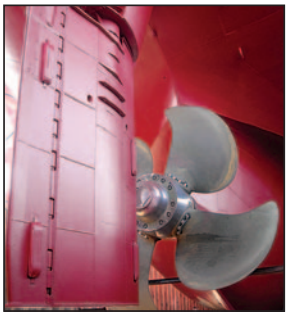
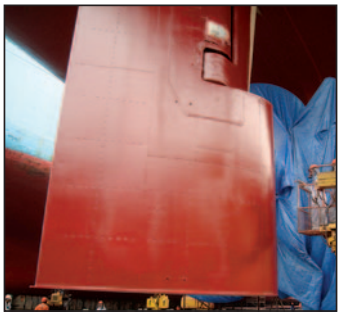
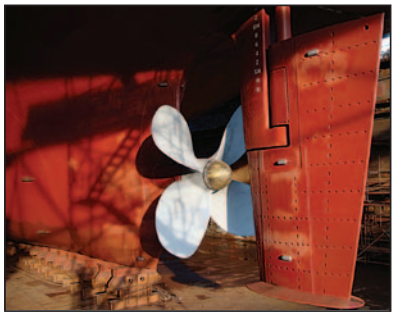
SUBSEA

PROTECTION AND PERFORMANCE

Magazine

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

Editorial

For many years, Ecospeed has been a leading ice-class coating, certified by class as ice-abrasion resistant and qualifying ships using it for reduced scantlings.

The original Ecospeed coating was not intended as an ice-class coating. Its superior ice-abrasion resistance was discovered later. Incredible results with Ecospeed were reported by ice-going ships, tugs, ice-breakers, polar supply and research ships, the world's most powerful ice-breaking cargo ship and many other ships that sail in ice and are conscious of protecting the ship and the environment.

We therefore refined the original coating and focused on its ice-going capabilities and created Ecospeed Ice which is designed to be a specialist ice-going coating superior to any other available. I would like to tell you why.

- It is a class certified ice-abrasion resistant coating.
- The hull remains smooth and retains its low friction properties for the life of the ship, saving fuel and reducing emissions.
- Due to superior protection, new-builds are able to take advantage of reduced scantlings, less steel and a lighter ship, saving construction costs.
- A base consisting of a resin which cures fully without becoming brittle or inflexible and has superior adhesion properties, reinforced with a high content of large aspect ratio glass platelets.

The coating still looks amazing on this icebreaker, even 15 years after application with no repaint.

- Extraordinarily tough bonding powers. Even in the event of mechanical damage, there will be no undercreep.
- Completely non-toxic. Vital for pristine polar regions and other sensitive environments. Will not leave biocides, heavy metals, microplastics or PFAS in the ice.
- Preparation includes grit blasting to create a profile of at least 75 µm and a cleanliness of SA 2.5 or better.
- Easily applied without specialized equipment. Just two coats each 500 µm DFT. Rapid overcoat time of about three hours minium, no maximum. Ready to launch in 24 hours.
- The coating remains intact and smooth for many years in the harshest of icy waters and will not need to be replaced. Only minor spot repairs for mechanical damage are required during routine drydocking.

Well over a hundred ice-going ships have been coated with our products with excellent and conclusive results.

When icebreaking research vessel *RV Laura Bassi* docked in Italy last year, only touch-ups were applied to the underwater hull coating. Even though the hull was originally coated with Ecospeed Ice fifteen years ago there has been no need for a full repaint since then.

Back in 2009 when the coating was first applied, the ship was still called *RRS Ernest Shackleton*. In ten seasons operating *RRS Ernest Shackleton* with Ecospeed Ice, the British Antarctic Survey (BAS) had to touch-up the coating only in areas of mechanical damage and carry out minor repairs around the bow, the most susceptible area to ice impact.

This is just one of the many case studies. Because of the excellent results our Ecospeed coating was selected to protect many icegoing ships including the British Antarctic Survey's newbuild research vessel *RRS Sir David Attenborough* and the world's most powerful icebreaking bulker, *Umiak I*.

