving device prior to Ecoshield application.



Ecoshield is applied in only two, identical layers.



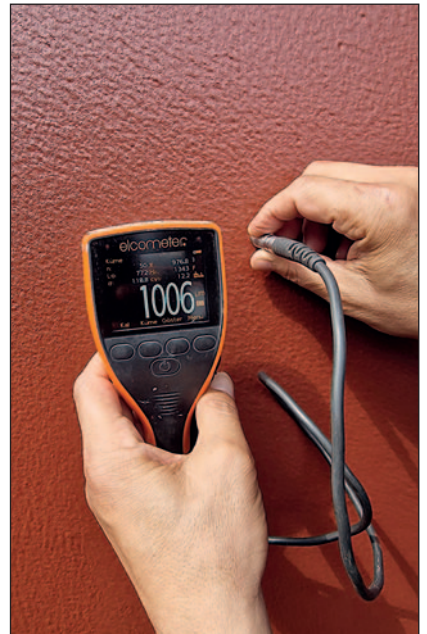
Propeller nozzles after application of first Ecoshield layer.



Ecoshield application is scheduled around other work on the vessel without interfering with it.



Application is simple if the correct procedure is followed.



Paint inspector measuring the dry film thickness of the second coat.

from Subsea Industries. Ecofix is a high-performance filler designed to restore damaged steel to its original smooth surface before recoating. Since Ecofix shares the same basic resin composition as Ecoshield, the latter can be applied just one hour after the filler is used and the two products bond together perfectly.

The ability of Ecofix to replace expensive and time-consuming hot work makes it a cost-effective repair solution. In the case of newbuild

rudders, slot welds can also be filled with Ecofix before applying Ecoshield, creating a hydrodynamically smooth surface.

Quick and flexible application

Time is of the essence when it comes to drydock operations, and Ecoshield's short overcoat time is a key advantage. Ecofix can be overcoated with Ecoshield just one hour after application and a second coat

of Ecoshield can be applied three hours after the first. There is no maximum overcoat time. The coating's flexible application schedule ensures that it can be integrated into the shipyard's workflow without causing delays. The entire process—including grit blasting, Ecofix application (if needed), and applying the two required layers of Ecoshield—can be completed in just one day. No special equipment or personnel are required.



No repaint will be needed during future dockings.



All running gear, such as thrusters and thruster tunnels, can be protected with Ecoshield.

Complete protection for all running gear

Beyond rudder protection, Ecoshield is highly effective for other underwater ship gear, including thrusters, azimuth thrusters, Azipods®, thruster nozzles, thruster tunnels, and other



Many customers have reported that they do not need to use cathodic protection on rudders coated with Ecoshield.

critical components. The coating's exceptional strength ensures that these areas remain fully protected throughout the vessel's operational life, eliminating the need for major repairs or recoating.

Proven long-term results

The success of Ecoshield is evident in the number of shipowners who have transitioned from experimental single applications to fleet-wide implementation, with many specifying the coating for their newbuilds. Those who have used the coating for over a decade report zero cavitation damage or failures, reaffirming its durability and effectiveness.

Ecoshield comes with a ten-year guarantee. It is the only coating we know that provides full protection against cavitation damage. Given the extensive financial risks associated with cavitation erosion and corrosion, Ecoshield offers peace of mind and a lasting solution to shipowners looking to protect their assets.

A smart investment for the future

The strategic use of Ecoshield provides shipowners with significant cost savings by reducing drydock time, eliminating the need for hot work, and even allowing anodes to be dispensed with. For newbuilds, applying Ecoshield during construction ensures protection from the moment the ship leaves the yard until the end of its service life.

Existing vessels also benefit immensely from the application of Ecoshield. By addressing corrosion damage early and preventing further deterioration, shipowners can extend the lifespan of their running gear and avoid costly repairs down the line. ■



SUBSEA

PROTECTION AND PERFORMANCE



Subsea Industries NV, was founded in 1983 specifically to take care of the design, development and marketing of what has become an evolving line of underwater hull and propeller

cleaning equipment as well as the line of hard hull coating systems.

All products produced by Subsea Industries have the same goal in

mind: To keep the underwater part of your vessel in the best possible condition for its entire lifetime at the best possible performance.

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