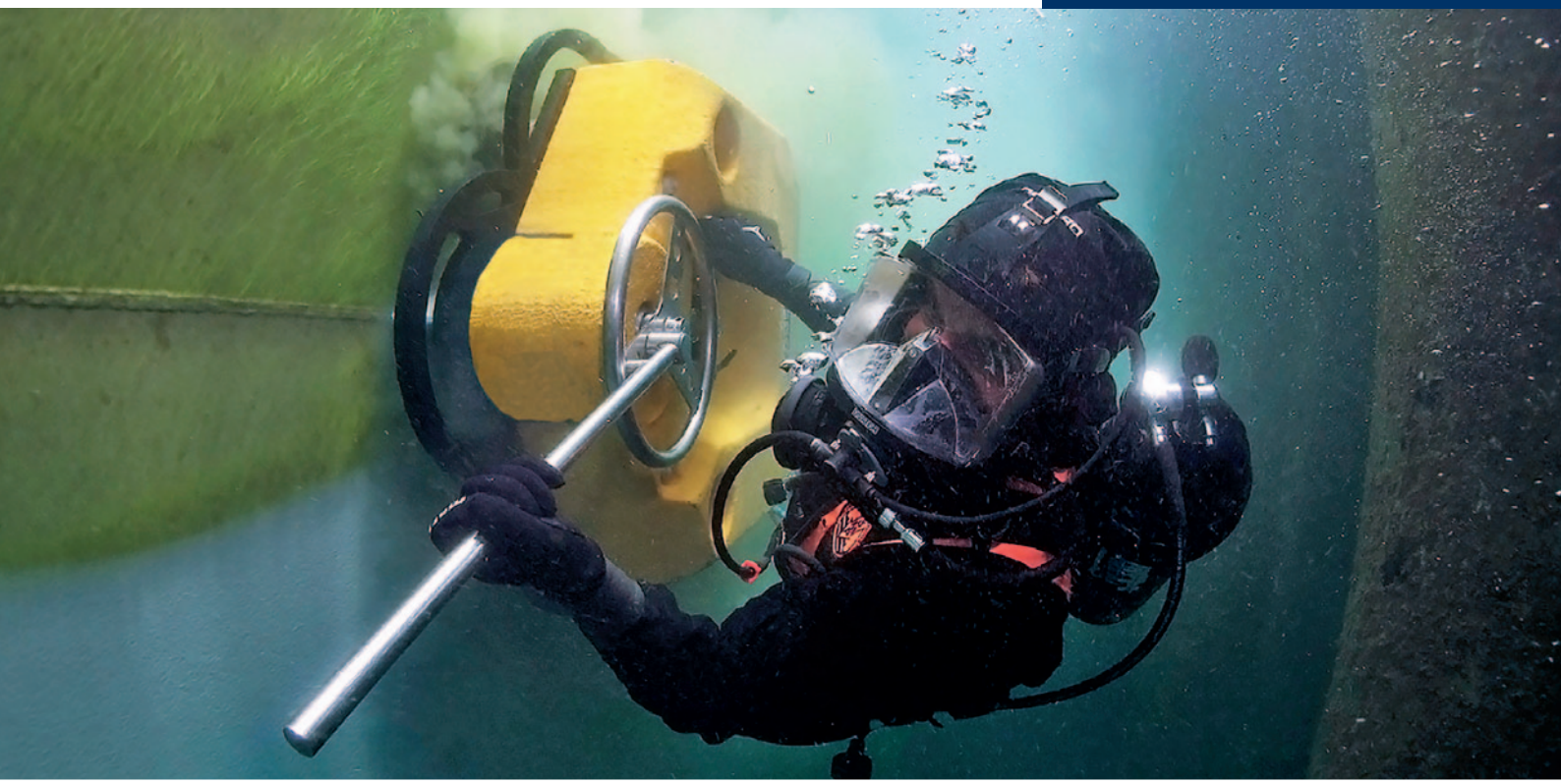
