

ECOSPEED[®]

DURABLE SHIP COATING TECHNOLOGY



Lifelong protection of your vessel can start in the newbuild or refit phase 3 - 6



ECOSPEED PREVENTS RUDDER CAVITATION DAMAGE

A great deal of effort goes into the design and manufacturing of rudders because they are such an important part of a vessel. Therefore they ought to be protected properly. Ecospeed's durability provides this protection because the coating will remain intact for the lifetime of the vessel. The smoothness attained by the coating also provides optimum hydrodynamic

conditions for rudders to operate at maximum efficiency. The ship's performance remains stable and the owner's investment is secured.

The coating is both flexible and tough. It provides the vessel with an impenetrable protective layer while its flexibility enables absorption of the forces that are produced by cavitation. Experiments in a flow chan-

nel have recently confirmed that Ecospeed performs extremely well under severe cavitation. The experiments were sponsored by the French MOD/DGA and were carried out by DCNS at LEGI in Grenoble.

Ecospeed's durability and hydrodynamic properties protect and enhance ship rudders thereby saving time and expense during future drydocking.

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ECOSPEED[®] a **HYDREX**
UNDERWATER TECHNOLOGY

Lifelong protection of your vessel can start in the newbuild or refit phase

The newbuild phase is the only time at which hull coating can be applied to the ship before it has suffered performance loss due to corrosion or mechanical damage. Choosing the right coating at this stage secures the future longevity and economy of the vessel. The initial investment in Ecospeed during the newbuild phase is relatively small and will be recovered even faster than if it is applied after the ship has seen some years in service.

Over the last three years quite a number of owners have chosen Ecospeed as a durable coating for their newbuild vessels. Among these ships are split hopper barges, vegetable oil tankers, general cargo vessels, cruise vessels (one with delivery scheduled at the end of this year and one in 2011) and the largest ROPAX ferry in the world (scheduled to be delivered in the fall of 2010). After



The first in a series of 4 newbuild general cargo vessels was coated in February 2008

the excellent results obtained with both these and existing vessels that were coated with Ecospeed earlier, more orders are coming in for newbuild series as well as single

ships. Just recently a Scandinavian shipowner added Ecospeed to the specifications of two of his newbuild bulker vessels. Since both ships will be trading in the Baltic area they need a long lasting defense against the rigors of the Baltic winter. Ecospeed's durable protection against ice and mechanical damage together with the 10 year warranty that comes with the coating where therefore the main reasons for choosing Ecospeed.

Ease of application

The timing of an Ecospeed application is geared to the schedule of the yard. This flexibility can be easily achieved with Ecospeed because the coating has versatile application potentials. Either of the two required layers can be applied at any time during the building process, even when there is a winter period or



The underwater hull of the largest ROPAX ferry in the world is given an Ecospeed protective coating

serious bad weather between applications. There is also a very short minimal overcoating time and no maximum overcoating time (compared to 48 hours with many other paint systems). When an application needs to be finished quickly, with just 2 coats and approximately 3 hours curing time required between the two layers, the entire process can even be completed in one day.

Future drydocking costs will be reduced significantly

Ecospeed will remain intact for the lifetime of the vessel and is guaranteed for ten years. Planning the maintenance of the vessel's stern area therefore becomes much easier. The smoothness attained by the coating also provides optimum hydrodynamic conditions for the vessel to operate at maximum efficiency. The ship's performance will remain stable and the owner's investment is secured.

Maintenance of the vessel's stern area, especially cavitation damage repair, can take a lot of time in drydock. Because of the close proximity of the rudder, the propeller and the stern area, along with the strict procedures concerning blasting,



A series of three general cargo newbuild vessels was coated in China



Application of Ecospeed on newbuild cruise vessel



Ecospeed application on newbuild ferry in Croatia

painting, welding and propeller and stern tube seal work, most of the repairs that need to be done in these areas cannot be performed concurrently. Painting is then usually assigned to the end of the schedule and as a consequence may not get done at all or else prolongs the stay in drydock. Taking into account the tight dry-dock schedule of most vessels this is often problematic. With an Ecospeed application one can avoid these problems from day one because no full repaint of the underwater hull will be needed during drydocking.



Third in a series of 4 newbuild vessels that was ordered after excellent results with existing vessels

Maintaining structural integrity

A great deal of effort goes into the design and manufacturing of rudders because they are an important part of a vessel. Therefore they ought to be protected properly. Ecospeed's durability provides this protection because the coating will remain intact for the lifetime of the vessel. The coating is both flexible and tough. It provides the vessel with an impenetrable protective layer while its flexibility enables absorption

of the forces that are produced by cavitation, thereby preventing the damage normally caused by this phenomenon.

