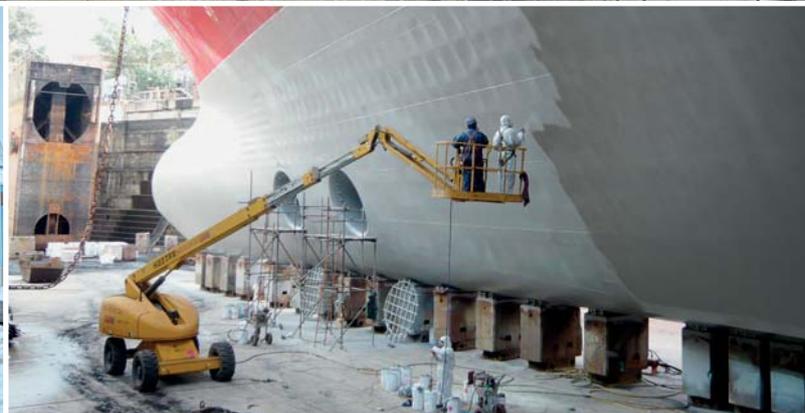


ECOSPEED®

SHIP HULL PERFORMANCE TECHNOLOGY



Lasting Ecospeed rudder protection for wide range of vessels.....	3
7.5 years drydock interval with Ecospeed.....	6

Contents

Page 3 - 4

Lasting Ecospeed rudder protection for wide range of vessels

Page 6 - 11

7.5 years drydock interval with Ecospeed



The only coating 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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Lasting Ecospeed rudder protection for wide range of vessels

Last month the rudders of three ships were coated with Ecospeed at shipyards in China. A 217-meter heavy lift vessel was treated in Guangzhou, while a 200-meter roro ship and a 137-meter LPG-tanker had their respective rudders coated in Zhousan and Nantong.

The three vessels are owned by different owners, but they experienced the same problems. Cavitation corrosion damage had appeared on the rudders of their ships. If a rudder is not given the proper protection against cavitation and the resulting erosion and corrosion damage, the financial consequences can be substantial for the owner. Ecospeed

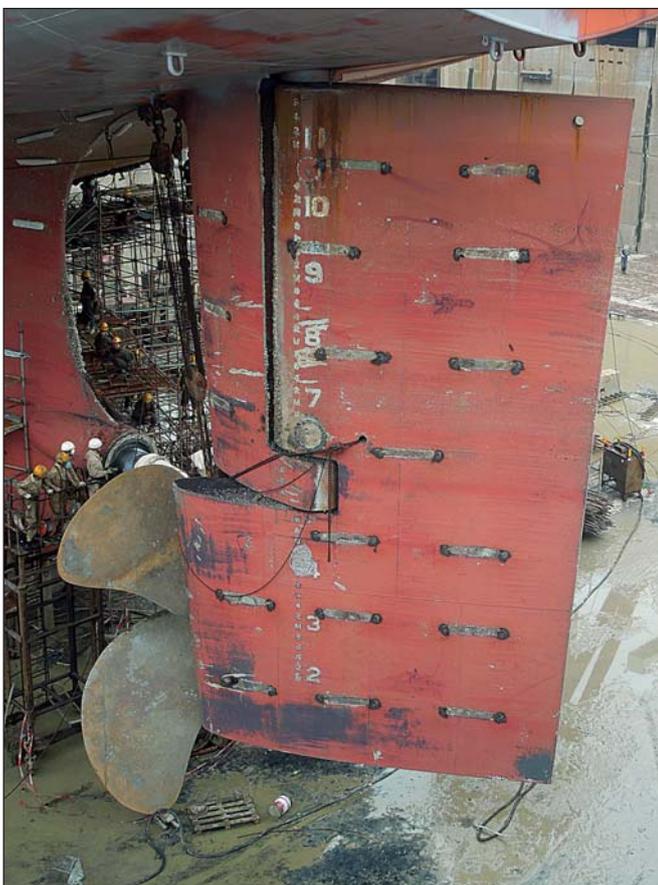
will prevent similar damage from reoccurring.

The coating can be applied to any type of rudder and will provide it with an impenetrable protective layer. At the same time its toughness and flexibility enable absorption of the forces that are produced by cavitation. This prevents the damage normally caused by this phenomenon.

