HYDREX®
UNDERWATER TECHNOLOGY

NEWS
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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.

Afloat propeller blade modifications adapted to your sailing schedule

Recently an afloat propeller blade modification was performed on a 229-meter bulker in Bremerhaven. The vessel was going to sail at a lower RPM and a modification of the 5 propeller blades' diameter would allow it to save fuel while doing this.

This is a good example of how we can also help customers when they have the need for preventive or other special custom projects.

Another example are the preventive modifications to the blades of three ice-going vessels. When several of this customer's vessels suffered damage and the propeller blades needed cropping after the winter, the owner wanted to find a way to prevent this from occurring to his other container vessels.

Marking the area to be cropped on one of the propeller blades.

The modified area was polished to optimize the efficiency.

When the next winter promised to be equally harsh, he wanted to give the blades extra strength and make them less susceptible to damage from ice or other debris. This was done by modifying the blades to a very specific design that made them less prone to damage while keeping the performance of the propeller as close to optimum as possible. The operation was performed in close communication with the manufacturer of the propellers.

The five identical pieced that were removed from the blades.

Modified propeller blade of bulker.

Bent blades can be straightened.

A propeller modification can easily be combined with any other maintenance or repair operation that needs to be carried out on the vessel. Thanks to the flexibility of our teams this allows a vessel to keep its schedule.

Underwater repairs in harsh winter conditions

Besides preventive modifications we can offer you the best possible solutions when propeller blades are damaged after impact with ice and other debris. Even if the damage is quite extensive.

After your call we will immediately mobilize a team to the vessel to inspect the damage and perform the required repairs. During the winter months these operations often have to be carried out in extreme circumstances. Ice conditions like this will

Severely damaged blades can be cropped.

Both propeller blade straightening and cropping can be done underwater or on a trimmed vessel.

not prevent our 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.

Ideally our propeller blade cold straightening technique is used. Should a piece of the blade be broken or if there is other damage too extensive for straightening, a section of the blade will be cropped. By doing so commercial operations can continue without the need to drydock.

Both types of repair are carried out with equipment developed in-house by our R&D department.

If you require an underwater propeller modification or repair, please contact our technical team at +32 3 213 53 00 or hydrex@hydrex.be. We are available 24/7 and ready to assist you around the globe. ■

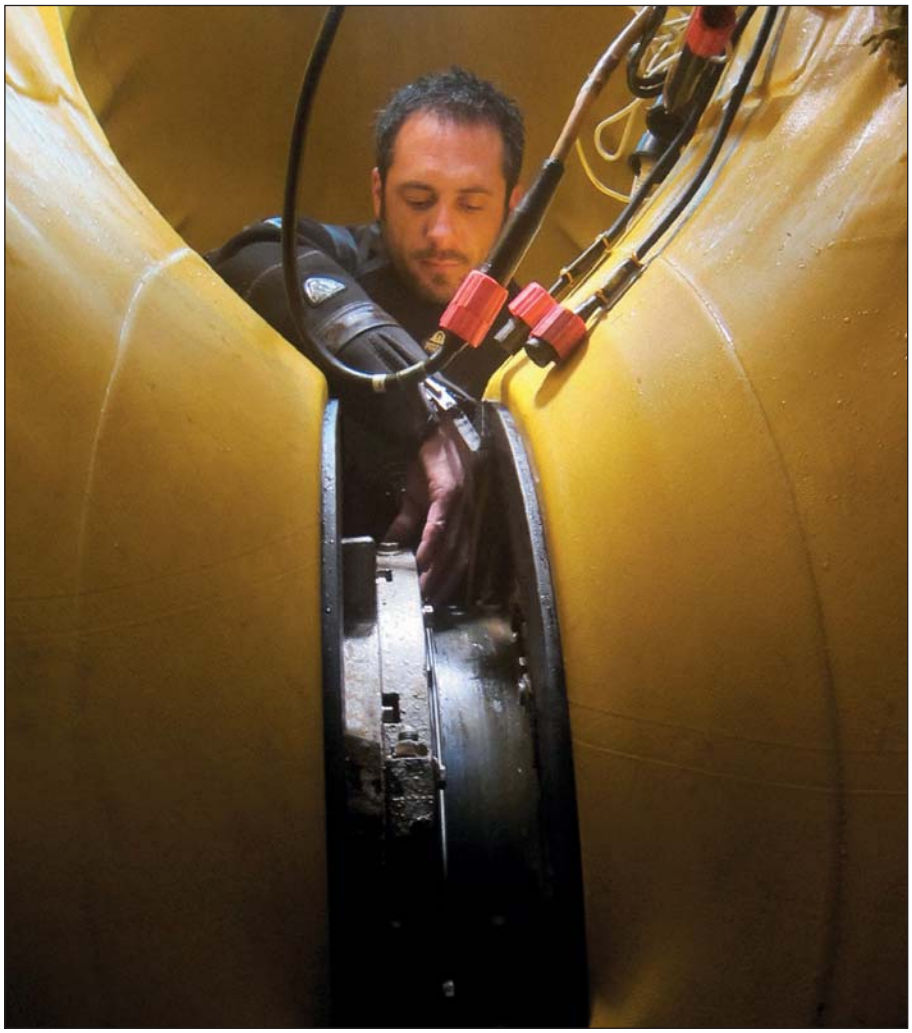
If you have received this magazine at the wrong address or if your company is going to move, please let us know.

