

**PERMANENT PROTECTION FOR RUDDERS AND RUNNING GEAR
 FROM CAVITATION DAMAGE, EROSION AND CORROSION -
 THE ECOSHIELD DIFFERENCE**

COSTLY DAMAGE TO RUDDERS AND RUNNING GEAR

Cavitation damage, erosion and corrosion can cause havoc to rudders, Kort nozzles, thruster tunnels, twisted fins and other running gear.



Traditional protective coatings, even when supported with sacrificial anodes, may hold up for a while, but it is not long before the paint is cut through and destroyed, the steel exposed, and pitting and corrosion appear.



The high-powered forces of cavitation can seriously damage poorly protected rudders and running gear.

In extreme cases the whole rudder can disappear. Usually rudders, thruster tunnels, nozzles and other running gear become badly pitted and require repair, either underwater with the ship afloat, or at the next drydocking. This can be very expensive and cause delays.

In-water welding repairs are costly. Time in drydock is extended with each day the ship is laid up, costing the owner/operator not only the drydock fees but the higher cost of having the ship out of service.

This damage to the vessel's rudder and running gear has become a way of life with no permanent solution in sight.



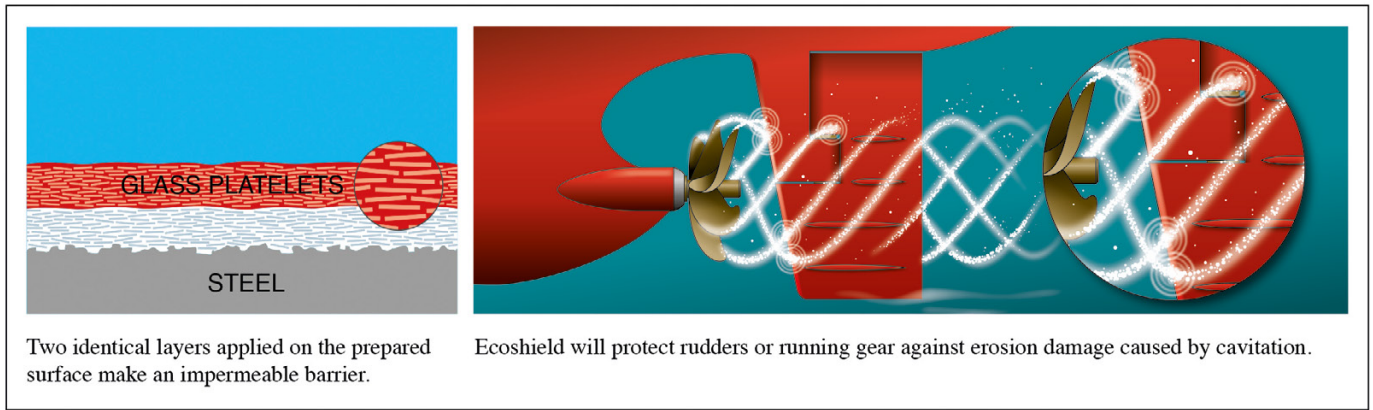
Rudder repairs in and out of drydock can be major expenses to a shipowner/operator.



This situation with rudders and running gear has continued since metal was first used for these parts of ships. The rudder in particular, because of its position directly behind the propeller, has been prone to the damage caused by cavitation.

Many solutions have been tried but with little success. A real solution to cavitation damage would save shipowners/operators a great deal of money, time and worry.

MEET ECOSHIELD...