With an Ecospeed application no repaint will be needed during dry-docking. Ecospeed is guaranteed for ten years. At most, minor touch-ups will be needed. Planning the maintenance of the vessel's stern

area therefore becomes much easier. The smoothness attained by the coating also provides optimum hydrodynamic conditions. This allows rudders to operate at maximum efficiency. The ship's performance therefore remains stable.

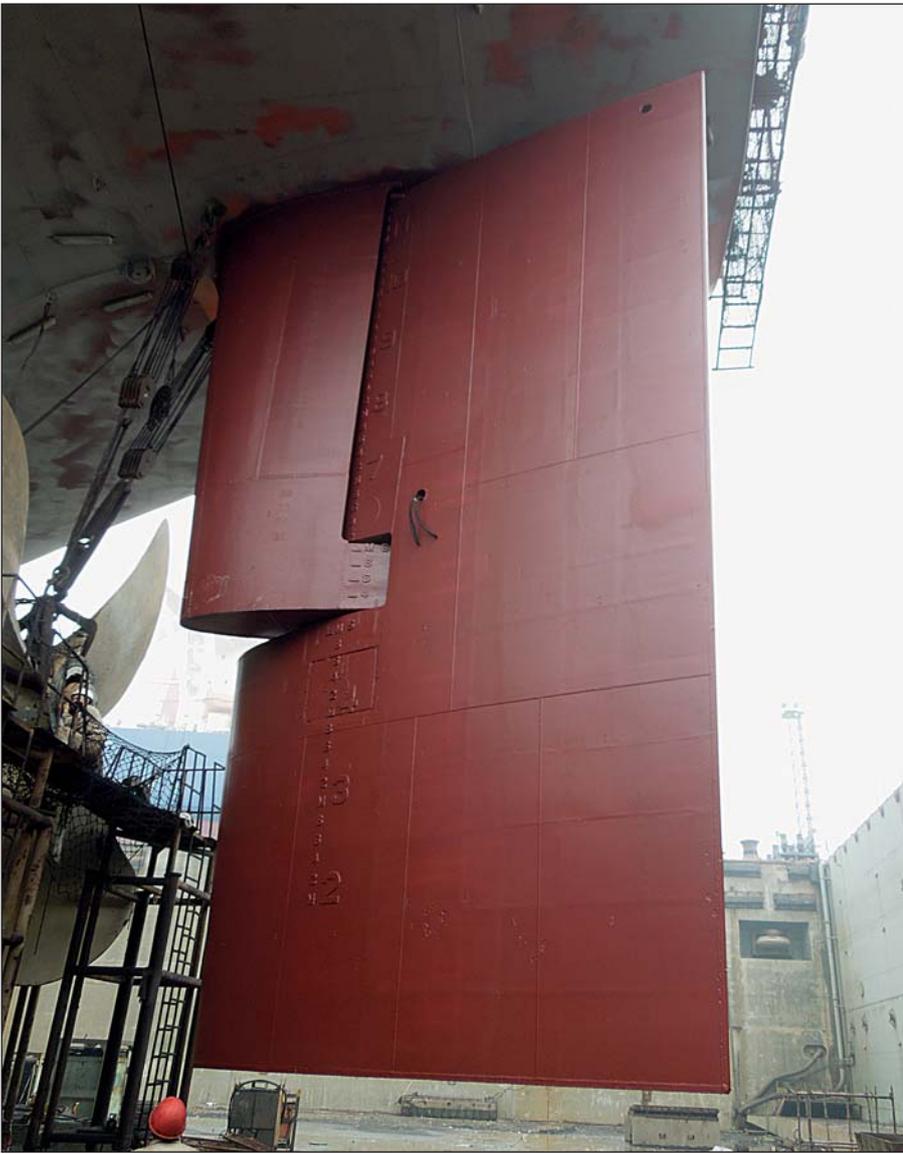
This is illustrated by an amusing recent anecdote. A shipowner had bought a container vessel. When the ship was scheduled to go to drydock, the owner wanted to have Ecospeed applied to the rudder on his vessel and placed an order. When the ship came out of the water, he called us to cancel the order because the coating on the rudder was still in perfect condition. It turned out that the rudder



