ECOSPEED®

SHIP HULL PERFORMANCE TECHNOLOGY

NEWS LETTER

Total Protection

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

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

Ships have been sailing for up to seven 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 has to be done only once to 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.

ECOSPEED®

SHIP HULL PERFORMANCE TECHNOLOGY

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Many results demonstrate Ecospeed's qualities

Over the years Ecospeed's many qualities have been confirmed on numerous occasions. Both by the certification and recognition given by independent organizations and by the excellent condition of the coating on vessels coming into drydock after sailing with Ecospeed on their underwater hulls and rudders for several years.

In this article we will give you a summary of some of the more recent important results.

Extensive tests with underwater cleaning equipment were carried out during an EU LIFE demonstration project.

RECOGNITION AND CERTIFICATION

1. Ecospeed ECOTEC-STC named one of best projects of 2010

Hydrex was presented an award for the ECOTEC-STC project which was named as one of the best LIFE projects completed in 2010. Over a three and a half year period the objective of this project was to evaluate the environmental and economical benefits of Ecospeed as a biocide-free, durable hull protection and antifouling system.

The project has shown that Ecospeed as a Surface Treated Coating is a valuable alternative technology to the biocidal copper-based antifoulings that are currently on the market. From the project tasks that were carried out, it has been demonstrated that Ecospeed exhibits the following environmental and economical benefits:

- There is no need for full re-application in drydock. After supervised application, Ecospeed comes with a guaranteed lifetime of 10 years and an expected lifetime of 25 years.
- Ecospeed has low VOC content and in comparison with foul release coatings or copper-based antifoulings, far fewer VOCs are emitted with each application.
- Effluent analysis has shown that Ecospeed is 100% free of biocides and therefore environmentally safe.
- Regular underwater treatment of Ecospeed is put forward as a Best Available Technology to

An EU LIFE project has demonstrated that Ecospeed exhibits many environmental and economical benefits.

Cleaning of Ecospeed test plate during experiments for the project.

minimize the risk of transferring non-indigenous marine species (NIS).

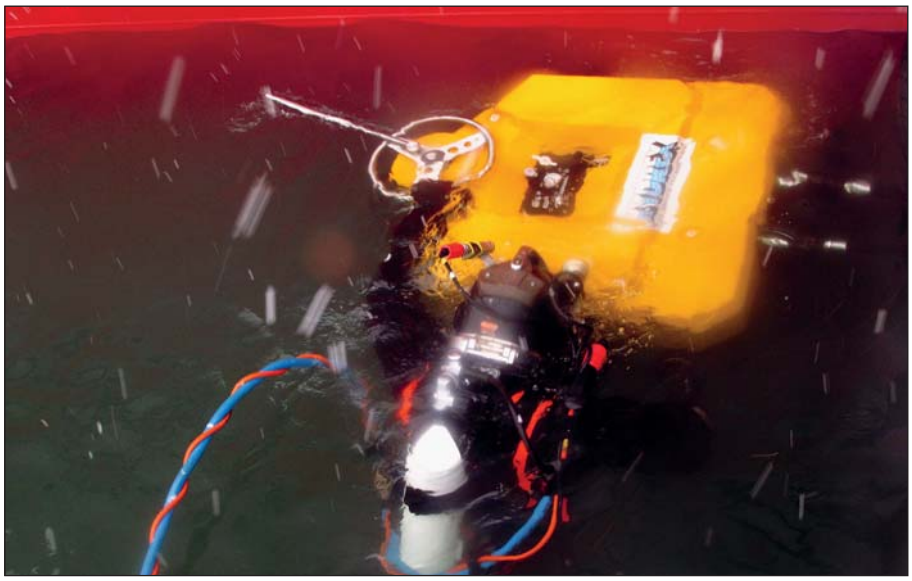
- Advanced maintenance tools have been developed to clean the coating.

- The analysis of the roughness characteristics has demonstrated an optimization of surface characteristics by underwater treatment.

The dissemination activities and events organized around the project results engendered significant interest. Proof of increased interest in Ecospeed as an alternative to anti-foulings is given by the number of applications since the beginning of the project. Almost 200 applications were carried out since December 1, 2006, of which more than 50 were full hull applications.

