HYDREX®

UNDERWATER TECHNOLOGY

Magazine

Number *231*

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.

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Editorial

I am proud to announce that our office in Rotterdam has officially opened on the 1st of March. Hydrex dive support vessels will be stationed in Rotterdam for immediate mobilization.

While we have been active in the Port of Rotterdam for a very long time, the increasing demand for underwater repair and maintenance work in the area instigated the need for a permanent presence. In the first article in this magazine you can find more information on the new office.

Further on in the magazine we write about a comprehensive thruster operation in Mexico on two vessels simultaneously. Both azimuth thrusters of an FPSO were repaired while the blade and shaft seals of the stern thruster of a 180-meter heavy load carrier were replaced.

Do not hesitate to call us when you need any repair or maintenance work performed. Hydrex has the means and knowledge to provide you with a fast and safe underwater solution.

Hydrex founder
Boud Van Rompay

Cover: Hydrex certified welder reinstalling the rope guard of portside azimuth thruster.

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

ISO 9001 certified

Underwater services and technology approved by:

BUREAU VERITAS
ABS
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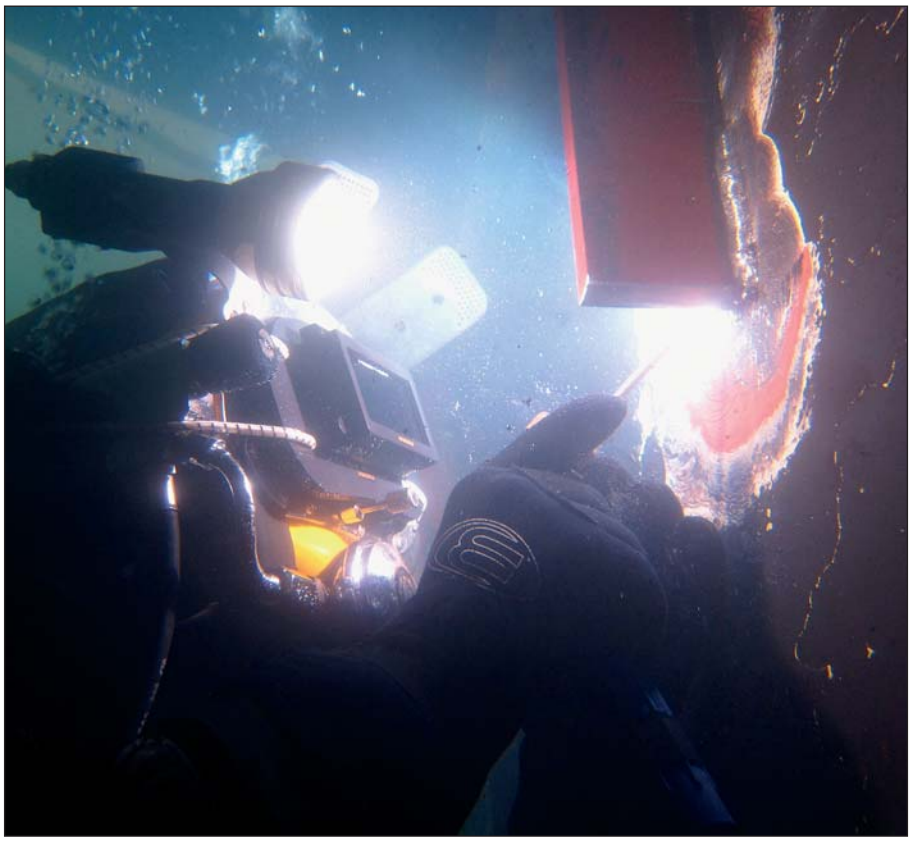
Hydrex office in Rotterdam officially opened

On the 1st of March the new Hydrex office in Rotterdam has officially opened. Its purpose is to improve the delivery of our services and underwater expertise to the maritime industry of Rotterdam.

