HYDREX®

UNDERWATER TECHNOLOGY

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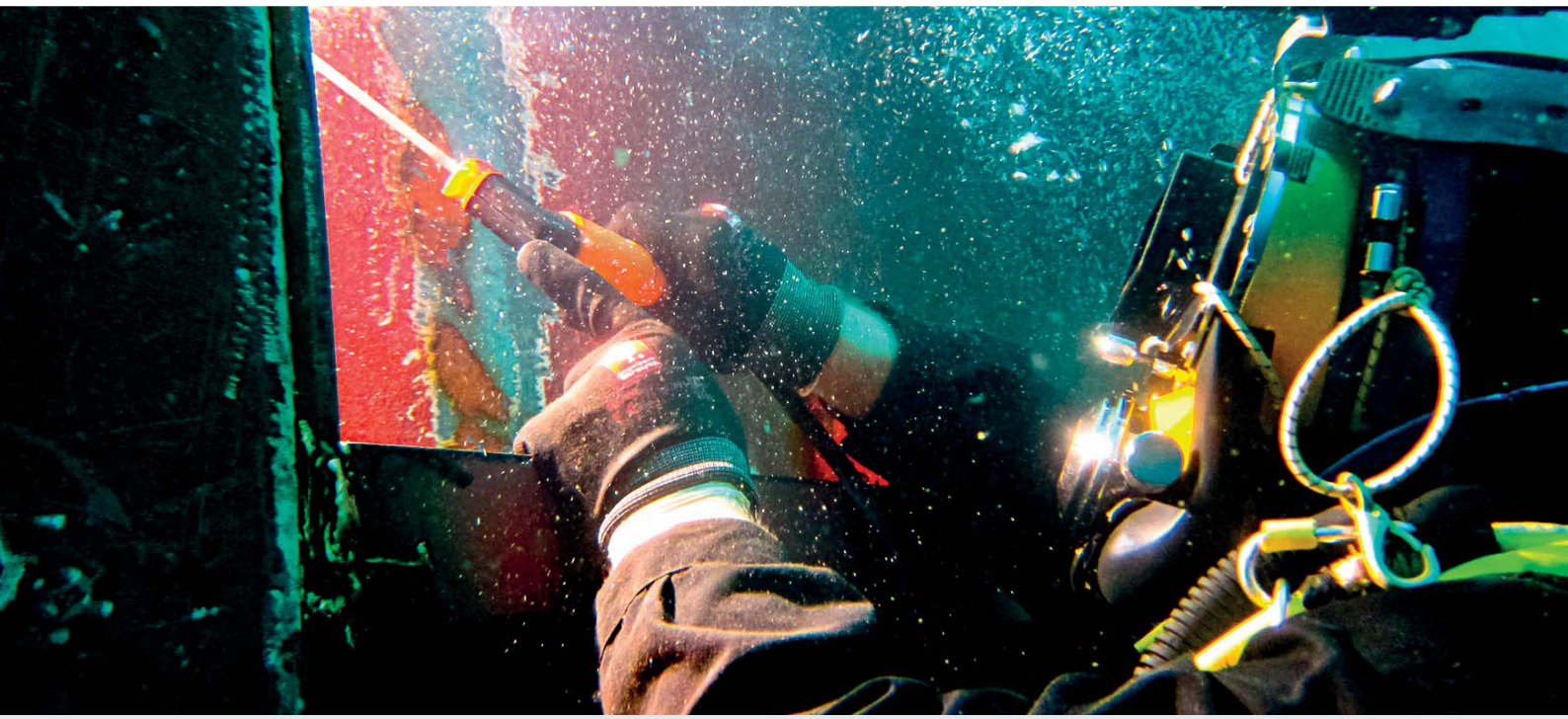

On-site propeller operations keep your ships sailing

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Editorial

In the first article in this magazine you can read about some of the more important recent underwater bow thruster repairs carried out by Hydrex. By performing these repairs on-site and underwater, we made sure that the vessels did not have to go into drydock.

Next you can find an illustration showing all the possible repair or maintenance work we can perform on your vessel below the waterline. Don't hesitate to call or mail us for extra information. We can carry out much more operations on-site and underwater than most people realize.

In the second article we talk about the fast on-site emergency solutions we offer shipowners. There are many reasons a ship is not allowed or able to sail on. We can perform routine as well as more complex repairs underwater. These allow the vessel to continue its schedule and go to drydock at a more convenient time and location.

These operations were all performed with the same purpose in mind: to keep your vessel out of drydock. This saves you a lot of hassle, time and money. Please contact us if you need assistance with one or more of your vessels. In the end that is still our main goal: to help you keep your ship sailing safely, economically and on schedule.

