

SUBSEA

PROTECTION AND PERFORMANCE



Magazine

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Long-term protection for critical ship components with Ecoshield

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

For shipowners today, technical performance is no longer judged only by speed or fuel consumption. Every unplanned repair, every extended drydock stay and every off-hire day has a direct impact on earnings, charter relations and long-term competitiveness.

Yet many of the causes of off-hire originate below the waterline.

Corrosion, cavitation damage, abrasion and coating breakdown on hulls, rudders and running gear continue to be treated as “normal wear.” In reality, they are among the most predictable and preventable causes of technical downtime. Conventional coating systems, by design, deteriorate over time. They sacrifice themselves, require frequent recoating and often fail first in the most critical areas such as rudders, thrusters and nozzles.

This creates a cycle that shipowners know all too well: coating failure leads to steel damage, steel damage



leads to repairs, repairs lead to extended drydock time. As a consequence, availability suffers.

At Subsea Industries, we have always approached this problem from a different angle. Instead of accepting periodic failure as inevitable, our coating systems are designed to remain intact for the lifetime of the vessel. By stopping corrosion and cavitation at the source, they remove some of the key causes of unplanned maintenance.

When coatings such as Ecospeed and Ecoshield are applied correctly, hulls and underwater components no longer require full repainting at each docking. At most, small touch-ups are needed. Repairs are simpler, faster and far less dependent on weather conditions. This shortens drydock stays and gives shipowners greater freedom in selecting yards based on technical quality rather than coating constraints.

The result is not only lower maintenance cost, but greater operational

predictability. Vessels stay on hire longer. Charter commitments are easier to meet. Coating and corrosion-related technical surprises become the exception rather than the rule.

In an industry where margins are tight and regulatory pressure continues to increase, keeping ships trading reliably is one of the most powerful advantages an owner can have. The choice of coating may seem like a technical detail, but in practice it is a strategic decision, one that directly affects availability, flexibility and long-term value.

Protecting steel is important. Protecting on-hire time is essential.



Subsea Industries NV
Boud Van Rompay
Founder

Long-term protection for critical ship components with Ecoshield

Modern vessels operate in increasingly demanding conditions. Higher efficiency requirements, tighter environmental regulations and extended drydock intervals place significant strain on key ship components. Among the most exposed are rudders, running gear and exhaust gas cleaning systems (ECGS), all of which face continuous mechanical and chemical attack, either below the waterline or from the aggressive nature of the water flowing through them.

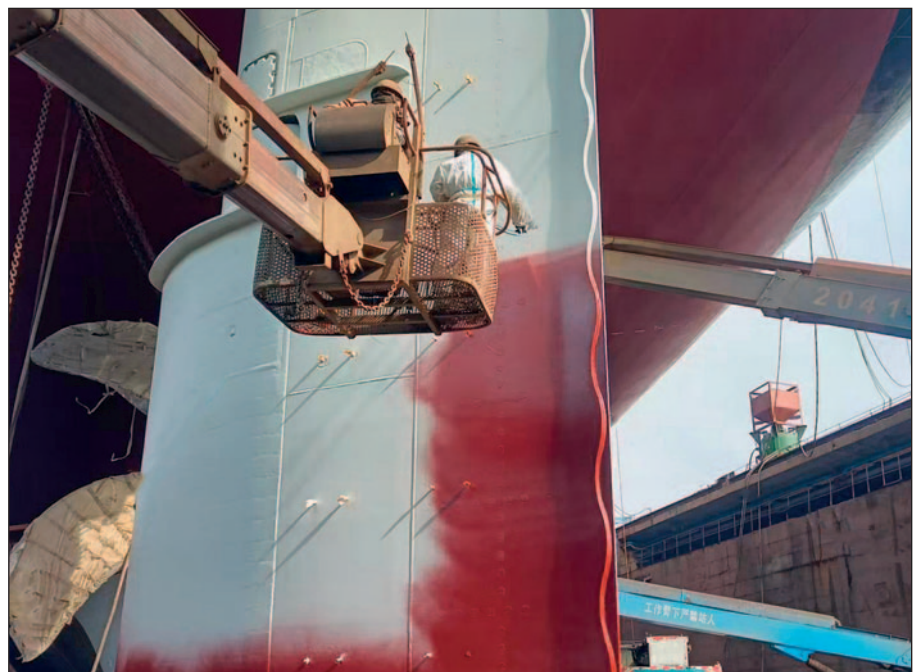
Ecoshield, developed by Subsea Industries, is engineered to protect these critical areas for the lifetime of the vessel. This two-part article explores how Ecoshield delivers durable protection against cavitation erosion and corrosion damage, first for rudders and running gear, and then for scrubber systems.



