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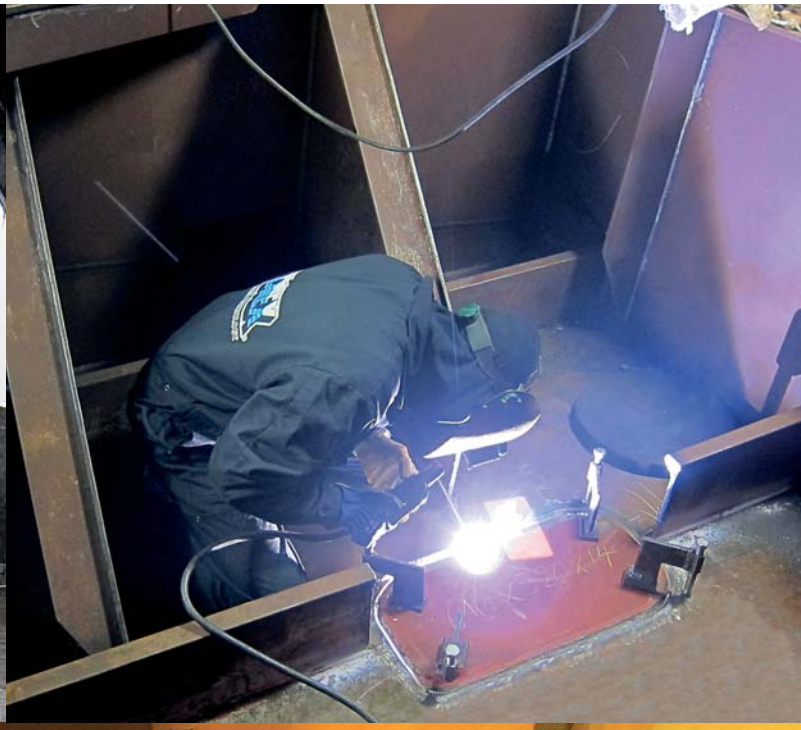
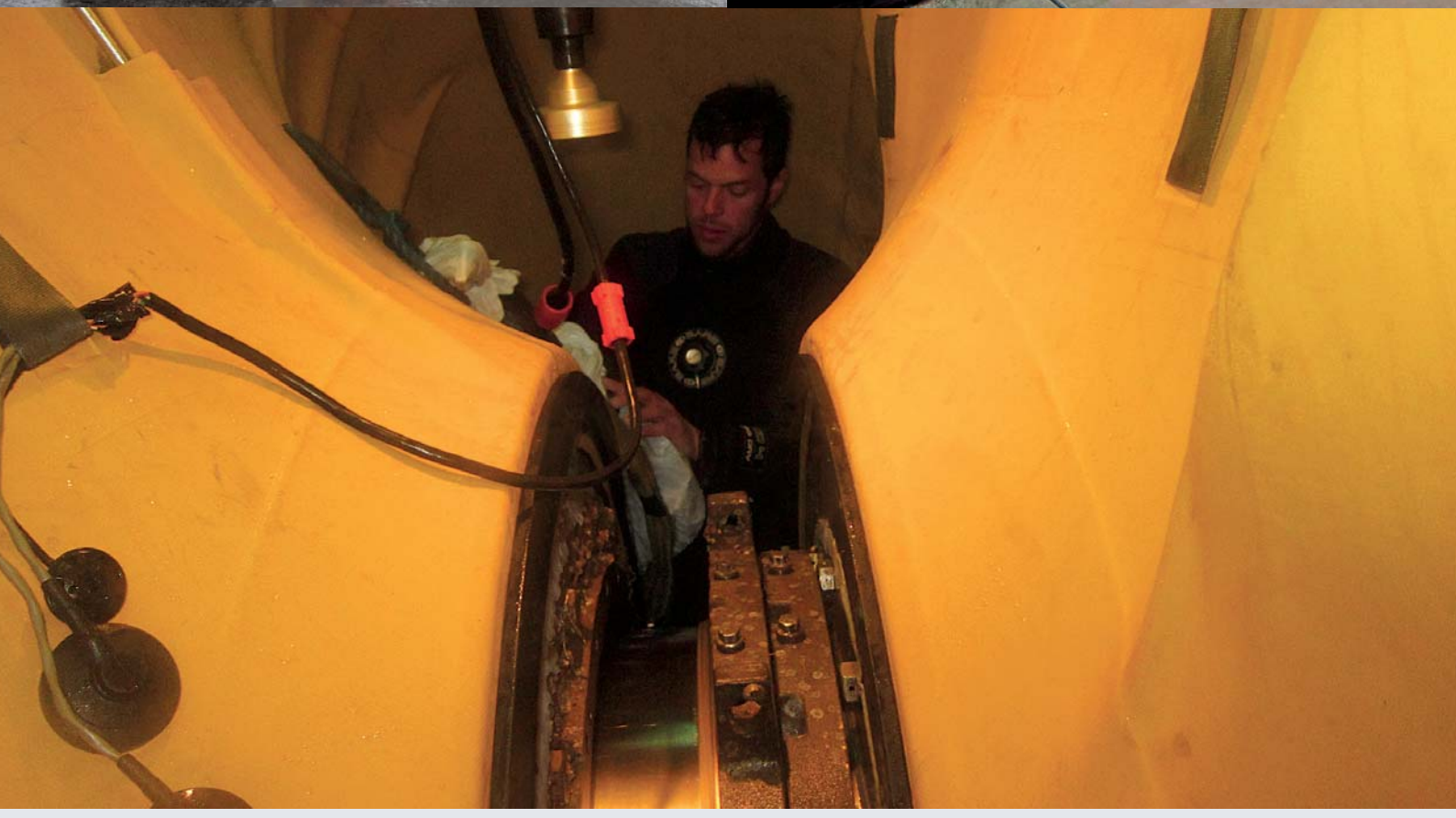
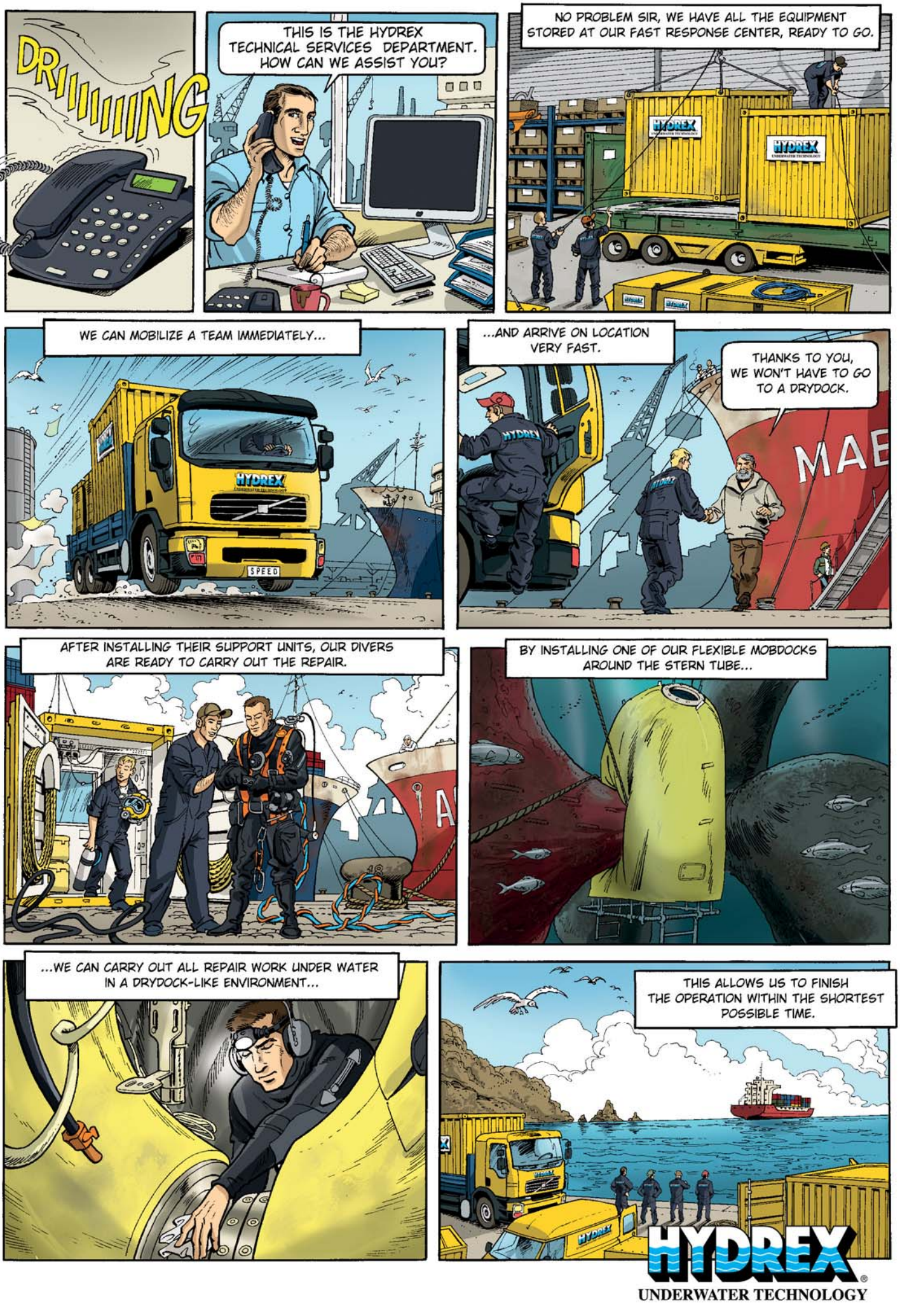
UNDERWATER TECHNOLOGY

