HYDREX®

UNDERWATER TECHNOLOGY

Number *197*

Fast response

Through an ever-expanding, worldwide network of offices and service stations, Hydrex can provide a wide range of services. From these locations, specialized repair and diver teams can be mobilized immediately to almost anywhere in the world.

All the lightweight equipment used by the teams is stored in fast response centers which are designed specifically for the purpose of speed and are equipped with all the latest facilities and tools. A good example of the easy to transport equipment is a range of unique flexible mobdocks which are used to perform stern tube seal, thruster, rudder and other permanent repairs that require a dry working environment.

With 40 years of experience and well trained diving teams at its disposal, the Hydrex technical department knows how to handle any kind of situation without loss of quality or loss of time for the customer.

Because Hydrex brings drydock-like conditions to the ship, you do not have to take your vessel off-hire and into drydock. This saves you valuable time and money.

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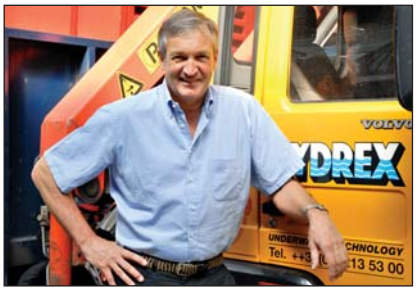
Editorial



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 over the last months, illustrating this point.

The first article talks about a permanent underwater rudder repair in Antwerp. Permanent in-water rudder repairs were hitherto not feasible and ships had to drydock in cases where a major defect was found. However, the newly-designed method makes these permanent rudder repairs possible and can be mobilized within hours to any port in the world.

In a second article we illustrate the advantages of our underwater propeller repairs by giving some recent examples of jobs carried out by Hydrex. In Algeciras a 200-meter vehicle carrier had its five propeller blades cropped. In Germany three of the five blades of a 183-meter tanker were ground, re-profiled and polished while a fourth one was straightened. Both repairs were carried out on-site, preventing the need to drydock.

Further on in the magazine you can find an article about several on-site steel repairs performed by Hydrex. In France Hydrex carried out a pipe repair on a 210-meter bulk carrier berthed in Dunkirk and reinforced the weld seams of a leaking doubler plate on a 183-meter tanker in Marseille. In Setubal, Portugal, two repairs were carried out on bulk carriers. An insert plate was installed on a 266-meter vessel while several doubler plates were installed on a 130-meter ship.

We hope that this magazine will encourage you to call us if you have a problem or need maintenance work carried out. We can offer fast tailor-made solutions that can keep your vessel out of drydock.

Best regards,

Hydrex founder
Boud Van Rompay

HYDREX N.V.
On Time Worldwide High Quality Underwater Services

ISO 9001 certified

Underwater services and technology approved by:

DNV · Lloyd's Register · ABS · GL · Bureau Veritas · ADC · RINA · Nippon Kaiji Kyokai ClassNK

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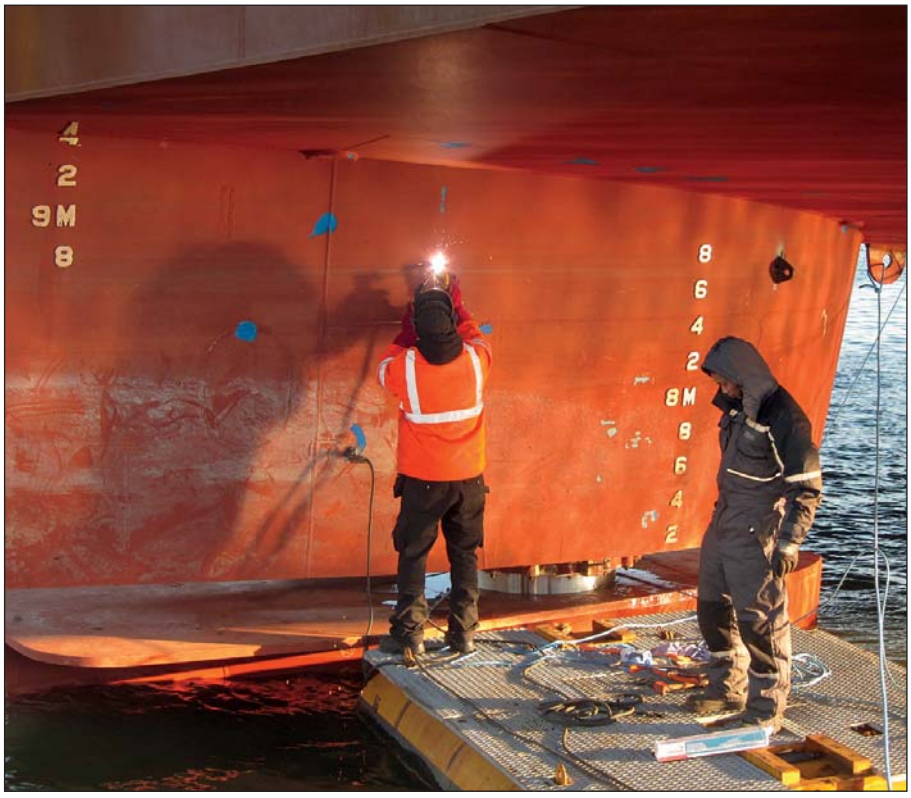
Permanent underwater rudder repair in Antwerp