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.

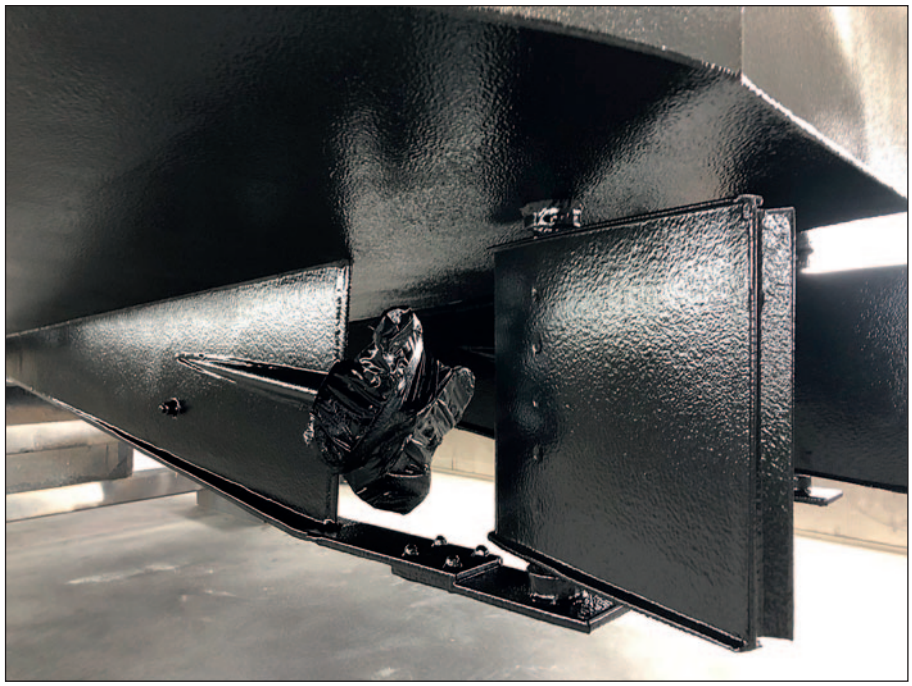
Ecofix is used in combination with Ecoshield, the ultimate rudder protection coating. When a rudder or other piece of underwater ship gear has not been properly protected, the surface will become corroded.

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

Watertaxi Rotterdam finds a workable hull coating in Ecospeed

The city of Rotterdam benefits greatly from a unique, well-organized system of waterborne passenger transport: Watertaxi Rotterdam (WTR). Only recently has WTR found the right fit in terms of hull coating: Ecospeed. Over the years, WTR has tried in vain to find a hull coating that would provide the protection needed, be long-lasting, and not impact the environment adversely. Finally, a year ago, Ecospeed was applied to one of the company's newbuild electric ferries. The coating, combined with regular cleaning, has proved to be what Watertaxi Rotterdam had been looking for all these years.



The newly painted electric water taxi with Ecospeed on the underwater hull.

Starting with a single boat

Hans Loos and Daan van der Have, cofounders and directors of WTR, have watched the company they created grow from a single water taxi for transporting guests to and from their Hotel New York in the Kop van Zuid neighborhood of Rotterdam, to its current extensive public transport network of water taxis and ferries serving much of Rotterdam and Schiedam.

Washing the coating is as easy as running a car through a car wash.

In the early days, the Kop van Zuid looked nothing like it does today. It was an old harbor area with a few buildings, including the New York Hotel and Restaurant. There was no bridge. Hans and Daan had a bright idea. Why not transport guests to and from the hotel and restaurant by boat? Practical and fun.

It was an instant hit. Beginning with a single boat, before long they had a fleet of seven small craft ferrying guests between the hotel and restaurant and the city. It was a very popular service.

"Then in 2000, we thought it would be a good idea to have a real water taxi company in Rotterdam," recalls Hans. They presented a plan to

After a month or so in service, the water taxi was cleaned and conditioned in Rotterdam by Hydrex.

Conditioning the hull by a diver using our underwater cleaning tools results in improved hydrodynamic performance.