You can contact us at:
hydrex@hydrex.be
or at
+ 32 3 213 53 00

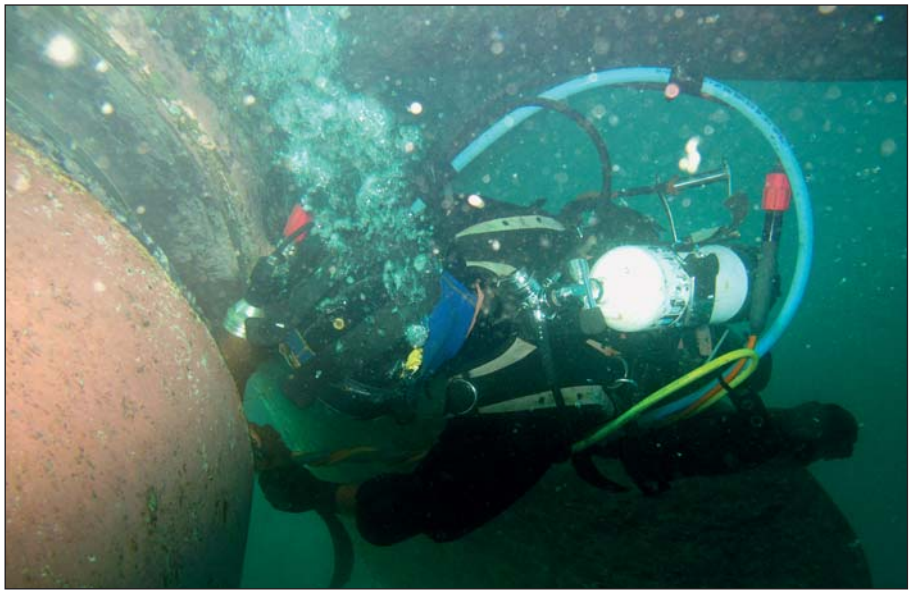
Underwater mobdock repairs: case studies

We are able to perform a wide variety of operations with our flexible mobdocks. These enable us to create a dry environment underwater for our divers to work in. There is no need to send the vessel to drydock. We will bring the drydock to you and all operations can be carried out alongside or at anchorage without interruption. The lightweight mobdocks allow for a fast mobilization and the necessary adaptability.

Hydrex was the first company ever to use a prefabricated cofferdam for hull repairs, introduced as early as 1979. It was used to carry out repairs to the *m/v Lunar Venture*. By 1983 the technology was in use to perform insert repairs on double bottom tanks from the inside. We have advanced this concept extensively since then to ensure that fast, professional and class approved work can be done while the vessel stays afloat and even while continuing normal commercial activities.



Hydrex diver/technician working inside flexible mobdock.