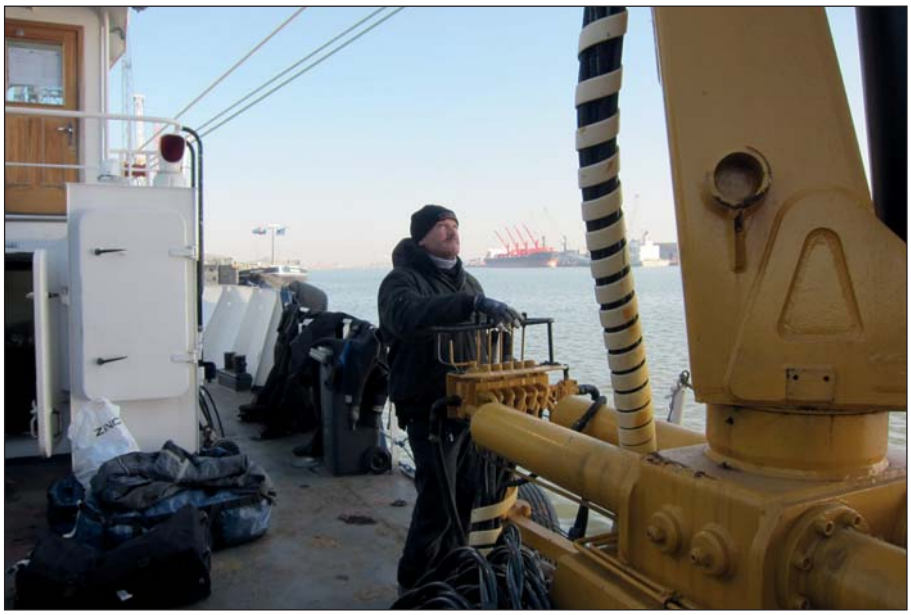
At the beginning of March a Hydrex team of diver/technicians sailed out with one of the company's dive support workboats to a 200-meter vehicle carrier berthed in the port of Antwerp. They performed an underwater inspection and repair of the vessel's malfunctioning rudder.

Hydrex diver/technician getting ready for underwater rudder operation in Antwerp.

The latest development allows Hydrex to perform permanent repairs on any type of rudder while the vessel remains at anchorage and cargo operations continue. Permanent in-water rudder repairs were hitherto not possible and ships had to drydock in cases where a major defect was found. The newly-designed method can be mobilized within hours to any port in the world. This allows Hydrex to offer the new service on a worldwide basis.

