

SUBSEA

PROTECTION AND PERFORMANCE



Magazine

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Corrosion damage very repair made ✓ easy



Subsea Industries has a product for filling and building up a corroded and pitted steel surface to its original form prior to recoating with Ecoshield. Ecofix is as tough as the steel itself, machinable, and can be used to repair most pitting or corrosion damage on rudders, stabilizer fins, thrusters and other underwater gear.

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 can cause severe pitting. The steel needs to be restored to its original shape with a smooth surface prior to recoating.

This is where Ecofix comes in. It is a superior, tested and proven filler. Because it uses the same basic resin as Ecoshield, the coating can be applied just one hour after the filler. The bonding and hardness are extraordinary. This is the effective alternative to very expensive fillers. And because it is part of the Ecospeed/Ecoshield family, it is fully compatible with our coatings.

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Editorial

All ship hulls and other submerged surfaces begin to acquire aquatic microorganisms almost as soon as they enter the water, despite any kind of anti-fouling or foul-release or other coating.

Today underwater ship hull cleaning, thoroughly and efficiently done on an industrial basis and on a suitable hull coating, is the answer to reducing fuel costs, cutting GHG emissions, preventing the spread of non-indigenous species and avoiding marine chemical pollution.

There is some hesitation from ship owners to clean, but if done by professionals with correct safety equipment and regulations then there is no risk. These safety measures are well within the abilities of a ship crew.

But it is important that all cleaning is done on hard, non-toxic, durable coating systems. This means that there will be no emissions from toxic paint materials and that the surface of the coating will not be damaged but instead gets buffed which enhances the performance. The wrong coating will be damaged by underwater cleaning regardless of what machine is used.



The coating must be designed to:

- Resist the aggressiveness of the cleaning.
- Improve instead of deteriorating.
- Be able to be cleaned as often as needed throughout the lifecycle of the vessel without damage.
- Be repaired quickly if needed should mechanical damage occur, and be brought back easily to its original condition.

Regular cleaning makes sure fouling only adheres lightly to the hull. By experience we have seen that animal growth appears much more slowly when the coating is smooth and conditioned.

When you clean regularly, only slime and algae need to be removed. Because these are non-invasive species this negates the need for a reclaim system.

There is only one solution if you want to increase a vessel's performance and mitigate the emission of carbon and CO₂: a hard durable coating combined with professionals using the proper tools.

Do not hesitate to contact us if you wish to discuss this or any other topic concerning protective coatings or underwater cleaning. We can work with you to come up with the best solution for your particular case.



Subsea Industries NV
Boud Van Rompay
Founder

Fednav's *Umiak I* Ecospeed Ice coating in great shape after two years

In April 2021, Fednav's *Umiak I*, one of the world's most powerful icebreaking cargo ships, had the entire hull from keel to gunnel coated with Ecospeed Ice, replacing the existing hull coating.

So, more than two years of heavy icebreaking later, how is the coating holding up?

Craig Verge, the superintendent of the *Umiak I* says, "I was out and had a look at the hull coating in Long Harbor, [near St. John's in Newfoundland & Labrador, Canada]." Craig works for Canship Uglund Ltd., the St. John's N.L. based ship management company that manages a variety of vessels including this



Fednav's Umiak I, DNV ice-class ICE-15, one of the most powerful icebreaking cargo ships in the world.



The Umiak I moored at Long Harbour, N.L. in July 2023, more than two years after Ecospeed Ice was applied to the hull.

189-meter icebreaking bulk carrier. "The Ecospeed is holding up well – as far as I can see there does not appear to be any damage from ice whatsoever," he says, "There is also only minimal mechanical damage from chains on fenders and tugs, and marks from tires." This report is from August 2023, more than two full years of service since the ship's hull coating was changed to Ecospeed Ice.

Fednav Ltd

The *Umiak I* is owned by Fednav Limited. With more than 75 years in the international shipping business, Montreal-based Fednav Limited is Canada's largest ocean-going, dry-bulk shipowning and chartering group.