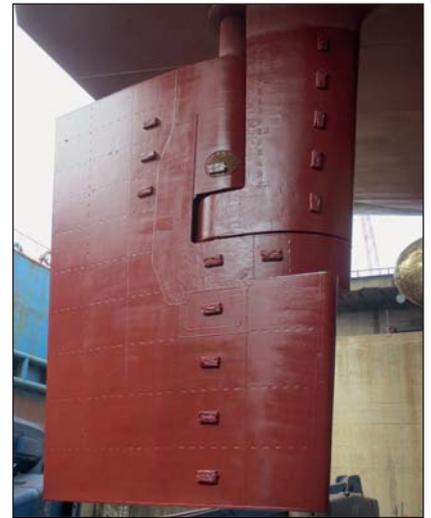
Condition of the rudder of the heavy lift vessel prior to Ecospeed treatment.



Ecospeed is applied in two identical layers after surface preparation.



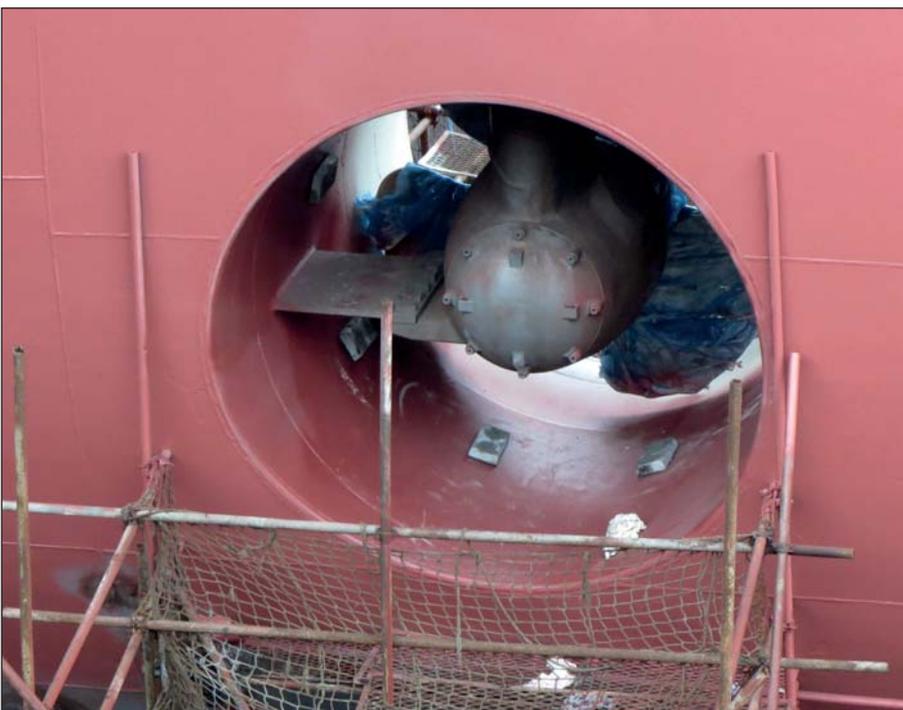
Ecospeed offers lasting protection against corrosion and erosion damage.



Ecospeed offers protection to all types of rudders.



An Ecospeed application can easily be adapted to a yard's schedule.



The thruster tunnel of the roro vessel was also coated to protect it against the cavitation forces caused by the thruster's propeller blades.

der had been coated with Ecospeed five years earlier by its previous owner.

If one takes into account the costs of the temporary underwater repairs and the regular inspections required by a condition of class until the next drydocking, it becomes clear that the investment in a coating system that offers extra protection from day one is easily won back. For this reason more and more owners have Ecospeed applied on the rudders of a large part of their fleet or have it put in the rudder specs of their newbuild vessels. These owners invest in the right coating system for protection because they know that the savings will be there. ■

Total Protection



The rudder of MV Elisabeth Russ before Ecospeed was applied in 2004, showing heavy cavitation damage.



The rudder of MV Elisabeth Russ in drydock in 2011. No further cavitation damage has occurred in the intervening 7 years.

Ships have been sailing for up to nine years (and counting) with Ecospeed without having to replace the coating on their rudders or having to opt for important and costly steel repairs.

