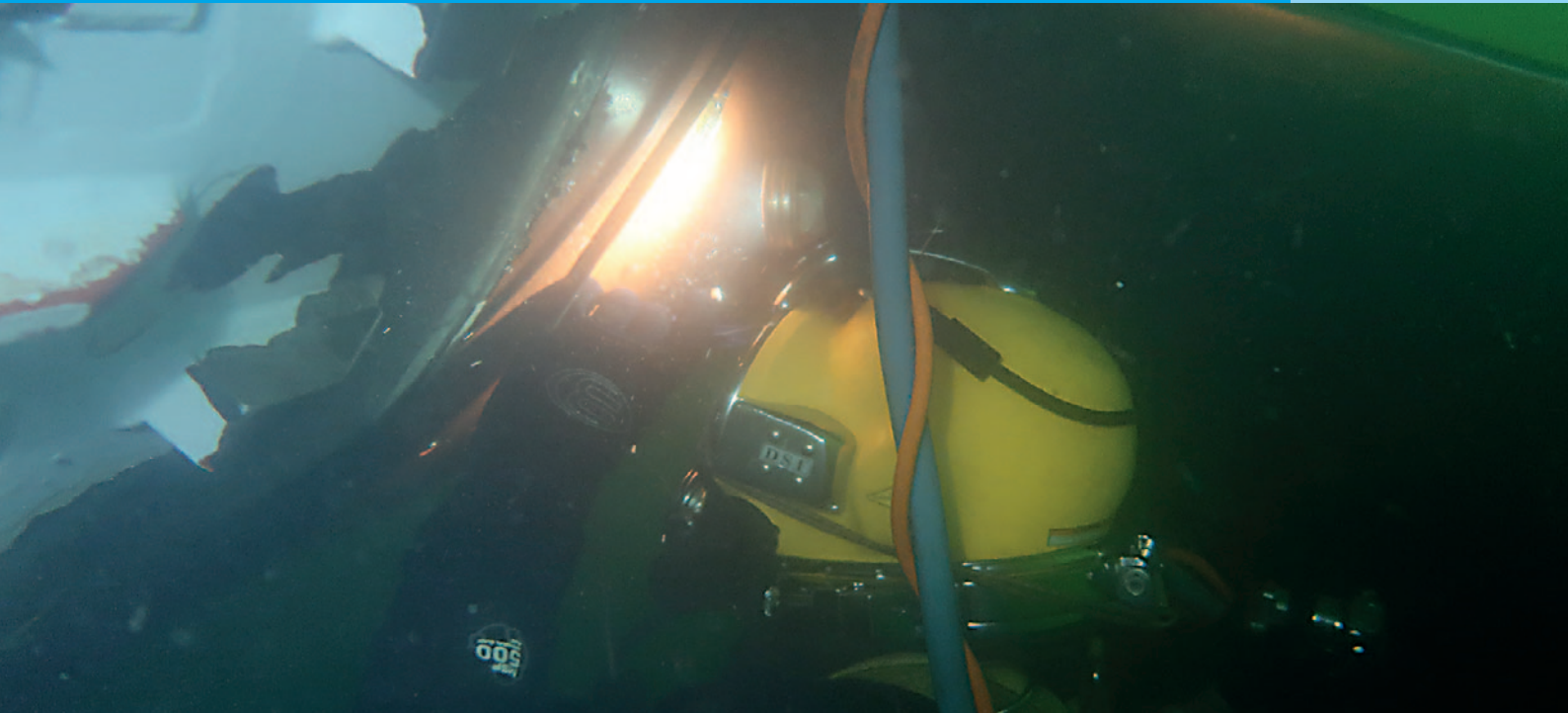


HYDREX[®]

UNDERWATER TECHNOLOGY

Magazine

Number 301



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Inwater propeller repairs



When damage to propellers occurs due to impact with ice and other debris we can help you, even if the damage is quite extensive. Our teams can restore the propeller's balance and efficiency.

By taking advantage of the in-house developed cold straightening technique, damaged blades can be straight-

ened underwater, allowing the ship to return to commercial operations without the need to drydock.