Hydrex diver preparing stern tube assembly for installation of a flexible mobdock.

Initially these techniques were applied mainly to the repair and replacement of bow thrusters. Using steel cofferdams as a mobdock to seal off the thruster tunnel, with an access shaft protruding above the water, work teams accessed the tunnel and from there could work on the thruster in complete safety.

We have since then developed this technology further using lightweight flexible mobdocks (mobile mini

Preparing a new split type spacer ring for installation.

drydocks). These were first used in 2002 and have been further developed by our in-house R&D department ever since. Hydrex constantly invests in the research necessary to evolve repair techniques and procedures. It is now possible for our diver/technicians to perform permanent repairs on seals, thrusters and any other part of the underwater vessel without the need to go to drydock.

For many of these operations we work together with OEMs. The most common type of mobdock operations are seal and thruster repairs or replacements. Mobdocks needed for underwater repairs on the standard sizes of seal assemblies and thruster tunnels are available in our fast response centers for immediate transportation. Tailor-made mobdocks can also be designed be our R&D department.

Hydrex truck and equipment arriving on-site.

Dry shaft seal renewal underwater

Damaged stern tube seals will cause an increasing amount of oil leaking or water ingress as the damage worsens. By replacing the seals when the damage is first discovered we keep the down time low. Oil leakages can also produce a potential or actual liability when for instance going to the United States or other sensitive areas. When they have a leaking stern tube, ships are often not given permission to enter ports, they can receive fines or are even not allowed to sail on.

By using a flexible habitat our divers create a drydocklike environment around a seal assembly. This enables our teams to perform seal replacements or other work on the housing. These repairs or replacements can be performed on a large variety of seal applications.

It is not always straightforward to replace seals because there can be quite a bit of variation in the configurations of the stern tube itself. There can also be complications with the liners, which can be worn down and show running marks. All this is routinely handled by the teams on the jobs. We usually supply the equipment and the owner is free to supply his own seals. We can handle all type of seals from all original manufacturers.

Case study: Two assemblies, twelve seals, one Hydrex team

Last year a team of our divers traveled to Veracruz, Mexico for a stern tube seal repair. The operation consisted of the underwater replacement of the damaged seals on both assemblies of a semi-submersible offshore platform.