2. The ban on underwater cleaning is lifted (for Ecospeed)

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 overturn their ban on underwater cleaning of ship hulls. These ports recognize the negative impact of biocidal paints and want to support environmentally safe solutions. The Netherlands was one of the first countries worldwide to practically ban the in-water cleaning of ship hulls in order to avoid the pulse release of TBT, copper or other biocides associated with it. Ships moored in ports continue to leach biocides, which leads to accumulation in sediments. The Dutch Ministry of Transport, Public Works and Water Management has pro-actively sought a solution to this environmental problem. It has come to the conclusion that a good non-toxic ship hull system includes regular and controlled removal of fouling and that the underwater cleaning of ships coated with Ecospeed is at present a Best Available Technology (BAT). Very strict criteria for environmentally safe in-water cleaning practices have been developed – criteria that only Ecospeed has been able to meet so far.



Diver getting ready…

for first underwater hull cleaning in Rotterdam since 1993.

The underwater cleaning of ships coated with Ecospeed is at present a Best Available Technology (BAT).

3. Ecospeed protects against cavitation

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.

Tests in a flow channel confirm Ecospeed resistance against cavitation.

The tests were organized by the French Ministry of Defense and were carried out in Grenoble. These test results have been borne out repeatedly on rudders on many different types of ships.

4. Recognized abrasion resistant coating

Ecospeed has also received the Lloyd's Register certificate that recognizes the coating as an abrasion resistant ice coating. This allows owners of vessels intending to navigate in ice conditions to reduce the thickness of the plating of the ice belt, the area on the bow just above the waterline that is most prone to mechanical damage from sailing through ice, if this area is coated with Ecospeed.

Lloyd's Register

RECOGNISED ABRASION RESISTANT ICE COATING

Certificate No: MNBE/2011/4335

The product below is recognised as an abrasion resistant ice coating for ships intending to navigate in ice conditions.

Providing the coating is applied in way of the ice belt of ships intending to navigate in first- year ice conditions and is maintained in good condition during service, the thickness of steel plating in way of the ice belt may be reduced by up to 1 mm in accordance with relevant Rules and Regulations.

The recognition is subject to Lloyd's Register being informed of any changes in and modifications to the product's formulation or specification and the product being used in accordance with the manufacturer's instruction and with the relevant requirements of Lloyds Register's Rules and Regulations.

Company: **Subsea Industries NV, Haven 29, Noorderlaan 9, 2030 Antwerp, Belgium**

Product name: **ECOSPEED**

Product colours: **Unspecified**

Film thickness: **1000 µm**

Surface cleanliness: **Minimum Sa 2½ (ISO 8501-1)**

Surface profile: **Minimum 75 µm**

Valid until: 1 September 2016
Date of issue: 16 August 2011

Jian-Zhong Zhang
Surveyor to Lloyd's Register EMEA
A member of Lloyd's Register Group

5. NORSOK approved coating system

The NORSOK standards are a series of standards, relevant to offshore installations, developed by the Norwegian petroleum industry. The complete test program typically takes about nine months and only the best coating systems manage to pass through. NORSOK M-501 has become a universally recognized standard that meets the most stringent requirements for corrosion protection. The standard is relevant for offshore use or other specific areas where pre-qualification is required. A pre-qualified coating system assures customers of long-term reliable protection.

6. Superior ballast tank coating

Ecospeed has been given a B1 classification by Det Norske Veritas AS after testing the coating's suitability as a ballast tank coating. B1 is the superior grade in a six grade classification system.

Tests conducted in a flow channel have confirmed that Ecospeed performs extremely well under severe cavitation.

NO REPAINT NEEDED DURING DRYDOCKINGS

1. Ice-going vessels

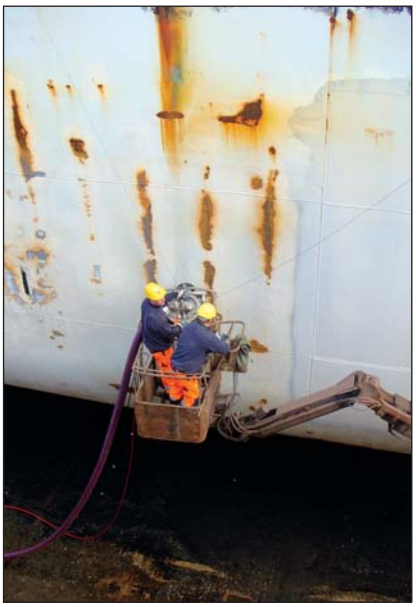
RRS Ernest Shackleton

When British Antarctic Survey's RRS (Royal Research Ship) *Ernest Shackleton* was drydocked in Denmark last year, the superintendent, engineers and paint specialists there to check the condition of the hull paint were amazed. After two seasons of battering its way through ice up to 2.5 meters thick with a high content of gravel and volcanic lava adding to its abrasiveness, the hull coating was virtually intact and undamaged. This was in strong contrast to the Shackleton's previous drydocking, when almost the entire hull, bearing a conventional ice-going underwater hull coating, was practically stripped to bare, unprotected steel.