Tests 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



After outstanding results with existing vessels Ecospeed was chosen as part of a cruise vessel's complete refit

coated with Ecospeed. The tests were organized by the French MOD/DGA and were carried out by DCNS at LEGI in Grenoble.

Fuel savings alone worth the investment

Increased fuel costs are due to the added resistance characteristics of each coating system. Towing tank experiments have made it possible to estimate the inherent added drag levels and the rate of increase over time is estimated roughly from data available in scientific literature. Ecospeed's resistance decreases more than for other coatings. Regular underwater treatment of Ecospeed is used as a performance enhancement measure to keep added drag caused by marine fouling under control. Moreover, this treatment will improve the coating's surface texture and hence increase its hydrodynamic efficiency. As a result, by adjusting the treatment interval, the increased fuel costs are minimized to significantly lower levels than would be the case for an spc or foul release paint.

On a global scale the potential for the reduction in fuel consumption and greenhouse gas emissions is enormous. The IMO (International Maritime Organization) currently estimates the annual fuel consumption by the world fleet at 310-350 million tonnes, implying an annual CO₂ output of approximately 850 million - 1.1 billion tonnes. If 80% of the world fleet would switch from biocidal antifouling to Ecospeed, this would save an estimated 28.5 million tonnes in annual fuel consumption and 90 million tonnes in annual CO₂ output.

Many ships sail with a chartering contract that includes a penalty clause if fixed distance/fuel consumption ratios are not met. However, the distance/fuel ratio is unpredictable with regular paint



Ecospeed application on bulbous bow of ROPAX ferry...



and during assembly

systems and will also worsen over the years. This is due to wear-down, build-up of paint layers, corrosion and other damage which reduces the vessel's performance and increases fuel consumption. In this way the ship becomes more expensive and profits are reduced. The protective Ecospeed coating keeps the ship's performance stable and protects the owner's investment. A fixed distance/fuel ratio can be determined in advance and penalties are therefore avoided.

Non-toxic

Ecospeed offers a TBT-free, copper-free and biocide-free solution for

the protection of the underwater hull. 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. This research proved that the coating is 100% toxin-free and that there is no negative effect on the water quality or the marine environment at any point of its application or use.

Underwater hull cleaning around the world

Another important outcome of the demonstration project was the submission of the experimental results to

port authorities and environmental agencies worldwide in order to achieve approval for the underwater treatment of Ecospeed. Several ports and countries have banned underwater cleaning out of concerns about the pulsed release of biocides or an increased risk of transferring Non Invasive Species (NIS). The experimental results and the derived criteria for environmentally safe underwater cleaning have already convinced several economically important ports to overturn the ban and this for vessels coated with Ecospeed.

Specifically European ports like Rotterdam, Antwerp, Oslo and Barcelona, which had maintained a ban on underwater cleaning, all decided between mid 2009 and March 2010 to allow the underwater cleaning of hulls coated with Ecospeed. It is expected that the list will expand in the future. These ports recognize the negative impact of biocidal paints and want to support environmentally safe solutions.