“The Ecospeed is holding up well – as far as I can see there does not appear to be any damage from ice whatsoever”

Fednav’s maritime freight division annually transports over 30 million tons of mainly dry-bulk, including agricultural products, sugar, fertiliz-

ers, and industrial minerals as well as steel and other general cargo on their fleet of 120 owned and chartered vessels.

The fleet is comprised of Handysize, Supramax, and Ultramax bulk carriers. Renowned for Arctic trading expertise, Fednav boasts the world’s largest fleet of ice-class bulk vessels.

Specializing for six decades in the St. Lawrence-Great Lakes Seaway System and in the ice-covered waters of the Arctic, today, Fednav’s

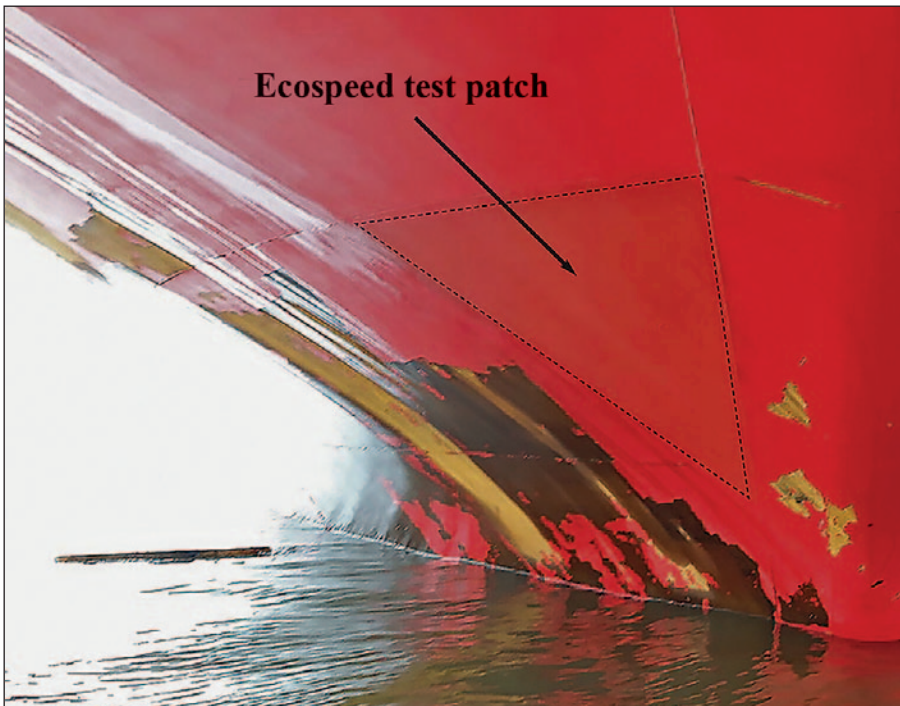


Fednav Ltd., some key facts and figures.

wider focus is on the transportation of bulk and breakbulk on a worldwide basis.

Having participated in every major shipping project in the Canadian Arctic since the late 1950s, Fednav’s Arctic Operations department knows how to deliver innovative and effective solutions for that challenging region.

The company owns and operates both 31,500-tonne *MV Umiak I* and *MV Nunavik*, the most powerful ice-breaking bulk carriers of their kind as well as the *MV Arvik I*, an ice-breaking vessel powerful enough to



One of the test patches applied to the bow area of the Umiak I shown here 5 years after application in excellent shape compared to the existing hull coating.



Ecofix used to repair severe pitting prior to application of Ecospeed

navigate unescorted through ice-covered waters. Fednav knows ice!