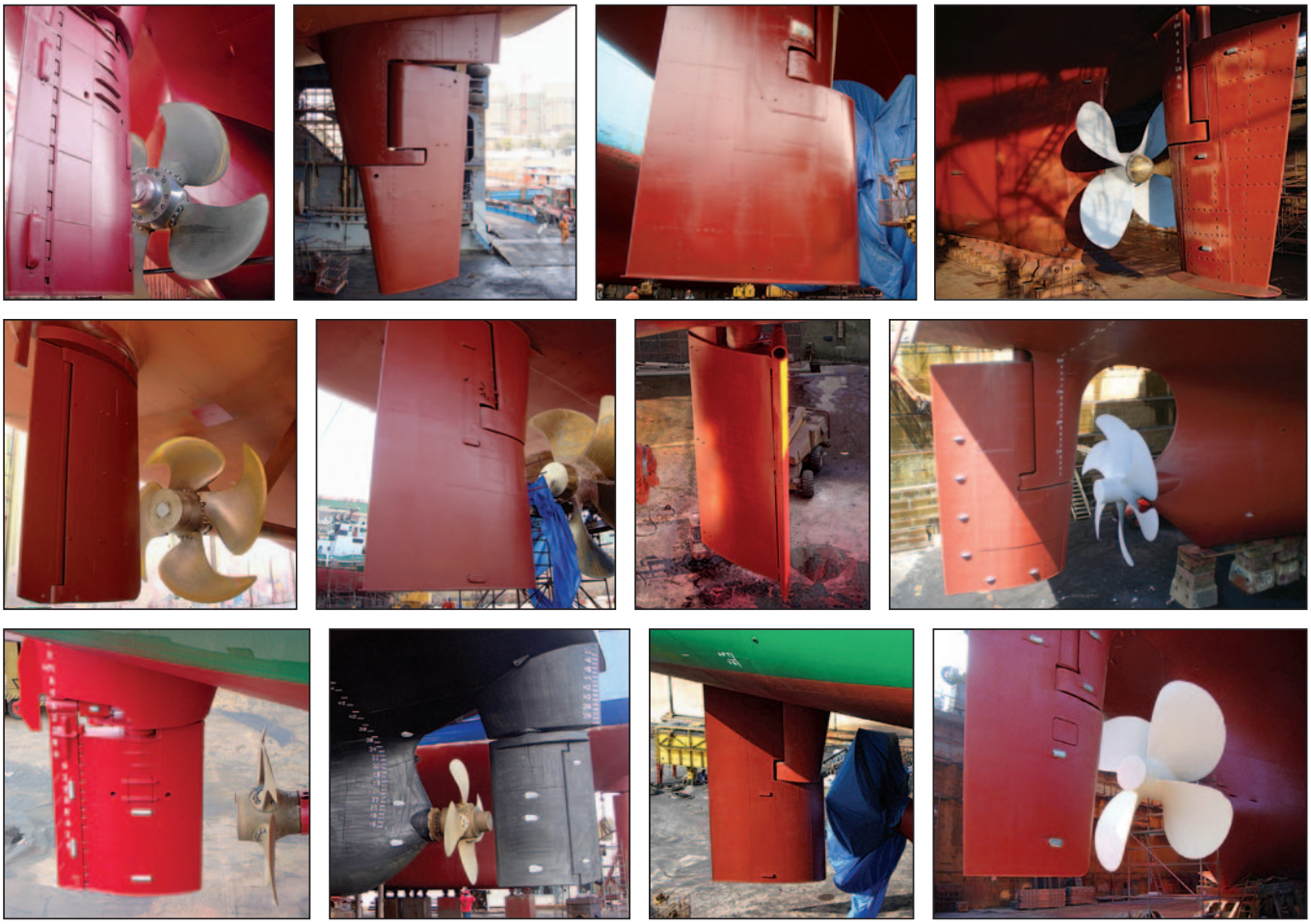
SUBSEA
PROTECTION AND PERFORMANCE