Best regards,

Hydrex founder
Boud Van Rompay

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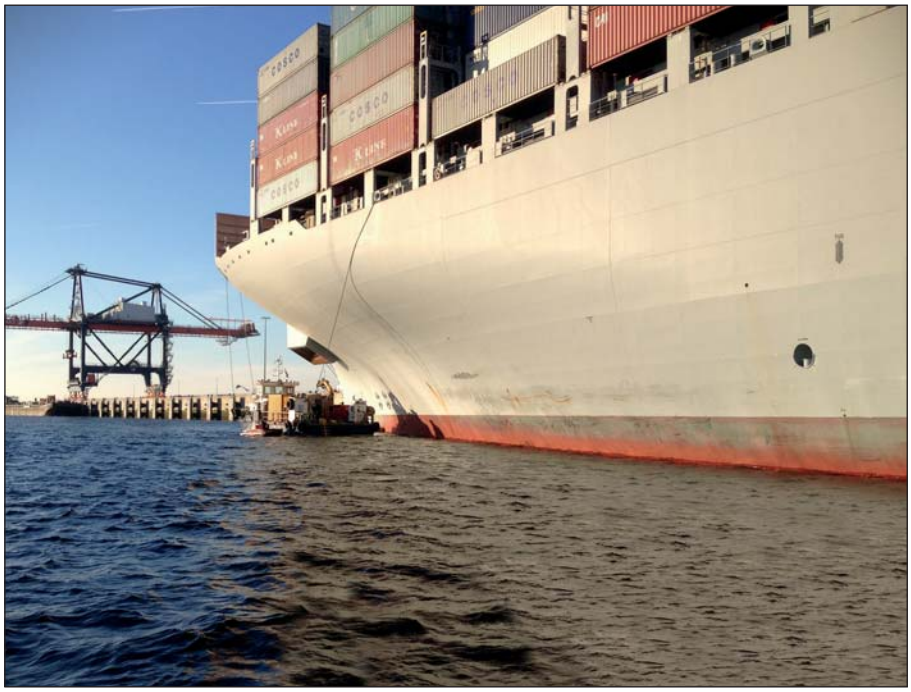
Table of contents

Fast on-site bow thruster repairs save time and money

Hydrex can assist shipowners with almost any problem they encounter with their vessel's thruster. A wide range of repair or maintenance work can be carried out on all types of thrusters. An entire unit can be overhauled, propeller blades or seals can be replaced or repair work on a specific part of a thruster can be performed on-site. All of these repairs can be carried out without the need to drydock the vessel.

Bow thruster operations are carried out using lightweight flexible mobdocks that close off the thruster tunnel on both sides. This allows divers to work in a dry environment around the unit. All operations can be carried out in port or while the vessel is stationary at sea and normal commercial activities can continue without disruption. An animation of the procedure used can be viewed on the special thruster repair page of our website or can be requested by contacting one of our offices.



Hydrex workboat next to container vessel.

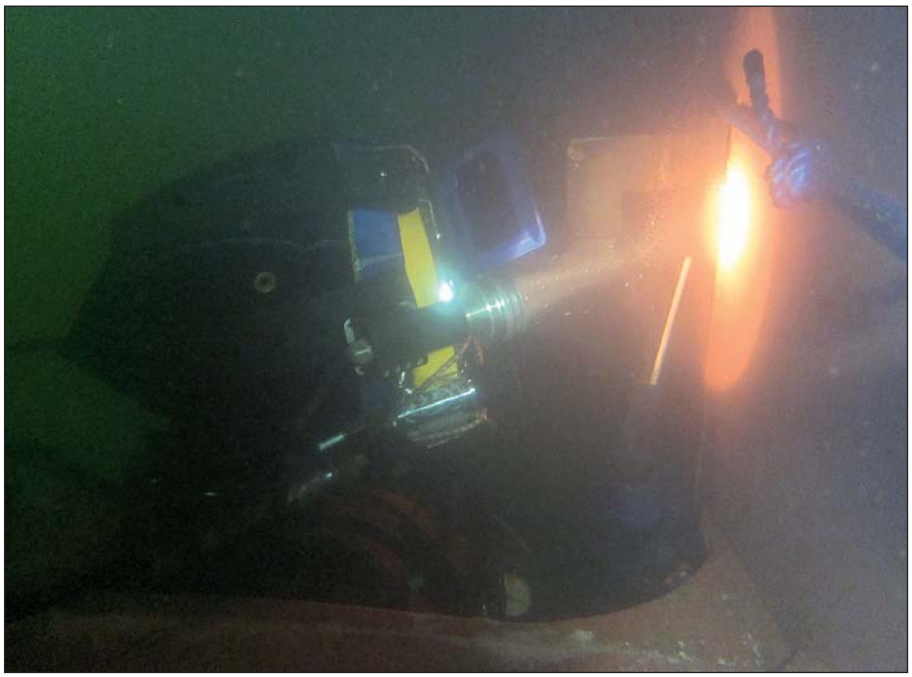
The size of the thruster does not matter. Hydrex flexible mobdocks can be easily adapted to the circumstance. They can be used for a wide range of repair or maintenance work on all types and sizes of thrusters and vessels.

