SUBSEA

PROTECTION AND PERFORMANCE

Magazine

ECOLOCK® 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.

ECOLOCK®

LIFETIME CORROSION PROTECTION FOR OFFSHORE UNITS

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Editorial

As you can read further on in this magazine, our new website has recently launched. On www.subind.net you can find information on our different coating systems and our cleaning equipment.

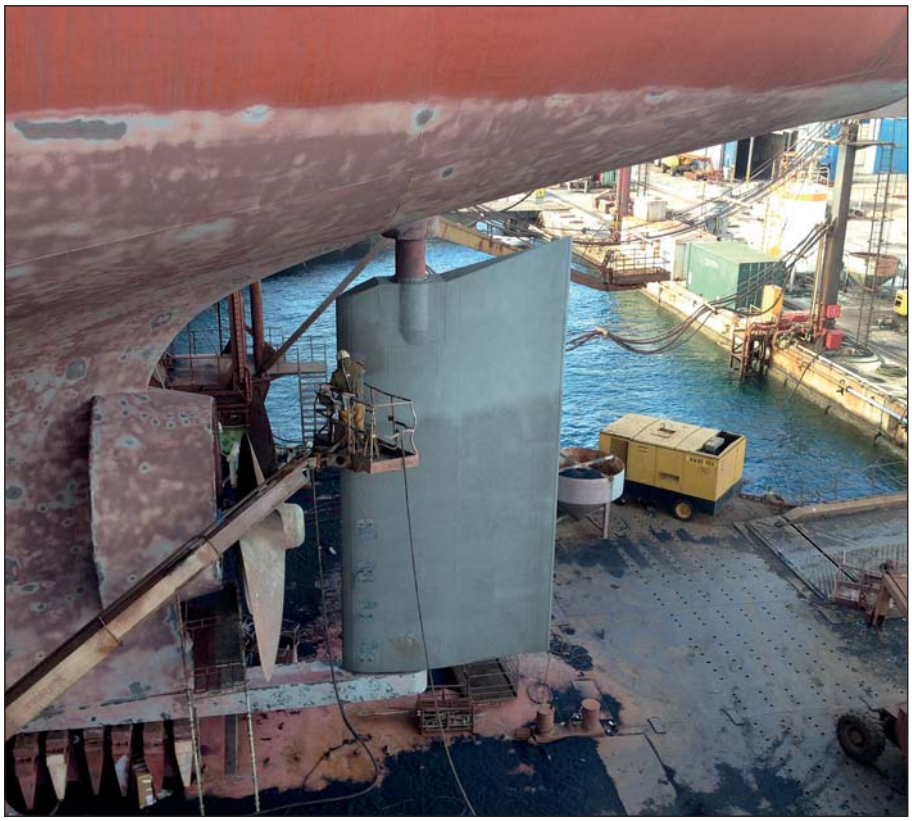
You can also find the latest news stories, case studies and our back catalogue of magazines on our new website. Be sure to visit www.subind.net regularly as we will update the website frequently and have some exciting announcements scheduled for the coming months.

We start off our magazine with a case study on the Ecoshield applications on vessel's owned by Pleiades Shipping Agents S.A. In 2013 a first rudder was coated. Nine more have followed since, with the nozzles of most of these ships also receiving Ecoshield protection.

We hope you enjoy reading this magazine. Do not hesitate to contact us if you have a question or want to know more about the benefits our coating systems can offer.

Subsea Industries NV
Boud Van Rompay
Founder

Ecoshield on rudders and nozzles of Pleiades tankers since 2013



Surface preparation prior to Ecoshield application.

In the last 2,5 years the rudders and nozzles of ten tankers owned by Pleiades Shipping Agents S.A. have been coated with Ecoshield. Several of the vessels have since drydocked again without needing a recoat on these areas much to the satisfaction of the owner.

Pleiades Shipping Agents S.A. has over 50 years of continuous experience of purchasing, successfully managing and operating merchant vessels of various types and sizes in both good and poor freight markets. Pleiades' fleet operates along worldwide trading routes transporting crude oil and petroleum products. The company strives to exceed the industry's standards for health, safety, environmental and quality management.[1]

At the end of 2013 Pleiades had the rudder of the crude oil tanker *Evrotas* coated with Ecoshield. They then went on to coat the rudders of other ships. As of April of this year ten tankers had their rudders coated with Ecoshield. Seven of these ships also had the coating applied on their

[1] Source: www.pleiades.gr/Company.html

Application of first layer on nozzle of crude oil tanker.

nozzles at the same time, two more had the nozzles coated when they came in for a scheduled docking last year after sailing with Ecoshield on their rudders for two years.