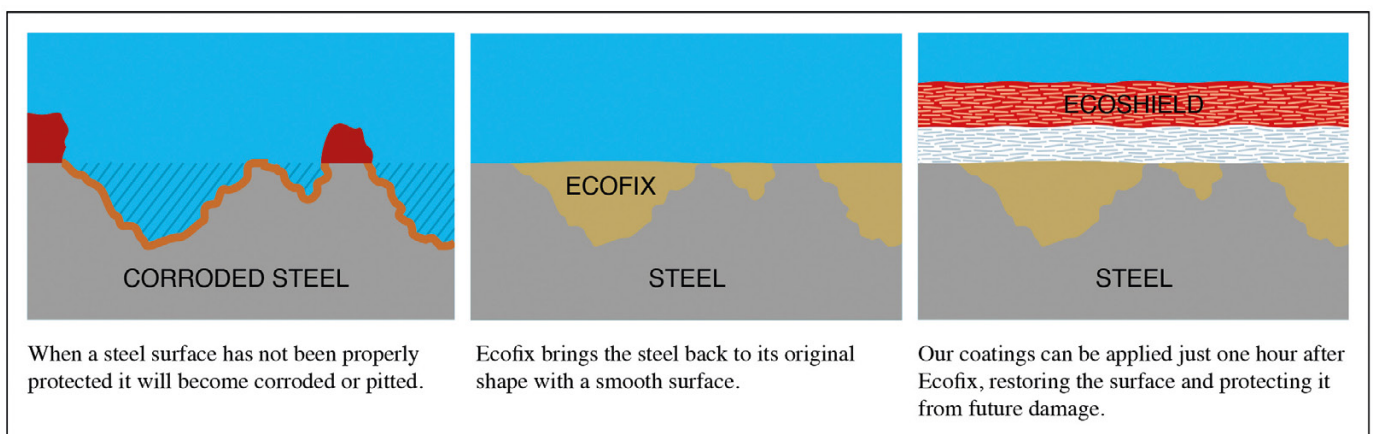
What has been missing generally in the solutions that have been attempted, is the ability to entirely isolate and insulate the steel or other substrate from the forces that cause so much damage. Conventional hull paint simply will not do this. The parts of the underwater ship that are particularly subject to cavitation damage and corrosion need special treatment.

What is required is a thick, glass-reinforced composite that forms an impenetrable barrier to the forces of cavitation, erosion and corrosion. It simply stops them dead so that the substrate cannot be reached, let alone damaged.

The barrier used must be able to flex as the substrate flexes. But the high content of large aspect ratio glass platelets is what provides the impenetrable barrier. Our resin bonds them very strongly to each other and to the substrate. There are also some secret ingredients. This is Ecoshield.

Over a thousand applications on ships' rudders, Kort nozzles, thruster tunnels, twisted fins, stabilizer fins, bulbous bows and other parts of the underwater ship are a testimony to the long-lasting protection provided by Ecoshield.