MV *Umiak I*

Built in Japan at the Universal Shipbuilding Corporation's Maizuru shipyard, the *Umiak I* was delivered in 2006. At the time it was the highest ice-class, non-nuclear cargo vessel in the world with DNV ICE-15 classification. "Umiak" is the native Inuktitut name for a supply boat. The ship was purpose-built to transport nickel ore from the Voisey's Bay mine in Labrador, Canada to the Long Harbour Nickel Processing Plant on Newfoundland's south coast. *Umiak I* makes twelve trips per year, transporting a total of 360,000 tonnes of nickel concentrate worth 1.5 billion CAD. On the return trip, the ice-breaking cargo ship carries re-supply cargoes for the Voisey's Bay mine.

The *Umiak I*'s main engine is coupled directly to a ducted controllable-pitch propeller. The variable-pitch propeller allows backing and ramming in heavy ice conditions without reversing the engine, and the nozzle protects it from ice impacts and provides additional thrust. In open water, *Umiak I* can achieve a speed of 13.5 knots (25.0 km/h; 15.5 mph) with only 35% engine load. In 1.5-metre (5 ft) ice, she can maintain a speed of 3 knots (5.6 km/h; 3.5 mph) with the aid of a water deluge system in the bow.

Deservedly, the *Umiak I* was the star of the 5th episode in Season 5 of "Mighty Ships," a documentary television program aired on Discovery Channel Canada in August 2011. She is indeed a mighty ship.

Umiak I and Ecospeed Ice

As can be expected, the hull coating



Fully coated hull ready for launch.

on the *Umiak I* is subjected to some of the harshest treatment any hull coating can receive. The original coating was not holding up as well as desired. Thus it was that in the ship's 2016 drydocking, it was decided to apply two test patches of Ecospeed Ice, a coating that had been very successful in other ice applications including the British Antarctic Survey's Antarctic research and supply vessel, the *RSS Ernest Shackleton*.

For the next five winter seasons, the test patches were closely monitored and found to be holding up remarkably well.

Based on the success of the test patches, in early 2021 it was decided to replace the *Umiak I*'s entire hull coating with Ecospeed Ice. The application was carried out in Remontowa Shiprepair Yard in Gdansk, Poland.

Where the steel had been severely pitted from ice-abrasion, particularly on the bow and the nozzle, the surface was first repaired with Ecofix, a compatible filler designed for use with Subsea Industries coatings. Ecospeed can be applied over Ecofix with only a one-hour overcoat time which can save a great deal of time in the yard.

Results to date

The *Umiak I* maintained its regular schedule for the next two years, forcing its way through heavy ice up and down the Labrador coast carrying its valuable cargo in the usual harsh conditions.

It was in July 2023, over two years after the Ecospeed Ice application, that the ship's superintendent, Craig Verge inspected and photographed the hull when the ship was moored at Long Harbour. The photos confirm his report that the hull coating had suffered no ice damage whatsoever.



Photos of the Umiak I at Long Harbour in July 2023 showing the condition of the Ecospeed Ice hull coating after two years of plowing through heavy ice. (Photos courtesy Craig Verge, Ship Superintendent.)

“Service experience with Ecospeed test patches, and later a full application of Ecospeed, on the *Umiak I* has demonstrated to us that Ecospeed is the leading hull coating product, of those we have tested, for his application”

Craig says, “The crew did report some minor coating damage from ice on the leading edge of the nozzle.” This is not surprising considering the role the nozzle plays in the repeated backing and ramming operation the ship employs to make its way through heavy ice. However, the nature of Ecospeed prevents undercreep and is also very easy to repair in drydock since it is one homogenous coating rather than a complex scheme of different types of paint. The repair blends in perfectly with the original hull coating.

Conclusion

David Williams, Senior Manager, Technical Services Fleet Management at Fednav was the naval architect responsible for introducing Ecospeed Ice to the company and initiating the test patches applied at the Verreault shipyard in Quebec in 2016.