No Ecoshield repaint was needed on these vessels, nor will it be during future dockings. At the most, quick and easy touch-ups amounting to less than 1% of the surface area will be required.

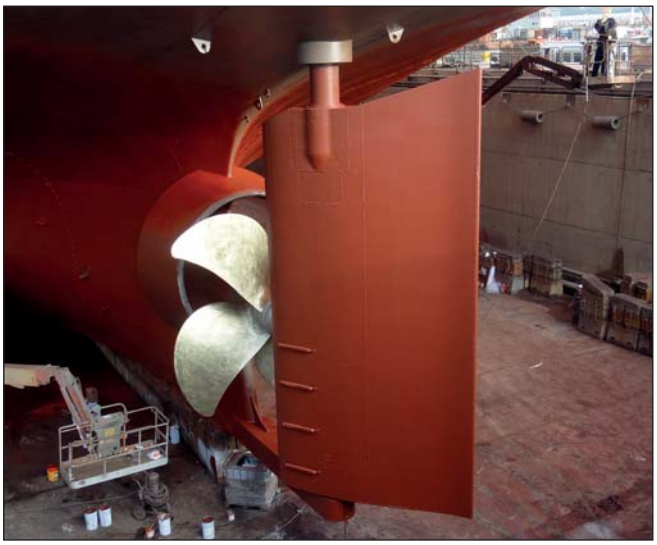
Pleiades' Technical Director Mr. Miltos Synefias commented that the decision to apply the coating on the first vessel was not an easy one, but that the obtained results made the choice to extend the coating to the other vessels obvious.

Ecoshield will prevent corrosion damage from reoccurring on an existing ship or can protect the rudder(s) of a newbuild vessel

Ecoshield is applied in two identical layers.

Overcoat time in between layers can be as short as three hours.

Application of second layer.



No repaint will be needed during future drydockings.

Freshly coated rudder and nozzle of crude oil tanker.

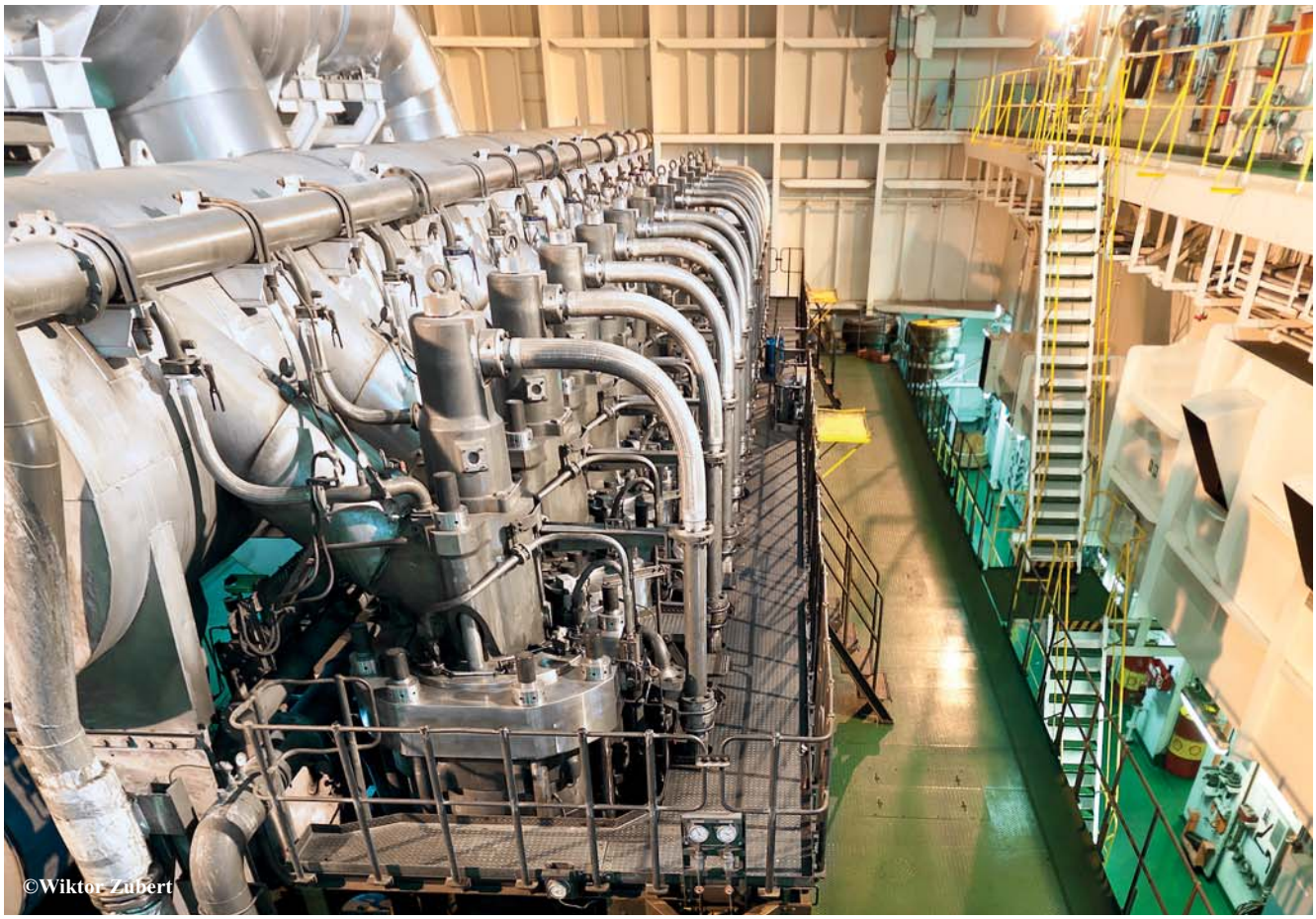
against cavitation and corrosion damage for the life of the vessel. Ecoshield is guaranteed for ten years.