We have now taken it even a step further. On several occasions we have removed the old bow thruster unit and reinstalled a new one in a single operation. This saves the customer extra time because we do not need to mobilize our divers and equipment twice.

Despite the scope of some these operations, bow thruster removals can be performed very fast. The

New propeller blades packed and ready for transport from the Hydrex yard.

The flexible mobdocks allows us to create a dry environment inside the thruster tunnel.



Diver preparing the bow thruster tunnel for the operation.

removal of the unit can be done in the wet, because it is overhauled. We only need to remove the blades and close the unit off with flanges. The reinstallation needs to be done in the dry because the blades need to be reinstalled without water ingress. Removal can be done within 24 hours. Reinstallation is usually done in 48 hours.

If required, a vessel can sail after we remove the unit and close off the tunnel with a blind flange. The reinstallation can then be done at a later date on-site or during the next drydock visit if required. This saves time in drydock: the old unit does not need to be removed in drydock, and the overhauled or new unit can be ready for reinstallation in drydock when the ship comes in.

For bow thruster unit removals or blade replacements in Western Europe we have two workboats available at our headquarters in Antwerp. The transport of the unit to the manufacturer can also be arranged by us if needed. This is a package we offer to customers. When we receive an inquiry, we determine if the thruster needs to be overhauled and if so, where it needs to go. Spare parts or thruster blades can be stored at our yard so that they are immediately available when we start the operation.

This article gives an overview of some of the more important recent thruster repairs carried out by Hydrex.

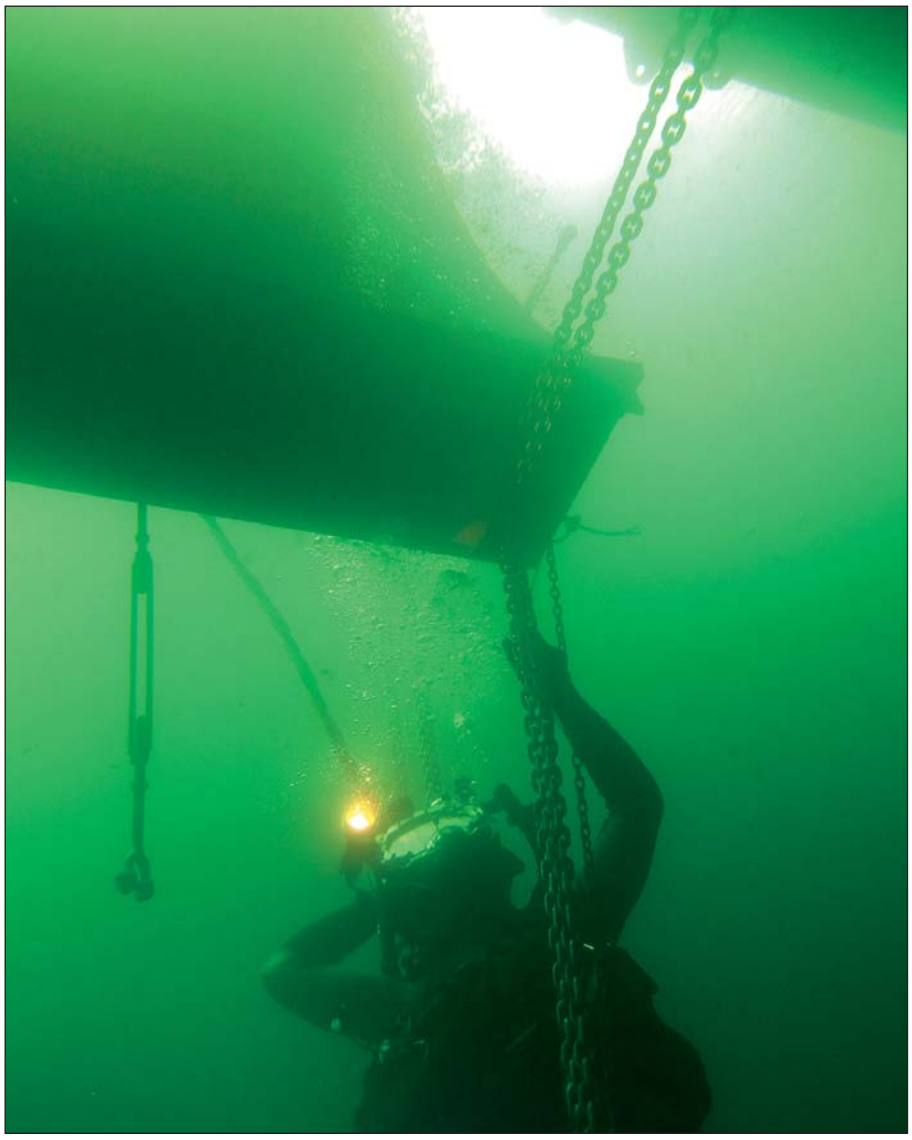
Fast bow thruster operation in Congo and Gabon avoids drydocking

An 86-meter research vessel needed the stainless steel belt in one of its thruster tunnels replaced. A Hydrex diver/technician team therefore flew to Pointe-Noire, Congo to perform the repairs.