Number *187*





Keeping ships in business



Editorial

In this magazine we give you a summary of some of the on-site repairs that were carried out by our diver/ technician teams over the last month.

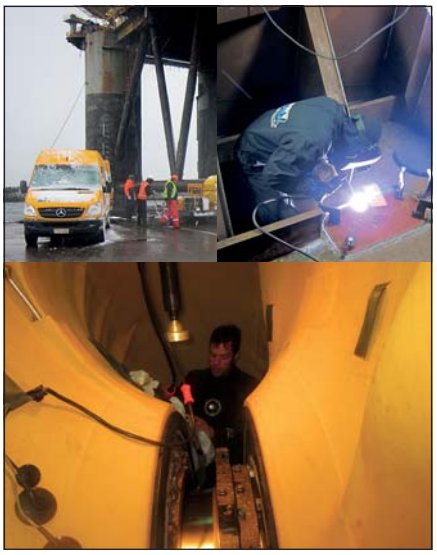
These include three insert repairs that were performed on vessels in Belgium, the Netherlands and Cameroon, an underwater stern tube seal replacement in France and an underwater bow thruster propeller blade cropping on a drill ship in Scotland.

Hydrex offers turnkey underwater repair and maintenance solutions to shipowners wherever and whenever they are needed. Our large and multidisciplinary team will help you find the best solution for any problem encountered with your ship below the water line. We will immediately mobilize our diver/technicians to any location around the globe to carry out necessary repair work without the need to drydock.

If you would like to learn more about the Hydrex services, please visit our website (www.hydrex.be) or call us 24/7 with your underwater repair needs, routine or emergency. We can offer turnkey solutions that include the engineering as well as the practical part of any operation. Our technical department is ready to find a solution for your specific needs.

Best regards,

Hydrex founder
Boud Van Rompay



Hydrex active with jobs around the world.