More and more owners have Ecoshield applied on the rudders and other running gear of a large part of their fleet or have it included in the rudder specs of their newbuild vessels. These owners invest in the right coating system for protection because they know the savings it will bring them. ■

ECOSHIELD®
THE DIAMOND STANDARD IN STEEL PROTECTION

Ecoshield will protect the rudder and nozzle against cavitation damage.

Rudder and nozzle of crude oil tanker after sailing with Ecoshield for two years.



The only hull performance system that gives your engine a break

Ecospeed provides your vessel with long-term protection and dramatically improves the ship's performance.

An impermeable and extremely tough coating is combined with an underwater cleaning system. This keeps the hull roughness at an optimum level and results in a major saving in fuel.

Ecospeed gives a very thorough and lasting defense against cavitation and corrosion damage for a ship hull's entire service life. The coating comes with a ten year guarantee. No repaint will be needed during future drydockings.

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New website launched: www.subind.net

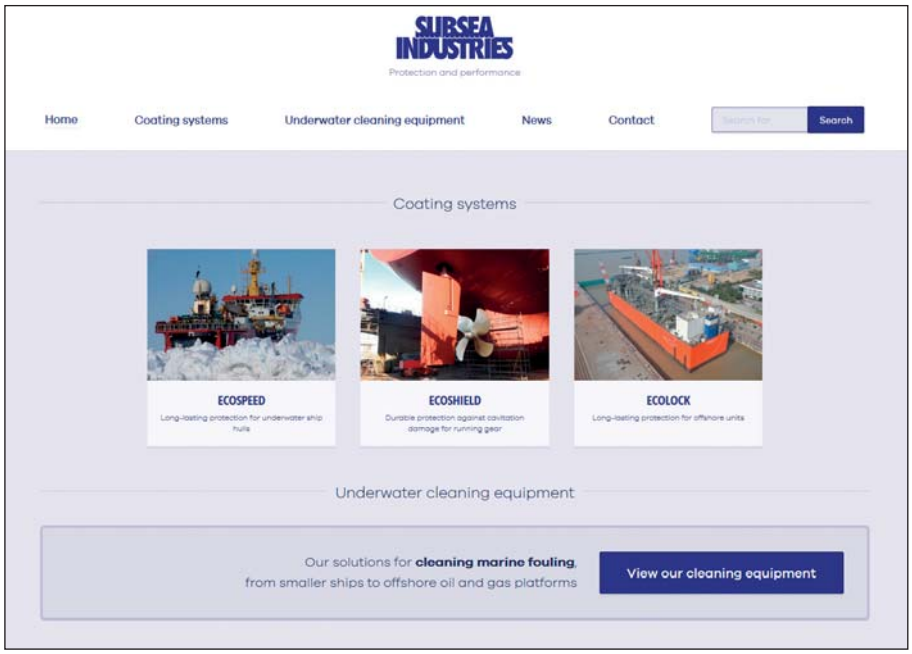
We are proud to announce that our brand new Subsea Industries website is up and running. On this website you can find information on our range of coating systems and cleaning equipment, as well as the latest news and case studies.