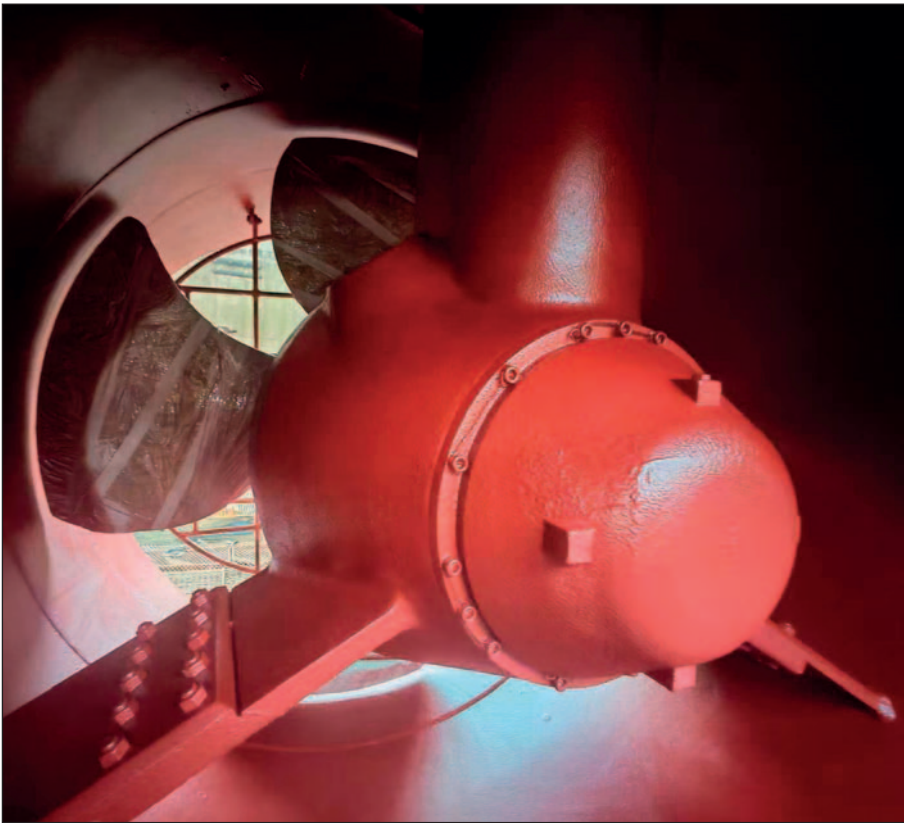
If not properly protected, cavitation can cause severe damage to rudders.



After surface preparation, Ecoshield is applied in two identical layers.



Minimum overcoating time between layers is only three hours.



All running gear can be protected with Ecoshield.

1. Protecting rudders and running gear

Rudders and running gear are essential to vessel maneuverability, safety and efficiency. Operating in turbulent flow conditions, these components are constantly exposed to cavitation which erodes the coating, leaving the underlying steel exposed to corrosion. Over time, this combination can lead to severe surface damage, reduced hydrodynamic performance and, in extreme cases, structural failure.