The difference lay in the fact that when the *Shackleton* left drydock in 2009, the hull was newly coated with Ecospeed. Even though Ecospeed is not intended specifically for ice-going ships and icebreakers, it consistently outperforms the specialized ice-going ship bottom paints.

Stephen Lee is the Senior Marine Engineer for British Antarctic Survey, the BAS's equivalent of a Technical Superintendent. He recalls the reaction of those present when the *Ernest Shackleton* was first pulled out of the water at Frederikshaven drydock in early 2011 "The biggest thing was the surprise at seeing the areas where you'd expect it to have taken a lot of damage... when she first came out of the water and onto the blocks it was a complete shock to all those present. All of us there commented on the condition of the hull and in particular that there was negligible damage at the bows, merely some scratch marks. None of us there would have predicted this. I then jokingly asked the question, 'Are you sure you've taken this ship to the ice?'" According to Stephen Lee, the

Ecospeed protects iceabreaker Oden while it crushes thick layers of Polar ice.



Comparitive ice-strength paint on the left, Ecospeed patch on te right.

crew of the *Shackleton* reported that they had been pushing into 2 - 2.5 meter thick ice, "...and it's just not touched it – just not touched it at all."

Icebreaker Oden

This icebreaker came in to drydock in Landskrona, Sweden, in April 2009 after sailing with Ecospeed on parts of its underwater hull for two years. During this period it was used for several expeditions to both the Arctic and Antartic.

After Ecospeed came out on top in a comparison between test patches coated with Ecospeed and another ice-strength paint, the management of the vessel was more than happy to have the rest of the underwater hull coated as well and also ordered the same treatment for fellow icebreaker, *Ymer*.

The *Oden's* Captain, Erik Andersson, recalls the problem with hull protection prior to 2007. "When the *Oden* went down to Antarctica the first year, we found that icebreaking was quite different down there, especially when you get close to the coastline where there is a lot of lava sand in the ice which makes it more or less like sandpaper. Also the ice is extremely hard in those areas. Due to that fact, the first year the icebreaker paint we were using was almost all more or less destroyed on the bow area so we were left with virtually unprotected steel."

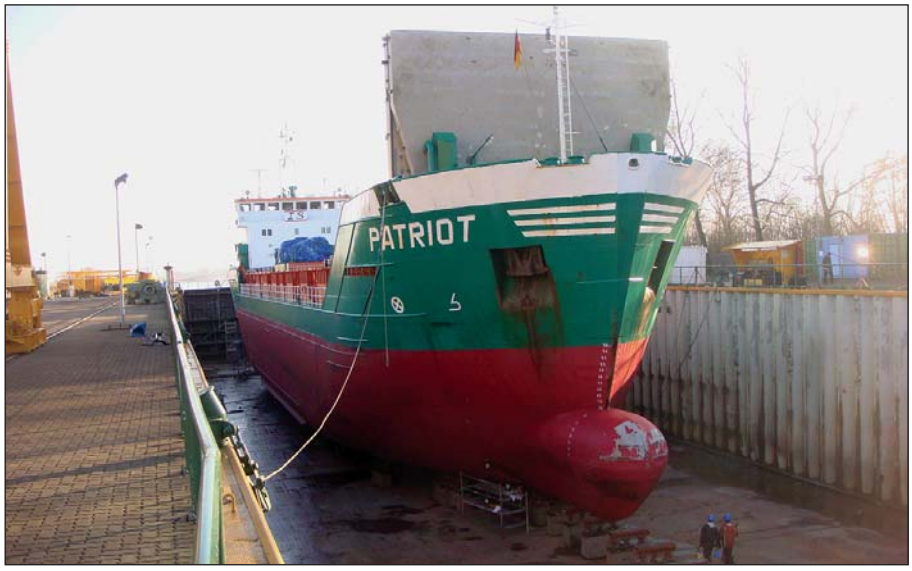
"We've had Ecospeed on the bow for a couple of years now and it's still there. It's still providing protection for the steel, whereas the conventional ice strength paint we were using would probably be gone by now."

"We've had Ecospeed on the bow for a couple of years now," continues Erik Andersson, "And it's still there. It gets thinner and you can see that it's actually shaving and getting thinner, but it's still providing protection for the steel, whereas the conventional ice strength paint we were using would probably be gone by now."