Ecospeed was launched commercially in 2002. Ecospeed is an environmentally *safe* underwater hull coating system which improves a ship's performance and provides it with long-term protection.

In 2013, after more than 10 years of strenuous testing, Ecoshield, became available for permanent protection against cavitation damage for rudders. Ecoshield is also suitable for bulbous bow, stabilizer fins, thruster nozzles and other underwater ship gear which needs special protection from corrosion.

In 2014 Ecolock was launched. 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.

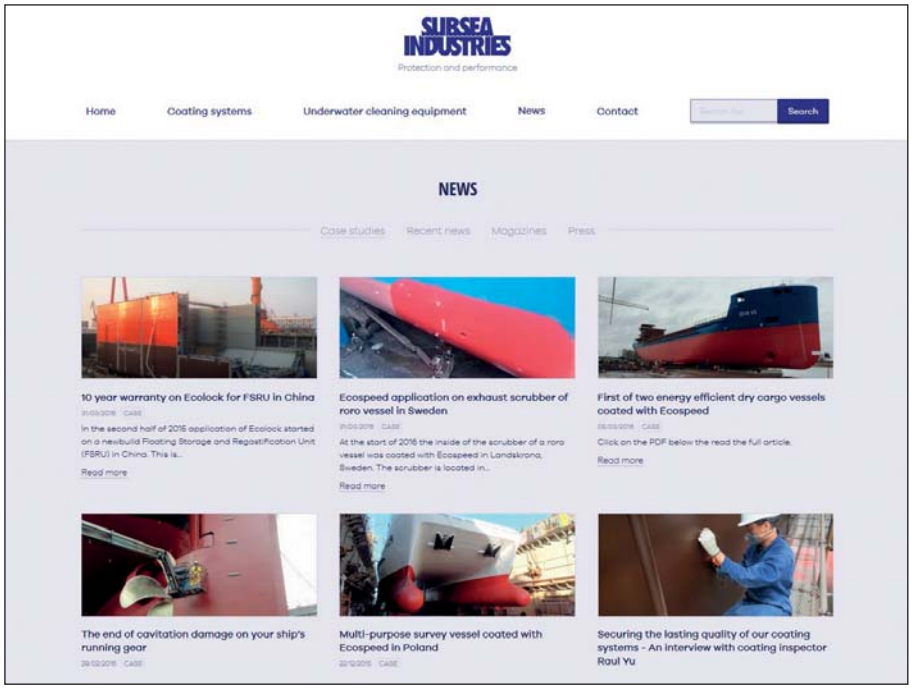
Technical documents, a list of certificates, an overview of the most important applications, … all of this can be found on our new website The familiar url www.subind.net will guide visitors to our homepage. From here they can navigate easily to the section of their interest.



Homepage of our new Subsea Industries website.

Be sure to visit www.subind.net regularly as we will update the website frequently and have some exciting announcements scheduled for the coming months.

You can of course still call or e-mail us for more information or specific questions. We are at your service 24/7.



On our new website you can find information on our coating systems and cleaning equipment, as well as the latest news and case studies.

Ecospeed helps shipowners achieve their ecological goals

The underwater hull coating Ecospeed offers a TBT-free, copper-free, biocide-free, DBT-free and silicone oil-free solution for the protection of the underwater hull. The Ecospeed hull protection and performance system is today's Best Available Technology for reduction of fuel consumption, GHG and other emissions through hull hydrodynamics and fouling control.

Ice going general cargo vessel coated with Ecospeed as part of the LIFE project.

100% non-toxic

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. Similar testing was conducted in Vancouver, Canada in 2012 with the same results. This research proved that the coating is 100% non-toxic and that there is no negative effect on the water quality or the marine environment at any point of its use. Moreover, the massive amounts of VOC and zinc anode emission associated with conventional hull coating systems are reduced considerably.

Ecospeed can reduce the carbon footprint of all types of vessels, helping owners achieve their ecological goals.