To enable a fast mobilization throughout the entire Rotterdam port without delaying a ship's commercials operations, Hydrex dive support vessels will be stationed in Rotterdam. These workboats are fully equipped with hydraulic cranes, winches, a dive spread and control room.

Hydrex workboat during underwater rudder operation in Rotterdam.

Marine Project Officer Willem Hopmans mobilizing for an underwater operation with Hydrex workboat.



Certified Hydrex diver/technician performing wet welding work.

This allows Hydrex to offer simple maintenance operations as well as repairs on all parts of the underwater ship propulsion system and the hull. Hydrex operations are class approved and carried out alongside or at anchorage while commercial activities continue without disruption. Hydrex does this with qualified and experienced diver/technicians, state-of-the-art equipment and advanced techniques that create drydock-like conditions underwater.

The offices of Hydrex Rotterdam are located at the Wilhelminaplein where Sales Officer Rotterdam Erwin Strik is ready to take care of all your questions. The practical side of business is in the hands of Marine Project Officer Willem Hopmans. Willem has over 15 years of diving experience and has been a part of the Hydrex team since 2003. As a fully qualified dive supervisor, Willem is the perfect man to be in charge of our workboats and all operations.

Although Hydrex has been active in Rotterdam for over 40 years, the growing demand for services in the area instigated the opening of our office on the 1st of March. An example of a recent operation in the port is the installation of a doubler plate over the cavitated area of the rudder of a 170-meter container vessel. This operation was performed during the ship's scheduled maintenance stop.

Feel free to contact Hydrex Rotterdam if you would like to have more information on our new office or if you want to find out how we can assist you and your vessel.

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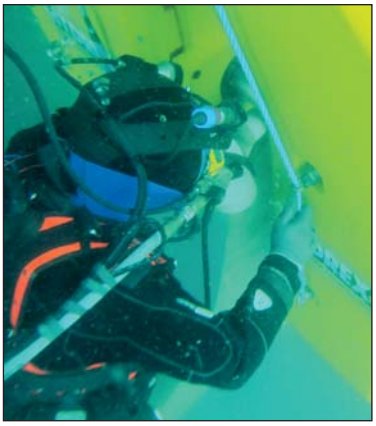
Fast underwater propeller blade straightening



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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Underwater thruster repairs on two ships at the same time in Mexico

Last month a team of Hydrex diver/technicians performed underwater thruster operations on two vessels simultaneously in Coatzacoalcos, Mexico. Repairs were carried out on both azimuth thrusters of an FPSO, while the blade and shaft seals of the stern thruster of a 180-meter heavy load carrier were replaced.

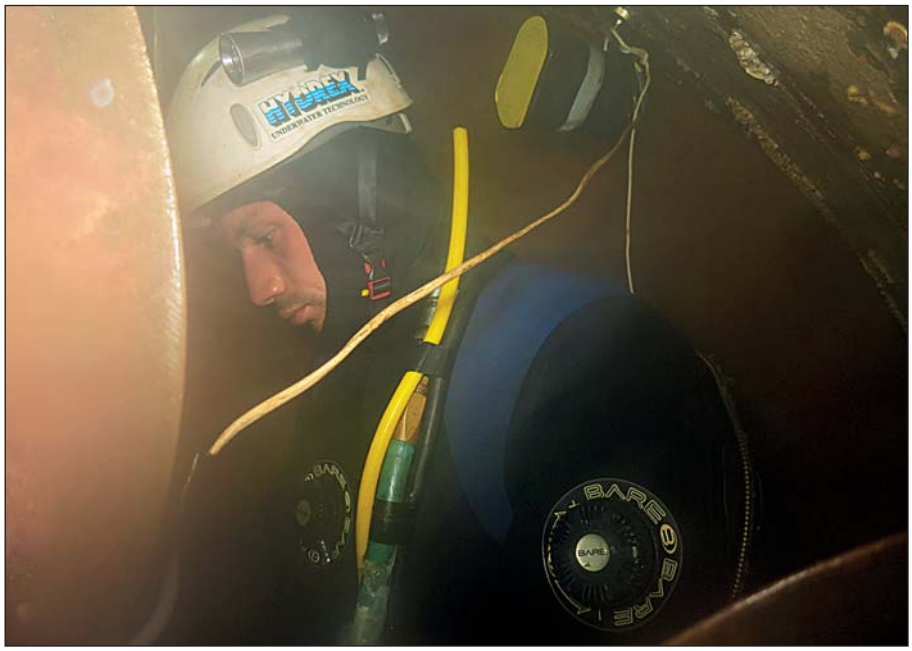
Hydrex diver/technician working on azimuth thruster in Mexico.