RRS Ernest Shackleton in Antarctic ice up to 2.5m thick.

M/V Patriot

Interscan Schiffahrtsgesellschaft mbH is a tramp owner based in Hamburg. Says Michael Tensing, Managing Director and one of the owners of Interscan of the ice going vessels, "We trade normally between the Baltic and North Sea down to Gibraltar and we are trading ice every year. If you have to face ice of up to 50 cm thickness or so and you have conventional paint, all the paint will be worn off. That is what was happening. Our solution was to use the cheapest paint available, no anti-fouling. It would be worn off every winter, and every spring we had to go to drydock to paint just to have a coating on the hull."



Only touch-ups required on ice-going general cargo vessel after 5 Baltic winters with Ecospeed.

said, 'That's exactly what we need for the rest of the ice classed ships'," recalls Michael Tensing. Seven years later, the underwater hull coating on the *Patriot* is still intact. It has not been replaced and only minor-touch ups have been required. "Now with Ecospeed the paint is so tough and resistant to ice that we only have our normal dockings every 2 to maximum 3 years and even after 2½ years you only have to wash the paint and that's it," says Interscan's MD. "That is quite something for us." Based on the success with the *Patriot*, Interscan specified Ecospeed for the hull of four 3450 ton newbuilds added to the fleet in 2008, the *Paivi*, *Tim*, *Pernille* and *Widor*, all 82.5 meter ice class E3/Finnish 1A multipurpose, heavy cargo vessels.

"Now with Ecospeed the paint is so tough and resistant to ice that we only have our normal dockings every 2 to maximum 3 years and even after 2½ years you only have to wash the paint and that's it."

Then in 2005, Interscan decided to try Ecospeed on the *Patriot*, a 3,000 ton, 82 meter ice class E2/Finnish 1B general cargo vessel built in 1994. "We saw the paint after one year of trading heavy ice and we

Then there is the performance factor. Mr. Tensing particularly notes that, "After 5 years or after 10 years even with Ecospeed you still have only one coat on the hull, as opposed to four coats with another type of paint. The thicker the paint layer gets and the more mechanical damage there is to the paint, the performance difference becomes more and more pronounced and Ecospeed definitely shows better performance as the surface is more even and moves through the water more smoothly with its single coat."

M/V Baltic Swan

In 2010 the container vessel *Baltic Swan* came into drydock at the Damen-Van Brink shipyard in Pernis, Rotterdam. The underwater hull was in virtually the same condition as it was when the vessel undocked two years before. The vessel required only a few touch-ups to bring her back in original condition.

M/V Baltic Swan is sailing for Swan Container Line and is owned and managed by Peter Döhle Schiffahrts-Kg. She was coated with Ecospeed in March 2008. The vessel has a fixed route going from Rotterdam to Bremerhaven and then on to Saint Petersburg. During the winter

Ecospeed coating in excellent condition on container vessel after 2 Baltic winters.

period the most northern parts of this route are almost completely frozen and the vessel's underwater hull frequently has to endure the impact of large pieces of floating ice. Despite this, there was no damage from the ice and the captain of the vessel was impressed with the condition of the Ecospeed coating.

M/V Ernst Hagendorn

When the ice-going general cargo vessel *Ernst Hagendorn* came into drydock 2½ years after a large part of its underwater hull had been given an Ecospeed coating, it was decided to apply it to the remainder of the underwater hull as well.

Application of Ecospeed on flat bottom section of Ernst Hagendorn.

In December 2006 owners G. Buck Schiffahrts GmbH & Co. decided to have the vertical sides, the bow area and the rudder of the general cargo vessel coated with Ecospeed while a traditional paint was applied to the flat bottom.

After sailing in the harsh icy conditions of the Baltic area for 2½ years, the vessel went into drydock at the Tosmare Shipyard in Liepaja, Latvia, in May 2009. Only very minor touch-ups were needed for the Ecospeed coating which was still in very good condition. Upon inspection of the flat bottom the owners decided to remove the conventional paint and apply Ecospeed. Additional cans were immediately sent to the shipyard so that the *Ernst Hagendorn* is now sailing with an Ecospeed protective coating on its entire underwater hull.