Rotterdam City Council who immediately saw its merits and decided to participate by providing all the jetties, facilities and infrastructure. Watertaxi Rotterdam contributed the boats and the organization. The water taxi service began in 2001 with five boats. It really was a water taxi company. Passengers, individually or in a group, would rent the boat to take them from one point to another.

"It was rather a nice company," says Hans. "But in 2013 we thought we should move it to another level, and we started to build boats – aluminum vessels." In 2015, the first five newbuild boats were added. They also introduced a new service where passengers did not have to rent the whole boat, but could simply pay a fare for their seat and still get to where they wanted to go.

In 2021 WTR won a European bid and 15-year contract for all the passenger transport by water in the

While in service, the taxi's hull is rapidly pressure washed every month to remove slime and any other fouling that has accumulated. This is done at the Watertaxi Rotterdam Kop van Zuid headquarters and maintenance facility.

Rotterdam area. The contract included the taxi service and also ferries. One of the stipulations of the contract was that the fleet would be zero-emissions by 2030. So, when WTR built their first three ferries, they made them electric.

Fast forward to 2025, and the long-term success is very easy to observe. The company's fleet has grown considerably. Today they boast fifteen fast water taxis, six electric boats, and one experimental hydrogen-powered vessel. Three ferry crossings. Fifty taxi stops. An app through which you can book and pay. All in all, WTR helps greatly speed up travel around Rotterdam and Schiedam, and makes getting from A to B a lot more efficient and fun.

Hull coatings

Many of the WTR taxis travel at considerable speeds (up to 50 kmh). All the boats tend to receive their fair share of bumps and scrapes as one would expect for vessels that are continually being docked and undocked at jetties as they rapidly drop off and pick up passengers. Their hull coatings have traditionally taken quite a beating. The new hull coating choice had to take this into account along with fuel efficiency. Another important consideration in choice of hull coatings is the environmental effects.

"We have always used traditional antifouling coatings on the hulls," says Hans. "There are a lot of restrictions on what you are allowed to use. We looked into how to make it as environmentally optimum as possible, but it's really rather difficult to find the proper system," he continues. "We tried with some other systems, like a foil, but it really was a disaster. It came off and it didn't work. With the fast-going vessels we tried just an epoxy coating without the antifouling, because we are able to clean the ships very easily. That was also not really a success. Now we are trying Ecospeed, and it looks like it's the coating that fits us best," concludes Hans.

Ecospeed

WTR applied Ecospeed to the aluminum hull of their sixth newbuild electric vessel in November 2023. The hull was conditioned by Hydrex with in-water cleaning in Rotterdam in mid-January of 2024. The in-water cleaning and conditioning helps buff the coating and improves its hydrodynamic properties.

Since then, the hull has been cleaned every month or so to remove the slime and any weed and small barnacles that attach. WTR has a very practical solution to the cleaning. The boat comes into a shed at the WTR head office and is lifted out of the water and pressure washed. It's as quick and easy as running a car through a car wash. "The coating is

Watertaxi Rotterdam vessels are a familiar sight in the port of Rotterdam as they ferry people back and forth around the port and Schiedam.

very well bonded to the hull and it's easy to clean. So we are very satisfied with the product," says Hans.

"The fact that it is non-toxic is very important to us," adds Hans. "We're really interested in doing it right."