The vessels are managed by the same company. We were asked to service both ships during one operation while they were berthed next to each other. This saved the time and cost of two separate mobilizations.

Afloat blade and shaft seal replacement

The stern thruster tunnel of the heavy load carrier was sealed off with our flexible mobdocks. All water was then emptied from the tunnel, creating a dry workspace around the thruster unit. The divers could then carry out repairs in drydocklike conditions. This is a necessity when opening up the unit for operations of this kind.

Next the team performed a full inspection of the unit. It was revealed that the four blade seals were leaking as was expected, but that the three shaft seals were also in need of

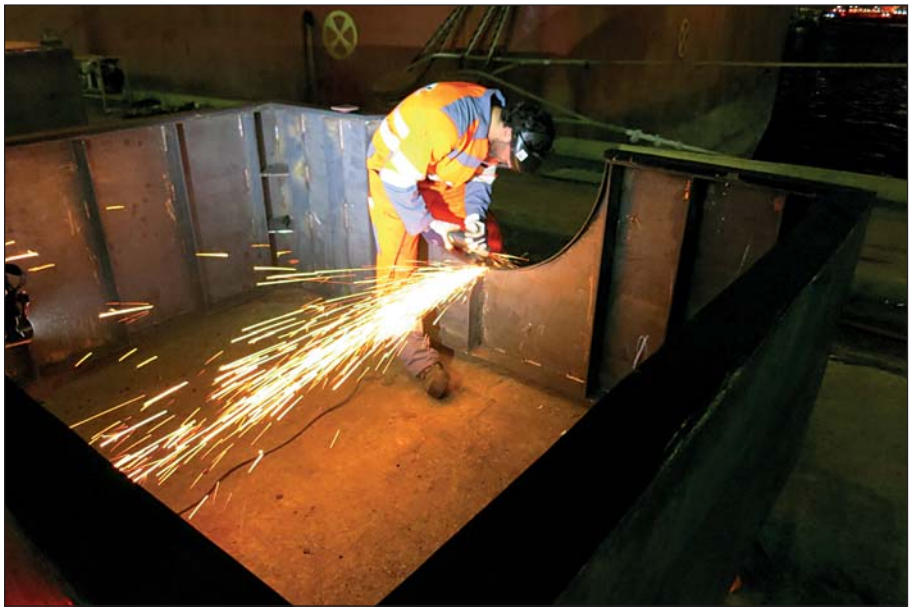


Diver inside dry stern thruster tunnel.

Newly bonded shaft seals.

Diver getting ready for underwater operation.

Cofferdam for underwater azimuth repair arriving on-site.



Preparing the cofferdam for assembly.