2. Oil spill response vessel

During the drydocking of the oil spill response vessel owned by the Port Authorities of Rotterdam, an inspection revealed that the Ecospeed coating on its underwater hull needed little attention, despite the fact that the vessel had been laying idle for the last two years and a thick layer of fouling had accumulated as a result. With a traditional coating this type of vessel needs to dock for two or three weeks every year and receive a full repaint. Much to the owner's satisfaction, the Ecospeed coating was still in excellent condition, as was revealed after high pressure washing. Despite the aggressive nature of the fouling, no rust or damage to the steel was present on the underwater hull of the vessel and only a minor touch-up was needed to the vessel's floater due to severe mechanical impact.

During the drydocking of an oil spill response vessel, an inspection revealed that the Ecospeed coating needed little attention, despite the fact that the vessel had been laying idle for the last two years.

Ecospeed on static Dutch government vessel in excellent condition after 2 years.

3. Navy vessels

During the most recent drydockings of several vessels of the Belgian Navy coated with Ecospeed, the underwater hulls were still in excellent condition and only a few touch-ups were needed. Among these vessels were the mine hunter M915 *Lobelia*, which was coated in 2006, and three tug boats, two of which were also coated in 2006 and one, A950 *Valcke*, which had been sailing with Ecospeed for over five years.

Ecospeed properties make it impossible for fouling to penetrate the surface. As a result Ecospeed will not deteriorate and the optimum average hull roughness will be regained after each cleaning because surface integrity is maintained. As Ecospeed allows hull cleaning to be performed quickly, effectively and at any point in the vessel's life span, ship hulls can be kept in optimum condition. This is especially significant for Navy ships where fouling inevitably builds up much faster during long idle periods in between operations. The Belgian Navy has its own cleaning equipment and this, combined with Ecospeed's durability, allows it to keep its fleet in the best possible operating condition, which is a major advantage for any military unit.

No need to repaint Navy underwater hulls after sailing with Ecospeed for 5 years.

Compared with conventional antifouling paints, Ecospeed gives the Navy greater savings on fuel costs and a wider operational range. In the past the Belgian Navy repainted its vessels every year with a copper-based antifouling paint, however, with Ecospeed no repainting is necessary during the lifetime of the vessel. This eliminates paint layer build-up which can help the Navy in achieving its goal of prolonging the drydock interval of its ships to 12 years.

Navy tug boat after sailing with Ecospeed on its underwater hull for 5 years.

4. Cruise ships

Long lay-up periods have no effect on quality of Ecospeed coating on cruise vessel

Ecospeed is ideally suited for ships during lay-ups because of its impermeability. This gives the coating its excellent and durable anticorrosive properties and protects the underwater hull against damage caused by any type of marine fouling. Despite the aggressive nature of certain types of fouling, no rust or damage to the steel will be present on the underwater hull of the vessel after cleaning.

This is illustrated by a cruise ship that remained stationary in the

Caribbean for seven months after it was coated with Ecospeed. After this period the coating's qualities allowed a complete removal of all fouling from the underwater hull of the vessel during an underwater cleaning without causing *any* damage to the underlying paint layers.

Ecospeed in excellent condition on cruise vessel after two years

When a 294-meter cruise vessel came into drydock in the Bahamas after sailing with Ecospeed for two years, less than 1% of the underwater hull needed touch-ups and no new paint layers were required on the rest of the underwater hull. As a consequence the technical operations that needed to be carried out on the vessel were very easy to plan because no repaint needed to be added to the schedule. Moreover, the vessel could leave drydock earlier than would have been the case if an extensive repaint had been required.

Left: before cleaning. Right: after easy and fast cleaning.

Ecospeed underwater hull coating in excellent condition on cruise vessel after two years.

During the docking, visitors could see first-hand the advantages Ecospeed offers ship owners. Marine consultant Mike Novak, noted that he could clearly see that the required touch-ups involved only 1% of the total surface. He stated that he had never seen an underwater hull in better condition after being in the water for two years. Ecospeed also improves the hydrodynamic characteristics of the hull and increases fuel efficiency. Because Ecospeed creates a smooth surface on the hull, the coating helps ships glide more easily through the water. Since the engines do not have to be pushed as hard to get from one place to the next, several cruise vessels coated with Ecospeed can actually run with reduced propulsion power. This helps to both save energy and conserve fuel.

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5. Rudders

Ernst Russ successfully ends rudder cavitation damage problems

Founded in 1893 Ernst Russ is a Hamburg based, family owned shipping company. The company has a fleet of ten vessels including five roro cargo ships. Due to the

The rudder of the Elisabeth Russ before Ecospeed was applied, showing cavitation damage.