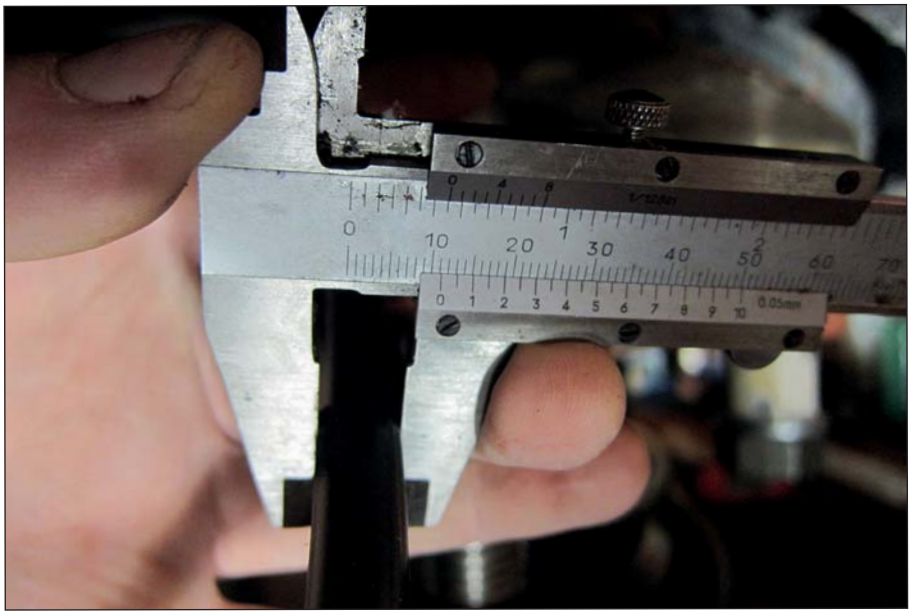

Hydrex team members preparing the rudder.

Major defects on rudders very often cause unscheduled drydocking of ships. The new technique designed by the Hydrex technical department allows engineers, welders and inspectors to perform their tasks in dry conditions with the vessel still afloat. Class approved permanent repairs on-site are now possible while commercial operations 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 hydraulic crane on the Hydrex workboat is used to lift equipment in and out of the water or onto the quay.

The two halves of the rudder casing ring.



Measurements of the rudder seal revealed it to be in good condition.

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 re-pair work on a specific part with-out 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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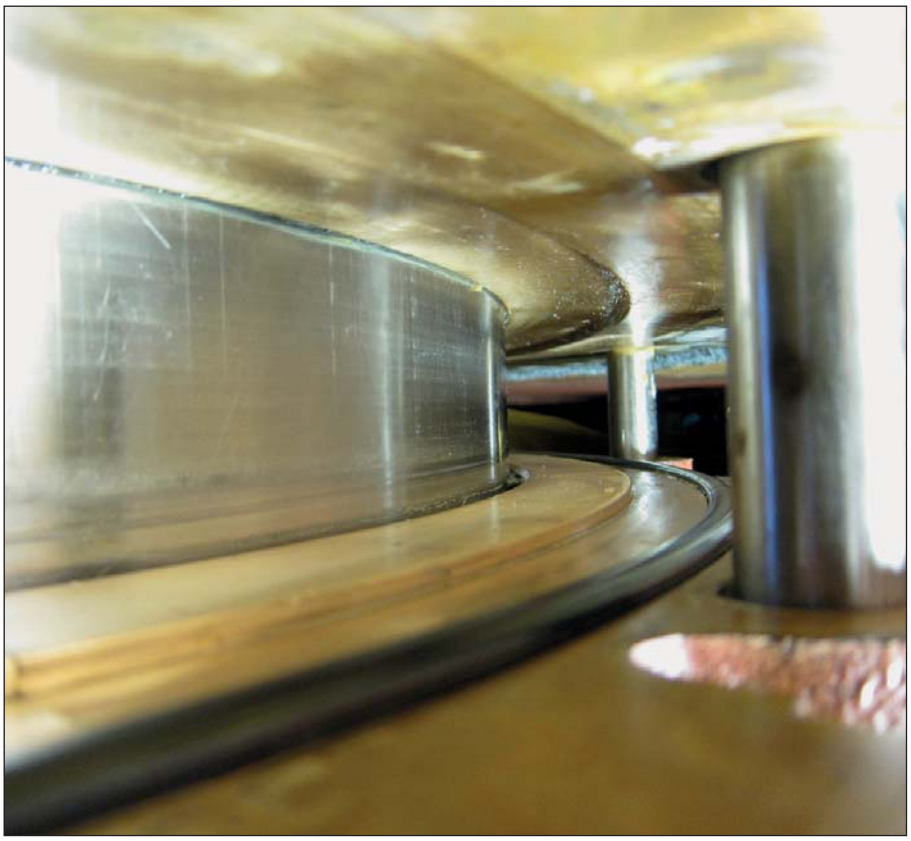


The former rudder seal assembly was not installed properly, causing the malfunction.