Looking back on that decision, in light of the results shown by the recent inspection after two years of the *Umiak I*'s sailing with Ecospeed Ice, David Williams says: “Fednav

has operational experience with various ice resistant hull coatings over our history as owners and operators of ice class vessels. Service experience with Ecospeed test patches, and later a full application of Ecospeed, on the *Umiak I* has demonstrated to us that Ecospeed is the leading hull coating product, of those we have tested, for this application.” ■



Corrosion solved

We are so used to corrosion on ships that no-one raises an eyebrow at the rust-stained hulls in any port or dock. It is, apparently, considered to be the way of things.

It is true that steel will rust. But with the knowledge and resources at our disposal we have long passed the point when we should have recognized that this is a problem, and solved it.

Corrosion on ships is rarely recognized as a failure of the coating, but that is precisely what it is. The first job of a hull coating is to prevent the gradual weakening and destruction of marine assets that is caused by corrosion. It remains a massive problem for shipping despite coating repairs eating up valuable days in drydock every few years. Not only that, but current coating compounds also leak a million ton of toxic material into our oceans every year.

Corrosion is not some unavoidable fact of life. The basics of the subject have been well known for centuries, but they are worth reiterating. The iron in a steel hull is, effectively, trying to return to the state in which it was taken as an oxidised ore. Three things are needed for rust to form: metal, water, and oxygen. Energy, the galvanic difference between metals, stimulates the process, and impurities in the metal, seawater, water vapor, acids, salts, carbon dioxide and stresses hasten it.

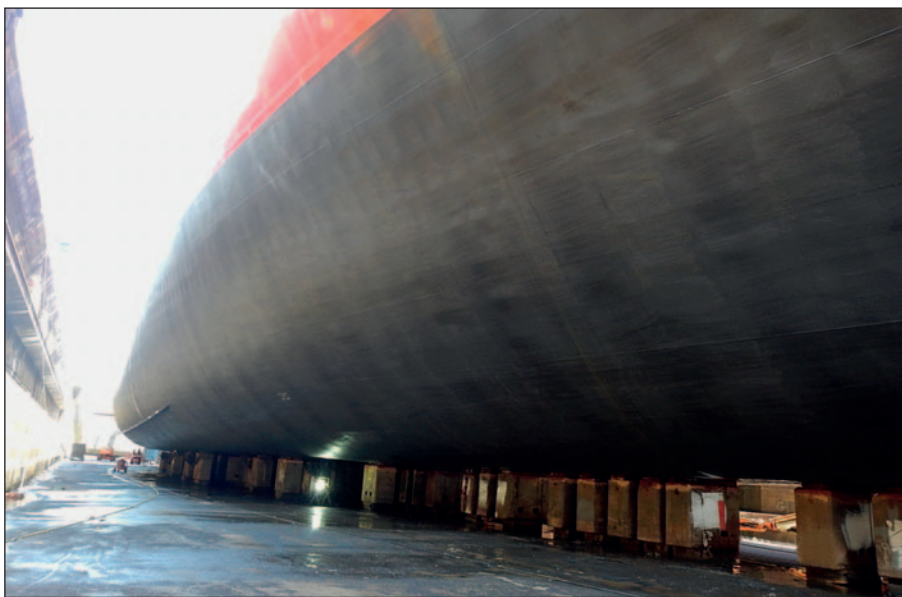
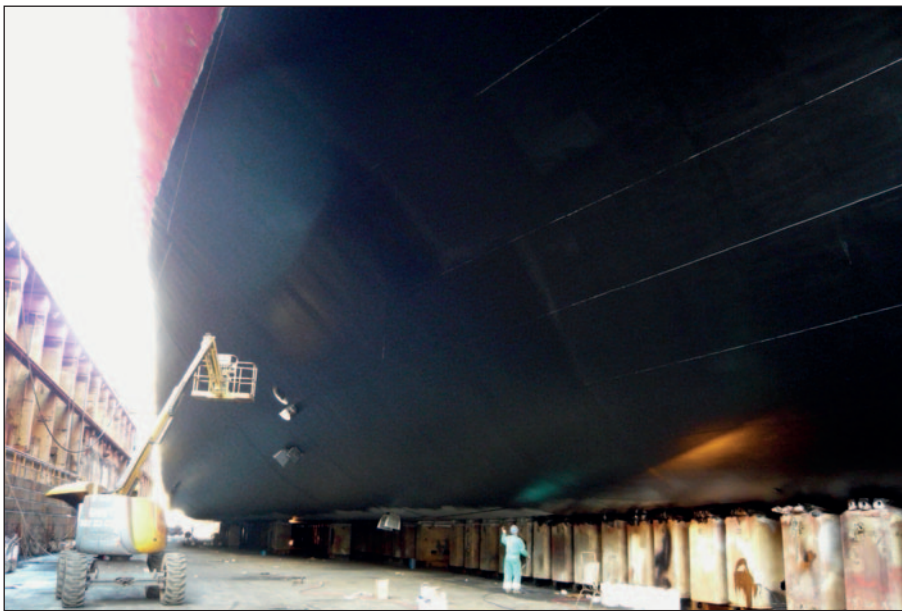
While cathodic protection slows the corrosion on a ship, total prevention is only achieved by preventing metal, water and oxygen from coming into contact with each other. That



