



UNDERWATER TECHNOLOGY

Magazine

Number 219



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Swift 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.



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Editorial



Providing a service that is both versatile and effective, Hydrex has built a reputation as the world's leading underwater repair and replacement specialists. With an ever-expanding worldwide network of offices and support bases, we can provide fast service at reasonable costs. In this magazine you can read about a wide range of underwater repairs carried out by our diver/technicians, illustrating this point.

These include permanent insert repairs carried out on vessels located in Antwerp and Zeebrugge, several propeller cone fin installations in Panama and Antwerp, a propeller blade cropping in Punta del Este and bow thruster blade replacements on three container vessels in Rotterdam.

If you would like to learn more about 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 tailor-made solution for your specific problem.

Best regards,

Hydrex founder
Boud Van Rompay



Cover: Removal of the frame covering the damage.



ISO 9001 certified

Underwater services and technology approved by:



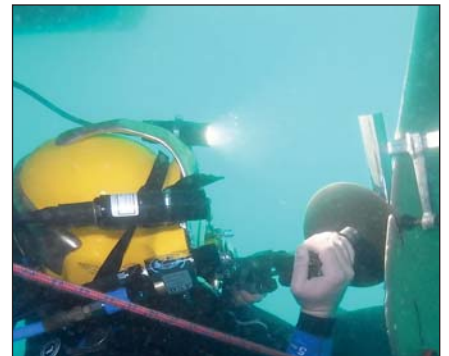
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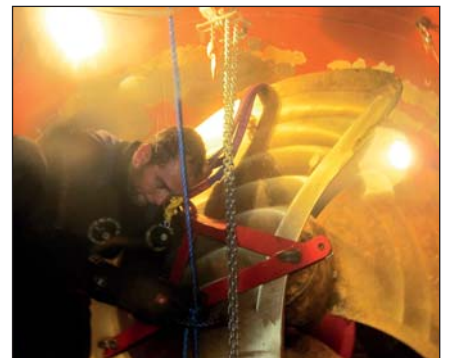
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Permanent underwater repairs keep vessels out of drydock

Last month Hydrex teams carried out underwater insert repairs on vessels in Zeebrugge and Antwerp. Both vessels had suffered cracks in the shell plating. In Zeebrugge a 600mm x 300mm plate was installed in the flat bottom of a 203-meter ro/ro vessel. A similar operation was carried out with a 300mm x 300mm plate on a 144-meter tanker in Antwerp. Despite the relative small scale of both operations, they were vital for the ship-owners. It allowed them to keep their vessels out of drydock and avoid having to go off hire.

Hydrex on-site hull repair services include the renewal of both small and large areas of damaged hull plating. These repairs can be carried out above or below water, according to the circumstances, with external mob-docks. Normal commercial activities can therefore continue without disruption. These operations follow the Hydrex procedure for welding



The plating and frames that needed to be removed were first marked.

cracks and inserts in the vessel's shell plating and they are approved by the major classification societies.

Class approved underwater crack repair

The team started the operation with a detailed inspection of both the onboard as well as the water side

of the affected plating of the ro/ro vessel in Zeebrugge. This revealed a 500mm crack that needed to be removed. Next the divers installed a cofferdam over the area.

This allowed the team to remove the longitudinal frame covering the damage. The diver/technicians could then cut away the damage and the surrounding area. Next they positioned a new insert plate, measuring 600 x 300 mm. The insert was then welded following the Hydrex class-approved procedure for insert plates, using a full penetration weld.

An independent inspector carried out ultrasonic testing and the repair was approved by the classification surveyor who was present during the operation. The diver/technicians then refitted the frame and removed the cofferdam, concluding the repair.



Removal of the frame covering the damage.



Cutting away the required area around the crack.



Preparing the edge of the hull plating to have a perfect fit for the new plate.



Fitting of the new insert.

Permanent in-water rudder repairs now possible without drydocking



Hydrex has developed an entirely new method enabling permanent repairs of rudders without drydocking the ship. Permanent repairs were hitherto not possible and ships had to drydock in case a major defect was found. The newly designed equipment is light-weight and can be mobilized very rapidly in our special flight containers. Therefore this new service is now available world-wide.