Inspection and subsequent repair avoids drydocking

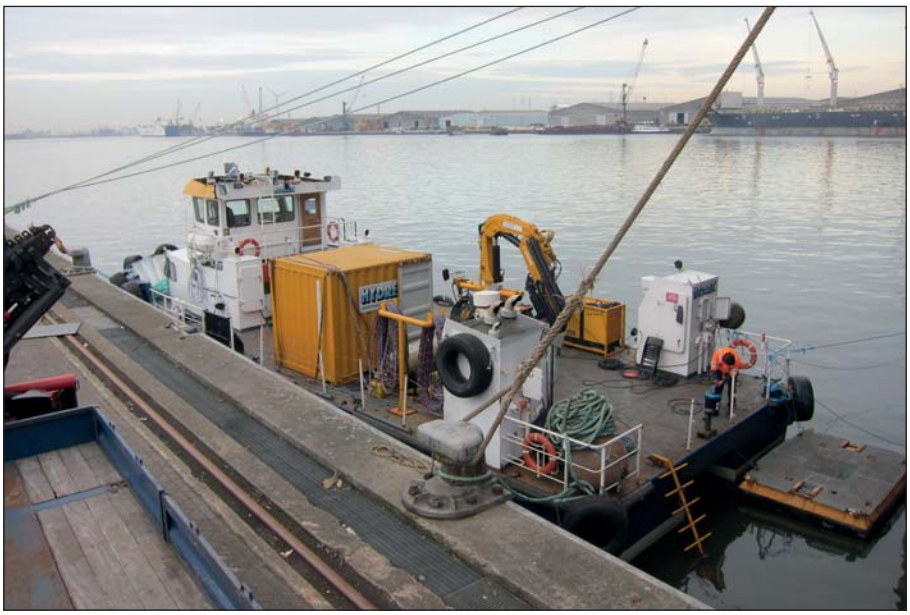
Hydrex was contacted by the owners of the vehicle carrier because the rudder was not working properly. A diver/technician team therefore mobilized from the company's headquarters with one of the Hydrex workboats which was loaded with all the needed equipment.

After arriving at the ship's location in Antwerp, the team carried out a detailed underwater inspection. This revealed several irregularities on the seal assembly of the rudder.

The new method allowed the divers to perform further inspections and make a detailed assessment of the situation of the rudder in drydock-like conditions.

Hydrex diver/technician performing an inspection.

Hydrex workboat during rudder operation in Antwerp.



Hydrex workboat with monitoring station and equipment on-site.

The rudder specialist that was present observed several reasons for the malfunctioning of the rudder. The drive band which is mounted around the seal ring was not secured, the two rings which lock the seal were too large in diameter and finally the rings were not greased.

Following the inspection by the rudder specialist, the Hydrex team carried out several repairs to remedy the rudder problems. First the existing rudder seal was tightened. Next the two wrong-sized rings were replaced with correct ones and both the upper and lower casing of the rudder seal assembly were reinstalled. Next the diver/technicians pumped grease into the rudder seal room and secured all nuts and bolts. The team could then dismantle the equipment and finalize the operations.

The vessel could continue its schedule with a fully functioning rudder. By carrying out the inspection and repair on-site and underwater, Hydrex allowed the owner to keep his ship out of drydock. This saved him valuable time and money. ■

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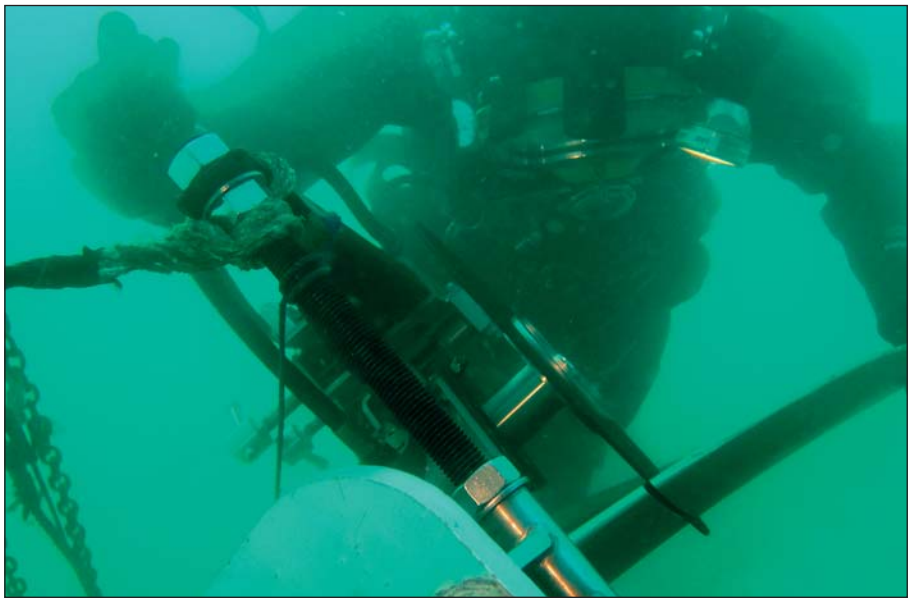
Fast on-site propeller repairs in Germany and Spain keep ships out of drydock