The effect of corrosion can be devastating if the wrong protection is used for an underwater hull.



Bow area of RRS James Clark Ross after sailing in ice with Ecospeed for six years: no corrosion, only small mechanical damage from the anchor chain.



Ecospeed condition after application (top) and after sailing in icy waters for five years (bottom).

is the primary job of a coating. The problem is simply that most coatings fail poorly in that task.

One reason for their failure is the permeability of zinc primers, epoxies and antifouling coatings usually used. Water can get through and behind the layers of coating where it can start the corrosion process while accelerating it by causing coating delamination. This is the sequence of coating degradation which opens the door for further corrosion.

A second reason is the use of heavy metals in coating systems such as copper. These have a high galvanic

differential with the steel of the hull. In practice we see copper-based coatings degrade very quickly – their difference in potential is the highest we encounter on ships. The fact that zinc, epoxy and antifouling, all of which have different surface tensions, are used together, further aggravates the problem.

Permeability, different surface tensions, poor adhesion and heavy metals are the four main factors that lead to an inferior protection on the ship hull.

It is not difficult to see that if a coating has no heavy metal content and

therefore can avoid potential differential, is impermeable to water and achieves superior adhesion, the problem is solved. If the steel hull is isolated from its surroundings, then galvanic activity and corrosion are canceled.

Our range of coating systems has achieved this.

Observation over twenty years on hundreds of ships protected with our coating systems, reveals a distinct absence of hull corrosion on any of them. We do not find corrosion on these hulls.