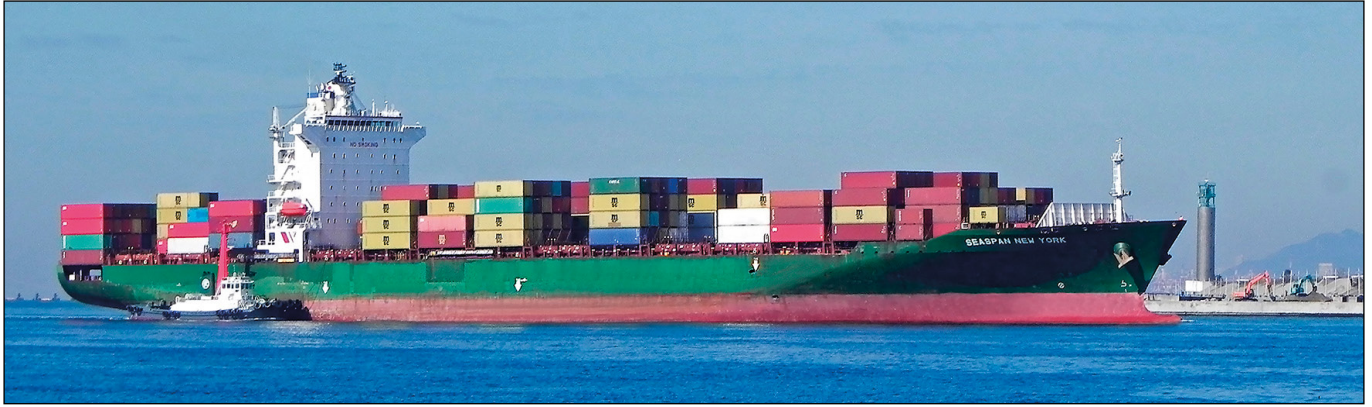
... AND ECOFIX



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 damage can cause severe pitting. The steel needs to be restored to its original shape with a smooth surface prior to recoating. Ecofix can replace costly and time-consuming welding repair in many cases.

Ecofix has the same basic chemical composition as Ecoshield so the two form an invincible pair for rudder repair and protection.

IN THE REAL WORLD



Seaspan New York before original application of Ecospeed in 2010.

“After high pressure washing in drydock we saw that no repair of the Ecoshield was needed on rudders that were coated 9 or 10 years ago...

Compared with conventional coatings, we save somewhere between one and three days in drydock per ship...

We are planning to apply Ecoshield on the rudder blade, bow thruster tunnel, energy saver and also the scrubber outlet on all our upcoming newbuilds.”



Mr. Emilian Jianu, NACE 3 FROSIO 3, Coating Performance Specialist, SEASPAN.



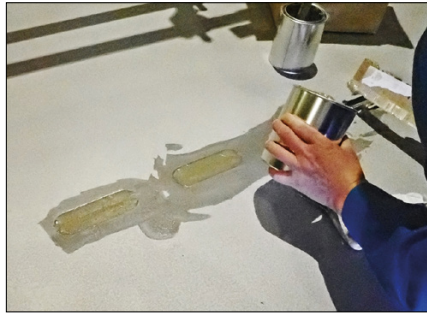
Seaspan New York (same ship) 5 years after Ecoshield application (no repaint).



Seaspan New York 10 years after original application with no repaint.

USE AND APPLICATION

Newbuild

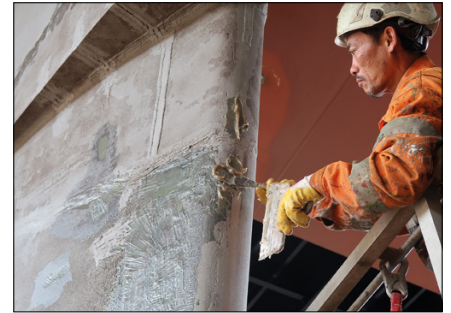


Newbuild application, block stage and dock stage.

- Ideally applied at newbuild so rudder and other running gear remain in pristine condition for the life of the vessel. Easier to apply during construction, avoiding the time pressure of drydock.
- Can and should also be applied on rudders and running gear that are already in service at next drydocking.
- Stays on for the life of the vessel without need to repaint.
- If mechanical damage occurs (anchor chain or collision) the bonding is so strong that undercreep will not occur.
- At most, minor touch-ups will be required during routine drydocking.
- Surface must be grit-blasted to produce a profile of at least 75µm and SA 2 ½ cleanliness.
- Weld slots can be filled with Ecofix prior to Ecoshield application.
- Airless spray, single feed. Requires no special equipment or conditions.

USE AND APPLICATION

Drydock



Rudder in drydock grit-blasted, pitting repaired with Ecofix, and then two coats of Ecoshield applied.

- Applied directly to prepared steel, no primer.
- Final DFT usually 1000µm but also 1500µm or 2000µm depending on requirements (500µm per coat with a 3-hour overcoat time).
- **Rudder or other running gear already damaged and pitted can be filled with Ecofix, a compatible, permanent filler. Ecofix can replace welding repair in many cases.**
- The Ecoshield bonds perfectly to the Ecofix as the basic chemistry is the same.
- The result is a new, indestructible surface for the steel, other metal or GRP.
- **Ecoshield comes with a 10-year warranty.**

Note: Only a rudder is shown in these illustrations but this applies equally to nozzles, twisted fins, and other running gear.