Last month, Hydrex teams carried out underwater propeller operations in Bremen and Rostock (Germany) and Algeciras (Spain). In Algeciras a 200-meter vehicle carrier had its five propeller blades cropped. In Germany three of the five blades of a 183-meter tanker were grinded, re-profiled and polished while a fourth one was straightened. Both repairs were carried out on-site, preventing the need to drydock.



Hydrex diver/technician cropping a damaged propeller blade underwater.

Damaged propeller blades will have a performance below average. The engine will have a higher work load. This results in increased fuel consumption and added stress. By taking advantage of Hydrex's in-house developed cold straightening technique, damaged blades can be straightened underwater. In this manner optimum efficiency of the propellers can be restored. If straightening is not an option, the affected area on the blade will be cropped. By doing this the greatest possible efficiency is achieved for the vessel. These repairs are carried

Cropped propeller blade.

The cropped pieces of all five propeller blades in Algeciras.

Three of the five blades of the tanker in Germany had suffered cracks and nicks.

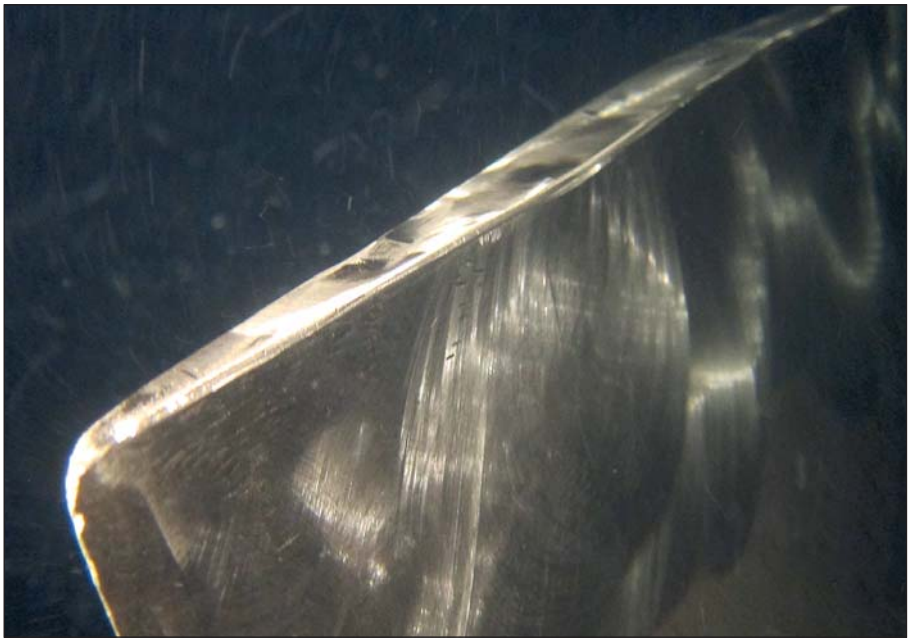
out with the Hydrex propeller blade cutting equipment. Both types of repairs can be performed on-site and underwater. This allows the ship to return to commercial operations without the need to drydock.

Underwater cropping of damaged propeller blades in Algeciras

With all five blades of its propeller severely bent, a 200-meter vehicle carrier in Algeciras needed a fast, on-site solution to restore the propeller's balance and efficiency. Hydrex diver/technicians are trained to carry out repairs underwater in the shortest possible time frame. A team was rapidly mobilized to the ship's location close to the Hydrex office in Algeciras Spain to perform propeller blade cropping.