NEWS
LETTER / 271



Advantages of a cleanable hull coating, part 2

LASTING 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.

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ECOSHIELD®
ULTIMATE PROTECTION

Advantages of a cleanable hull coating, part 2

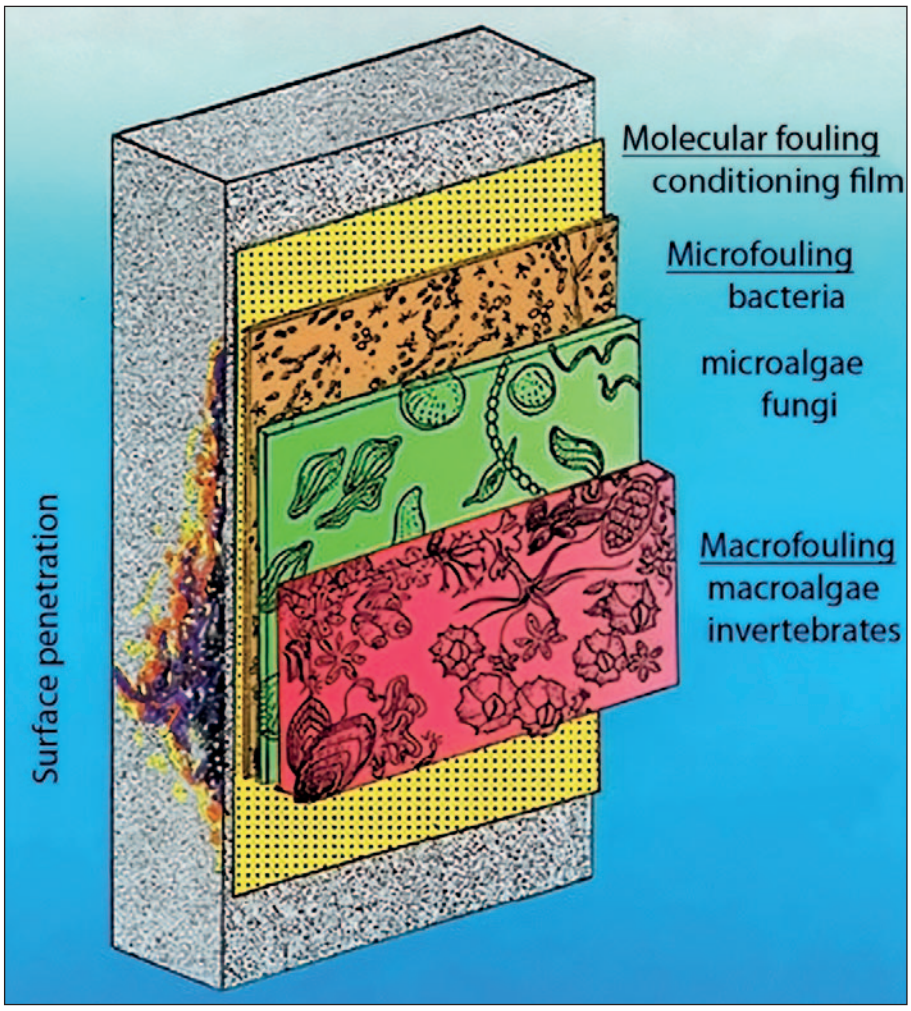
(This is Part 2 of a 2-part article on the subject of ship hull cleaning for maximum fuel efficiency. Part 1 was published in issue 270 of the Subsea Magazine.)

As explained in Part 1, the right hull coating combined with correct cleaning, is the optimum solution to maintaining maximum ship hull and fuel efficiency while safeguarding the marine environment from chemical pollution and the transfer of invasive, non-indigenous aquatic species. In Part 2 we will examine in detail how this is achieved.

First requirement – a cleanable coating

There are two basic properties that make a hull coating cleanable in the water:

1. It must be a hard, durable coating which is not adversely affected in any way by cleaning, either in the water using brushes or other methods, or in drydock using high pressure water jets. This means that the coating must not be removed, damaged, made rougher, or experience any loss of thickness as a result of the cleaning.
2. The coating must not emit any harmful substances into the water when it is cleaned. This includes heavy metals such as copper, zinc and others, organotins including TBT and DBT (dibutyltin, despite the ban on organotins in antifouling paint, often used as a catalyst in silicone-based foul-release coatings), biocides, PFAS, microplastics or any other harmful substance.



Build-up of marine fouling (from Davis and Williamson, 1995.)