Getting rid of repeated environmental hazards

Ecospeed requires only two coats of 500 μm each of the exact same coating applied to bare steel, aluminum or glass-reinforced plastic (GRP). No primer, no midcoat, no tiecoat, no topcoat are needed; just two coats forming a homogeneous protective coating. Moreover, Ecospeed is applied once in the life of the hull. This is a major advantage compared with other hull coatings. If you reapply three to four layers of antifouling coating on the entire hull and are re-doing the above every three to five years, you inevitably come to a point where there are too many layers of coating on the ship's hull. This will degrade the quality of the coating even more easily and rapidly because of the internal stresses being built up in the coating, resulting in a required full reblast, probably every ten years or so. This poses a big environmental hazard each time. Repeat applications mean repeated VOCs and repeated debris

of the mess that results when the conventional coatings are removed.

Easy and environmentally friendly fouling removal: solving the NIS problem

Over the last several years, there have been concerns that non-indigenous species (NIS) are transported by fouled hulls just as much or even more than in ballast water. Once a hull becomes heavily fouled, a situation occurs where there is an increased risk of transporting NIS that needs to be remedied by defouling activities, either by out-of-water removal or by underwater cleaning. In this respect, underwater cleaning has come under some scrutiny out of fear that viable NIS are released and spread, rather than contained and disposed of by the operation. Several ports and countries have banned underwater cleaning out of concerns of pulse release of biocides and/or an increased risk of transferring NIS.

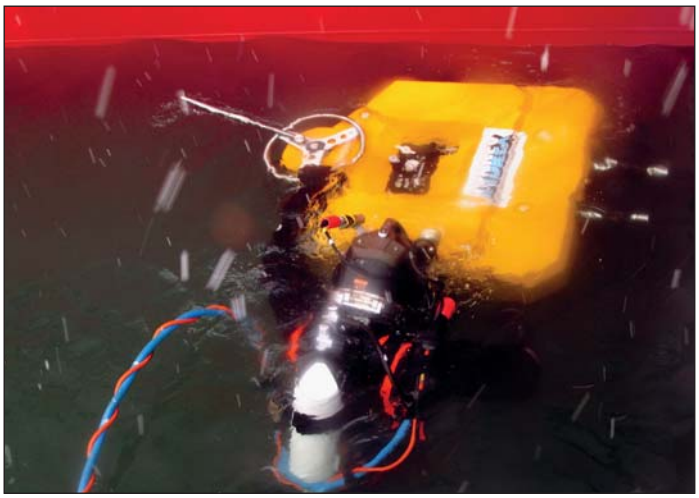
Another important outcome of the EU LIFE project was the submission of the experimental results to port authorities and environmental agencies worldwide in order to allow the underwater treatment of Ecospeed. The experimental results and the derived criteria for environmentally safe underwater cleaning have already convinced several economically important ports to make an exception to the ban in the case of Ecospeed. These ports recognize the negative impact of biocidal paints and want to support environmentally safe solutions.

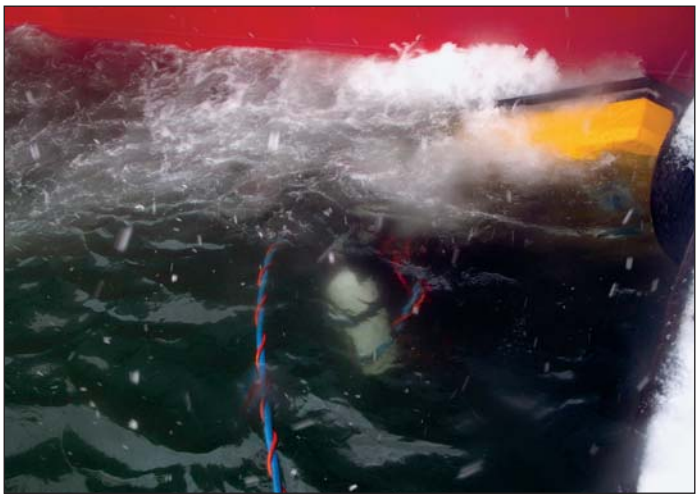
Underwater hull maintenance is carried out with specially designed underwater hull cleaning tools simultaneously cleaning as well as optimizing the smoothness of the Ecospeed coated surface. Maintenance procedures can be repeated whenever needed during the vessel's lifespan without causing damage to or deterioration in the quality of the coating's surface and even significantly improving the coating's hydrodynamic characteristics on each occasion. This will keep the hull as hydrodynamically smooth as possible, bringing about a major saving in fuel.