Major defects on rudders very often cause unscheduled drydocking of ships. The new method designed by our technical department allows engineers, welders and inspectors to perform their tasks in dry conditions. Class approved permanent repairs on-site, without moving the ship, are now possible and commercial operations can continue. Steel repairs and replacements can be performed and pintle and bushing defects can be solved without the loss of time and money associated with drydocking.

The equipment can be mobilized within hours to any port in the world and is available for rapid mobilization from the Hydrex headquarters in Antwerp.

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Fully welded insert plate.



Ultrasonic testing by independent inspector.

Permanent class approved insert operation

The same procedure was followed during the operation in Antwerp. The only differences being that the gas tank adjacent to damage needed to be declared gas free before the team could begin the operation and that, besides the framework, a pipe needed to be removed and reinstalled afterwards.

Because the crack was slightly smaller, a 300mm x 300mm plate



Reinstalled frame covering the new insert.

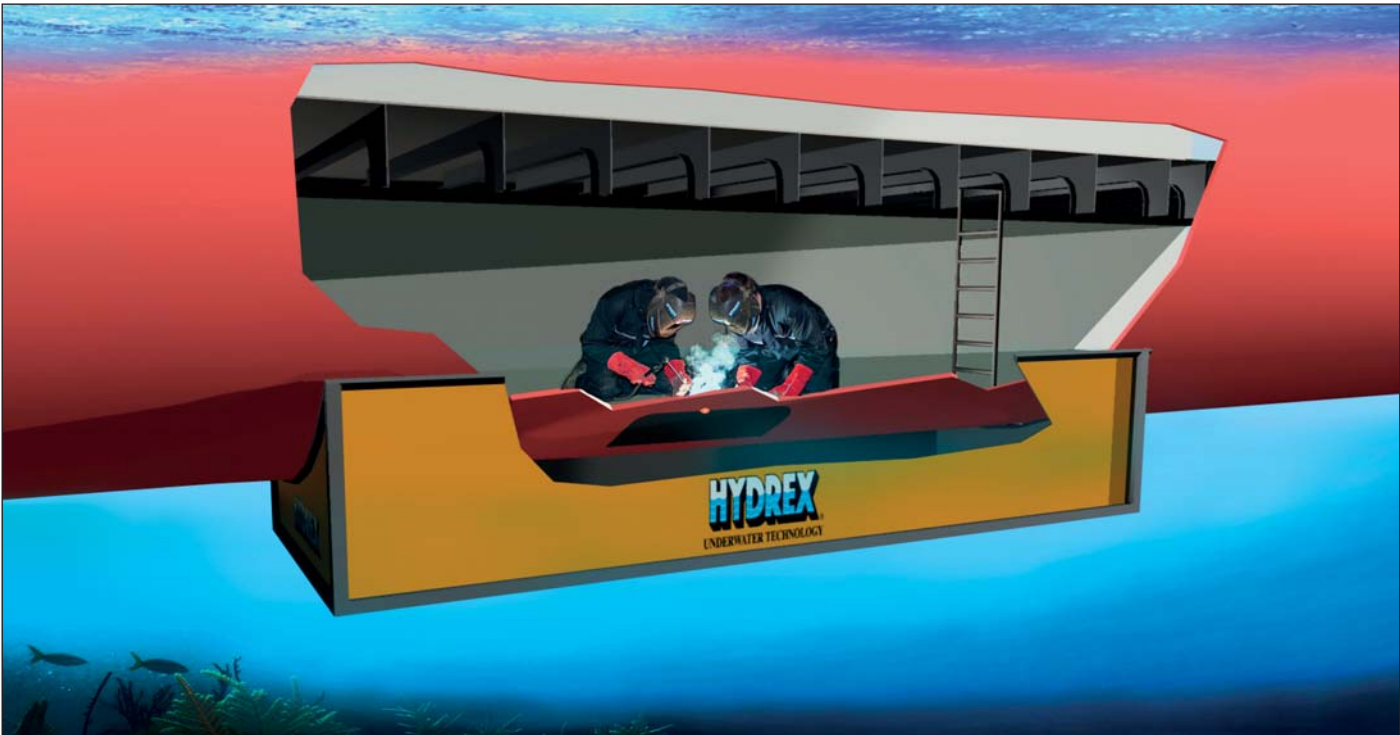


Illustration showing cofferdam covering the affected area.