An underwater inspection revealed that all five blades had suffered deformations along the trailing edges too extensive to be straightened.

Cropping the affected areas of the blades was the only option. This would restore the propeller's balance. The team then calculated the cutting line needed to modify the trailing edges of the propeller blades. The area to be cropped was marked out on the five blades and verified. Next the divers cropped the blades one by one and ground their edges. This gave them the correct radius. Finally, the Hydrex technicians polished the blades to minimize any remaining loss of efficiency.



The cropped blades were grinded and polished for a maximum efficiency.

Underwater propeller blade straightening in Bremen and Rostock

One of the five blades of a tanker's propeller was severely bent. Three of the others four propeller blades were also damaged, but less severely. A fast, on-site solution was required to restore the propeller's balance and efficiency. A Hydrex team therefore mobilized rapidly to the ship's location in Bremen.

The underwater survey of the damaged propeller blades revealed that three blades had suffered cracks and dents along their trailing edges. The Hydrex diver/technicians therefore ground away the cracks and polished the edges of these blades.

The ship then continued on its schedule. In the next port of call, Rostock, the team met up with the vessel again. The team positioned the straightening machine over the bends of the trailing edges of the

bent blade. The blade was then returned to its original state. This restored the propeller's efficiency.

These repairs were carried out in extreme winter circumstances. Icy conditions like this will not prevent Hydrex divers from providing the service you need. They are professionally trained to perform a wide variety of operations, both above and below water, anywhere in the world and under extreme conditions.

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. ■

The Hydrex team grinded away the cracks and polished the trailing edges of the blades.

Hydrex trucks with cold straightening machine.

Fast underwater ship hull repairs save time and money

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 tailor-made mobdocks. Normal commercial activities can therefore continue without disruption. These operations follow the Hydrex procedure for welding cracks in the vessel's shell plating and they are approved by the major classification societies.

Hydrex diver/technician teams carry out these on-site hull repairs all over the world. In most cases the damaged area can be replaced with a permanent insert and no condition of class is imposed. On the rare occasions where the damage does not allow such a repair, a temporary doubler plate is installed over the affected area. This allows the owners to keep to their schedule and have a permanent repair carried out during the next scheduled drydock visit.

To offer the fastest possible service to customers, Hydrex offices have fast response centers where an extensive range of state-of-the-art tools and diving support equipment is available at all times for the repair teams.

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Class approved underwater steel repairs in France and Portugal

Hydrex teams carried out underwater steel repairs on vessels in France and Portugal. In France Hydrex carried out a pipe repair on a 210-meter bulk carrier berthed in Dunkirk and reinforced the weld seams of a leaking doubler plate on a 183-meter tanker in Marseille. In Setubal, Portugal, two repairs were carried out on bulk carriers. An insert plate was installed on a 266-meter vessel while several doubler plates were installed on a 130-meter ship.

Hydrex vans and equipment on-site in Dunkirk.

On-site pipe repair in Dunkirk

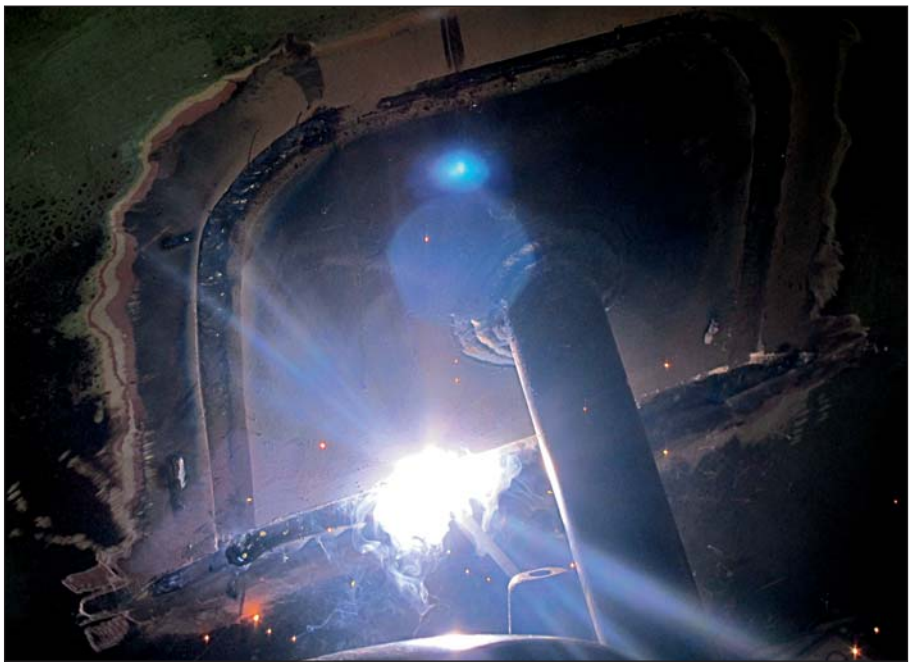
The operation in Dunkirk started with preparations for the welding work inside the engine room. At the same time a cofferdam was installed and secured underwater over the location of the boiler blow down pipe.