Ecospeed can be applied on a rudder at a very low cost, especially compared with the large

drydock costs. It will give a rudder supreme protection against cavitation and corrosion damage for the rest of the vessel's service life.

Ecospeed is a really fast and easy way of keeping a rudder's performance at maximum efficiency at all times.

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7.5 years drydock interval with Ecospeed

Drydocking a ship is a complex, expensive, time-consuming and stressful activity. It is regarded by most ship owners, operators, officers and crew as a necessary evil. Time spent in drydock is time spent out of service. It is becoming increasingly difficult to find drydock time available when and where one would like it. This is particularly true for larger vessels. Thus drydocking often takes a vessel well away from its normal operating route. Many different activities need to be scheduled for accomplishment during a drydocking and these activities may interfere with each other.

For these reasons, there has been a trend of extending the maximum drydock interval from five to seven and a half years. Most large classification societies already allow this extension.



Ecospeed's non-toxicity makes it the ideal coating for a company that takes its environmental responsibilities seriously.

Extension can help achieve large savings

According to Germanischer Lloyd (GL), keeping a ship in the water for a longer period will provide ship-owners with "maximum scheduling flexibility while maintaining the highest standards of quality and

safety. Owners who previously would have had to look for an available dry-docking facility each five years can now have their ship inspected at dock-side.

"While the Extended Dry Docking offers tremendous flexibility and savings in positioning and docking costs, it also reduces the off-hire times and allows owners to bring additional scheduling options to the table during charter party negotiations," says Mr. Matthias Galle, GL Vice President for Classification and Technical Matters.¹

Det Norske Veritas (DNV) has also extended the allowed drydock interval for vessels under their care and this for similar reasons. "DNV's Extended Drydocking Service project team has evaluated in-service experience and improvements to hull coating performance, as well as assessed the quality of in-water repair and survey technology.



An Ecospeed application will protect a vessel against damage from impact with ice.



Bow area of ice going vessel prior to Ecospeed application and after sailing with Ecospeed during several Baltic winters.

“Based on the positive results of the trials, DNV is now offering ship-owners the opportunity to extend the interval between drydockings under a new scheme that could cut operating costs significantly over a ship’s lifetime.”ⁱⁱ

American Bureau of Shipping (ABS) also agreed to extend out-of-water drydocking periods from five to seven and a half years for eligible vessels and for this reason has started a pilot program “wherein vessels may undergo two under-

water examinations before the traditional out-of-water drydock inspection is required.”ⁱⁱⁱ

“We have been discussing this option for over three years,” says ABS Chief Surveyor Lenny Pendexter. “Although we had agreement in principle, we had to be satisfied that the coatings would, in fact, provide the lifespan that the manufacturers were projecting. We feel that the seven and half year period between drydockings is now feasible.”ⁱⁱⁱ

Corrosion protection an absolute must to allow 7.5 year interval

An extension of the drydock interval can of course only be achieved if certain conditions are met. For this reason the classification societies have set up a set of strict rules that need to be followed.

Clients of DNV can benefit from the extension if their ship is “provided with a high-quality underwater coating designed to last for the extended period.”ⁱⁱ

On this topic GL states that “for newbuildings, the hull dry film thickness must be a minimum of 300µm and the ship must be fitted with anodes prepared for seven and a half years and/or have an impressed current system installed and maintained.”ⁱ

Ecospeed has been designed to give a very thorough and lasting protection against cavitation and corrosion and to work in conjunction with either sacrificial anodes or an ICCP-system. The coating is applied in two coats each of 500 µm dft. It has unrivaled anti-corrosive properties. If the cavitation cannot harm the



The Ecospeed hull coating betters with each cleaning.



Heavily corroded rudder and worn out anodes prior to Ecospeed application



and with rudder and anodes intact after two years with Ecospeed.

coating then no damage can occur.

A metal object in water will cause electrolysis (chemical erosion of the metal caused by an electric current which is created due to a difference

in potential between the metal and the surrounding water). This effect is enhanced in salt water. Any object that is coated with Ecospeed will be free of electrolysis. This means that anodes will last much longer or are

simply not needed.