The stainless steel belt is installed around the perimeter of a thruster tunnel at the location of the thruster blades. There the impact of the cavitation caused by the rotation of the blades is the most severe. Extra protection against cavitation damage is therefore essential. When the stainless steel belt in the thruster tunnel of the research vessel suffered cracks, the underlying steel was exposed to cavitation. The belt needed to be replaced as soon as possible to prevent the thruster tunnel from being too severely damaged. The owner of the vessel would have had to take his vessel to drydock if no on-site solution was possible.

A tailor-made open-top cofferdam

An open top cofferdam gave the Hydrex technicians access to the thruster tunnel.



Hydrex diver/technician guiding the cofferdam underwater.

Hydrex technicians securing the new stainless steel belt.

was designed by the Hydrex technical department. It was constructed in a local workshop in Pointe-Noire under the supervision of Hydrex diver/technicians. At the same time a regular-shaped second cofferdam was also built.

Infrastructure and dredging work in the port of Pointe-Noire brought the visibility down to almost to zero. The safety of the divers could not be guaranteed. For this reason Hydrex proposed a new location for the operation.

The owner gladly accepted the proposal to move the research vessel to Port Gentil, Gabon. Thanks to the sheltered environment of the bay the swell is limited. This makes it an excellent location to carry out repair or maintenance work on a ship, barge or rig in ideal conditions.

After a short trip the ship arrived in Port Gentil with the Hydrex team and all the equipment on board. A diving station was set up and the diver/technicians started the installation of the cofferdams. Next they emptied all water from the thruster tunnel, descended into it and carried out the repair. The old damaged belt was removed and replaced with a new stainless steel belt.

The actual operation was finished in only five days. The team removed the cofferdams and the ship was ready to continue its schedule with its thruster tunnel fully protected against cavitation once more.

On-site bow thruster removal and reinstallation in New York

To save time and money for the owner of a bulk carrier, Hydrex removed the bow thruster of the ship and installed a new unit during the vessel's stop in New York. By carrying out both parts of the operation while the ship was berthed, she could continue her schedule without going to drydock. One single mobilization was needed which saved costs.

The Hydrex technical department prepared every step of the operation in detail to make sure that the team could carry out both the removal of the old bow thruster unit and the installation of the new unit during a single operation, in the shortest possible time and without any loss of quality.

Together with all the necessary equipment, a team mobilized from the Hydrex office in Tampa, Florida, to the vessel's location. Because the vessel was trimmed to a position that brought the thruster tunnel out of the water, there was no need to close off the thruster tunnel.

An inspection of the old bow thruster unit revealed that a mooring rope

Underwater stern tube seal repairs with new generation flexible mobdocks

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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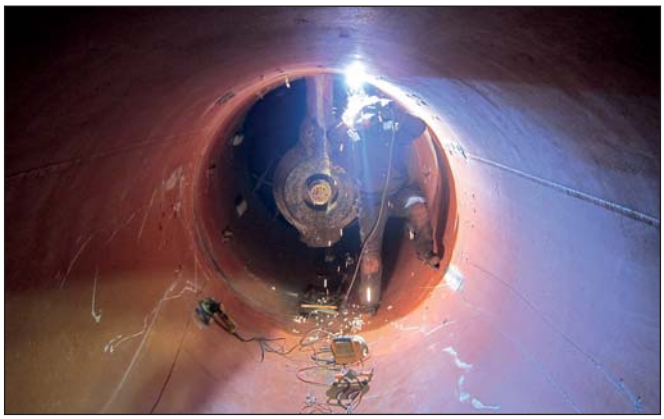


Preparing the thruster tunnel for removal of the old unit.

Bringing the new unit inside the tunnel.

New unit installed and secured.

was tangled around the propeller hub, causing the malfunction that led to the need for replacement. The divers removed the hub first. Next the team cut the support brackets connecting the gearbox to the thruster tunnel and secured the unit with chains. It could then be fully disconnected from the thruster room and was carefully lowered, extracted from the tunnel and brought to the surface.