Crack in the bottom plating of tanker in Antwerp.



Securing new insert plate in Antwerp.



Installing additional frames over new insert.

was enough to replace the damaged area. The affected area was situated right next to the sea chest in the turn of bilge. It was therefore essential that the cofferdam was modified to fit perfectly over the rounded shape of the hull.

Conclusion

All operations were performed to the highest quality standards by in house trained diver/welders. We have a wide range of cofferdams at our disposal as well as certified plating which we can mobilize immediately to any location around the world. ■

Hydrex under-water inspections



Underwater inspections are an essential aspect of ship repairs. Building upon conventional technical skills and know-how while also taking advantage of the latest technology, Hydrex offers a unique hull monitoring service to its customers. This gives ship owners total control of the underwater hull and the underwater gear of their vessels. An informed decision can then be made concerning any required follow-up action. Catching problems early can save much time and money.

Hydrex diver/technicians can carry out inspections underwater and on-site very swiftly without disturbing the vessel's sailing schedule.

With fuel costs amounting to 40% of operational expenses and continuing to rise, reducing fuel consumption is a vital concern of ship owners. This is the reason why hull monitoring pays for itself. Underwater hull roughness, marine fouling, bent propellers and poor paint condition are all factors that will increase fuel usage due to the drag or inefficiency created by the damaged or affected area. The data gathered can then be used for a wide range of actions.

Our diver/technicians are trained for a wide range of operations and they can carry out the inspections in port or at anchor anywhere in the world.

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Underwater propeller repair in Uruguay with new generation equipment

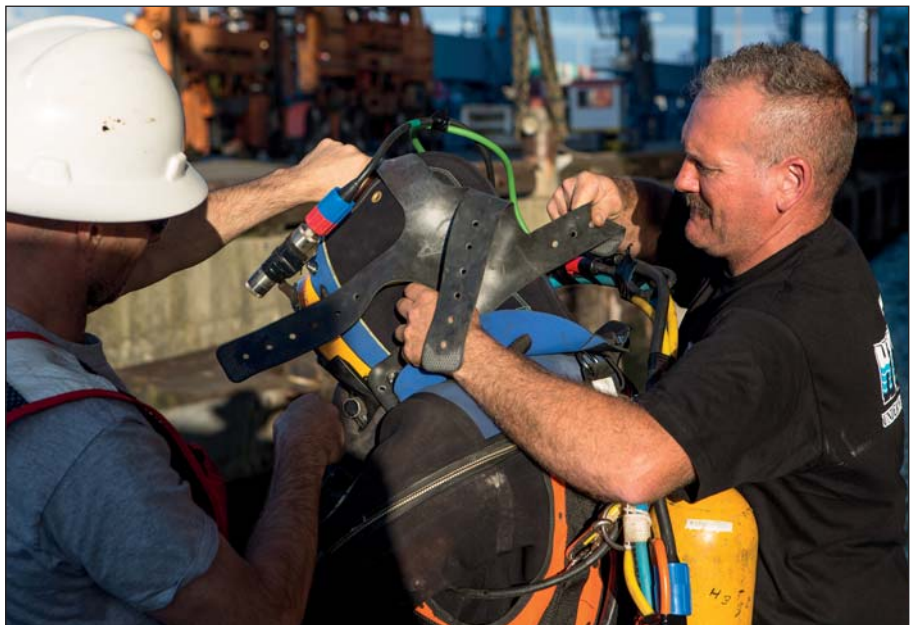
Recently a diver/technician team performed a successful propeller blade cropping operation on a 190-meter bulker at anchorage in Punta del Este, Uruguay. An underwater inspection revealed that all five blades were bent severely, with three of the blades bent over more than 90°. Cropping was the only option.