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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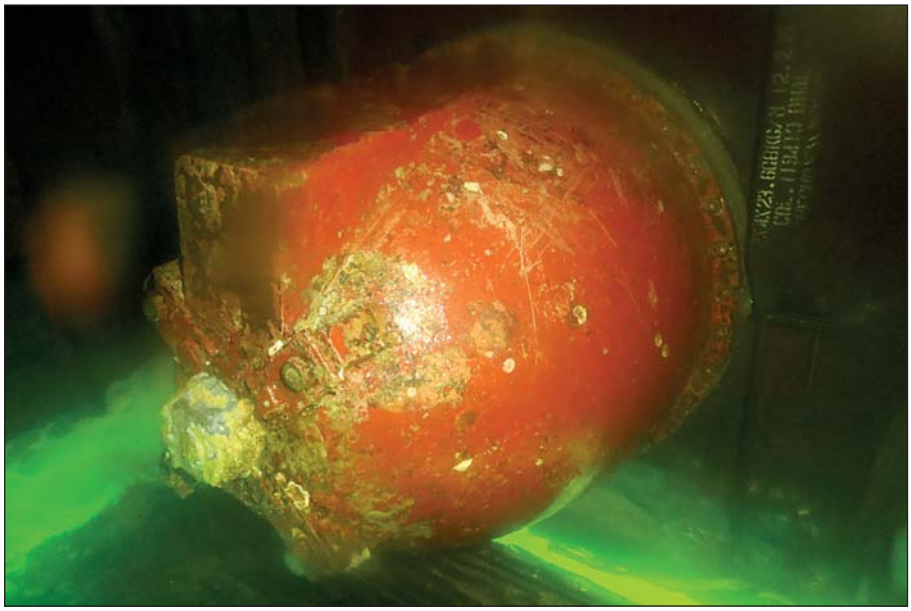
Hydrex technicians working on the cofferdam.

Cofferdam lowered into the water for azimuth thruster operation.



Dry area created around gearbox of starboard azimuth thruster.

replacement. This extended the scope of work. Our technical department had factored this in as a possibility. Therefore the OEM was asked in advance to be ready to mobilize. As a result one of their technicians was on location very fast.

In the meantime the diver/technicians had already replaced the four blade seals. When the representative of the OEM arrived on-site, the three shaft seals were also replaced.

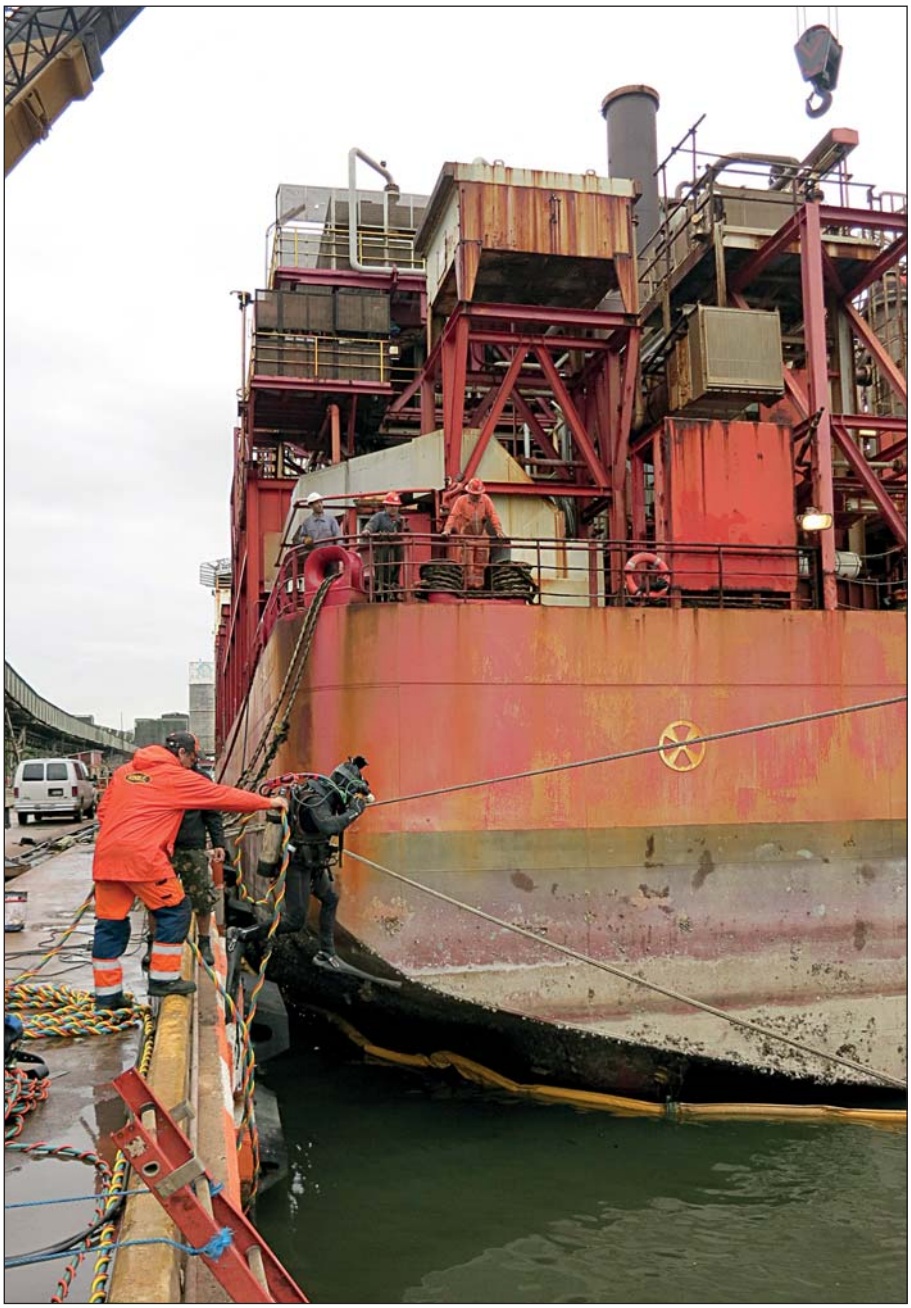
A leakage test confirmed that all seals had been successfully replaced. The team then re-flooded the thruster tunnel and removed the flexible mobdocks. This concluded the operation on the heavy load carrier well within the available time frame.