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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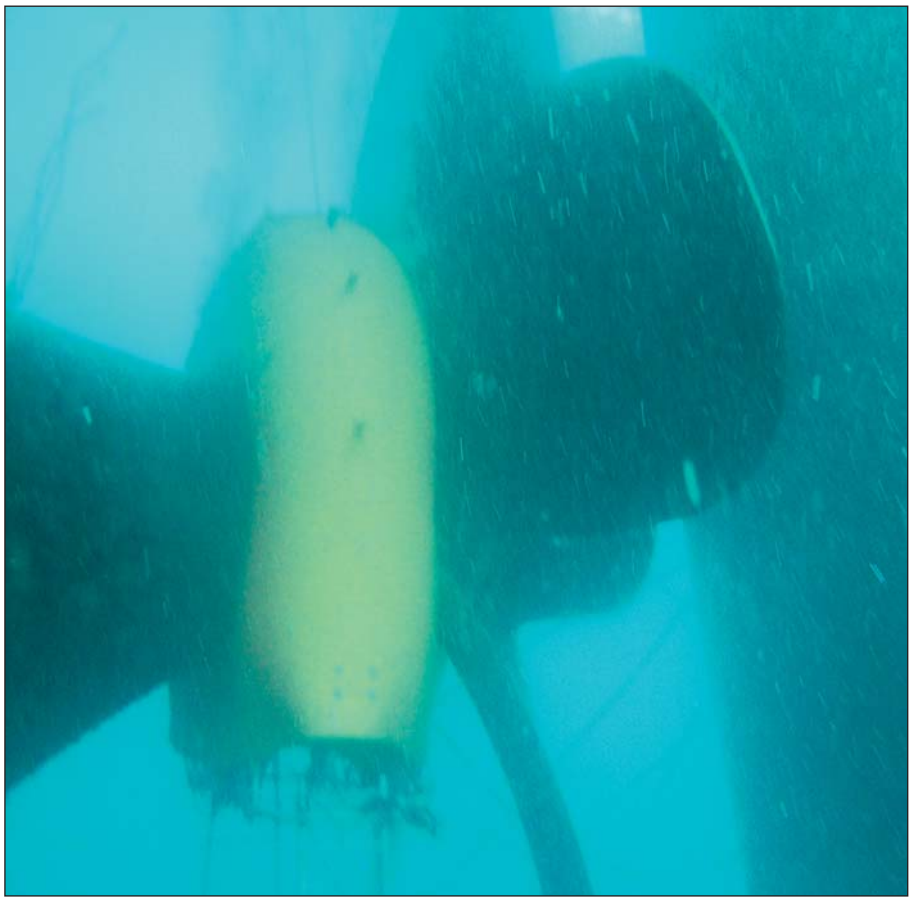
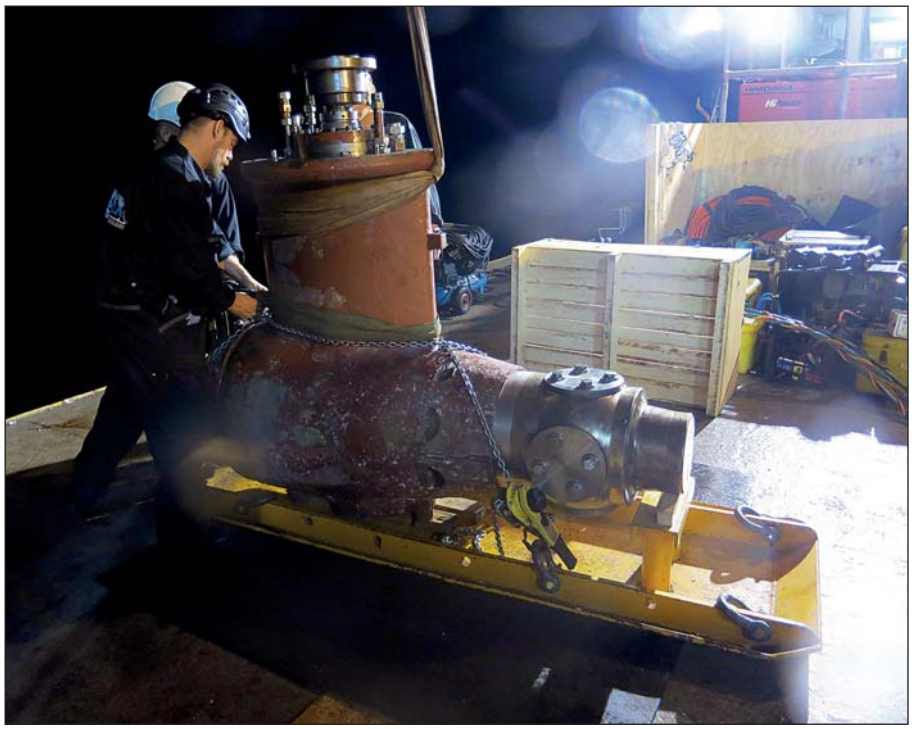
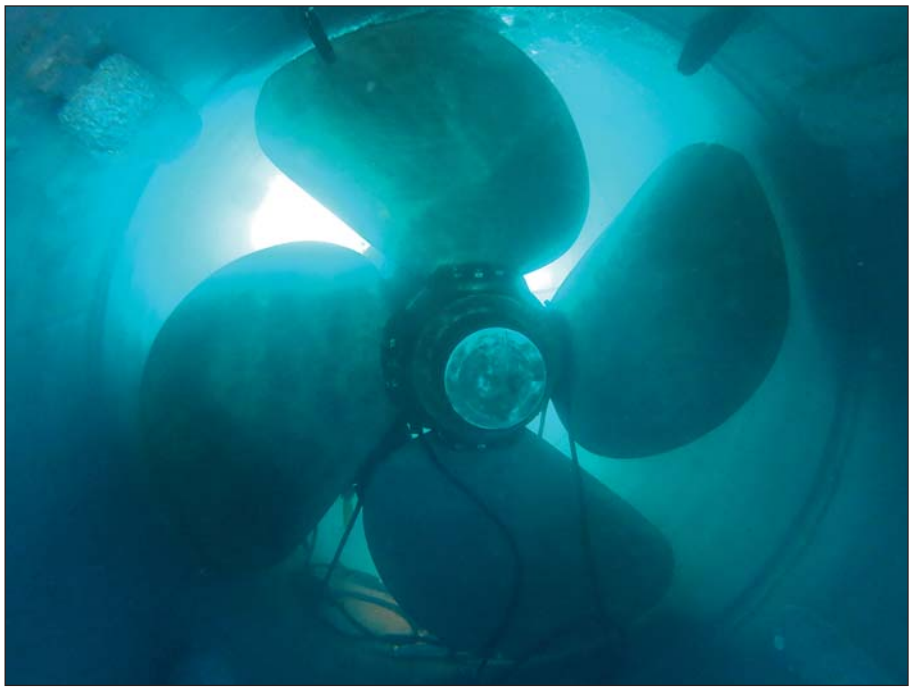