The team could then disconnect the inside piping and remove the old pipe. The new pipe was then fitted, secured and welded according to the Hydrex class approved welding procedures. Once the new boiler blow down pipe was fully welded, ultrasonic testing was performed with positive results. The attending Bureau Veritas surveyor, the owner of the vessel and the ship's superintendent were all very satisfied with the way the team performed the operation. The ship could continue its schedule without any loss of time.


Old boiler blow down pipe.

Underwater hull repair on tanker in Marseille

The Hydrex cofferdam technique was used to reinforce the weld seams of a leaking doubler plate that had been installed in drydock on a 183-meter tanker. The operation took place in Marseille. An inspection carried out by the Hydrex diver/technician team revealed that

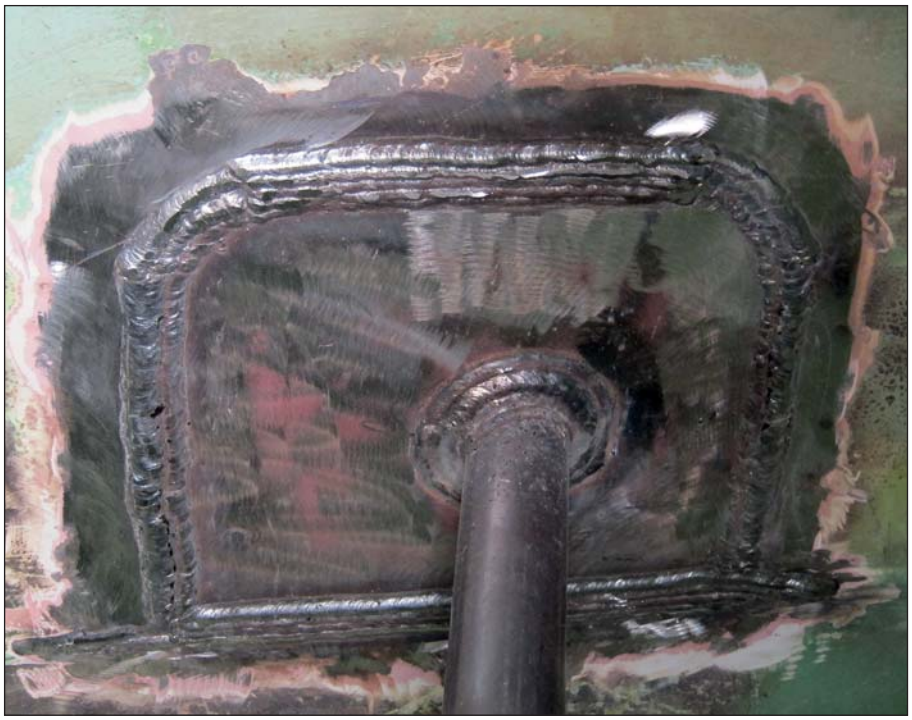


Welding the new blow down pipe.

there was a hole in the weld seam and cavitation damage was present in another area. Grinding out the damaged weld and replacing it was therefore the best solution. The team installed a cofferdam over the water-side of the affected area and then removed the weld seam over a length of 500 mm. Next they re-welded the seam to the approval of the present ABS surveyor, finishing the repair.