Repair work on both azimuth thrusters of FPSO

The scope of work of the operation on the FPSO was a lot more complex.

Repair work was required on both azimuth thrusters of the vessel. The repair on the starboard thruster consisted only of the replacement of the oil distribution box. It had therefore been decided to perform this part of the operation underwater with a tailor-made cofferdam that was designed by our in-house R&D department. The parts of the cofferdam were made at a local workshop to our specifications and transported to the vessel. Our diver/technicians then assembled and welded the cofferdam on-site.

When ready for installation it was lowered into the water, positioned over the gearbox and secured. The water was then removed from the cofferdam. This allowed the team to safely remove the thruster casecap



Diver taking the plunge.

Hydrex diver/technician preparing to dismantle the gearbox.

and gain access to the damaged oil distribution box, which they then replaced with the new one.

After the gearbox was fully reassembled, the cofferdam was removed. The divers then started the final part of the operation: removing the portside azimuth thruster to perform more comprehensive repair work on the unit.

Once the thruster was secured, the unit was detached from the vessel and carefully lifted out of the water. Because the vessel had been trimmed, the thruster was not positioned completely vertically. It was essential that it was handled very carefully while maintaining the same angle. Because of the size and weight of the unit this was not straightforward. Hydrex team members are trained to keep to the highest quality and safety standards in every situation. All required precautions were taken and they worked together with the vessel's crew to ensure that the azimuth thruster was brought safely ashore.

The diver/technicians then carried out several repairs to the unit including the replacement of the blade seals, the liner, the bearings and the oil distribution box. These repairs were performed in cooperation with the superintendent of the vessel.

The thruster was then lifted from the shore and lowered into the water again. Finally it was repositioned and reattached by our team following the reversed procedure as during the removal. The vessel can now sail for another 18 months, when a full overhaul of the azimuth thrusters is scheduled.

Removal of the thruster blade to replace the blade seal.

Hydrex certified welder reinstalling the rope guard of portside thruster.

Portside azimuth thruster being lowered into the water again after the repairs.