Grzegorz Girjat, Superintendent of Ernst Russ, shows the state of the rudder of the Elisabeth Russ in drydock in 2011. The original Ecospeed application is still visible but not further cavitation damage has occurred in the intervening 7 years.

higher propeller revs of these roro cargo vessels, their rudders suffered particularly from cavitation damage.

Grzegorz Girjat is Superintendent of Ernst Russ, responsible for the five roro ships. The rudders were originally coated with a standard epoxy coating. Grzegorz Girjat explains, "During the first intermediate docking, between two and three years from launch, we observed that we already had extensive cavitation damage on the rudders."

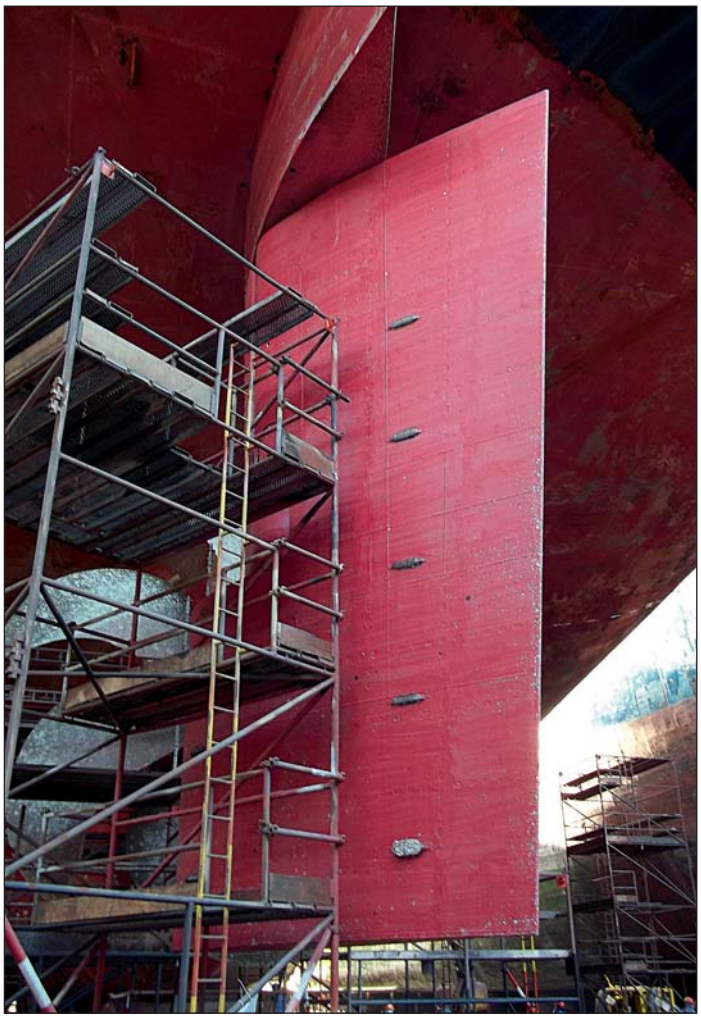
During a 2004 docking, Ecospeed was applied experimentally on the *Elisabeth Russ*. The trial was successful beyond all expectations. When the ship next came out of the water in 2007 it could be seen that no further cavitation damage had occurred. As a result, the rudders of the remaining four roro ships were coated with Ecospeed, all with similar results.

The most recent drydocking of the *Elisabeth Russ* in 2011, confirms that the original Ecospeed protection applied in 2004 is still holding firm and the rudder is intact, free from any further cavitation damage.

"In general everybody is looking to be in drydock as short as possible and to get all the work done as quickly as possible," explains Grzegorz. "Additional hot work on the rudder inevitably results in some collisions with other jobs. I would say for me it is quite clear. Had we not applied Ecospeed on the rudders, we would certainly have extensive work to do in drydock."

Ecospeed in excellent condition on rudders after years at sea

One year after the Ecospeed underwater hull coating had been applied on her rudder, the 197-meter bulk carrier *Gypsum Integrity* came into



The rudder of the container vessel Marie Delmas after Ecospeed application in 2007 … and during drydocking in 2012 after five years.

drydock in Setúbal, Portugal while Ecospeed was applied on the rudder of her sister vessel, *Gypsum Centennial* at the same location. A few months later the 195-meter container vessel *Marie Delmas*, owned by another company, came into drydock in Dubai five years after receiving an identical treatment. Shortly afterward the rudders of two other ships owned by this company, CMA Ships UK Ltd., were also coated with Ecospeed and this in China.

The drydocking of *Gypsum Integrity* and *Marie Delmas* allowed the owners to see the excellent condition of Ecospeed on the respective rudders. This gave them further proof that they had made the right decision in choosing the same treatment for their other vessels.