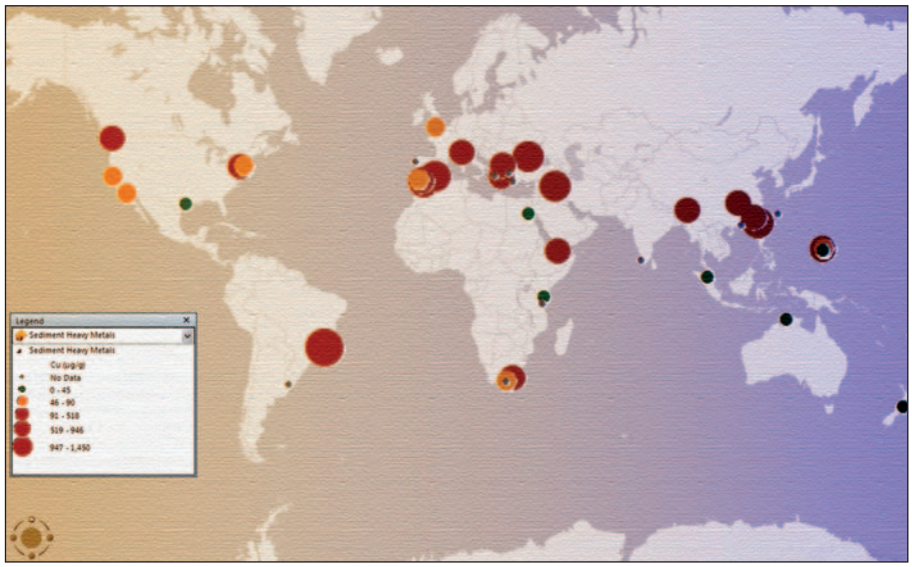
WTR are looking at using Ecospeed on the rest of the fleet. The 15 fast vessels will need to be phased out by 2030 as part of the drive to achieve zero emissions for the fleet. They will be replaced by newbuild electric boats. This will provide an opportunity to convert the fleet to Ecospeed which will mean zero emissions into the water, as well as zero emissions into the atmosphere.

Watertaxi Rotterdam are setting an excellent example for the Port of Rotterdam in terms of care and responsibility for the environment. ■

Pressure washing the Ecospeed coated hull is quick and simple and does not damage the coating or pollute the environment.

Truly non-toxic long lasting ship hull coatings

Beneath the surface of the sea, lakes, rivers and other bodies of water, lies hidden one of the planet's most serious problems: polluted, contaminated sediment. A key contributor to this situation is the continual emission of toxic and polluting substances into the water from the hulls of ships, due to the coatings in general use. Fortunately there is an alternative.



Cover image from the book Quantification of Pollution Levels in Harbour Sediments *which provides a geospatial perspective of pollution levels in sediments around the world, attributable to toxic antifouling paint.*

Antifouling coatings

The most commonly used type of ship hull coating, biocidal antifouling paint, is designed to continuously leach heavy metals and other biocides into the water to deter marine life. The paint is applied at newbuild or in drydock and by the time the ship comes back to drydock after two and a half or five years (for yachts it's usually every year), the biocidal topcoat has all gone and needs to be replaced. The heavy metals and toxic substances have leached into the water and from there drop down to the sediment where they remain.

Ecospeed coatings have been tested by independent labs which concluded that there was no toxic emission of any kind from the coating in use or when cleaned.

Global copper release from antifouling paints is estimated at 20,000 - 40,000 metric tons per year for the commercial shipping fleet. Total annual biocide releases from leisure craft are estimated to be several thousand metric tons. The concerns are contamination and bioaccumulation. Many scientific papers exist on the dangers of this chemical overload to the planet's waters and the life forms that live in them or depend on them.