The new bow thruster unit was then lowered into the water and brought into the thruster tunnel. Next our diver/technicians positioned the gearbox using chain blocks and secured it with bolts. The team completed the operation by reconnecting the thruster unit to the engine room and reinstalling the portside grid.

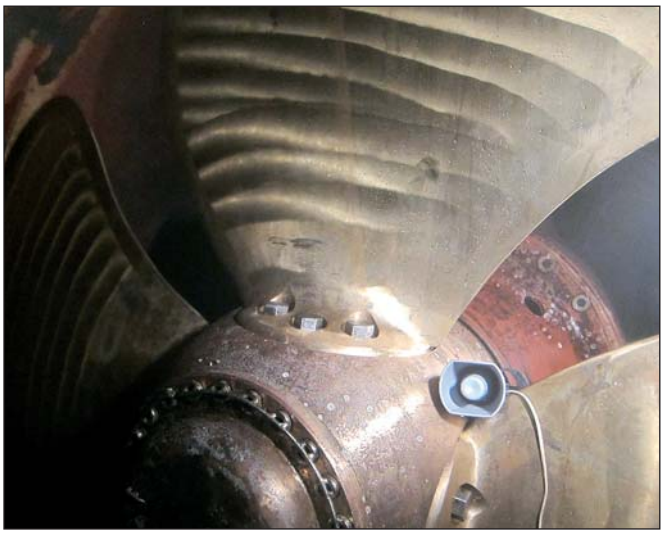
Underwater bow thruster blade replacement in Barcelona

Hydrex divers carried out bow thruster blade replacements on a 270-meter container ship in Barcelona. A condition of class was issued after cracks were detected in the old blades, forcing the vessel to go off hire until a solution was found. Hydrex therefore mobilized a team to Barcelona and performed the operation on-site and underwater using the company's flexible mob-docks.

As soon as our technical department received the call from the owner, a team and all the required equipment was mobilized to the vessel's location. When the diver/technicians arrived, the replacement blades were on board the container vessel. The new blades were prepared for installation while the rest of the Hydrex team readied the bow thruster tunnel for the operation.

Hydrex diving station during bow thruster operation in Barcelona.

Hydrex diver during thruster blade removal.



Thruster unit with new blades installed.

Hydrex truck and equipment next to container ship.

The Hydrex flexible mobdocks were then installed on both sides of the thruster tunnel. Next the team could evacuate 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 and brought it to the surface. Next a replacement blade was lowered into the water and taken into the thruster tunnel. The team positioned the new blade on the bow thruster and bolted it on. This procedure was repeated for the other blades.

After the blades had been replaced they were put on torque. Leakage tests were carried out successfully and the divers removed the flexible mobdocks.

During the replacements the superintendent of the vessel was present. He followed the operation and gave his approval.

The Hydrex team worked in shifts around the clock to finish the job as soon as possible. By performing the operation on-site and underwater, Hydrex made it possible for the owner to have the condition of class removed without going to drydock.

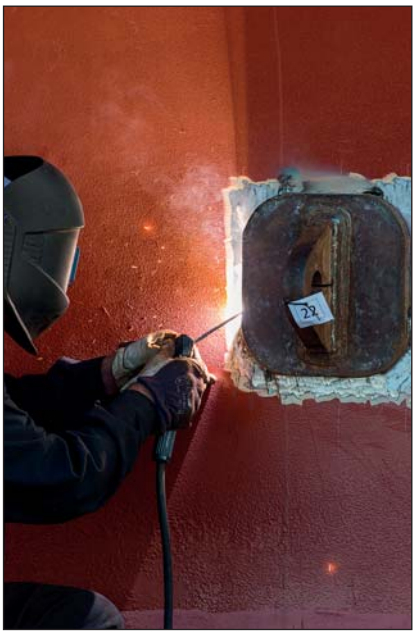
Underwater bow thruster reinstallation in Tacoma, U.S.A.

Three months after Hydrex diver/technicians removed the bow thruster of a 294-meter container ship in Tacoma, a Hydrex team once again mobilized to this location to reinstall the overhauled unit underwater with the use of the Hydrex flexible mobdock.

The superintendent of the ship was very satisfied with the first part of the operation. The job was completed well within the available time frame thanks to good teamwork of the Hydrex divers, the ship staff and the floating crane operator. For this reason the customer asked Hydrex to take care of the reinstallation as well.