If straightening is not an option, the affected area of the blade will be cropped. This is done to achieve the greatest possible efficiency. Cropping is carried out using our propeller blade cutting equipment.

Our teams can also carry out any other repair work on the propeller. Examples of this are the removal and reinstallation of entire propeller blades or replacement of the propeller seal ring.

Contact us for more information on underwater propeller repairs. We are at your disposal 24/7.

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+ 32 3 213 5300 (24/7)
hydrex@hydrex.be
www.hydrex.be

Editorial



We take care of the entire underwater part of your vessel. Providing a service that is both versatile and effective, we have built a reputation as the world's leading underwater repair and replacement specialists.

I hope that the stories in this magazine will encourage you to contact us if you have a problem or need maintenance work carried out. We can offer fast, tailor-made solutions that can keep your vessel on schedule.

I invite you to give us a call if you have a problem with your ship that you are not sure can be solved afloat. We will evaluate the problem and can let you know if an underwater

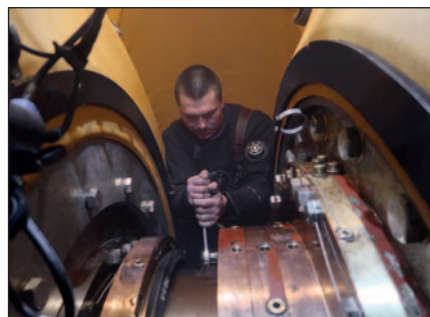
solution is possible. Many solutions are available without the need for drydocking.

Our technical advisors will inform you whether the operation is feasible underwater. We will give you fast and clear answers to your questions. We can assist you with routine maintenance operations as well as complex repairs. Very simply put: We fix ships.

A handwritten signature in black ink, which appears to be 'BVR', followed by a long horizontal line.

Hydrex founder
Boud Van Rompay
bvr@hydrex.be
www.hydrex.be

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Stern tube seal repairs close to home and far away

We have developed a flexible mobdock repair method that enables the underwater replacement of all types and sizes of shaft seals. This technology has been successfully used for many years. It allows ship owners to keep their vessel sailing, saving precious time and money.

Damaged stern tube seals will result in increasing amounts of oil leaking or water ingress as the damage worsens. By replacing the seals when the damage is first discovered, we keep the downtime low. The ship can keep its schedule because seal repairs can be performed during cargo operations. We do this by creating a dry underwater working environment around the shaft.

It is not always straightforward to replace seals, because there can be considerable variation in the configurations of the stern tube itself. There can also be complications



With our mobdocks we create a dry working environment underwater.

with the liners, which can be worn down and show grooves. All this is routinely handled by our teams on the jobs.

All shaft seal repairs we offer are performed in cooperation with the OEM. This allows us to supply the

correct OEM seals and handle all type of seals from all manufacturers.

In this article you can find a short summary of a selection of recent seal repairs our teams have performed.



Our workboats are ready for immediate deployment to operations in Belgium and the Netherlands.