Ecoshield has been specifically developed to address these challenges. The coating consists of a thick, glass-platelet reinforced vinyl ester that forms a dense, impenetrable barrier on the steel surface. Once applied, Ecoshield provides long-term resistance to cavitation erosion and corrosion, eliminating the need for repeated recoating during the vessel's operational life.

Why rudders and running gear need special protection

Cavitation is one of the primary causes of damage to rudders and other underwater appendages. As pressure fluctuations occur around

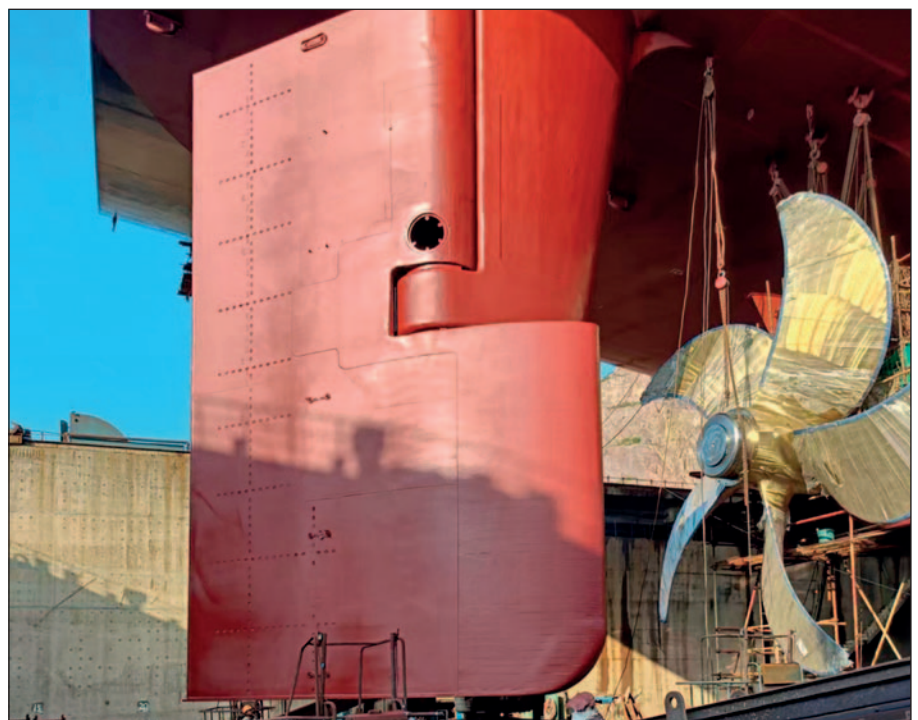
moving components, vapor bubbles form and collapse violently against the steel surface. The resulting micro-impacts progressively remove material, creating pits that grow deeper with time.

Traditional coating systems often struggle to withstand this continuous mechanical assault. Once a coating breaks down, corrosion rapidly develops in the substrate, accelerating damage and increasing repair scope.

Ecoshield addresses this issue through its unique composition. This ensures long-term coating integrity, even in areas subject to extreme hydrodynamic forces. As a result, rudders and running gear retain their original profile and performance characteristics over extended service periods.

Application flexibility and lifecycle benefits

Ecoshield can be applied both during vessel construction and as part of routine drydocking programs. When



After application, no full repaint will be needed for the lifetime of the ship.



The flexibility of application makes it easy to adapt it to other yard work.



Only two layers are needed for full protection.

applied at the newbuild stage, it ensures immediate protection from the first day of operation. For vessels already in service, Ecoshield can be applied following appropriate surface preparation, even when cavitation damage has already occurred.

In cases of existing damage, surfaces can be rebuilt before coating application, using Ecofix, a compatible filler that restores pitted or irregular surfaces, eliminating the need for more costly hot-work repairs.