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On-site permanent insert repairs in Belgium, the Netherlands and Cameroon

Over the last couple of months Hydrex teams of diver/technicians mobilized to vessels berthed in Zeebrugge (Belgium), Amsterdam (the Netherlands) and Douala (Cameroon) to perform insert repairs on a roro vessel and two tankers. These repairs were carried out according to the Hydrex class approved procedure for the welding of inserts in a vessel's shell plating while afloat by using an external cofferdam.

Hydrex diver/technican preparing for underwater operation in Zeebrugge.

A 560 mm crack in the bottom shell plating of a 203-meter roro vessel needed to be repaired during the ship's stop in Zeebrugge. The Hydrex team therefore carried out a detailed inspection of both the onboard as well as the water side of the shell plating, after which they installed a cofferdam over the affected area.

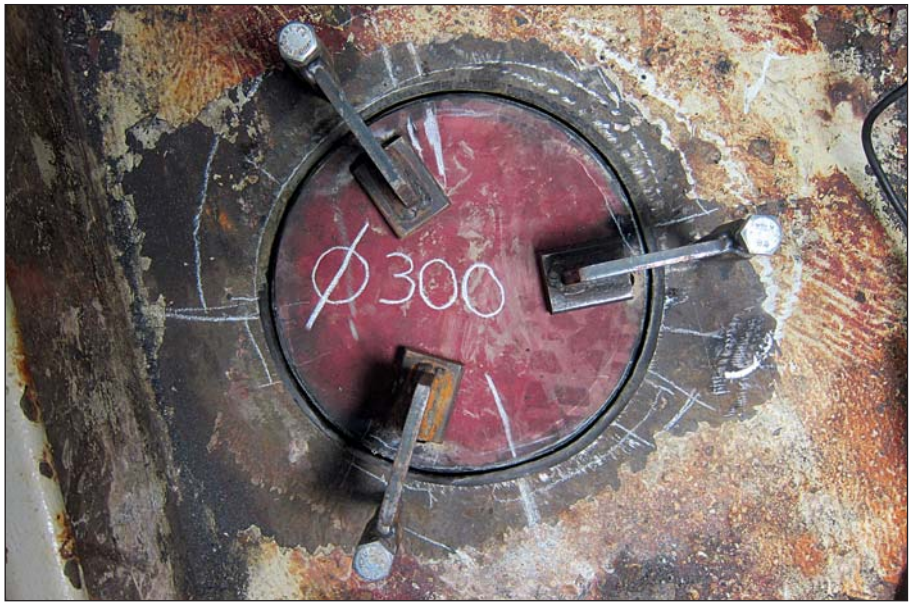
This allowed them to remove the frames covering the damage and cut away a 610 mm x 320 mm piece of the shell plating around the 560 mm crack. Next they positioned a new insert plate of the same dimensions and secured it with a full penetration weld. An independent tester then carried out ultrasonic testing and the repair was approved by the DNV surveyor who was present during the operation. The diver/technicians then reinstalled the frames and removed the cofferdam, concluding the repair.

Securing the new insert plate with full penetration weld on roro vessel in Zeebrugge.

In Amsterdam a round insert with a diameter of 300 mm was installed on a 144-meter tanker to stop the leak in one of the ballast tanks of the vessel.

After the ship had been declared gas free, the Hydrex diver/technician team started with a detailed inspection of the damaged area, both underwater and inside the ballast tank. The team then installed a cofferdam over the crack and removed the damaged area. Next the diver/technicians prepared the edges of the hole and installed the new insert with a full penetration weld. This was done under the supervision of an LR surveyor. After successful ultrasonic testing of the weld seams

New insert plate with reinstalled frames on roro vessel.



Round insert plate positioned on tanker in Amsterdam.

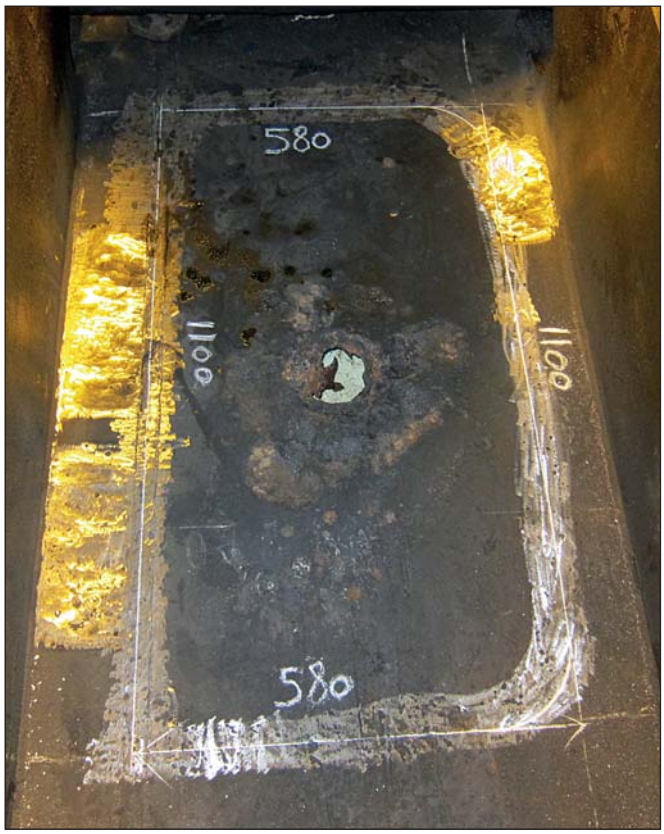
of the new insert, the cofferdam was removed. The owner could sail his vessel free of cracks.

Another Hydrex diver/technician team removed the cavitated area on the flat bottom area in the ballast tank of a 228-meter tanker. The operation was carried out during the ship's stop in Douala, Cameroon.

A temporary doubler plate had been installed over the cavitation. The team therefore performed the underwater part of the inspection after which they installed the cofferdam.

All welding work is performed according to class approved procedures.

New insert in Amsterdam seen from the outside.



Cavitated area on tanker in Cameroon, ready to be cut away.