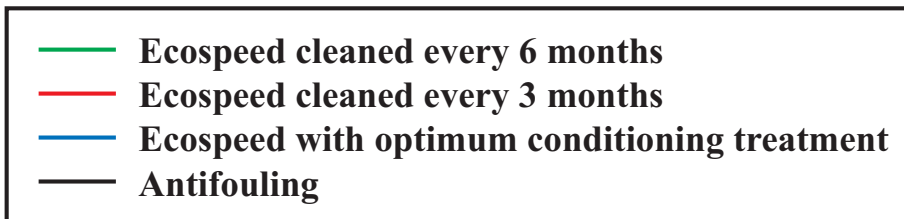
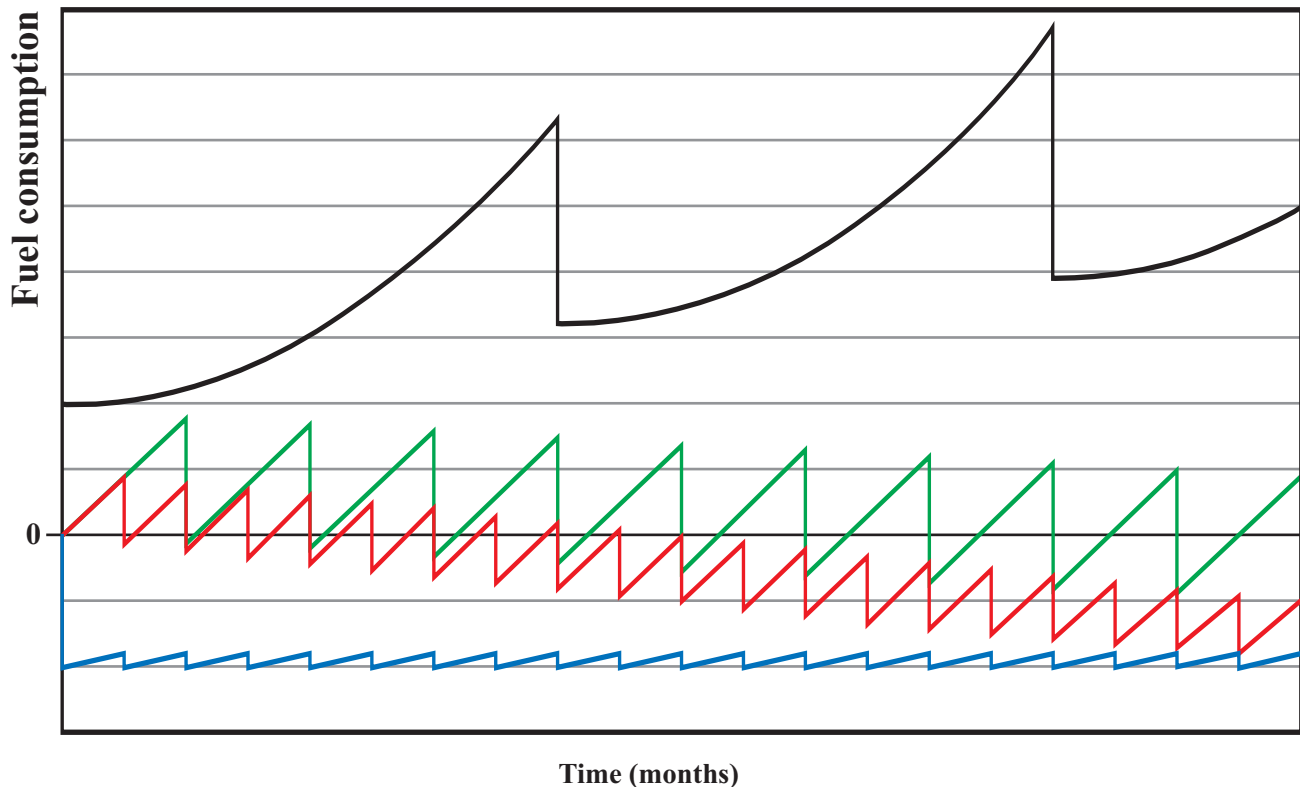
Ecospeed benefits all newbuilds from the start. It is the coating that not only provides long lasting all-round protection, but is also economically viable and ecologically sound.



After excellent results with two of his existing vessels an owner chose Ecospeed for a series of newbuild general cargo vessels

Optimization of ship performance

Development of additional fuel consumption over time



The expected development of added fuel consumption over time for a biocidal antifouling is compared with three treatment scenarios for Ecospeed for one particular trading area.

In the green scenario, Ecospeed undergoes an underwater treatment every 6 months. In the red scenario, the treatment interval is halved to three months; fouling will not occur as extensively and the associated added fuel consumption is limited. Both scena-

rios show that with each treatment, effective cleaning restores the added fuel consumption to the zero reference observed at sea trials. The unique conditioning aspect that is carried out simultaneously with each cleaning optimizes the surface gradually over time, producing fuel savings with each treatment. In a third scenario, extensive best possible conditioning is carried out immediately after curing. As a result the fuel consumption observed at the sea trials will be lower and better pro-

tection prevents that fouling will occur as rapidly. The total savings in fuel consumption over the lifetime of a vessel is directly proportional to the area between the antifouling plot and the different Ecospeed scenarios.

Adjusting the frequency of underwater treatments allows an optimization of the vessel's service speed and minimization of its fuel consumption.



ECOSPEED DURABLE SHIP COATING TECHNOLOGY

Ecospeed is the underwater ship hull coating system that optimizes performance and gives protection for the life-time of the vessel to which it is applied.

Repainting is not needed at drydocking which results

in massive savings. Less days in drydock result in more days at sea.

The environmentally safe, totally non-toxic Ecospeed system keeps ships running at peak performance with lowest fuel consumption. Marine growth is controlled

in an environmentally safe way. Ecospeed is a proven Best Available Practice to handle any alien species issues.

Ecospeed can truly keep a ship at peak performance for life.

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