Flexible mobdock installed around a stern tube assembly.

Hydrex technician inside a closed-off thruster tunnel



Preparing a bow thruster unit for reinstallation.



Reinstalled bow thruster unit and blades.

The unit left the field after its project was finished and was berthed alongside to have repair and maintenance work carried out without docking. We were asked to perform the stern tube seal repairs during the available window of opportunity.

After the diving team removed the rope guard of the portside stern tube seal assembly, they performed a thorough underwater inspection of the assembly. Next they installed the flexible mobdock. They then removed the four damaged aft seals one by one and replaced them with new ones. The two forward seals were also replaced during the repair.

All parts of the assembly were then reinstalled and secured. Leakage tests were carried out with positive results, after which the divers removed the flexible mobdock. This part of the operation ended with the reinstallation of the rope guard.

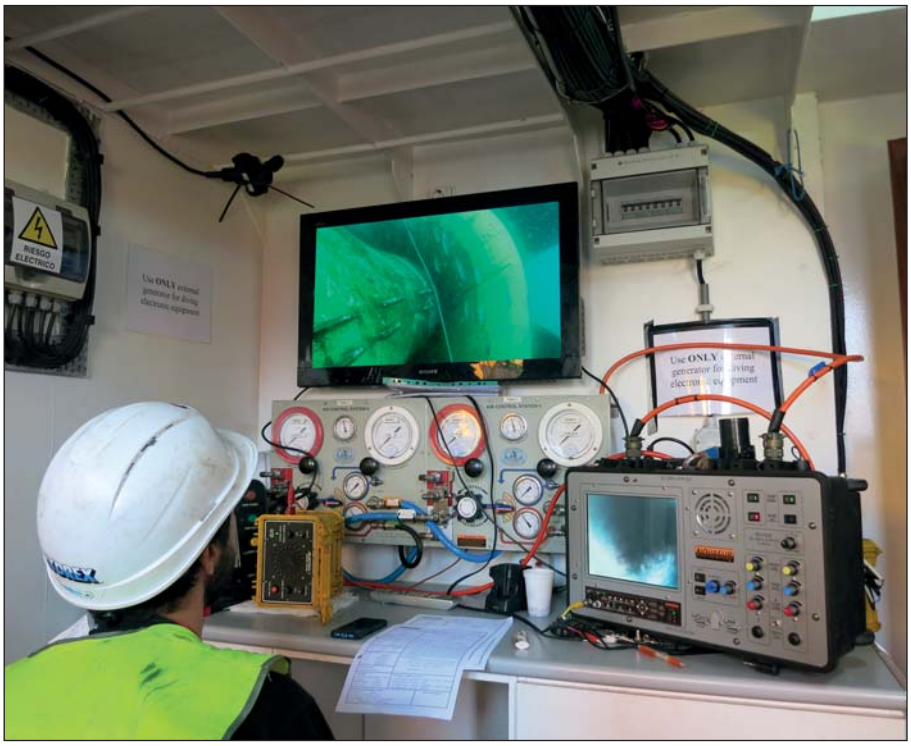
All six seals of the starboard side assembly were then given the same treatment. At the request of the customer part of our diver/technician team remained on standby for a short time to make sure everything was in order. When this was the case, they left the platform together with the rest of our equipment.