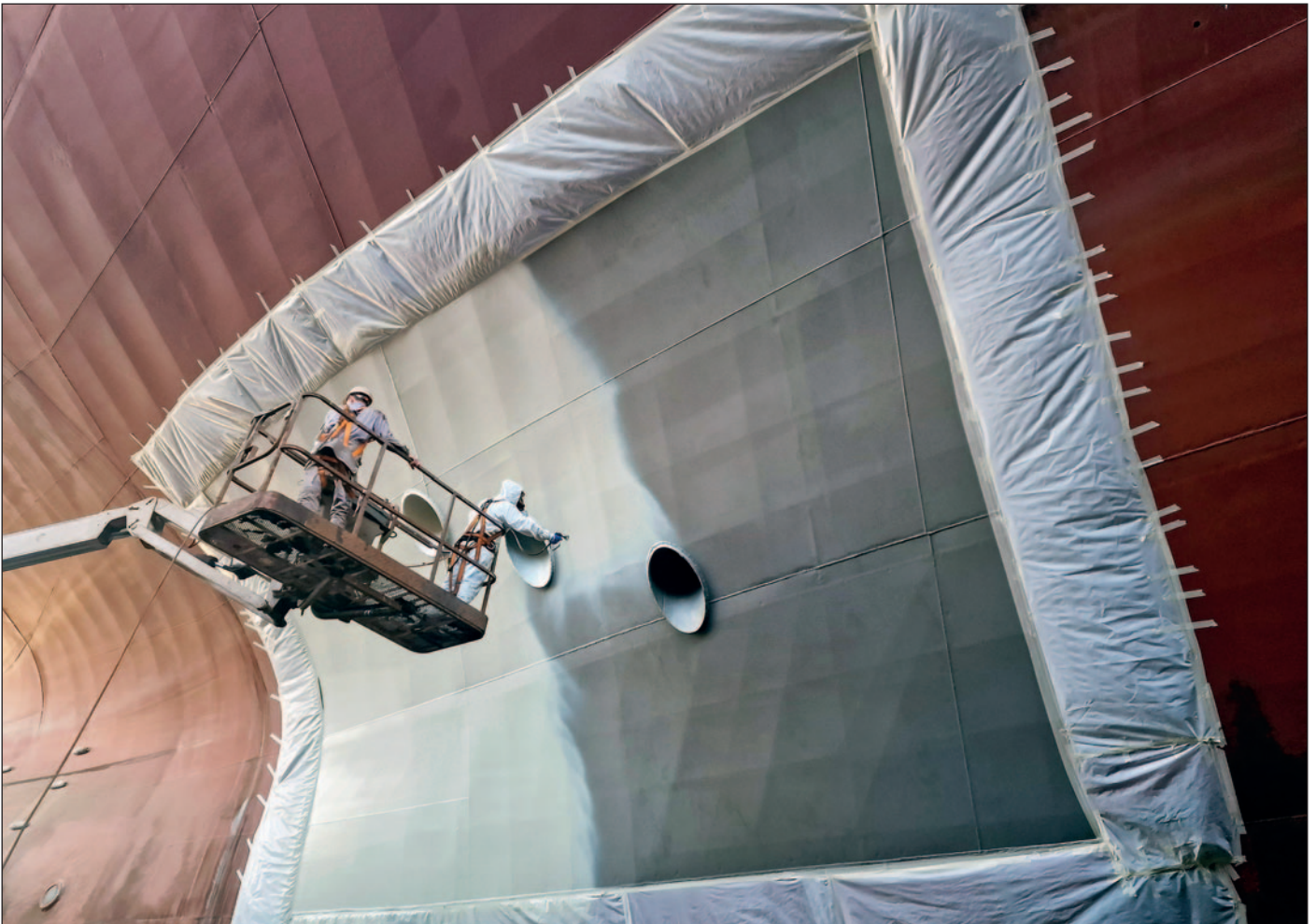
Over the vessel's lifetime, this durability delivers significant operational benefits. Reduced coating work during drydockings translates directly into shorter yard stays, lower maintenance costs and increased vessel availability.