New insert in Cameroon positioned and ready to be welded.

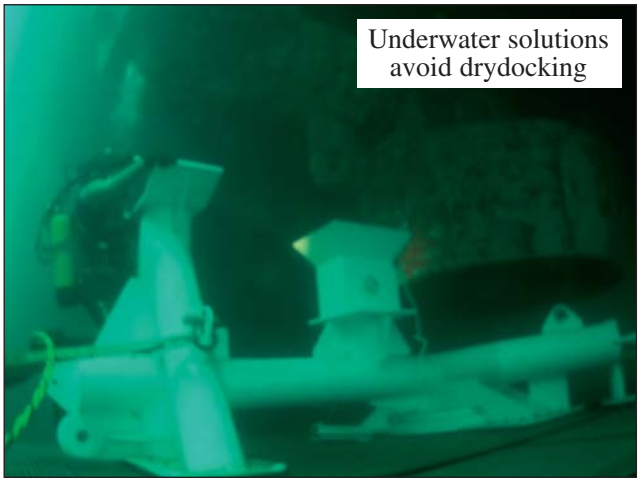
Class approved permanent insert plate in Cameroon.

The diver/technicians then removed the doubler plate and inspected the onboard side of the cavitation damage. A 1100 mm x 580 mm area was cut away, removing the area that had been damaged the most. After the team installed and welded the new insert plate, they filled up three smaller cavitation spots around the insert. An ultrasonic tester carried out the required NDT test and the BV surveyor approved the operation.

Our divers are trained to perform a wide range of procedures; they stayed in close communication with each other and with the technical department in the office, throughout these operations. This allowed them to finish these jobs within the shortest possible time frame and this without any compromise of the high quality standards Hydrex is known for.

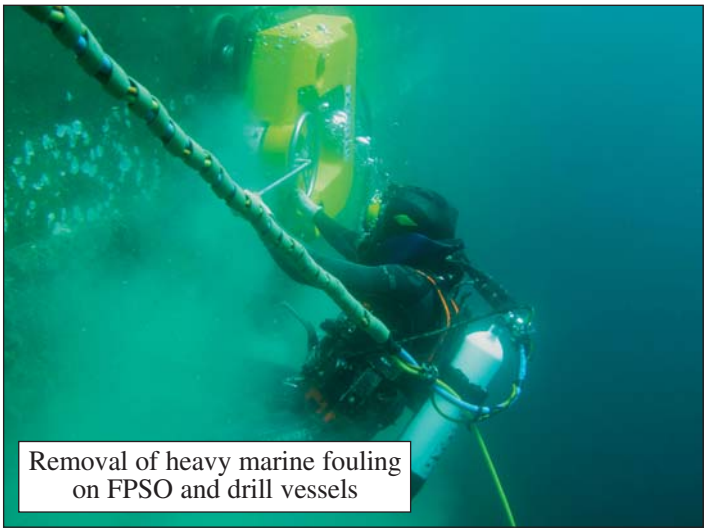
These permanent repairs allowed the owners of the vessels to continue their schedule without having to go to drydock. As a result, no further attention to the hull cracks will be needed.

Hydrex has certified divers at its disposal, ready to perform all types of offshore inspections.



Underwater solutions avoid drydocking

Fully trained and certified diver/technicians



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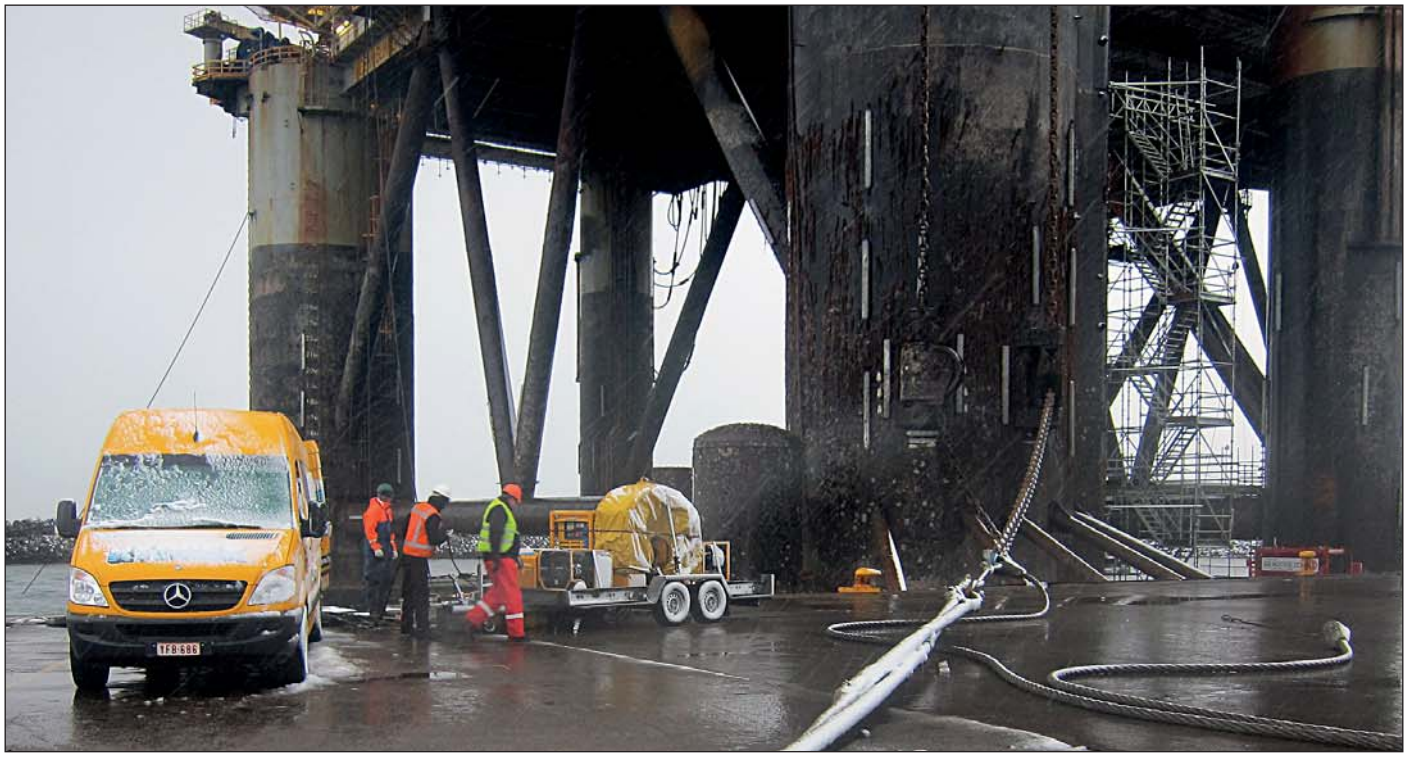
Underwater bow thruster propeller blade cropping on drill ship in Scotland