Bow thrusters

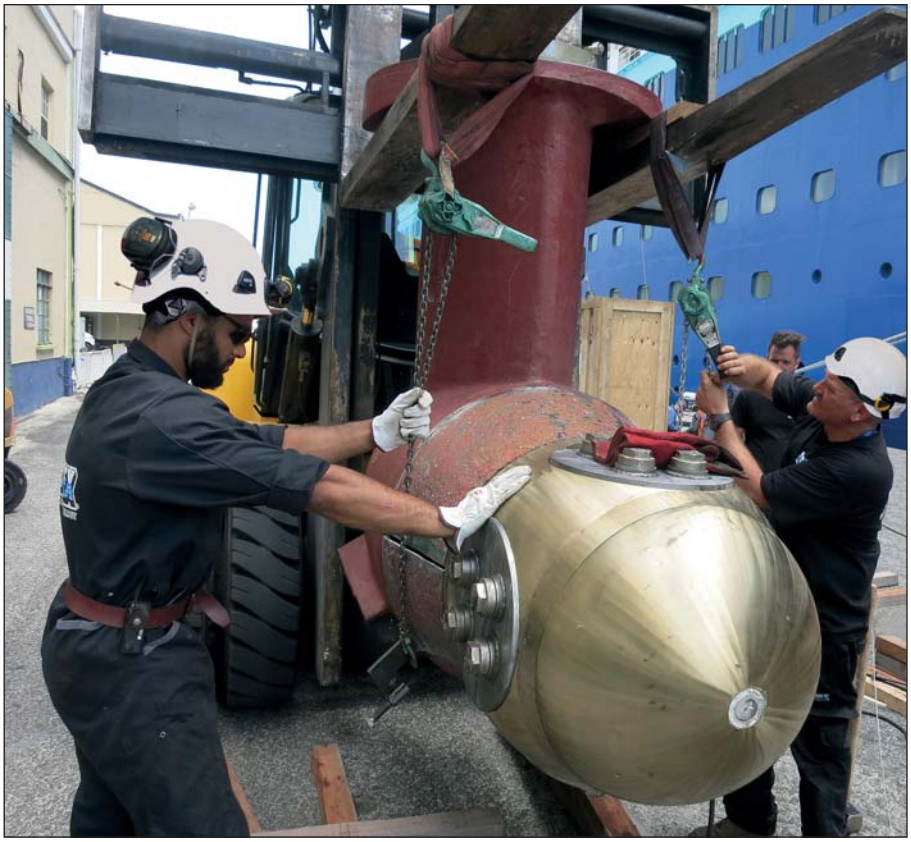
Our diver/technicians can perform a wide range of repair or maintenance work on all types of thrusters. An entire unit can be overhauled, propeller blades and seals can be replaced or repair work on another specific part of a thruster can be performed on-site. These repairs are performed in cooperation with OEMs and can be carried out while the vessel stays afloat with minimum impact on its schedule.

Bow thruster operations are carried out using our flexible mobdocks that close off the thruster tunnel on both sides. These lightweight mobdocks can quickly be transported to any location around the world.

In most cases a thruster overhaul is planned during a scheduled drydocking. This usually means that the unit is removed in drydock. The ship then has to wait for the repaired thruster to return and be reinstalled before the vessel can leave drydock. This means a longer drydock time and consequent cost. We can however remove the unit while the ship is still afloat so it can already be



Hydrex team leader monitoring an underwater operation.



Preparing the new unit for installation.

brought to the manufacturer to be overhauled. When the vessel enters drydock the overhauled unit will be ready for reinstallation without any delay. The reverse procedure is also possible. If the thruster is removed in drydock, we can reinstall it in dry conditions underwater at a later date. In this way the ship can already leave drydock while the unit is still with the manufacturer.