Beyond rudders — comprehensive running gear protection

In addition to rudders, Ecoshield is widely applied to other cavitation-prone components, including thruster tunnels, thruster nozzles, stabilizer fins and other propulsion units. By protecting all critical underwater appendages with a single, proven coating system, ship-owners can standardize maintenance strategies and achieve consistent long-term performance across the vessel's underwater profile.

2. Protecting scrubbers, tanks, pipes and outlet areas

Exhaust gas cleaning systems have become a common feature on many vessels, enabling compliance with global and regional emission regulations while continuing to use the much cheaper heavy fuel oil. While effective in reducing sulphur emis-



Application of first layer on scrubber overboard area.

sions, scrubbers introduce a highly aggressive internal environment. Acidic washwater, elevated temperatures and continuous flow place extreme demands on the materials

and coatings used within these systems.

Key components such as scrubber chambers, internal pipework, recy-

cle tanks and overboard discharge areas are particularly vulnerable to corrosion if not adequately protected.



Ecoshield is chemically resistant, making it ideal for scrubber pipe protection.



No corrosion damage will appear on scrubbers protected with Ecoshield.



Recycle tank protected with Ecoshield.

The corrosive challenge inside scrubbers

The washwater circulating through scrubber systems contains sulphuric acid and chlorides that can rapidly attack unprotected steel. Conventional marine coatings are often unable to cope with these conditions for extended periods, leading to early coating failure and corrosion beneath the film.

Damage is frequently observed not only inside the scrubber system itself, but also at the overboard discharge point and surrounding hull plating. If left unchecked, corrosion in these areas can lead to steel thinning, leaks and increased maintenance requirements, with potential implications for vessel safety and compliance.

Effective protection therefore requires a coating system with exceptional chemical resistance, strong adhesion and long-term stability under continuous exposure.

Ecoshield as a solution for scrubber protection

Ecoshield provides a robust solution for protecting scrubber-related components. The dense, glass-flake reinforced vinyl ester resin forms an impermeable barrier that isolates steel surfaces from aggressive washwater and corrosive compounds. When applied correctly, the coating prevents corrosion from initiating

and spreading, even in highly acidic environments.

Ecoshield can be applied to a wide range of scrubber components, including internal pipework, scrubber tanks, washwater chambers, overboard discharge pipes and the hull area surrounding the overboard pipes. The same protective principles apply across all these areas, ensuring consistent performance throughout the scrubber system and protecting the affected hull area.

As with underwater components, correct surface preparation is essential. Once applied, the coating remains stable and intact over long service intervals, reducing the need for inspection and repair.

Lifecycle and operational benefits

The long-term durability of Ecoshield offers clear advantages for scrubber protection. By eliminating frequent recoating cycles, maintenance requirements are significantly reduced, allowing vessel operators to focus on planned maintenance rather than reactive repairs.



Application on scrubber system of oil tanker.



Ecoshield protects the area around the outlets for a ship's entire lifetime.

Preventing corrosion at an early stage also protects the structural integrity of scrubber systems and surrounding steelwork. This reduces the risk of leaks, unplanned downtime and costly steel repairs, while supporting reliable scrubber operation throughout the vessel's life.

Where corrosion has already occurred due to the use of inferior or unsuitable coatings, damaged areas can be restored and coated with Ecoshield to halt further degradation, extending the service life of existing installations.

Integrating coating applications into vessel workflows

Ecoshield applications can be seamlessly integrated into scheduled drydockings or retrofit projects. The

coating is compatible with standard shipyard practices and does not require complex application procedures. The fact that the coating has a 3-hour minimum overcoat time with no maximum makes its application very flexible. Once in service, its durability reduces future maintenance scope, helping operators optimize drydock planning and minimize vessel downtime.

Summary

Rudders, running gear and scrubber systems are among the most heavily exposed and maintenance-intensive components on board modern vessels. Subjected to cavitation, corrosion and aggressive chemical environments, these areas require a protective solution that delivers reliable long-term performance.