“Two of the challenges faced in extending the drydock interval from 5 to 7.5 years are how to prevent corrosion and fouling,” according to DNV. “The most important of these is probably the fouling issue, particularly at the end of the period when there is a risk of extensive fouling leading to increased fuel consumption and higher emissions of greenhouse gases.”^{iv}

What makes Ecospeed unique is that the coating is designed for regular underwater maintenance. This is carried out with specially designed tools and brings the smoothness of the paint surface to an optimum condition. Regular underwater cleaning removes any marine fouling at an early stage of development, thereby maintaining and even improving the ideal surface characteristics throughout the service life of the vessel. This procedure is made extremely easy by the coating's properties and can occur whenever needed, at any point in its lifespan, without causing damage or deterioration in quality.

Cleaning Ecospeed results in the restoration of the optimum hull smoothness after each cleaning as the coating's surface retains its in-



Ecospeed also offers lasting protection for those areas prone to corrosion and erosion damage.



Corrosion damage on rudders is often a consequence of a lack of protection against cavitation.

tegrity. Tests have shown that a very large number of repeated underwater cleanings on the same surface improve its smoothness and have no deteriorating effects. This will prevent any increase in fuel consumption over the years as would happen with more traditional paint systems and will keep the hull hydrodynamically smooth, thus bringing about a major saving in fuel.

Because of the pulsed release of biocides or an increased risk of transferring non-indigenous species (NIS), a number of ports do not authorize in-water hull cleaning. After the submission of the experimental results of an EU-LIFE demonstration project to port authorities

and environmental agencies worldwide, several economically important ports have already overturned the ban on underwater hull cleaning specifically for vessels coated with Ecospeed.

Stringent tests were carried out within the framework of the aforementioned EU-LIFE demonstration project to provide scientific data and to authenticate the non-toxicity of the Ecospeed hull performance technology. 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 or maintenance. This is important for ship-owners who have reduced impact on the environment high on their

agenda. Applying Ecospeed allows them to sail with a completely non-toxic hull coating system and to have their hull cleaned without risk of chemical pollution.

Lasting protection against damage

DNV states that “if an extended dry-dock interval is implemented after the first bottom survey, the requirement is that the coating on both the water ballast tanks and outer hull must be in ‘good’ condition, i.e. less than 3% of the area is to be corroded.”^{iv}

Ballast tanks are generally known to be susceptible to coating degradation and corrosion attacks. Relevant tests have therefore been developed by DNV for classification of ballast tank coatings. Their procedures to test coatings on blast cleaned substrate have been categorized into 6 gradations of effectiveness. Ecospeed was subjected to DNV’s stringent testing procedure. At the end of the testing, Ecospeed was assigned the highest possible level of effective protection against degradation and corrosion possible under the DNV classification system.

Tests conducted in a flow channel have confirmed that Ecospeed performs extremely well under severe cavitation. These tests were divided into six stages during which the coating was exposed to an increasing pressure drop, creating a growing cavitation force. Even after the last stage no erosion was present on the test patch coated with Ecospeed. The tests were organized by the French Ministry of Defense and were carried out in Grenoble.

Ecospeed comes with a 10 year guarantee and is expected to last the lifetime of the vessel. At most,



No repaint is needed during the remainder of a vessel's sailing life.

minor touch-ups will be required. This is in strong contrast to traditional anti-fouling paints where a new application is necessary during each drydocking.

Easy one-time application

DNV concludes that “the reason for an extended drydock interval is of course to save costs. However, the possible increased cost of preparation and maintenance should also be considered. Due to better surface

preparation and more layers of coating, the time in drydock may increase compared to today's five-year interval. Coating systems available to allow a longer interval are typically more expensive than those capable of shorter service lives. Additionally, hull cleaning may be necessary to remove fouling and reactivate the antifouling, at least at the end of the interval.”^{iv}

Ecospeed requires only two coats of 500 µm each of the exact same

material 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 homogenous protective coating. This is a major advantage compared with other hull coatings. Whether you are looking at classic antifouling coating systems which easily have five coating layers of different paint to be applied, or when comparing Ecospeed to some of the newer silicone based hull coatings, which also consist of four to five layers of different coatings to be applied, a two-coat homogenous application is always going to be quicker, cheaper and more flexible.