Case study: Replacement in stages keeps cruise vessel on schedule

A 208-meter cruise vessel sailing in the Caribbean suffered steering problems after one of its two bow thrusters malfunctioned. Having to depend on a tug every time the ship berthed would quickly become very expensive. Going off-schedule, however, to have the bow thruster replaced would cost the owner both money and reputation.

A solution was therefore needed that could be carried out on-site without interrupting the vessel's schedule. Enter our tried and tested flexible mobdock technique and our experienced diver/technicians.

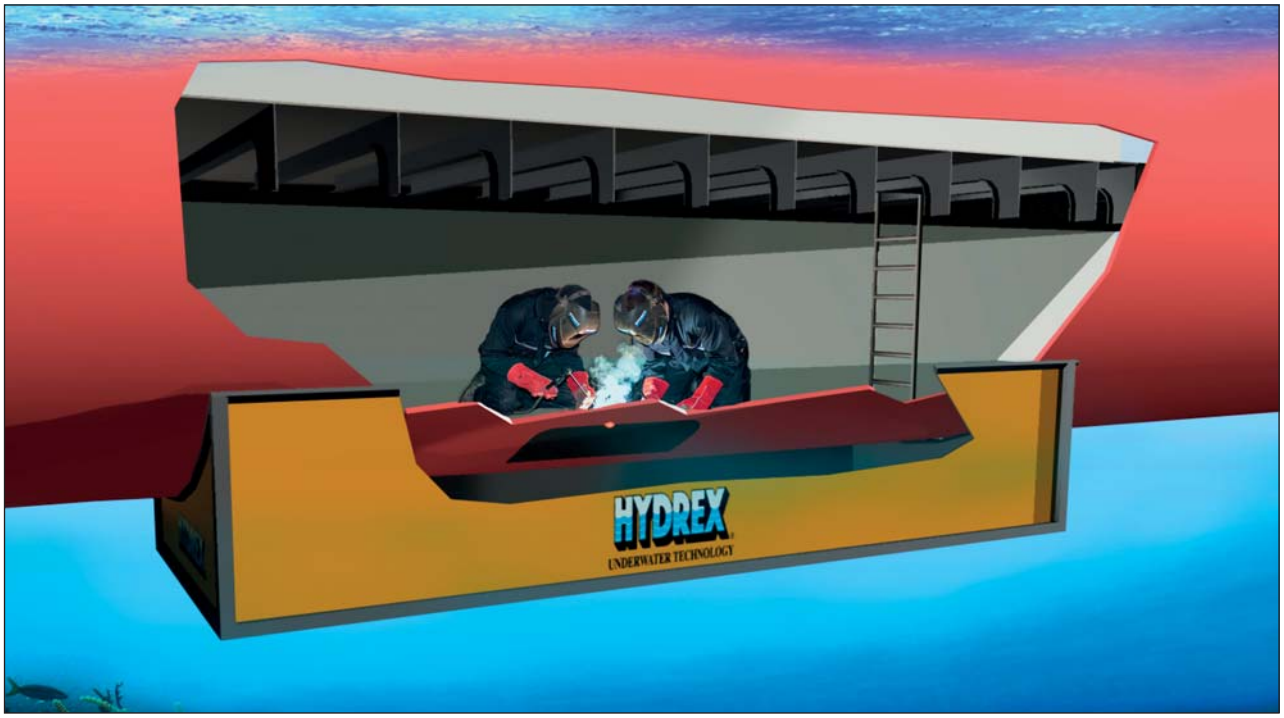
There was only a time frame of eight hour at each port of call during the ship's cruise in the Caribbean. It was therefore important that the operation was split up in parts that could be finished before the vessel had to leave again. A perfect planning and constant communication between our technical department in the office and our team on location was essential in achieving this.

Information

If you have any questions regarding a possible mobdock repair, do not hesitate to contact us.

Animations of the procedures used can be found on our website. For more information on mobdock or other underwater repairs, please contact one of our offices. We are at your disposal 24/7 and ready to mobilize almost immediately. ■

Hydrex 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 cofferdams. 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 all 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 to mobilize to your location.

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Always on time

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 performs 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 we 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.

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