ECOSHIELD RESULTS

“In SCICON worldwide’s 25+ years of inspecting a wide range of ship coating projects as an independent coating inspection and consulting company, we can honestly say that we have never come across a product equal to Ecoshield. Not only does the 1000 µm of glass-platelet reinforced coating provide for excellent barrier corrosion protection, but more importantly (and that’s where we have seen many ‘similar glassflake’ coatings fail) outstanding resistance against long term cavitation and mechanical impact (ice, debris, etc...). In that respect, Ecoshield really is in a class of its own.”

Gunnar Ackx, Managing Director
www.sciconworldwide.com

NACE Level III Certified Coating Inspector, SSPC Level III Certified Protective Coating Inspector SSPC Certified Protective Coating Specialist, SSPC Past President (2016-2017).



“We can honestly say that we have never come across a product equal to Ecoshield.”

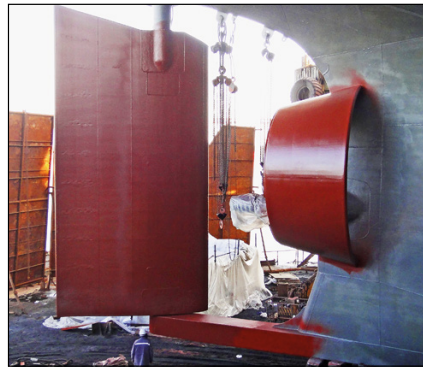
“Highly qualified professionals with FROSIO red level certificates evaluated the coating and gave the green light for application. After five years of operation at various speeds there were only minor detachments and those were easily repaired.”

Mr. Georgios Zolotas, Fleet Manager, Danaos Shipping

“We offer the Ecoshield-coated thruster as an option, but it is a very good solution for increasing the life of thruster installations aboard tugs and pushboats operating in shallow waters. We can see a really big improvement. Thrusters are less prone to damage, reducing maintenance and operational costs. We see these benefits not only with the towboat application, but also other applications such as harbor tugs and passenger vessels.”

Frank van der Vegt, Area Sales Manager
ZF Marine Krimpen





The rudder of the Pleiades vessel Xanthos. Lft. Before Ecoshield application January 2014. Ctr. Original Ecoshield application. Rt. After 7 years sailing, no repainting or repair.

*“We were experiencing heavy cavitation of the rudder blades as well as cavitation damage on the propeller nozzle on all our vessels. With the Xanthos, after high pressure washing, **the rudder blade and the propeller nozzle were in immaculate condition, 7 years after Ecoshield was applied. Fantastic.** Having a rudder and nozzle in good condition, from a typical drydock of 10 days, you save 1 day. Roughly speaking 10-15% time saved from the total drydock. The market right now is \$15-20,000 per day so you can save \$15-20,000 off the drydock just for one off-hire day.”*

Mr. Dimitris Gyftopoulos, Technical Superintendent Engineer, Pleiades Shipping Agents S.A.

“The decision to apply the coating on the first vessel was not an easy one, but the results obtained made the choice to extend the coating to other vessels obvious.”

Mr. Milos Synefias, Technical Director Pleiades Shipping Agents S.A.

“The rudder blade and the propeller nozzle were in immaculate condition, 7 years after Ecoshield was applied – fantastic!”