By taking advantage of the in-house developed cold straightening technique, damaged blades can be straightened underwater. This allows a ship to return to commercial operations without the need to drydock. Optimum efficiency of the propellers can be restored by bringing the blades back to their original form.

With the five blades of the bulk carrier's propeller severely bent, a fast, on-site solution was needed to restore the propeller's balance with a minimal loss of efficiency. Hydrex diver/technicians are trained to carry



Hydrex diver cutting a damaged propeller blade.



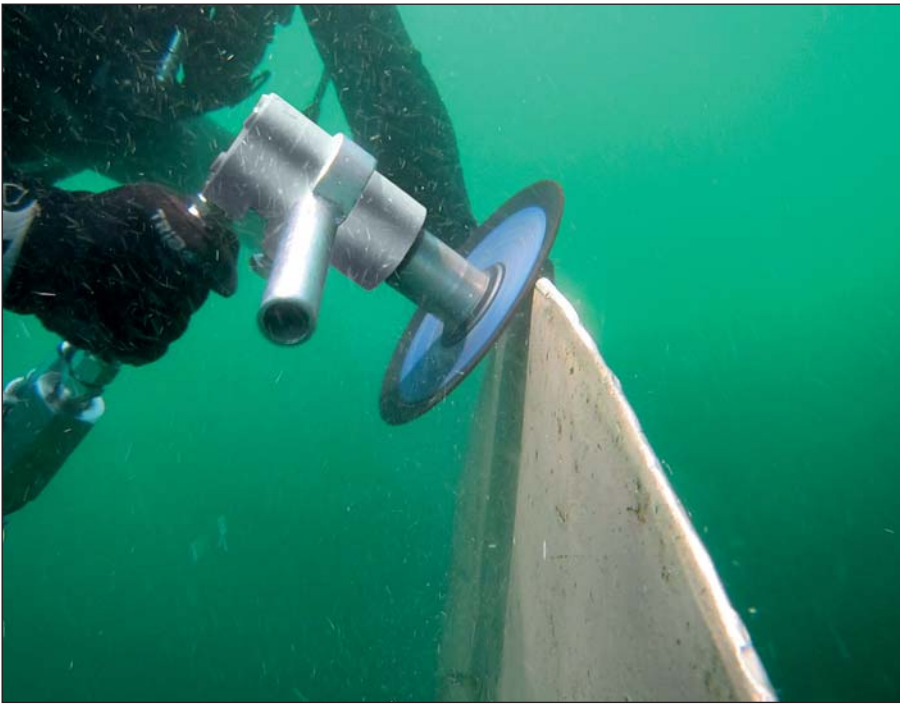
Hydrex diver/technician getting ready for underwater operation.



The cropped parts of the bent propeller blades.

out repairs underwater in the shortest possible time frame. A team was therefore rapidly mobilized to the ship's location to restore the damaged blades to as close to their original condition as possible.

After the equipment arrived at the vessel's location the team started the underwater operation with a detailed survey of the affected propeller blades. The team then used the information acquired during the inspec-



Polishing the cropped blades minimizes the loss of efficiency.

tion to calculate and determine the correct measurements needed to crop the propeller blades. Next the divers cropped the blades. When the

cropping was complete, the blades were polished to make sure that any remaining loss of efficiency would be minimal.

Conclusion

Our R&D department is constantly looking into ways to enhance the available propeller repair techniques even further to improve our services. New models of both the straightening and the cutting machines have recently been put into service. These allow us to straighten blades that could previously only be cropped and to crop extremely damaged blades with only a minimal loss of efficiency for the propeller. Both types of repairs can be carried out on-site and underwater, allowing the ship to return to commercial operations without the need to drydock. ■

KEEPING SHIPS IN BUSINESS



In most situations bent blades can be straightened on-site.

Stern tube seal repairs



Using our flexible mobdock method to create a dry underwater environment, we have carried out stern tube seal repairs and replacements underwater for some years now in cooperation with top specialist suppliers.

This technology brings drydock

conditions to the ship rather than having to take the ship to drydock, saving a considerable amount of time and money in doing so.