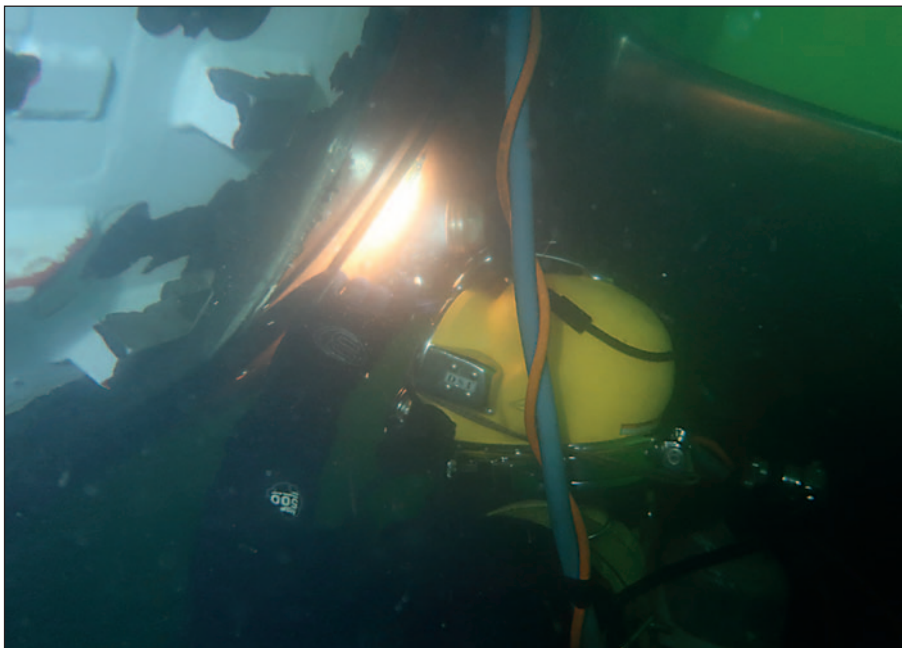
Hydrex diver reinstalling the rope guard.

Leaking seal assembly fixed underwater in Antwerp

One of our diver/technician teams carried out an underwater stern tube seal repair on a 300-meter container vessel berthed in Antwerp. The ship was leaking oil, making an immediate repair necessary. Using a Hydrex flexible mobdock the team was able to carry out the entire operation on-site and underwater, saving the owner an expensive and time-consuming trip to drydock.

Once the operation was confirmed all preparations were handled quickly and the lightweight equipment was mobilized immediately from our headquarters in Antwerp. After arriving on-site, the diving team first set up a monitoring station next to the vessel. The operation then started with the removal of the rope guard and a thorough underwater inspection of the stern tube seal assembly.

After the inspection the divers cleaned the assembly and installed

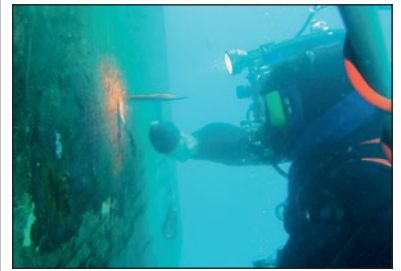


Hydrex diver working on the rope guard.



Hydrex diver installing the seal assembly after replacement of the seals.

Hydrex underwater 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 you much money in the long run.

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 to see if actions are required.

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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Team leader following the operation from inside the monitoring station.

the flexible mobdock. The split ring was then removed and brought to the surface to be cleaned. Next the divers removed the first seal and replaced it with a new one which was bonded. This was done in cooperation with the supervising OEM technician. The procedure was repeated with the other seals.

A successful operation was concluded with leakage tests, the removal of the flexible mobdock and the reinstallation of the rope guard.

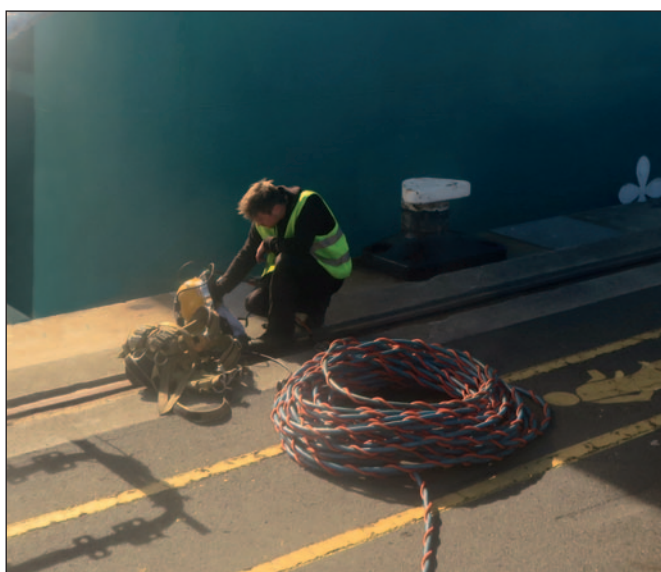
Stern tube seal repairs in Australia

We mobilized our diver/technician teams to a 180-meter ro-ro vessels in Port Burnie, Tasmania to carry out stern tube seal replacements.