Conclusion

Flexibility is an important element of every job we carry out, but in this case it was crucial that both repairs were adjusted to each other. Taking into account the scope of both jobs, this was not an easy feat. Our technical department has many years of experience in dealing with complex jobs, logistically and technically. They also have a large team of qualified divers at their disposal. These are trained to handle a wide variety of repairs and can adjust to changing circumstances.

The team worked in shifts throughout the entire operation. This allowed us to adapt the operation to the schedule of the vessels without losing the safety and quality standards that we impose on any job we perform. ■

KEEPING SHIPS IN BUSINESS

If you have received this magazine at the wrong address or if your company is going to move, please let us know.

You can contact us at:
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or at
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Permanent underwater insert repair in Palm Beach

A roro vessel suffered corrosion damage to the aft starboard side shell plating. We mobilized a team from our office in Tampa Bay to the vessel's location in Palm Beach to perform a class approved permanent underwater insert repair. This allowed the owner to keep his ship on schedule.

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 roro vessel.

Next the divers installed a cofferdam over the waterside of the affected area. Because the damage was situated in the turn of bilge it was essential that the cofferdam was modified to fit perfectly over the rounded shape of the hull.

The frame covering the damage was then removed. This allowed the team to cut away the damage and the surrounding area. Next they positioned a new insert plate, measuring 500 x 660 mm. The insert was then welded following the Hydrex class-approved procedure for insert plates, using a full penetration weld. Next to the insert a strip of less severely corroded shell plating was repaired with clad welding.

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

Hydrex welder preparing the insert plate.

Adapting the cofferdam to the rounded shape of the hull.

Preparing the cofferdam for installation.

Preparing the edge of the hole for the insert.

Welding the insert plate.

Finished insert with reinstalled frame.

Conclusion

The divers also carried out a full inspection of the underwater hull of the roro vessel as well as cleaning its two propellers. By combining several jobs, the entire operation could be carried out economically and within a very short time frame. Only one mobilization needed to be planned.

Repairs like this can be carried out above or below water, according to the circumstances, with external cofferdams. 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. ■

Rapid underwater bow thruster removal in Rotterdam

A Hydrex diver/technician team removed a bow thruster unit which needed to be overhauled from a 363-meter container vessel. The removal itself was carried out in Rotterdam. Earlier the team had already prepared the thruster tunnel during the ship's stop in Le Havre, France. This allowed the divers to perform the operation underwater in a very short time frame without interrupting the vessel's schedule.

Hydrex diver/technician team approaching container vessel in Rotterdam.

Because of the ship's tight schedule in Rotterdam, the time required to remove the thruster unit needed to be brought back to the absolute minimum. For this reason a Hydrex team mobilized to the vessel while it was berthed in Le Havre to perform all possible preliminary work. This included removing the thruster blades one by one and preparing the engine room and the bow thruster tunnel for the operation.

When the preliminary work was complete, the team returned to the company's headquarters in Antwerp. As soon as the container vessel was entering the Rotterdam port, the team mobilized again, using one of the Hydrex workboats loaded with all the needed equipment. The Hydrex catamarans are fully equipped as dive support stations with hydraulic cranes, winches, nautical and communication equipment and a dive control room. They can be used for a wide range of operations. This increases flexibility, which was essential during an operation like this where only a tight time frame was available.

Operation in stages avoids loss of income

After the diver/technicians arrived on site, they secured the gearbox

Bow thruster unit lifted out of the water.

Thruster tunnel grid brought to shore.

Thruster unit on Hydrex workboat.

The Hydrex team delivered the thruster unit to the manufacturer in Rotterdam.

with hoisting equipment. The team then disconnected the bow thruster unit from the engine room and lowered it onto a cradle. This cradle was designed especially for thruster operations.