This class accepted method is performed by our diving teams under our warranty. It can be used while the ship is carrying out its

usual cargo or other commercial operations in port.

Visit the special stern tube seal repair section on our website for more information and examples of the many seal repairs we have performed in recent years.



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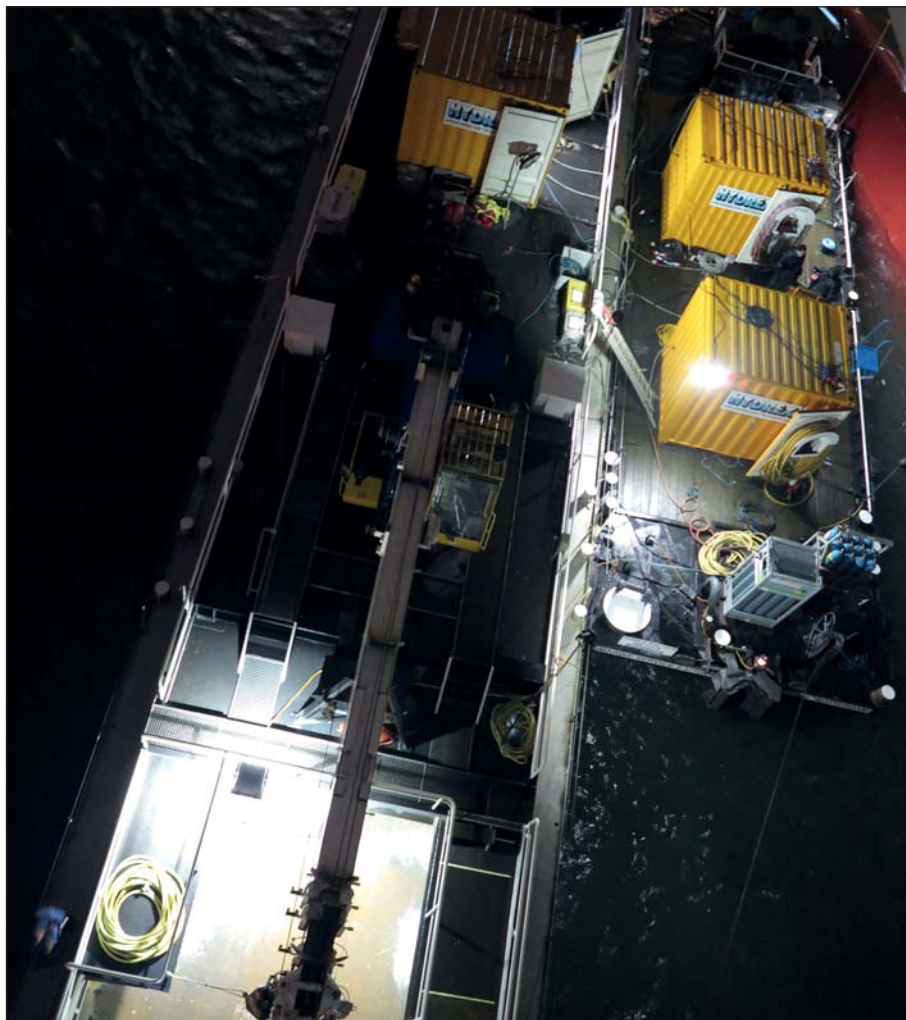
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Fast underwater bow thruster blade replacement in Rotterdam during commercial activities

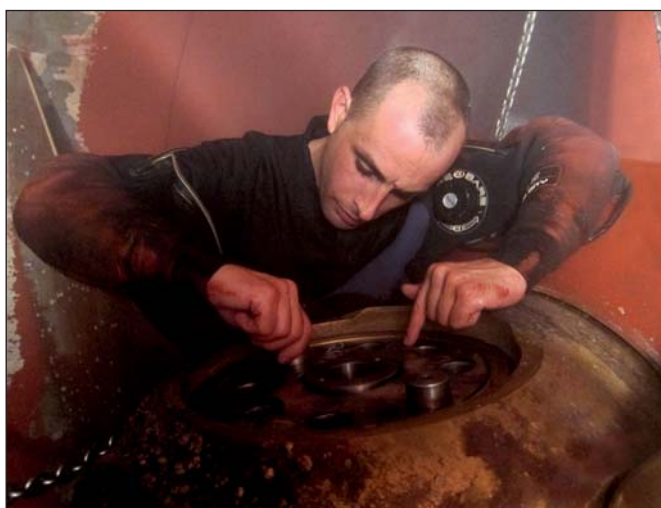
Hydrex has carried out underwater bow thruster blade replacements on several occasions in Rotterdam. Three 366-meter container ships belonging to one owner were given the same speedy treatment during unloading.