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

Underwater maintenance of Ecospeed can be carried out whenever needed and without damaging the coating.

When washing an antifouling paint in drydock, the floor of the drydock rapidly becomes awash with discolored, dirty red water contaminated with toxic materials, and the antifouling paint spreading everywhere. With Ecospeed, none of the paint material is lost. It is clean water that you see. 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.





Diver getting ready for first underwater hull cleaning in Rotterdam since 1993.

Fuel savings reduce ecological impact tremendously

The emission of greenhouse gases (GHG) such as carbon dioxide (CO2) and nitrous oxides (NOx) as well as pollutants such as sulfur oxides (SOx) and particulate matter (PM) into the earth's atmosphere by the burning of fossil fuels to drive ships is of increasing concern internationally.

While other aspects of ships and shipping play their own part in attempts to remedy this environmental concern, a key factor is the underwater ship hull. This is subject to biofouling, as micro-organisms and vegetable and animal matter naturally attach to a ship's hull. A fouled hull carries with it a fuel penalty. The worse the fouling, the slower the ship will sail at a given RPM. Or, put another way, the more power will be required to keep the ship sailing at a given speed. This means higher fuel consumption. Depending on the degree of fouling, this can be as much as 85% more. Higher fuel consumption results in a greater volume of greenhouse gases and other emissions which pollute the earth's atmosphere.

On a global scale the potential for the reduction in fuel consumption and greenhouse gas emissions is enormous. The IMO currently estimates the annual fuel consumption by the world fleet at 310-350 million tonnes, implying an annual CO_2 output of approximately 850 million - 1.1 billion tonnes. If 80% of the world fleet would switch from biocidal antifoulings to Ecospeed, this would save an estimated 28.5 million tonnes in annual fuel consumption and 90 million tonnes in annual CO_2 output.

Ecospeed is applied in only two identical homogeneous layers.

Summary

Ecospeed is a TBT-free, copper-free, biocide-free, DBT-free and silicone oil-free solution. No toxic substances are released at any stage of its use including during curing or during in-water treatment. This makes Ecospeed at present a Best Available Technology (BAT) which surface texture improves with repeated underwater hull maintenance. Fuel consumption as well as GHG, VOC and zinc anode emission is thereby reduced. ■

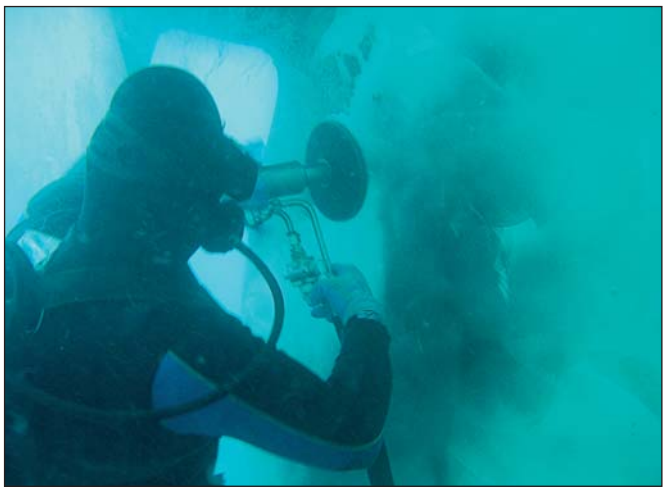
KEEPING SHIPS IN BUSINESS

Underwater Cleaning Equipment

In harsh underwater environments it is essential to have sturdy and reliable equipment. The unique design of our underwater cleaning machines provides the efficiency and durability required in such conditions. All our systems are carefully designed with operational safety as a prime consideration. A range of systems is available for various applications. All our cleaning units are offered separately or supplied with a complete support system including umbilical, tools and hydraulic power unit.

MC 111

The MC111 is our smallest model specially designed for cleaning and polishing ship hulls, propellers and thrusters. The MC111 is very handy and can be easily taken into difficult corners and niches while still obtaining the desired results.



MC 131

The MC131 is a compact unit designed for cleaning all kinds of marine fouling from yachts and smaller ships to offshore oil & gas platforms. The brush rotation speed is adjustable by the diver so as to achieve an optimum hourly cleaning rate.

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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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