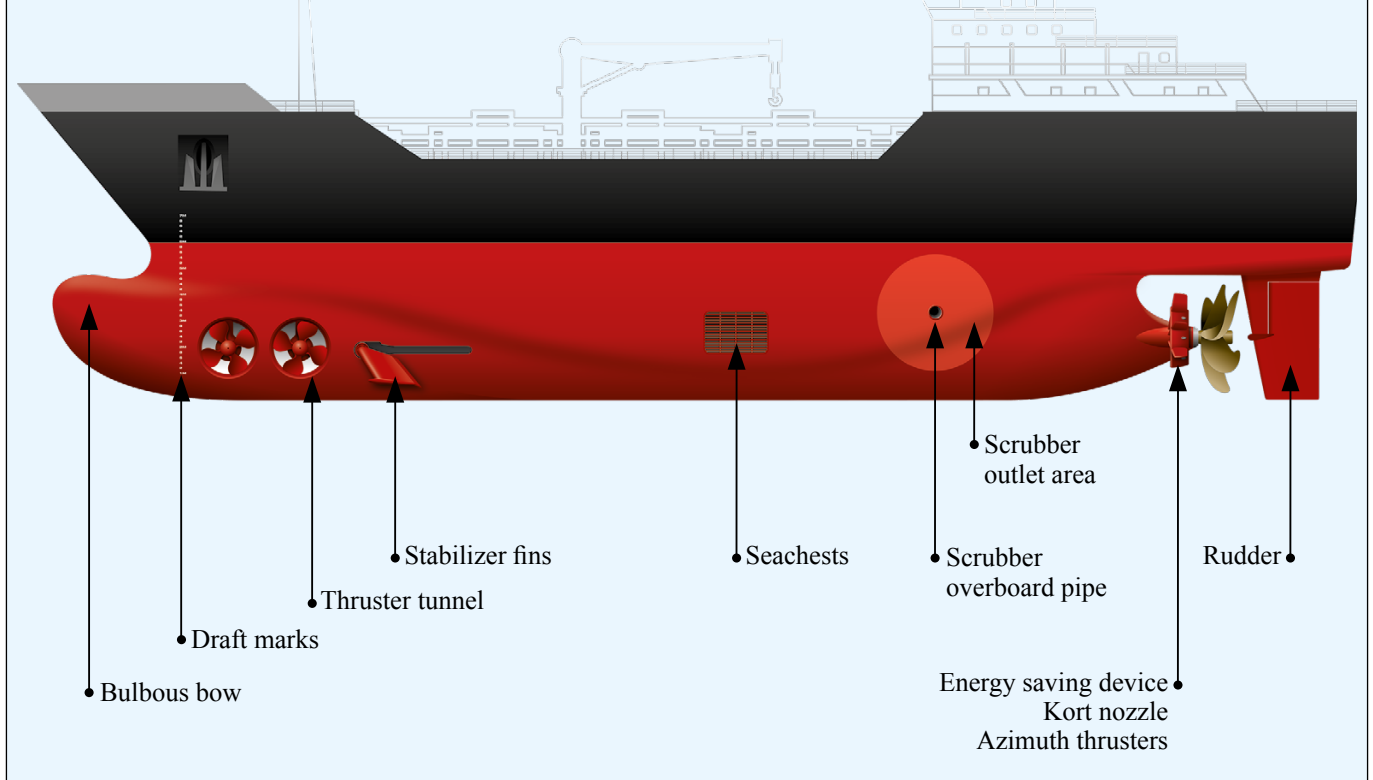


*“None of the rudders have sustained any further cavitation damage. They have been touched up where the paint was chipped or scraped, but the cavitation damage to the rudders ended with the first application of Ecoshield. In general everybody is looking to be in drydock as short as possible and to get all the work done as quickly as possible. 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 Ecoshield on the rudders, we would certainly have extensive work to do in drydock.** Even replacing the doubler plates is a lot of work.”*

Grzegorz Girjat, Superintendent Ernst Russ

LIFETIME PROTECTION FOR YOUR SHIP

PARTS OF YOUR SHIP THAT SHOULD BE PROTECTED WITH ECOSHIELD



**CONTACT US FOR MORE INFORMATION
AND FOR A QUOTE ON A SPECIFIC PROJECT**

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