Despite the remote location of the ro-ro vessel, our technical department was able to make all practical logistic arrangements and organize a mobilization of the equipment very swiftly. In the recent past we have carried out several operations in Australia, including repairs on this ro-ro ship's sister vessel.



One of our divers working on the rope guard of car carrier in Tasmania.



Final check of the diving equipment prior to underwater operation.



Hydrex diver working on the rope guard during a stern tube seal operation.



Old stern tube seal (left) and new seal (right).



Stern tube assembly after seal replacement.



One of our divers working inside our flexible mobdock.

Double repair on pipe laying vessel in Rotterdam

Our diver/technicians replaced the seals of both stern tube assemblies of a pipe laying vessel berthed in Rotterdam.

A team traveled to the vessel's location on one of our workboats. These workboats are fully equipped as dive support stations with hydraulic cranes, winches, nautical and communication equipment, and a dive control room. They are stationed in Rotterdam and Antwerp which allows for a fast mobilization throughout both ports.

Working together with the OEM allowed Hydrex to provide the customer with original spare parts which guarantees the best quality material. A technician of the seal manufacturer was also present during the operation.

By organizing everything from start to finish the owner did not have to worry about making any arrangements for the repair. After the seals had been successfully replaced he was able to sail his vessel to its next stop free of oil leaks. ■

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High quality in-water ship re

Permanent insert repairs

Specialist class approved insert repair work carried out on a permanent basis. Providing a real alternative to drydock.

Emergency repairs

Fast response emergency repairs worldwide.

Inwater video inspections

Professional video surveys provide a reality of the problem and enable owners and classification surveyors to directly diagnose any problems.



Echo sounder inspection and replacement

Speed log
Checks for damage, marine fouling and replacement.

Bow thruster and propellers
Permanent on-site repair, maintenance and replacement with the award winning flexible mobdock technique.

Hull cleaning on suitable coatings

Bilge keel
Check and repair broken welds, renewal of sacrificial anodes.

pair and fuel saving services

KEEPING SHIPS IN BUSINESS



Sea valves, sea chests and gratings
In-water inspection, cleaning and repair of intakes and valves, installation of new sea chests, condensers and coolers afloat.

Stern tube seal replacement
Permanent inwater stern tube seal replacements and repairs with the unique Hydrex flexible mobdock technique.

Propeller operations
Propeller cleaning with special tools, on-site blade straightening and cropping. Permanent repairs to all types of propellers or installation of propeller cone fins.

Rudder repairs
Permanent on-site repairs on all types of rudders with groundbreaking new technology.

Pintle and bushing repair and replacements

Scrubber pipe repairs and lasting protection



Exhaust scrubbers filter out all harmful toxins from exhaust gases of marine diesel engines. These hazardous pollutants can severely corrode the pipes of the scrubber. Using the experience we have accumulated over the years allows us to assist you at moment's notice if this happens.

We offer a full package to owners that are experiencing similar damage. Not only can we replace the corroded exhaust pipe while your vessel stays on schedule, but we can make sure that you will not have to call us again in a few months time for the same problem. This is done by coating the pipes with a highly

corrosion resistant coating called Ecospeed.

Contact us for more information on scrubber pipe replacements or other underwater repairs. We are at your disposal 24/7.



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Permanent hull repairs in Antwerp and Zeebrugge

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 relatively small scale of both operations, they were vital for the shipowners. It allowed them to keep their vessels out of drydock and avoid having to go off hire.



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

Our 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 mobdocks. Normal commercial activities can therefore continue without disruption. These operations follow the Hydrex procedure for welding

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

Class approved underwater hull 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 repaired. Next the divers installed a cofferdam over the area.

This allowed our men 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 600mm x 300mm. The insert was then welded following our 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.



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.