Last month a Hydrex diver/technician team cropped all four blades of the bow thruster of a semi-submersible drill rig stationed in Invergordon, Scotland for maintenance. The blades had suffered multiple dents and cracks and needed to be modified to restore the propeller's balance.

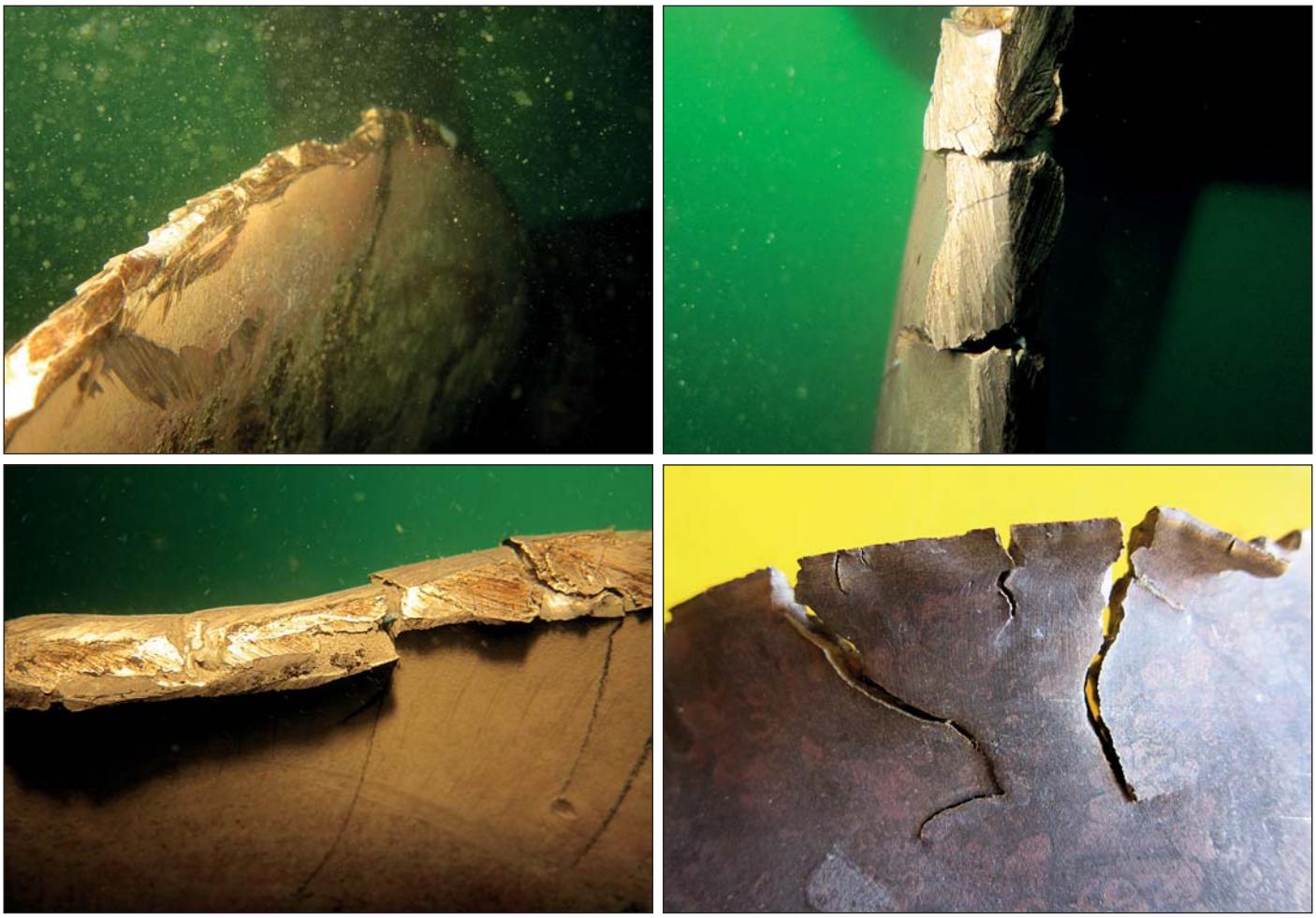
Hydrex cropped pieces of all four propeller blades to restore the propeller's balance.

The team first carried out a detailed underwater inspection of the propeller to get a full assessment of the damage. This revealed that each blade had suffered so many small damages that straightening the blades was not an option.

The information acquired during the inspection was then used to determine the correct measurements needed for the cropping. The area to be cropped was marked out on the four blades and verified. The team then cropped the blades one by one and ground their edges to give them the correct radius. When the cropping was complete, the



Hydrex truck and equipment on-site.