This article highlights how Ecoshield provides lifetime protection for both underwater running gear and scrubber-related components. By resisting cavitation erosion on rudders and thrusters and safeguarding scrubber pipes, tanks and outlet areas against acidic washwater, Ecoshield helps shipowners reduce maintenance costs, minimize downtime and protect critical assets throughout the vessel's operational life.

It's amazing the difference a couple of coats of the right coating can make! ■

Ecospeed defined

The purpose of Ecospeed is to offer a long-lasting, non-toxic protection for all ship hulls and to provide a system that keeps a hull very smooth and free of fouling for the service life of the vessel with minimal repair and no replacement. Instead of using chemicals to try to kill and repel marine fouling organisms, Ecospeed uses a hard, impermeable, impenetrable coating along with manual removal of fouling at an early stage.

The technology can be broken down into three parts:

1. Coating

Ecospeed is a glassflake reinforced resin coating that is impermeable, impenetrable, long-lasting, inert and non-toxic. The coating is applied in two coats each of 500 µm dry film thickness (DFT) to a properly prepared hull, either at new build or in drydock for an in-service vessel. It works equally well on steel, aluminum or GRP. A minimum of about 3 hours is required in between coats and there is no maximum overcoat time. This coating has extraordinary adhesion and bonding qualities. It is very tough and resistant to abrasion. It is also flexible and remains firmly bonded to the plates even when these flex considerably.

2. Fast and easy cleaning

Underwater maintenance of Ecospeed is carried out with specially designed underwater hull cleaning tools that simultaneously remove all fouling and optimize the smoothness of the paint surface. It allows divers to clean the flat areas as well as the harder to reach parts of the hull



Ecospeed offers a cost-effective and environmentally-acceptable approach to hull protection and anti-fouling.

without damaging the coating. One of the many unique characteristics is that with repeated underwater hull cleaning the coating's surface improves. Cleaning can be carried out whenever needed, at any point in its lifespan.

Ecospeed can also be cleaned in drydock with high pressure tools. With Ecospeed the coating is always in a brand-new, excellent condition after a high pressure washing and no material is lost. Only the fouling is removed. The coating stays on the ship instead of dispersing in the water and contaminating the shipyard and the surrounding waters.

By optimizing hull surface friction and using the best possible surface hydrodynamic characteristics, fuel savings over the lifetime of the ship are most often found to be in the 20-40 % range. In contrast with AF compounds that rapidly degrade over time, our coating lasts. Therefore the performance of the ship does not degrade either.

3. Minor touch-ups in drydock

The coating is expected to last the full service life of the ship without need for replacement or any major repair. Mechanical damage such as that caused by collision or anchor chain abrasion, or by welding on the hull can easily be touched up during routine drydocking. Because the coating consists of a single, homogenous layer, any repair or touch-up easily blends in without any difficulty. The integrity of the hull coating is maintained despite such repairs. Because no repaint is needed, several days and up to a week can be saved in drydock times during each visit.

The coating alone provides superior hull protection, but it is the full Ecospeed technology that results in the major fuel savings. ■

Corrosion damage very repair made ✓ 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.

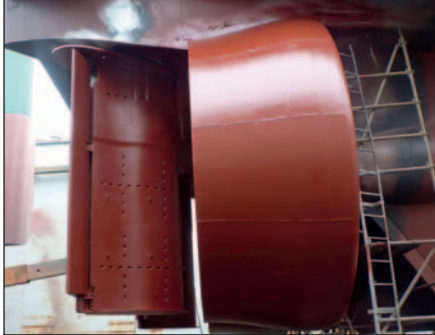
This is where Ecofix comes in. It is a superior, tested and proven filler. Because it uses the same basic resin as Ecoshield, the coating can be applied just one hour after the filler. The bonding and hardness are extraordinary. This is the effective alternative to very expensive fillers. And because it is part of the Ecospeed/Ecoshield family, it is fully compatible with our coatings.

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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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