Another returning customer is a Canadian based company that has ordered the application of Ecospeed on the rudder of an 18th vessel.

The rudders of all these vessels will not have to be repainted during future drydockings and extensive repairs will not be needed. Planning the maintenance of the vessels' stern area therefore becomes much easier. The smoothness attained by the coating also provides optimum hydrodynamic conditions for rudders to operate at maximum efficiency.

At least 150 rudders have now been coated with Ecospeed with 100% success. The number increases as more and more shipowners and operators find that there is indeed an answer to rudder cavitation damage. None of these rudders has suffered cavitation damage after the Ecospeed was applied and none has had to be recoated with Ecospeed. ■

The most recent drydocking of the Elisabeth Russ in 2011, confirms that the original Ecospeed protection applied in 2004 is still holding firm and the rudder is intact, free from any further cavitation damage.

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SHIP HULL PERFORMANCE TECHNOLOGY

White Paper No. 10 and the *Journal of Ship Hull Performance* April 2012

With bunker prices at a whole new level, anything which can help a ship operate more economically and profitably must be of the highest interest. The latest issue of the *Journal of Ship Hull Performance* takes a close look at two subjects which can each greatly affect these economic issues. Together, they can account for a fuel penalty of as much as 40%. On the positive side, full grasp and intelligent application of these subjects can lead to fuel savings that high.

These subjects are hull coating degradation and propeller maintenance.

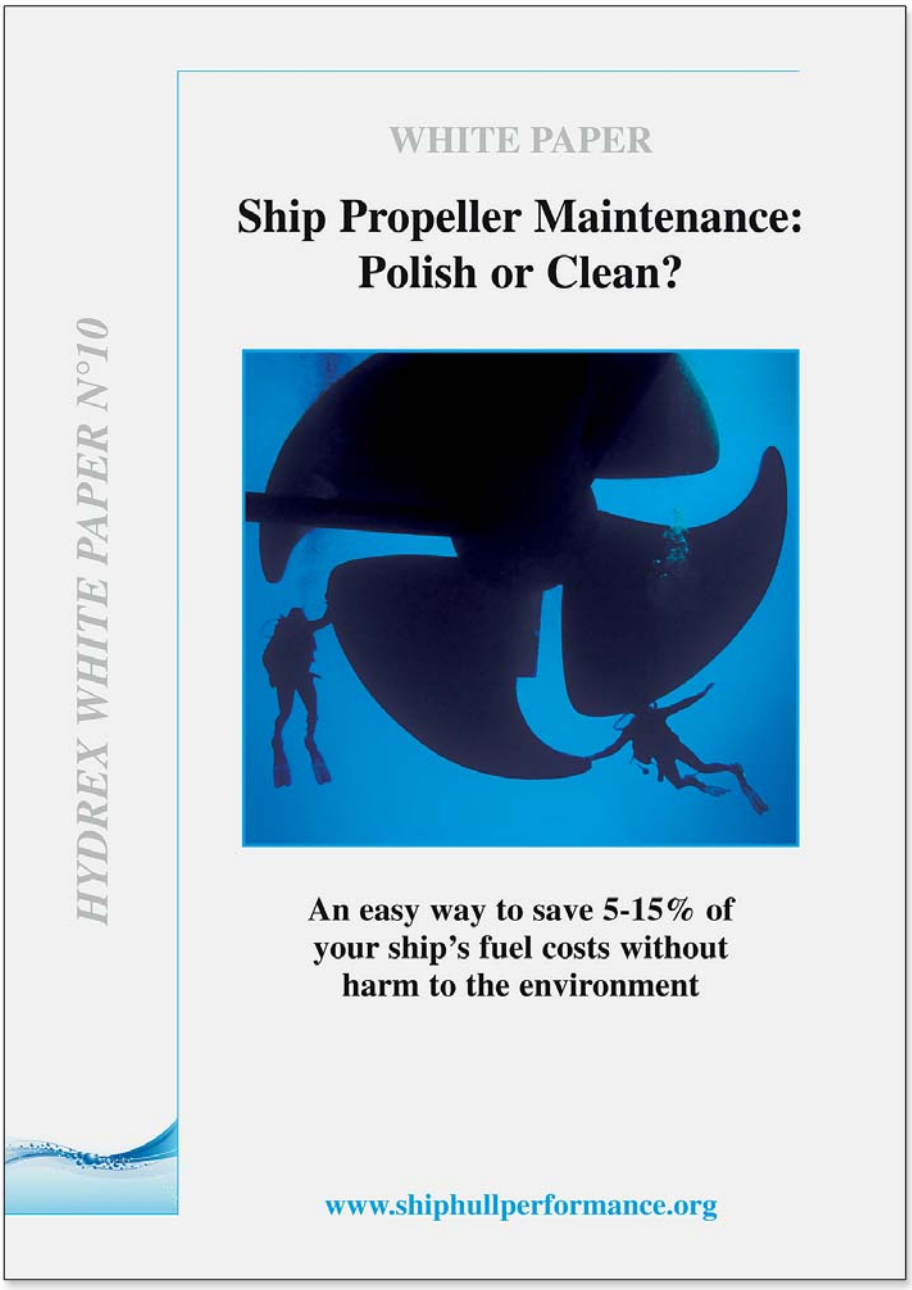
Hull coating degradation, its causes and how to prevent it is covered in Hydrex White Paper No. 9 Hull Coating Degradation – the Hidden Cost, which was announced in the last issue of the Hydrex magazine. It is an acknowledged fact in the shipping industry that blasting a conventionally coated 10-15 year old ship hull back to bare steel can improve fuel consumption by 25-40%. This shows the fuel penalty attributable to a hull coating which has become rough with age. Obviously the penalty doesn't suddenly accrue after 10 years service. It is a gradual build-up beginning with initial coating damage and deterioration and compounded at every drydocking by spot repairs and partial repainting, each time leaving the hull rougher, until finally the hull has so much inherent drag that a full blasting and recoating is the only answer. The White Paper addresses the causes and the best available practices for eliminating this fuel penalty.