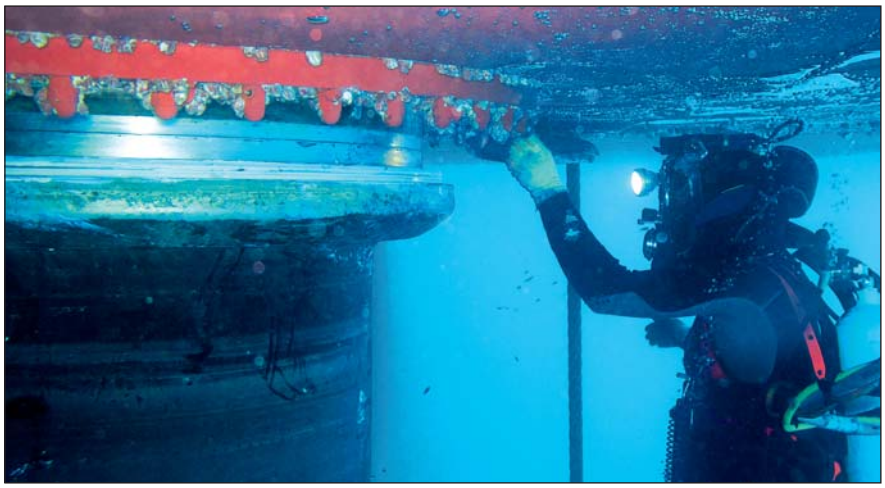
All four propeller blades had suffered multiple cracks and dents.

ON-SITE BOW THRUSTER OPERATIONS

The Hydrex lightweight flexible mobdocks are designed to be easily transported around the world and are used to close off the thruster tunnel on both sides, allowing divers to perform repairs and other operations in a dry environment around the bow thruster unit.

This technique enables them to reinstall the propeller blades of an overhauled thruster inside the thruster tunnel after the unit has been secured or replace the blades or seals and perform repair work on a specific part without removing the unit.

Since the development of this flexible mobdock technique, numerous thruster repairs have been carried out by Hydrex diver/technicians around the world.



There is no need to send the vessel to drydock as all operations can be carried out in port or while the vessel is stationary at sea. Normal commercial activities can therefore continue without disruption.

COLD STRAIGHTENING OF SEVERELY BENT PROPELLER BLADES

In its quest to provide cost effective services to customers, Hydrex developed procedures to address different kinds of damage to propellers. This research led to the design of the Hydrex cold straightening machines first used in 2002.

By taking advantage of this technique damaged blades can be straightened underwater, allowing the ship to return to commercial operations without the need to drydock. Blades can be brought back close to their original form, restoring the propeller's optimum efficiency.

The cold straightening machines have been in use for quite some time now but the Hydrex research department has been looking into ways to expand the technique even further to improve our services. A new version of the straightening machine was recently put into practice. It is compatible with the existing models and is used to restore more severely bent propeller blades to their original condition.

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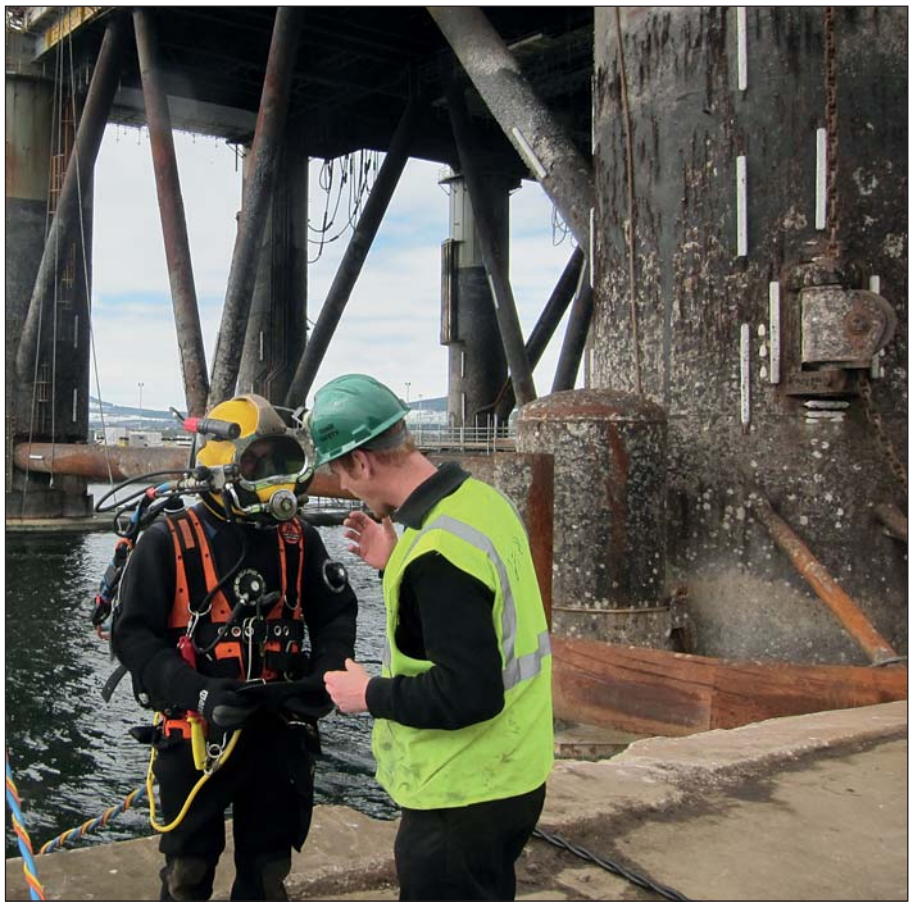
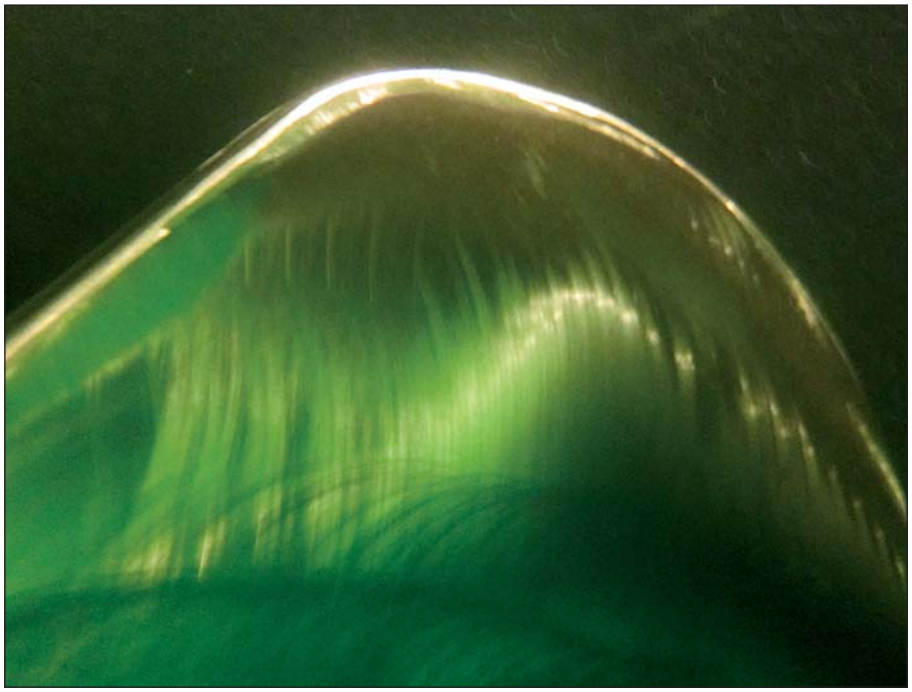