This immediately excludes from in-water cleaning all antifouling coatings, since it is impossible to clean them in the water without reducing the coating thickness and their effective life. If any hard fouling is present, it is impossible to clean it off without damaging the coating. These coatings are porous and the glue of the fouling organisms, barnacles in particular, penetrates the coating. When the fouling is removed, so is some of the coating.

The same is true of a foul-release coating, usually silicone. These coatings are notoriously fragile. If hard fouling attaches, it cannot be cleaned off without removing some of the coating, making it rougher and less effective.

In-water cleaning of these types of coatings will have a harmful effect on the marine environment. Depending on the coating, the cleaning will cause a pulse discharge of heavy metals, biocides, silicone oils,

[Hull condition]	Additional shaft power (%)	Additional fuel in 2020 (million tonnes)	CO_2 emissions (million tonnes)	Additional fuel cost (billion $)
Freshly applied coating	0	0	0	0
Deteriorated coating or thin slime	9	44	134	22
Heavy slime	19	92	279	46
Small calcareous fouling or macroalgae	33	160	486	80
Medium calcareous fouling	52	253	768	127
Heavy calcareous fouling	84	408	1,238	204

(Fig. 2) Estimated effect of effective fouling control on annual fuel consumption and CO_2 emissions [for all shipping]. All figures are projected to 2020 and are compared to a fouling free hull. (The increased shaft power as a function of the fouling degree is obtained from Schultz (2007) and is based on his calculations for an Oliver Hazard Perry class frigate sailing at 15 knots.)[18]

PFAS or microplastics or a combination of these.

Contamination from these coatings can be so severe that dead zones are created. The area becomes impossible to dredge without spreading the pollution further and increasing the damage.

The options for hull coatings that can be cleaned in the water without liability are relatively few. It requires a hard coating which will not suffer damage or loss of thickness with even aggressive cleaning, and which is chemically inert with no active ingredients which can leach out or be forced out with the cleaning operation.

One such coating is Ecospeed. It can be cleaned as aggressively and frequently as needed to keep the hull smooth and fuel efficient without any loss of thickness of the coating or the release of any noxious or harmful ingredients into the water.

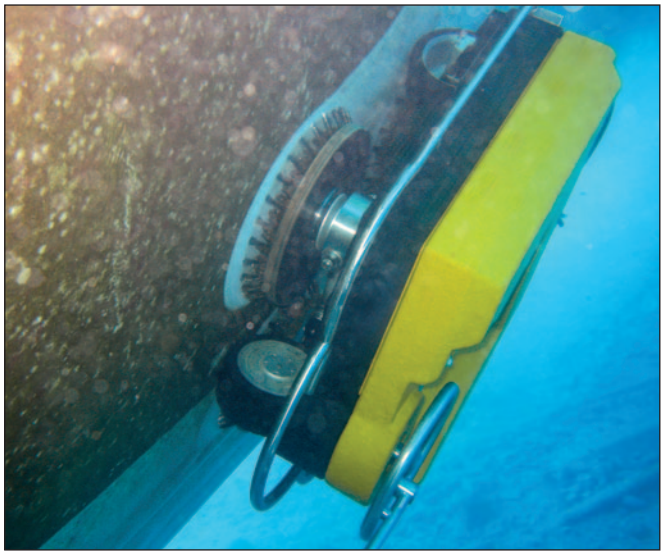
When to clean

While hulls coated with Ecospeed can be allowed to become heavily fouled without risk of damage to the coating, they can be cleaned whenever needed.

If optimal fuel performance is the goal, the hull should be cleaned when it has accumulated no more fouling than slime and light weed. This degree of fouling already carries a fuel penalty of between 9 and 31% according to tests carried out by Michael Schultz at the US Naval Academy in Annapolis, Maryland, USA. The idea is to keep fouling to a minimum.

If a ship has been idle for a while and has therefore accumulated medium to heavy fouling and is now preparing to sail to a different environmental zone, it should be cleaned before it sails. This obtains optimum fuel efficiency for the voyage and eliminates the risk of transferring hull-borne invasive aquatic species. In many ports, the ship would be required to clean the hull before being allowed entry. Sailing with a clean hull takes care of this requirement in advance.

Trying to clean an antifouling coating underwater damages the coating and pollutes the marine environment.



Ecospeed can be cleaned aggressively in the water whenever needed without harm to coating or environment.