Insert and doubler plate repairs in Setubal, Portugal

A Hydrex diver/technician team installed a 640 x 300 mm insert in the bottom shell plating of a 266-meter bulk carrier during the vessel's stay in Setubal after a 350-mm crack was found in the ship's hull plating. After the team installed a cofferdam over the underwater side of the crack they cut



New boiler blow down pipe on bulk carrier in Dunkirk.

The damaged weld seam in the leaking doubler plate before the Hydrex operation in Marseille

Ultrasonic testing showed that the repair had been successful.

Hydrex certified welder securing a doubler plate.

500 mm of weld seam was removed and rewelded.

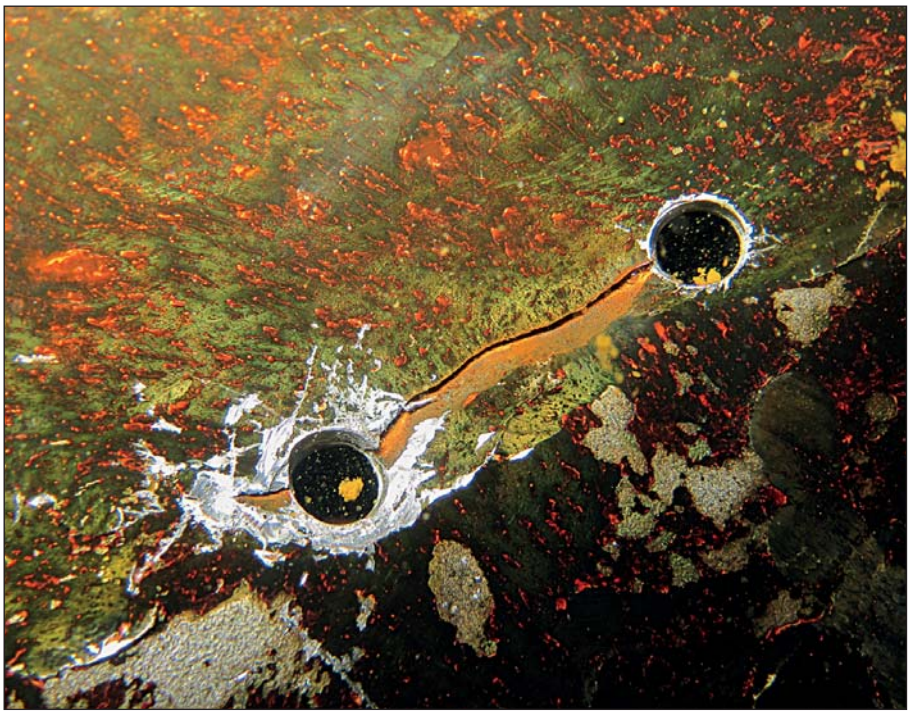
away the affected area. Next they prepared the edges of the hole and installed the new insert with a full penetration weld. This was done under the supervision of the LR surveyor present during the operation. The insert repair was then successfully tested by an ultrasonic testing operator.

In the same port five doubler plates were installed to cover the same number of cracks found in the flat bottom area of a 130-meter bulk carrier. To prevent the cracks from spreading further, the Hydrex diver/technician team first drilled crack arrests. Next they fitted the doubler plates and secured them with 3-layer welds. To meet the DNV class requirements, extra brackets were installed on the largest doubler plate (measuring 1400 x 800 mm). The vessel could then sail safely until the next scheduled drydocking where permanent repairs would be carried out.

Conclusion

Despite the relative size of these operations they are nonetheless vital for shipowners if they want to avoid unscheduled drydock visits for their vessels.

Because these repairs can be carried out above or below water with tailormade mobdocks, normal com-



Hydrex divers drilled crack arrests prior to installing doubler plates on a bulk carrier in Setubal.

The double plates were designed to fit the shape of the hull.

mercial activities can continue without disruption while the repairs are in progress. Hull repairs are approved by the major classification societies and can save owners a great deal of trouble and money.

To achieve this, Hydrex offers the fastest possible service to customers. Our offices have fast response centers where an extensive range of state-of-the-art tools, and diving support equipment is available at all times for the repair teams. These fast response centers enable Hydrex to mobilize diver/technician teams immediately to any location around the world. ■

New generation cold straightening equipment

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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Keeping ships in business

Hydrex offers turnkey underwater repair solutions to shipowners wherever and whenever they are needed. Hydrex's 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 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), Algeciras (Spain), 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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