An Ecospeed coating schedule can easily be adapted to that of the yard and it does not have to be the other way around. Traditionally a paint application schedule is defined firstly by surface preparation, secondly by the weather conditions, usually very difficult to predict, and thirdly by the curing times of the various coatings. In this respect the application of Ecospeed is easier to adapt to the application windows that become available. The coating can be applied quite rapidly on a prepared surface and the possible overcoat time ranges from three hours to very extended periods of time, depending on weather conditions and what suits the shipyard. The second (final) coat can be applied immediately or one can wait weeks or months to complete the job.

Ten year drydocking interval

From a hull protection and fouling control point of view, a 7.5 year drydock interval is only the beginning and a ten year drydocking interval is perfectly feasible.

Hydrex White Paper No. 11 “Extending the Interval Between Dry-



Ecospeed is applied in only two layers, allowing a very swift and flexible application schedule.

docking to Ten Years” takes a closer and more theoretical look at this subject. Since hull protection and fouling control are considered the biggest challenges to a longer interval between mandatory drydocking, this White Paper focuses on these.

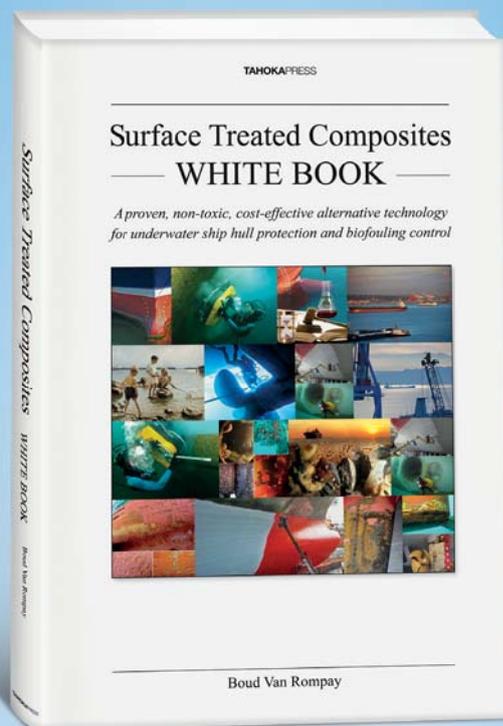
It is available for download in its entirety at www.shiphullperformance.org free of charge.

Summary

Applying Ecospeed to the underwater hull of a vessel can offer tremendous savings in fuel for a shipowner. Ecospeed meets the requirements to allow a lengthening of the drydock interval to 7.5 years. This alone brings about a large saving in drydock cost and avoids a substantial loss of money during the otherwise required off hire time. Any future class required drydock visits can be kept very short because only minor touch-ups will be needed. In contrast to AF and FR coated hulls, there will be no need to drydock solely to repaint. On top of this, Ecospeed will keep a vessel’s performance at its optimum level at all times, generating enormous savings by the significant reduction of fuel consumption. ■

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- i Extended Dry Docking, <http://www.gl-group.com/en/17290.php>, accessed 23 April 2013.
 - ii 7.5 years – the docking interval, <http://www.dnv.com/industry/maritime/publicationsanddownloads/publications/dnvcontainershipupdate>, accessed 23 April 2013.
 - iii ABS and A.P. Møller Agree on Extended Survey Periods, [http://www.eagle.org/eagleExternalPortalWEB/ShowProperty/BEA Repository/News & Events/Press Releases/2010/APMoller_ExtSurvey](http://www.eagle.org/eagleExternalPortalWEB/ShowProperty/BEARepository/News%20&%20Events/PressReleases/2010/APMoller_ExtSurvey), accessed 23 April 2013.
 - iv 7.5 years – the coating challenge, <http://www.dnv.com/industry/maritime/publicationsanddownloads/publications/dnvcontainershipupdate/2010/2-2010/75yearsthecoatingchallenge.asp>, accessed 23 April 2013.

The Reference on non-toxic hull coatings



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Ecospeed 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 underwater hull with an impenetrable protective layer while its flexibi-

lity enables absorption of the forces that are produced by cavitation. This prevents the damage normally caused by this phenomenon.

By removing the existing paint layers and applying Ecospeed on the hull 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 Ecospeed application no full repaint will be needed during drydocking. Ecospeed is guaranteed for ten years. At the most, minor touch-ups will be required.

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