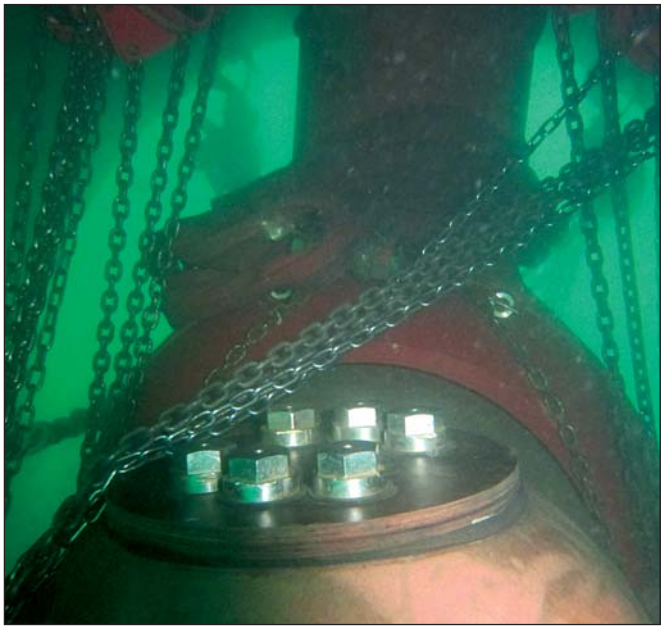
Together with all the necessary equipment, the team mobilized from the Hydrex office in Tampa, Florida to the vessel's location. After they set up a monitoring station on a workboat, the team positioned the bow thruster onto a cradle. This cradle was designed especially for thruster operations. It can be adjusted to the size of the unit. In this manner the thruster is prevented from tipping over, making it much

Hydrex performed a bow thruster reinstallation in to Port of Tacoma, Washington, U.S.A.



Preparation of the hull for the chains used to lower the unit.

Hydrex diver preparing for the underwater operation.



Bow thruster unit being positioned in the thruster tunnel.

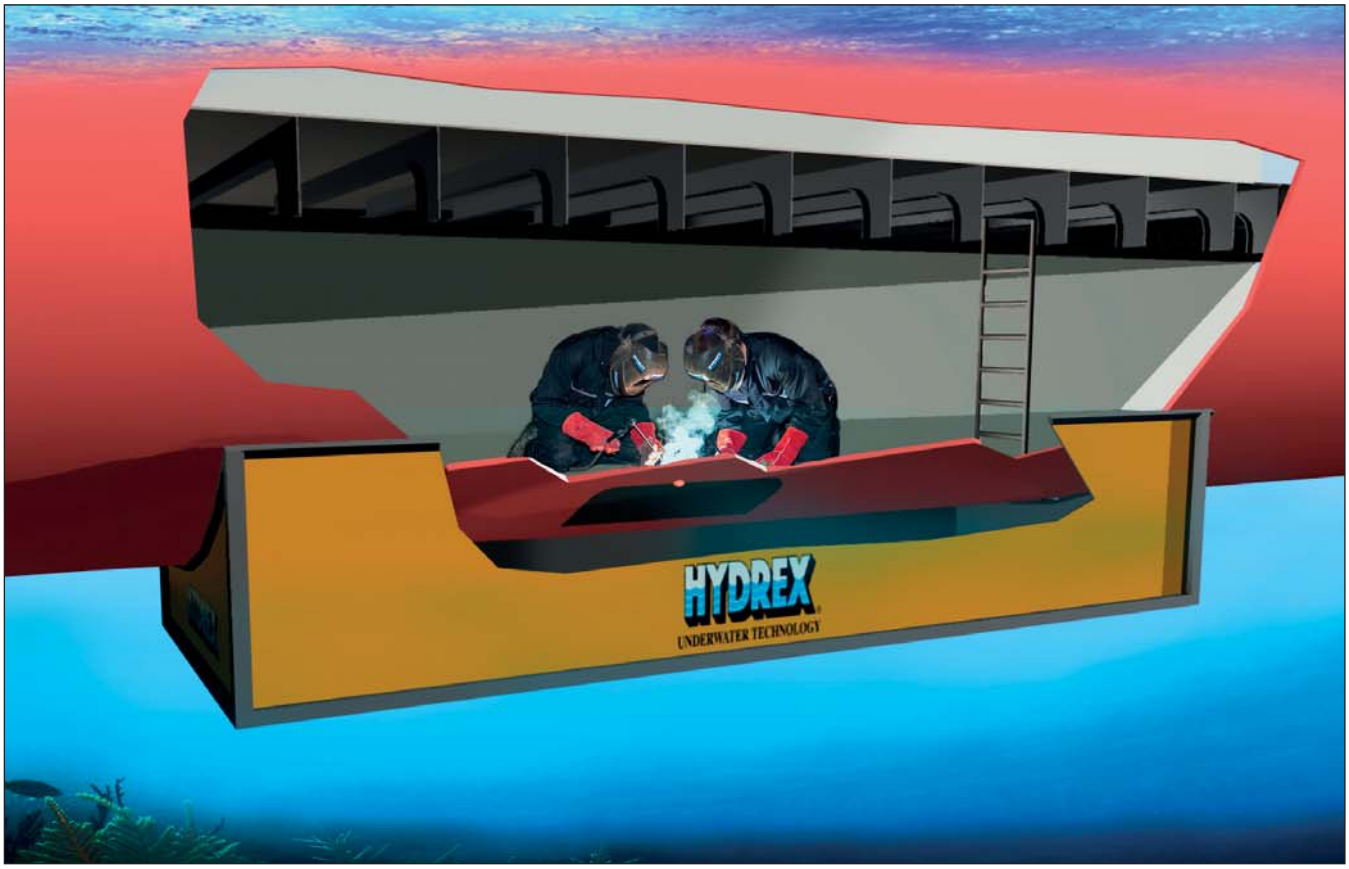
easier to handle. The Hydrex divers could lower the unit into the water and maneuver it inside the thruster tunnel in one take. The team positioned the bow thruster and secured the unit.