The owner of the ships had the luxury of being able to schedule the blade replacements well in advance. This allowed the Hydrex technical department to get a team on the road before the vessel arrived. As a consequence, the diver/technicians were ready to start the operation as soon as the ship was berthed.

The same procedure was used during each of the operations. The new blades were lowered from the deck onto the workboat with the ship's crane. Meanwhile the rest of the Hydrex team prepared the bow thruster tunnel for the operation.



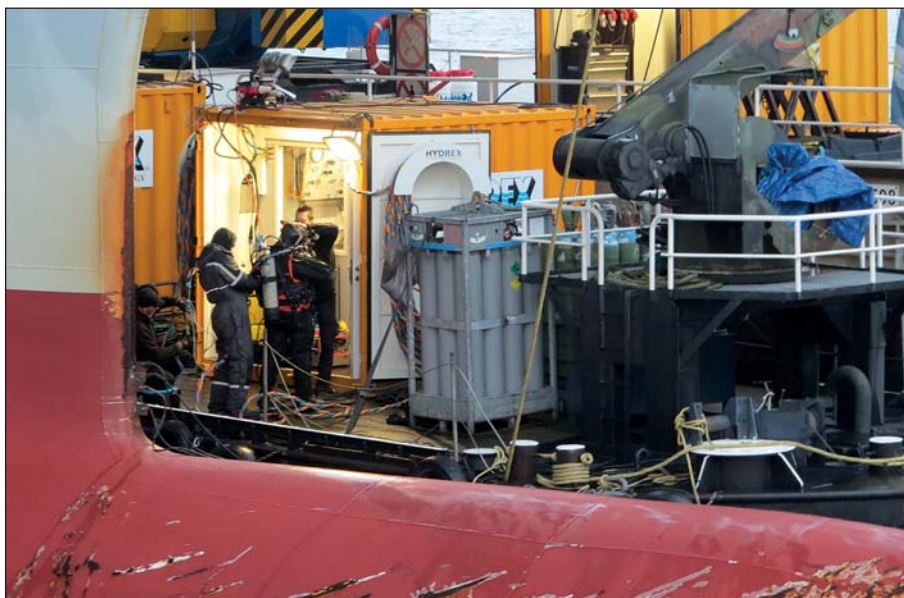
Hydrex equipment on workboats next to container vessel in Rotterdam.



Hydrex diver/technician preparing the bow thruster unit for blade installation.



New bow thruster blade ready to be positioned in thruster tunnel.



Hydrex diver getting ready for underwater operation.

The Hydrex flexible mobdocks were then installed on both sides of the thruster tunnel. Next the team could remove all water from the tunnel. In this manner a dry working environment was created.

The diver/technicians then removed the first blade of the bow thruster. They brought it to the surface. A replacement blade was then lowered into the water and taken to the thruster tunnel. The team positioned the new blade on the bow thruster and secured it with bolts. This procedure was repeated for the other blades.