Hydrex diver/technician preparing for underwater propeller blade cropping.



The edges of the blades were polished to achieve the best possible efficiency.

Hydrex technicians polished the blades to make sure that any remaining loss of efficiency would be minimal.

The cropping was completed on-site, during a maintenance service. The operation restored the propeller's balance and brought its performance as close to its optimum condition as could be achieved.

Underwater stern tube seal repair in France avoids drydocking

To save time and money for the owners of a 270-meter container vessel that was leaking oil, a Hydrex diver/technician team replaced three stern tube seals, using one of the company's flexible mobdocks. This enabled the team to carry out the entire operation on-site and underwater during the vessel's stop in Le Havre.

A dry working environment is created around the stern tube seal assembly.

After the divers and all equipment had arrived at the vessel, the Hydrex team leader met up with the vessel's owner and superintendent while the rest of the diving team set up a workstation to monitor all underwater activities. Next all quayside preparations were made for the main activity, which started immediately with the removal of the rope guard. The divers then performed a thorough underwater inspection and shaft weardown readings. This revealed that a rope was tangled around the stern tube seal assembly, causing the oil leak. The rope was removed and the split rings were disconnected and brought to the surface to be cleaned.

Next the team installed the flexible mobdock, creating a dry working environment around the stern tube seal assembly that allowed the entire assembly to be cleaned. Subsequently the divers removed the first seal and replaced it with a new one which was then bonded. This procedure was repeated with the other two damaged seals. They then reinstalled and secured all parts of the stern tube seal assembly. After a successful leakage test the flexible mobdock was removed and the rope guard repositioned.

Hydrex has carried out repairs and replacements on all types of seals on-site and underwater, for a number of years now. This helps owners to extend their vessel's drydock interval and eliminates the loss of time and production brought about by drydocking.

Using the Hydrex flexible mobdocks, fast response to any emergency call is guaranteed to locations around the world from the various Hydrex offices.

A rope tangled around the assembly had caused the leak.

After the stern tube seal replacement the entire assembly was put together again and secured.

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Fully equipped for a worldwide fast response

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.

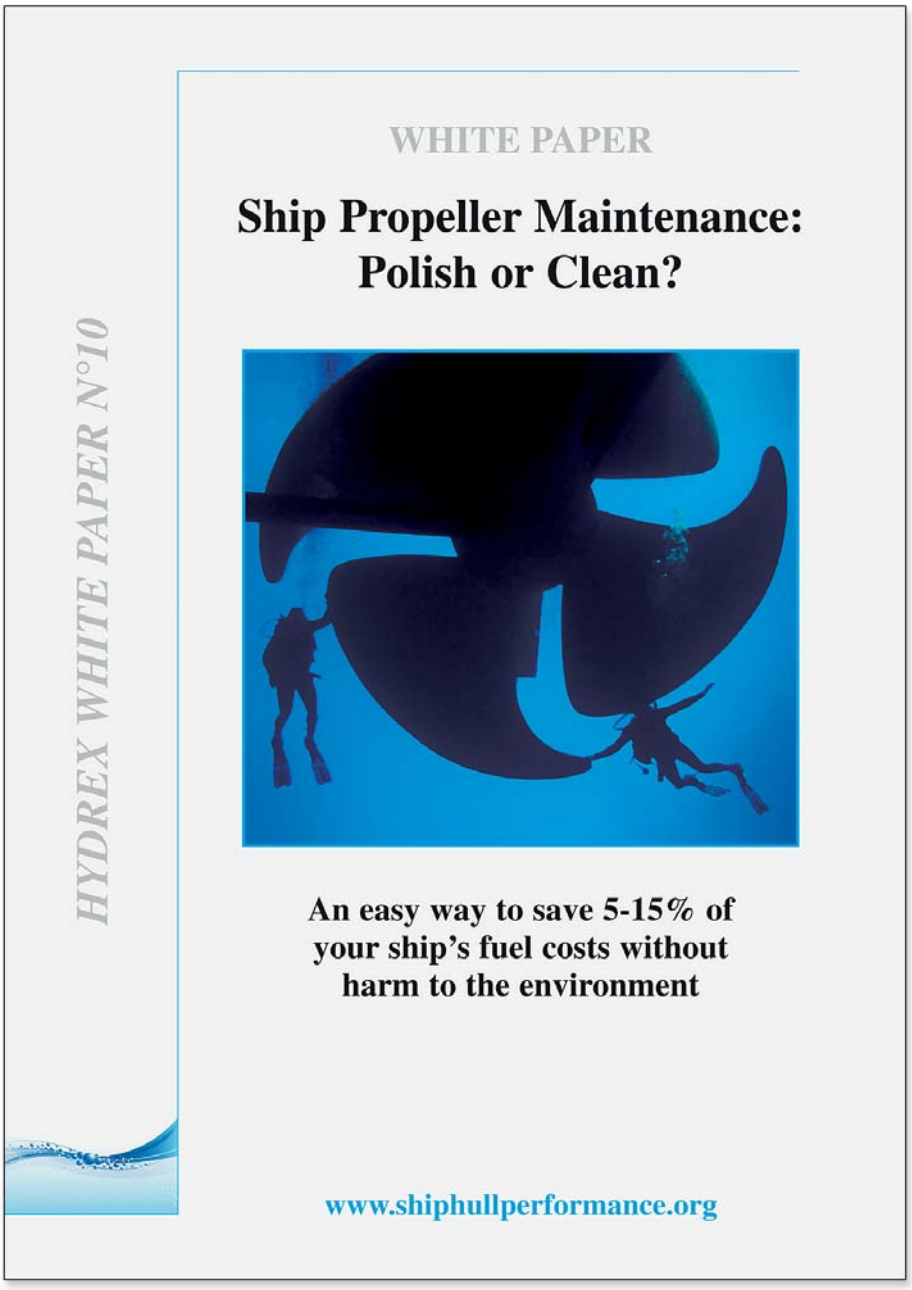
Propeller maintenance has long been regarded as a low cost, high returns practice. Research has found fuel penalty figures of 5-15% associated with propeller roughness and fouling. Considering the ease and low cost of keeping a propeller smooth