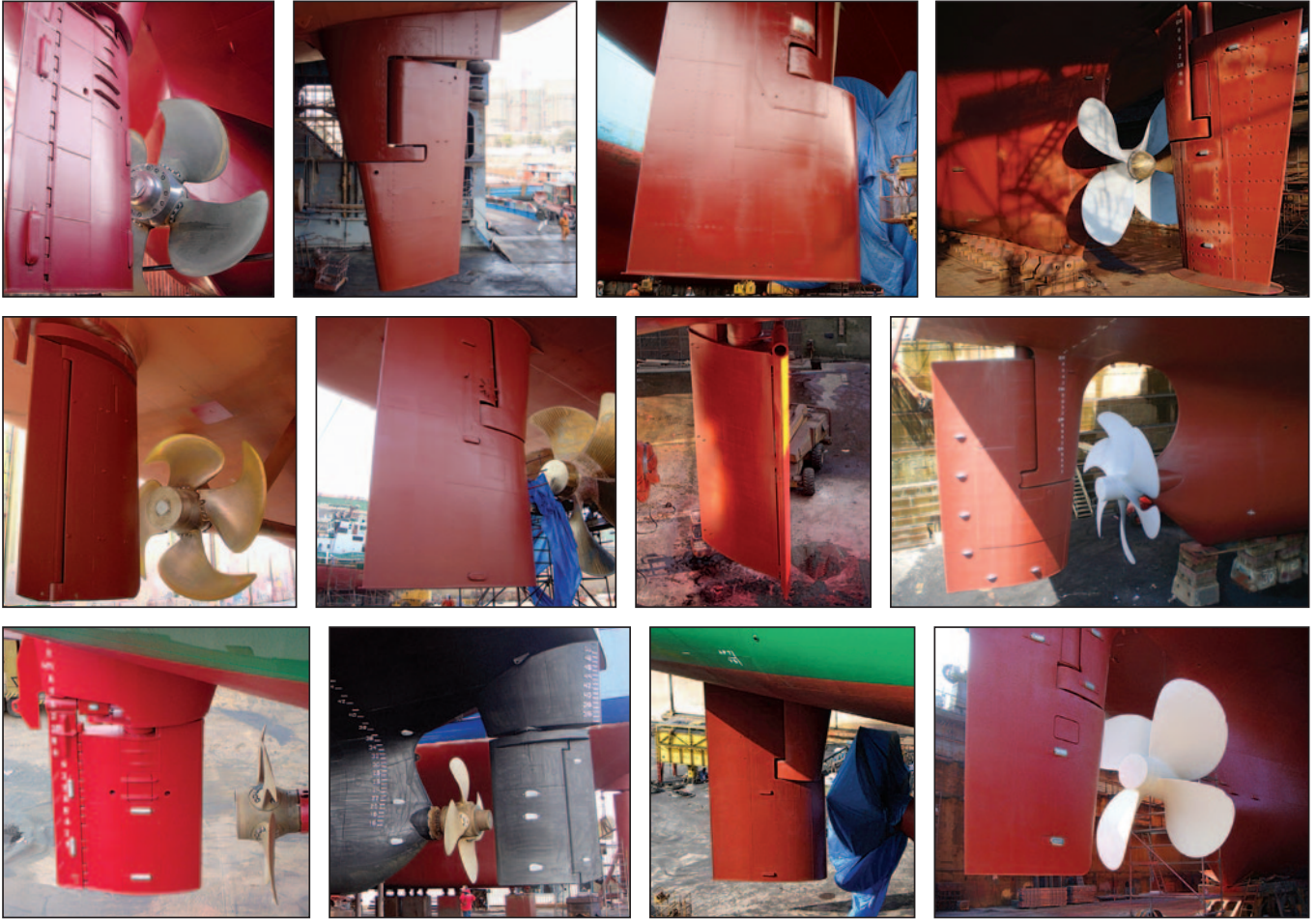
With our glass-flake coating systems we have the solution. Their superior adhesion, impermeability and toughness fully isolate the steel hull. Even heavy corrosive environments in port or in seawater fail to touch the anodes or the steel surface of the hull. In fact, anodes become superfluous on an Ecospeed hull.

We have seen more than 20,000 ships over the last fifty years – after some time they all have corroded, rough, degraded and inefficient hulls.

An amazing discovery we frequently make is that, on inspection of ships coated with our systems, we never see corrosion of any significance, even when there has been small impact damage. Not after two years, not after five years, not even after ten years. This proves that with an inert coating there is no influence on the steel, even when exposed to seawater.

The conclusion is simple: the majority of the coating systems in general use today do not protect the hull sufficiently. They should be replaced with coatings that can do the job. ■

LASTING PROTECTION



Ecoshield 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 Ecoshield on the rudder we can break the never ending cycle of painting, suffering damage, having

to perform extensive repairs in dry-dock followed by a full repainting, again and again.

With an Ecoshield application no full repaint will be needed during drydocking. Ecoshield is guaranteed for ten years. At the most, minor touch-ups will be required.

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SUBSEA

PROTECTION AND PERFORMANCE



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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