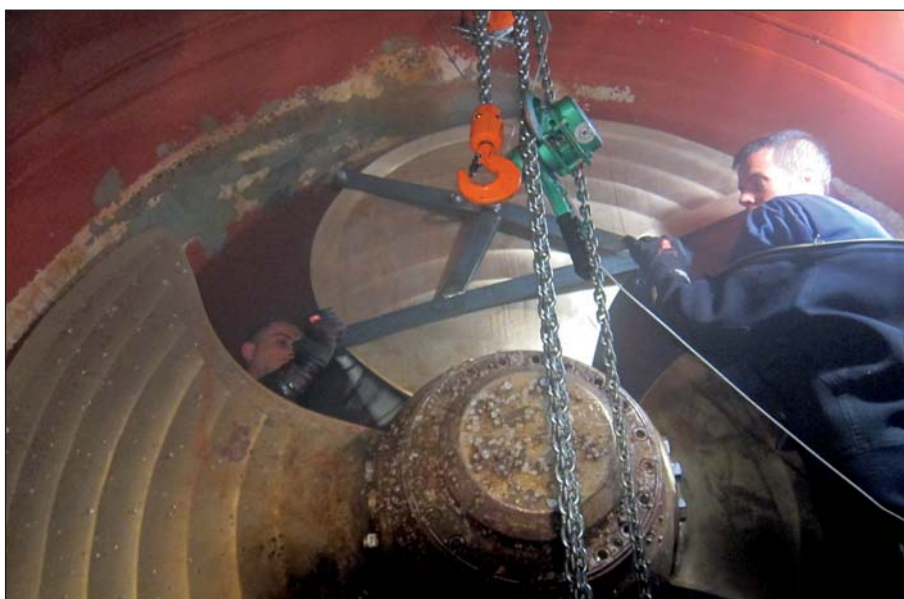
After the blades had been replaced, the divers removed the flexible mobdocks. This finished the repair.

During each of the replacements a local representative of the bow thruster manufacturer was present. He supervised the operations and gave his approval.

In cases like these, timing is of the highest importance. Hydrex team members are trained to carry out the approved procedures within a short time frame. Only a skilled and efficient team can perform this kind of operation without mistakes or delays. The bow thruster blade replacements in Rotterdam were carried out during loading or unloading. The operations were concluded well before the end of these commercial activities. This allowed the container vessels to leave Rotterdam again perfectly on schedule. ■



Replacement bow thruster blades.



Positioning one of the new thruster blades.

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, rud-

ders, 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 drydock.

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

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Immediate fuel savings from underwater propeller cone fin installation

Over the last few months Hydrex installed different types of propeller cone fins on bulk carriers and general cargo vessels. These operations were carried out in Antwerp and Panama. They can be performed economically almost anywhere. As a result of the underwater operation an owner can instantly start benefitting from the fuel savings a propeller cone fin brings. He does not have to wait until the next scheduled drydocking for the installation.



Hydrex workboat next to vessel during propeller cone fin operation.

Propeller caps like these can recover energy loss of a propeller hub vortex in the propeller's slipstream. This decreases fuel consumption from 3% up to 5% and reduces cavitation on rudders and hulls. Propeller cone fins can be tailor-made for any size and make of propeller, on both new build or in-service vessels.

On-site installation prevents a long wait for fuel saving benefits

Regardless the type of cone fin, Hydrex carries out these operations



Propeller cone fin ready for installation.



Old propeller cap being lifted out of the water.



Hydrex technician preparing propeller cone fin for installation.



Lifting the propeller cone fin during operation in Panama.



New propeller cone fin lowered from the deck of the vessel into the water.



Hydrex divers preparing the propeller for cone fin installation.



following the same procedure. A team of our diver/technicians mobilizes to the vessel's location. After a preliminary inspection the divers remove the propeller cap and clean the area where the device is to be installed. They then lower the spinner cone into the water and position it on the propeller. Grease is inserted in the space underneath the propeller cone for lubrication and finally the bolts are put on torque and secured with wire. If needed, the Hydrex team works in shifts around the

clock to finish the operation as quickly as possible.

The owner of the vessel can start enjoying the fuel savings the propulsion improving device creates right away. Having to wait for the next scheduled drydocking to have the propeller cone fin installed can lose him up to two years of fuel savings. In contrast, he will have earned back the cost of the underwater installation in about eight weeks. The savings are considerable. ■

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Keeping ships in business

Hydrex offers turnkey underwater repair solutions to ship-owners wherever and whenever they are needed. Hydrex's multi-disciplinary 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 carry out necessary repair work without the need to drydock.

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) and Algeciras (Spain).

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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