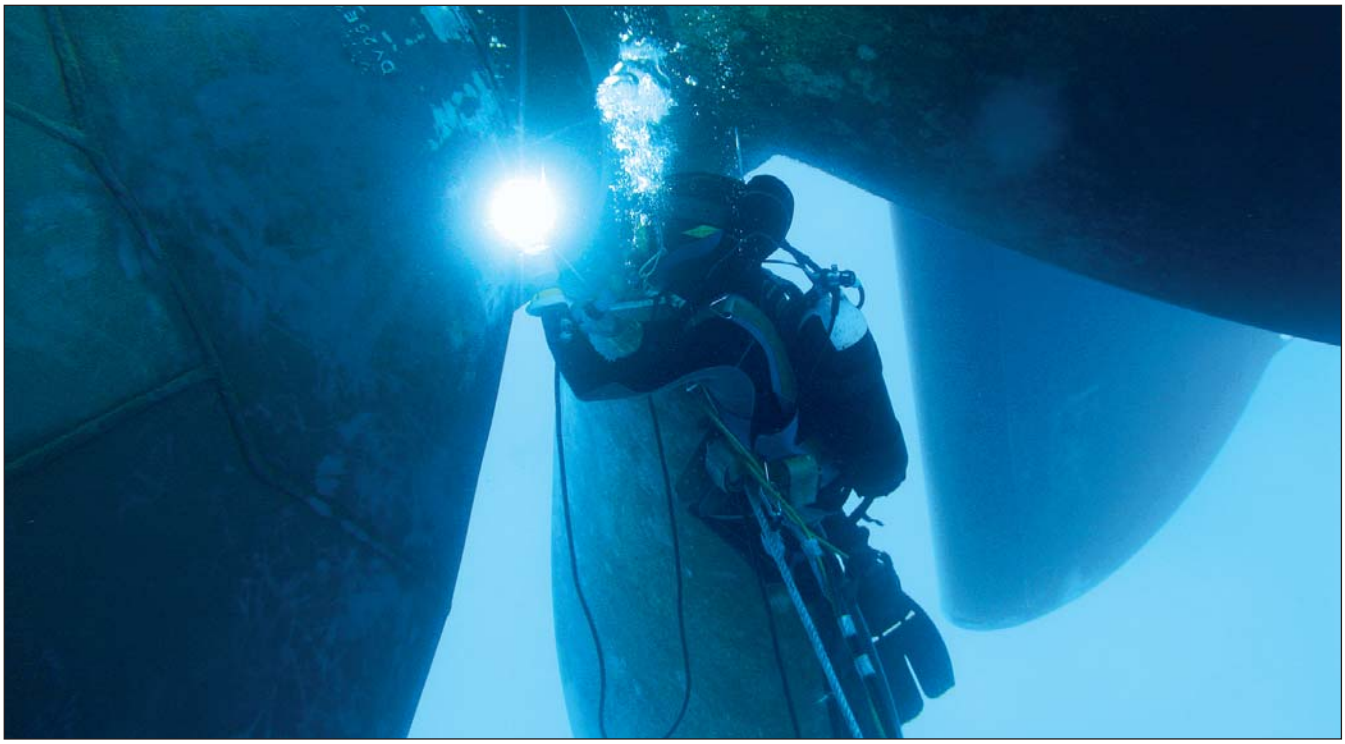
The bow thruster was then brought onboard the Hydrex workboat. Next the team securely sealed off the engine room by positioning a flange over the space connecting the thruster tunnel to the room. This made it possible for the vessel to continue to sail while the unit was onshore being overhauled.

With the bow thruster unit on deck the team sailed the Hydrex workboat to the manufacturer.

Off-hire time causes a substantial loss of money. It was therefore very important that the ship could keep its schedule. Performing the removal in two stages allowed this. This kind of flexibility can only be achieved successfully by staff who have familiarity with such operations and have the relevant know-how and equipment. Hydrex has a technical department capable of executing all the required planning. Our diver/technicians are trained and qualified to perform the full range of required class-approved repair procedures in even the harshest conditions. ■

Hydrex workboat in Rotterdam.

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 as well as maintenance services are done while the vessel is afloat. This eliminates the need to drydock.

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

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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 Rotterdam, 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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