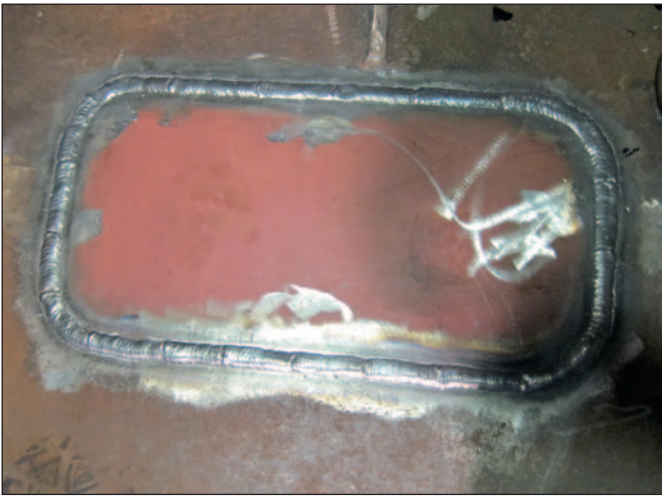
Cutting away the required area around the crack.



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



Fitting of the new insert.



Fully welded insert plate.



Ultrasonic testing by independent inspector.



Reinstalled frame covering the new insert.

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 the 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

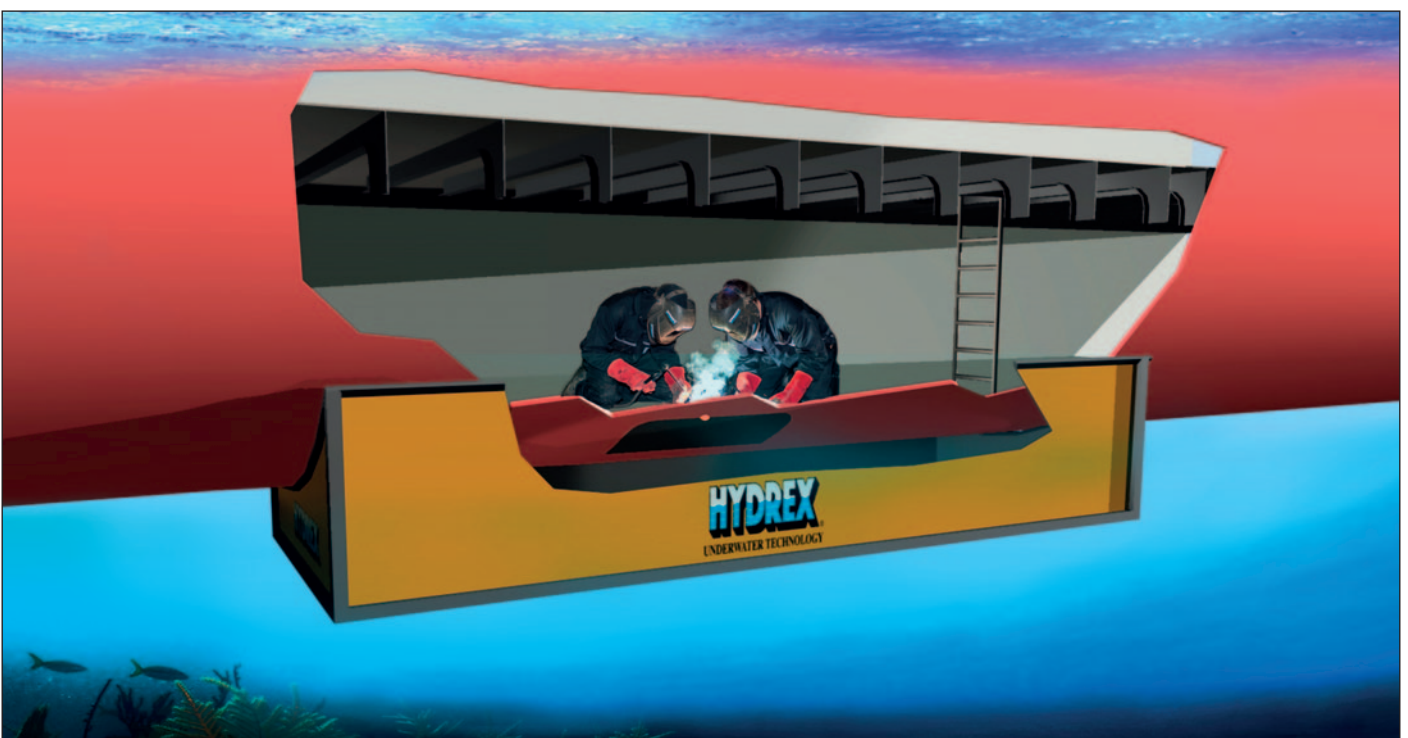
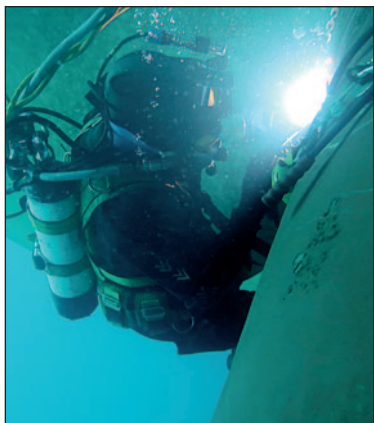