Propeller maintenance has long been regarded as a low cost, high returns practice. Research has found fuel penalty figures of 5-15% associated with propeller roughness and fouling. Considering the ease and low cost of keeping a propeller smooth while in service, this form of maintenance is clearly worthwhile. Usually this maintenance consists of

periodic polishing with a polishing or grinding disk, either in the water or when the vessel is in drydock. Hydrex White Paper 10, Propeller Maintenance, however, looks at a different approach to maintaining a smooth propeller, one which can provide a higher yield with faster, lighter and more frequent cleaning. This approach results in less removal of material from the propeller and therefore lower emission of heavy metals, which is kinder to the environment.

The *Journal of Ship Hull Performance* Vol 2 Issue 2, April 2012, includes these two White Papers and a lot more.

We have included a remarkably enlightening set of facts and figures regarding potential fuel savings from hull and propeller maintenance which were presented by Mr. Daniel Kane of Propulsion Dynamics at the Green Ship Technology 2012 conference in Copenhagen. These are real world scenarios and demonstrate just how much can be saved through correct hull coating and hull and propeller maintenance practices.



An exciting research project has been launched. Commissioned by Boud Van Rompay and Hydrex, three highly qualified scientists, one British, one South African and the third Greek, have begun a project to find out just how serious the sediment contamination situation is. The first phase of the project will use a geographical information system to codify, tabulate and map currently known information about sediment pollution, particularly around ports and harbors and especially shipyards where the ship-related contaminants are highest. This phase will then point the way to more in-depth research to quantify and qualify the situation with regard to marine pollution. The idea is not only to count the cost of continuing to pour heavy metals and other chemicals into the sea although that is a part of it: how widespread and how serious is the contamination problem and what will the cost be to clean it up? But Hydrex is also developing ways of removing contaminated sediment without spreading the pollution further and this research aims to establish the extent to which that technology is needed.

The *Journal of Ship Hull Performance* also announces an upcoming Hydrex White Book Volume 1 which will be a compilation of the first 10 Hydrex White Papers plus a number of key articles and interviews from the first year and half of issues of the *Journal of Ship Hull Performance* and some key references and papers.

Hydrex White Paper No. 10 and the latest issue of the *Journal of Ship Hull Performance* are available for download at www.shiphullperformance.org and will soon be available in printed form if you would like to order a hard copy. ■

ECOSPEED®

SHIP HULL PERFORMANCE TECHNOLOGY

Ecospeed ship hull performance technology lasts the lifetime of the vessel. The need for full repaints during future drydockings is eliminated.

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

Ecospeed is a 100% non-toxic technology and is guaranteed for 10 years. Its surface texture will improve over time with regular inwater hull maintenance.

a HYDREX® UNDERWATER TECHNOLOGY

Phone: +32 3 213 5318 info@ecospeed.be
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Supreme Rudder Protection

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 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 Ecospeed 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 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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