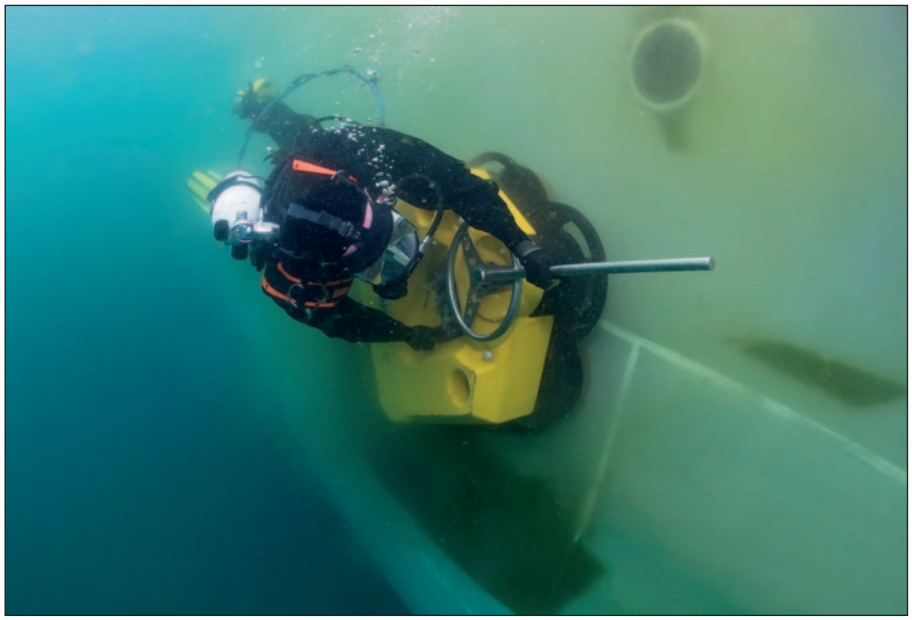
Foul release coatings

Foul release coatings, despite often being advertised as "biocide free," also contaminate and pollute the water and sediment. "Biocide free" just means that the paint doesn't contain any of the chemicals listed as biocides by the IMO, the EU and other regional regulatory bodies. And yet many of these coatings contain large quantities of dibutyltin (DBT), an organotin which is a close cousin to the infamous TBT which has caused so much harm to the marine environment and continues to do so even though it has long since been banned as an antifouling biocide. The toxic chemicals in FR paint experience the same fate as those in AF coatings.

There are additional pollutants from ship hull coatings which include silicone oils, microplastics and PFAS.

Dangerous effects

Contaminated sediment around the world is added to every day as 100,000+ ships and 20-25 million smaller boats and recreational craft ply the world's oceans, seas, rivers and lakes, leaving a trail of poisonous chemicals in their wake.



Ecospeed is a system combining a long-lasting, cleanable, non-toxic coating with routine cleaning as needed, which can improve fuel efficiency by at least 10% compared to traditional AF and FR coatings without harming the marine environment.

There are very large areas that cannot be dredged because the contaminated sediment will be resuspended with fatal results on subaquatic life. The contaminants (poisons) can go all the way up the food chain and become part of our diet.

This is a disaster in the making, or rather, a disaster already created. The fact that these poisons and other pollutants are sanctioned by the IMO and other regulatory bodies does not make them any less poisonous or harmful.

Choices

The arguments used to continue this unsustainable course of action are that antifouling and foul release coatings are needed in order to keep fuel consumption and thus greenhouse gas emissions down as much as possible, and to help prevent the spread of non-indigenous aquatic species. Another argument is that the chemicals in question are not really that harmful.

These arguments might have some validity if there were no alternative.

However, there is an alternative which can protect ship and boat hulls for their useful life without the need for recoating. It does not emit any toxic chemicals into the water. This solution, if used properly, can greatly improve long-term fuel performance of hulls compared to AF or FR coatings. It eliminates the transfer of invasive species.

The water line of a cruise ship coated with Ecospeed 12 years before the photo was taken. The coating has not been replaced since first applied. The hull is kept clean by the crew during normal cruise operations.

Founding of Subsea Industries

Hydrex founder Boud Van Rompay became aware of this situation as a result of his commercial diving and ship hull cleaning activities beginning in the 1970s. He recognized that what was needed to turn the tap off on the steady and continuous pollution of the world's waterways was a system for protecting ship hulls and ensuring high fuel efficiency *without* the use of poisonous chemicals.

After years of development and testing, Ecospeed emerged as the solution. It is a system consisting of a very tough and durable coating which is completely inert, has no active ingredients and does not emit anything into the water; this is combined with cleaning as needed to remove biofouling. The cleaning can be done in or out of the water. Ecospeed is a system which replaces the use of chemicals with some honest to goodness elbow grease. Taking all aspects into consideration, it represents a considerable cost

savings for the shipowner. Most importantly, its use does not worsen the widespread situation of contaminated sediment.