Illustration showing cofferdam covering the affected area.

Stern tube seal repairs

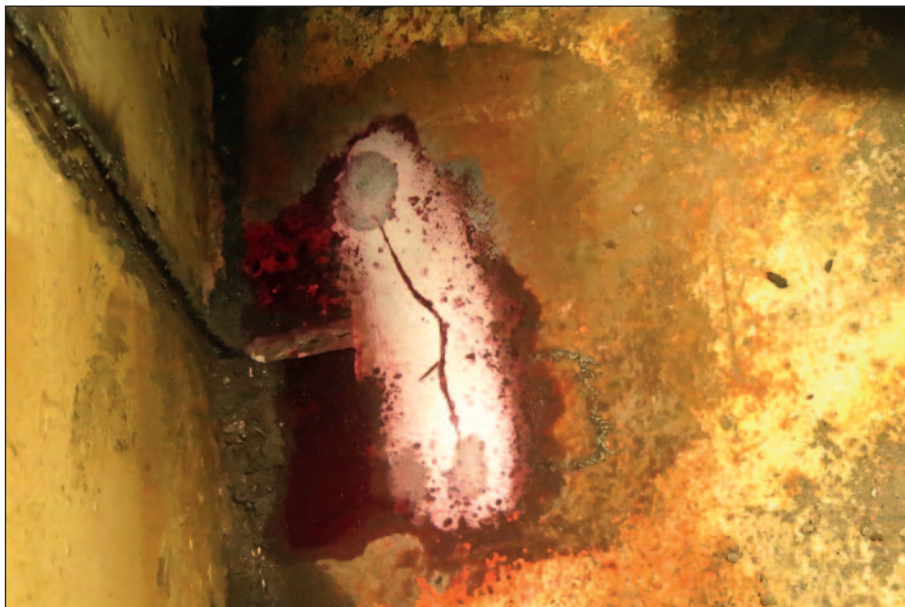


Using our flexible mobdock method to create a dry underwater environment, we have carried out stern tube seal repairs and replacements underwater for some years now in cooperation with OEMs.

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.



Crack in the bottom plating of tanker in Antwerp.



Securing new insert plate in Antwerp.

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. ■



Installing additional frames over new insert.

In-water bow thruster repairs



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.