Cleaning the hull of a 340m cruise ship can be accomplished quite rapidly by a competent diver using the Typhoon M313 cleaning unit on Ecospeed coating.

Slime and weed are not considered invasive species as they are found everywhere.

The frequency of cleaning required will vary with the type of ship and its requirements, the sailing pattern and the climate in which the ship is operating.

The two requirements of most ports for in-water cleaning are that the cleaning not contaminate the water column with toxic chemicals, heavy metals or other substances and that any macrofouling cleaned off has been acquired locally and therefore does not pose a threat of spreading invasive species.

We have been successful in gaining permission to clean microfouling off Ecospeed coated hulls in many ports without the need to collect the material that is cleaned off.

Note on reclaim systems

Much publicity has been circulated about reclaim systems that are alleged to contain and collect unrealistically high percentages of material cleaned off the ship's hull. Unfortunately this is false optimism. To really collect all the effluent particles, chemicals and organisms that come off a fouled hull during the cleaning of an antifouling or foul release coating would require prohibitively large and expensive equipment and take a completely unviable amount of time to carry out. Due to the shape of the ship hull, the behavior of the water, chemicals and particles involved, the force required to clean a fouled hull and the effects this has on the surrounding water, the reclaim claims are not valid.

The answer is to use a completely non-toxic, hard hull coating such as

High pressure washing in drydock is very effective in cleaning Ecospeed.

Sailing with a recently cleaned hull results in optimum fuel efficiency and avoids transferring invasive aquatic species.

Ecospeed, to clean before macrofouling has accumulated and/or to clean off macrofouling that has accumulated locally and has not been imported from another environmental zone. and to clean before sailing.

How to clean

Until an industrial level in-water cleaning system is developed, the most successful cleaning system we have found is the use of powerful, hydraulic, diver-operated cleaning units with rotating brushes. Different types of brushes are used for different levels of fouling. With Ecospeed on the hull, even stiff steel wire brushes can be used to remove heavy fouling without any harm to the coating. Lighter fouling can be successfully removed using softer brushes.

A competent diver using a Subsea Industries three-brush, all-wheel drive, hydraulic machine can clean as much as 2,000 square meters in an hour. On a large ship, two or more teams can be cleaning simultaneously, resulting in a full hull cleaning in an acceptable period of time.

Where this system was used correctly, the shipowner claimed fuel savings of 10% compared to previous use of antifouling coatings.

Conclusion

There is a workable system which allows ships to sail with clean hulls, greatly reducing fuel consumption, eliminating marine pollution from heavy metals and other toxic substances, and preventing the transfer of invasive aquatic species.

It involves the use of a hard, non-toxic coating such as Ecospeed and regular cleaning to keep the fouling to no more than slime and light weed.

This is the proven, effective approach. ■

This converted semisubmersible rocket launch platform would lie idle for months and accumulate heavy fouling. This was easily cleaned off when it was time to sail to the equator for the next launch.

ECOSPEED®
SHIP HULL PERFORMANCE TECHNOLOGY

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. Ecofix 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 Ecospeed/Ecoshield family, it is fully compatible with our coatings.

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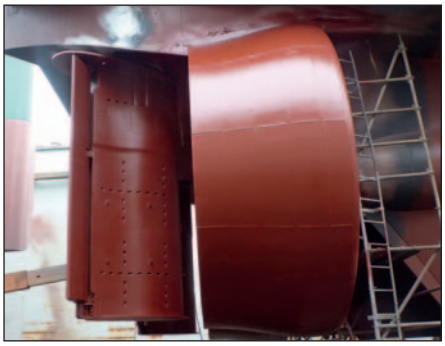
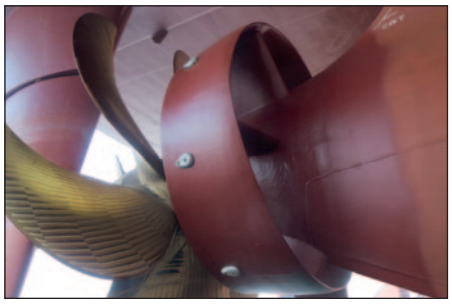
ECOFIX®
CORROSION REPAIR

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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08/25