Since the launch of Ecospeed in 2002, Subsea Industries' family of non-toxic coatings has expanded to include Ecoshield, a tougher version designed to protect rudders and running gear from cavitation damage, and Ecolock – long-term, non-toxic, cleanable protection for offshore, assets guaranteed for up to 35 years.

Real non-toxic coatings

The Ecospeed family of coatings are hard, non-toxic protection consisting of a high proportion of glass platelets in a vinyl ester resin. The only other ingredients are bonding agents and pigments.

Independent testing by more than one laboratory has established that Ecospeed does not emit any toxic chemicals on application, in use, or during conditioning and cleaning in the water.

In March 2010, the independent Belgian testing laboratory ERM (Environmental Resources Management) issued its findings after testing Ecospeed: "The toxicity tests performed on the water samples demostrated that the released substances were harmless. Also no effect on the estrogen activity could be recognized."

In July 2012, a Washington State, US lab, Nautilus Environmental, was tasked with conducting toxicity tests on Ecospeed as part of a process for obtaining permission from WA State Ecology and Fish & Wildlife departments to clean the underwater hulls of ships coated with Ecospeed in the waters of the notoriously strict Washington Sate. No adverse effects were observed as a result of exposure to Ecospeed in water in the organisms used for the toxicity testing.[1] The head of WA State Dept. of Ecology was satisfied that there was no danger in allowing Ecospeed to be cleaned in Washington State waters (where cleaning of traditional hull coatings is strictly forbidden)[2].

In practice this means that a ship hull can be coated and in service for 20 or more years without emitting a single gram of toxic substances into the marine environment. Used properly, it can also deliver at least 10% fuel savings compared to AF or FR coatings, and can completely eliminate the threat of spreading invasive aquatic species. The lifecycle cost savings are considerable, especially when fuel savings are included in the calculation.

There is another major advantage to using a completely non-toxic coating: the rules change, as has been shown in the past. The use of toxic coatings is under constant scrutiny. It is much safer for a shipowner to future-proof his investment in hull coating by using a completely non-toxic solution which will always be compliant, no matter how the regulations evolve.

Bottom line

The Ecospeed family of coatings lives up to the purpose for which it was conceived. They are the answer to stopping the continual marine and sediment pollution by ship hull coatings. They are also a solution which will remain compliant no matter how the regulations concerning toxic emissions from ship hull coatings evolve.

It's time to completely turn off the tap on the flow of toxic substances into our planet's waters. It can only take so much, and it's already seriously suffering. ■

The hull of a Hydrex workboat sailing with Ecospeed for 12 years without recoating. Hydrex has the security of knowing that the hulls of its workboats are entirely non-toxic. Keeping them clean is not a problem.

[1] *Nautilus Environmental Toxicity testing for Ecospeed October 10, 2012*

[2] *Email correspondence with Randall Marshall, WA State Dept of Ecology 17 November, 2020*

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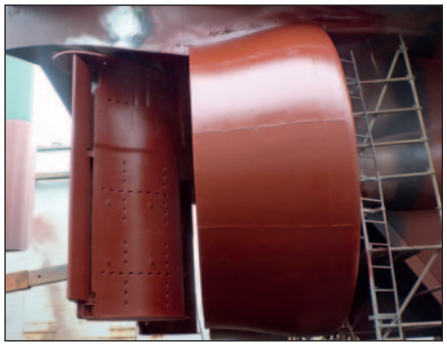

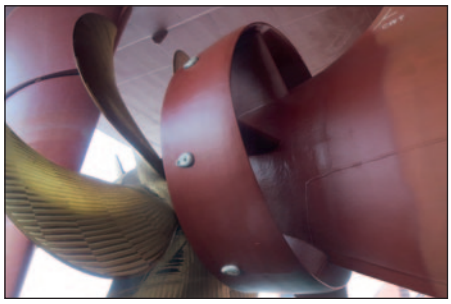

Subsea Industries NV, was founded in 1983 specifically to take care of the design, development and marketing of what has become an evolving line of underwater hull and propeller cleaning equipment as well as the line of hard hull coating systems.

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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