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. ■

Fast and high quality on-site repair services in theWestern Mediterranean area and North Africa

The Hydrex office in Algeciras is ready to mobilize immediately with their two dedicated dive support vessels. Both vessels are fully equipped as service stations for a wide range of repair operations and allow for a fast response in the bay of Algeciras, Gibraltar and North African ports.

As part of the Hydrex group, Hydrex Spain takes advantage of the companies' 37 years of experience. All operations are carried out by highly certified diver/technicians all of which have been trained in the headquarters in Antwerp and have extensive experience, enabling the office to offer their customers the high quality Hydrex is known for.

Jobs recently carried out by Hydrex Spain include a propeller modification, pipe repairs, rudder repairs and stern tube seal repairs in Algeciras, propeller modifications in Cadiz and an azimuth bow thruster removal and reinstallation on a pipe laying vessel in Cartagena.

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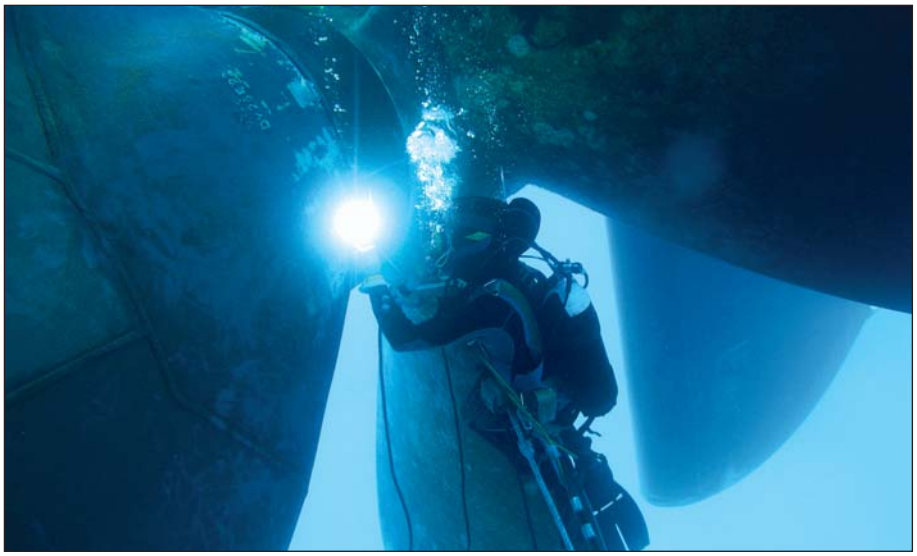
Hydrex US ready to mobilize immediately

Hydrex has an office located in Clearwater in the Tampa Bay area that is ready to mobilize immediately. The office has a fast response center that is equipped with an extensive range of state of the art logistics, trucks, tools and diving support equipment. This enables Hydrex US to efficiently service vessels and offshore units calling on ports in Canada, North, Central and South America as well as the Caribbean.

All staff members of the Hydrex office in Clearwater undergo stringent training at the Hydrex headquarters in Antwerp. They can carry out both simple and complex high quality jobs even in the harshest of circumstances.

Repairs to thrusters, propellers, rudders, stern tube seals, damaged or corroded hulls and all other underwater repair and maintenance services are done while the vessel is on-site. This eliminates the need to dry-dock.



All used methods are fully approved by all major classification societies.

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KEEPING SHIPS IN BUSINESS

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Fast underwater repairs keep ships out of drydock

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Hydrex has a long track record of performing complex permanent underwater repairs to thrusters, propellers, rudders, stern tube seals and damaged or corroded hulls. By creating drydock-like conditions around the affected area, our diver/technicians can carry out these operations in port or at anchor.

All the projects we undertake are engineered and carried out in close cooperation with the customer and any third party suppliers, relieving the customer of all the hassle of coordination, planning and supervision.

Headquartered in the Belgian port of Antwerp, we have offices in Tampa (U.S.A), Algeciras (Spain), Mumbai and Visakhapatnam (India), and Port Gentil (Gabon).

All Hydrex offices have fully operational fast response centers where an extensive range of state-of-the-art equipment is available at all times.

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