The team then used the lightweight flexible mobdocks developed by Hydrex to close off the thruster tunnel on both sides. This allowed the diver/technicians to evacuate all the water from the tunnel and create a dry working environment around the bow thruster. The thruster propeller blades were then reinstalled one by one. The team completed the operation by reconnecting the thruster unit to the engine room.

Conclusion

Performing jobs like these on a tight schedule takes a lot of planning. This can only be done successfully by staff who have familiarity with such operations and 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 also has very well-equipped rapid response centers including customized workboats, ready to mobilize directly to the job site. An effective, competent team is the only way to consistently achieve a high quality result in the short periods of time usually available to ships. ■

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 own-ers to keep to their schedule and have a permanent repair carried out during the next sched-uled 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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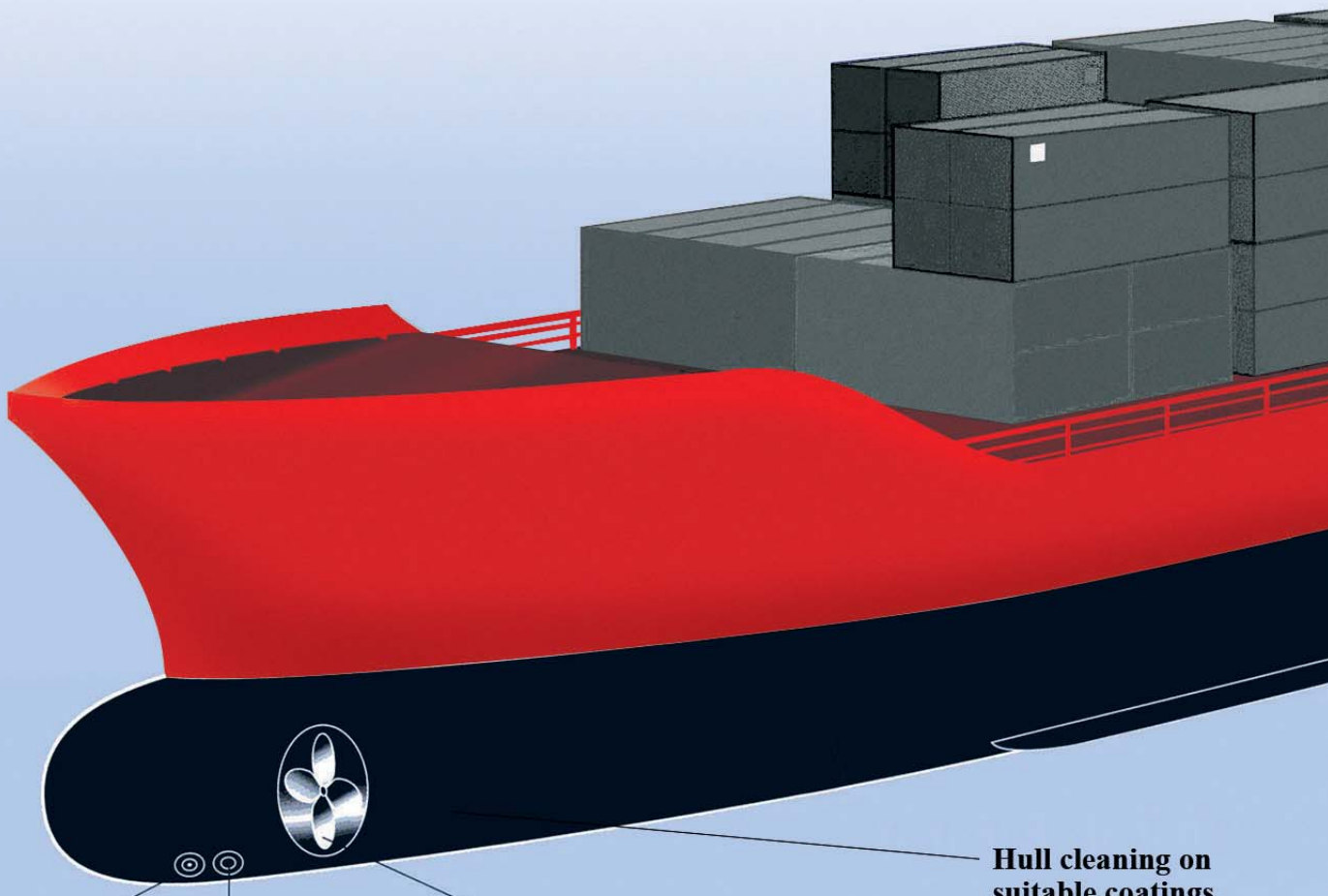
Specialist class approved insert repair work carried out and on a permanent basis. Providing a real alternative to drydock.