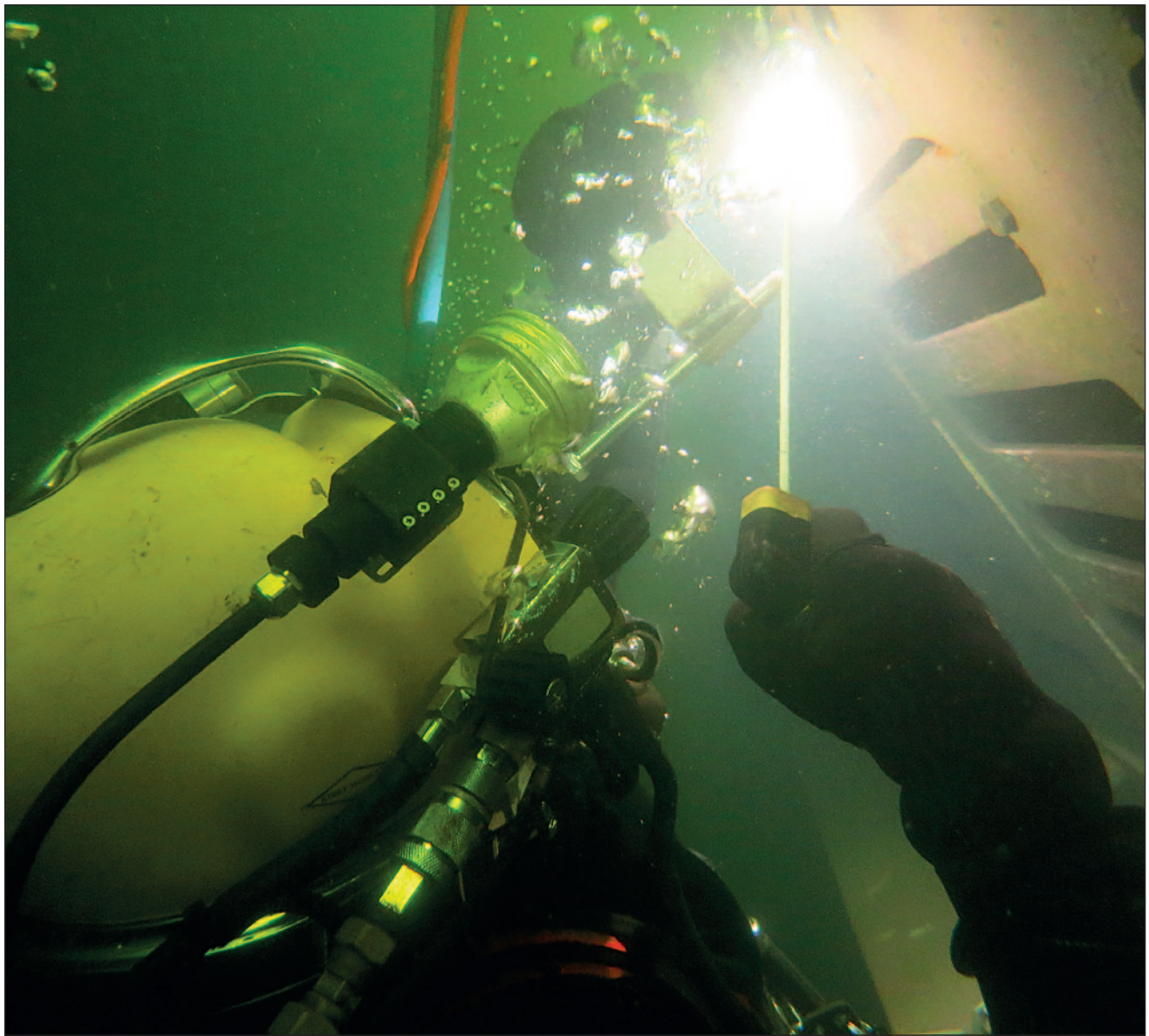
There is no need to send the vessel to drydock as all operations can be carried out in port or while the vessel is stationary at sea. Normal commercial activities can therefore continue without disruption.

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+ 32 3 213 5300 (24/7)
hydrex@hydrex.be
www.hydrex.be



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Headquarters Hydrex N.V. - Antwerp

Phone: +32 3 213 5300 (24/7)

E-mail: hydrex@hydrex.be

Hydrex Rotterdam

Phone: +31 10 313 25 19 (24/7)

E-mail: info@hydrex.nl

Hydrex Spain - Algeciras

Phone: +34 956 675 049 (24/7)

E-mail: info@hydrex.es

Hydrex LLC - Tampa, U.S.A.

Phone: +1 727 443 3900 (24/7)

E-mail: info@hydrex.us

www.hydrex.be