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.



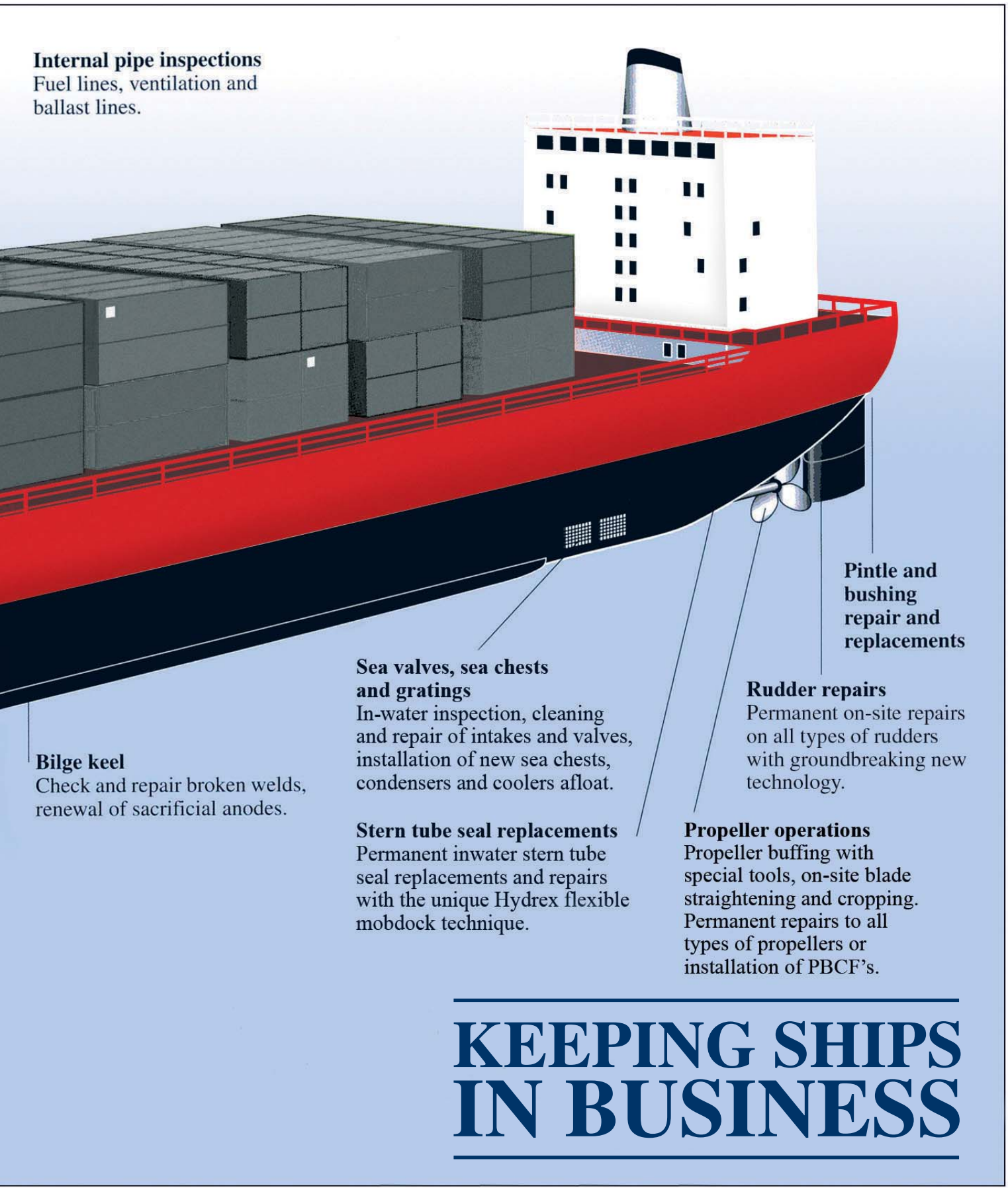
Hull cleaning on suitable coatings

Echo sounder inspection and replacement

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

Speed log
Checks for damage and marine fouling.

air and maintenance services

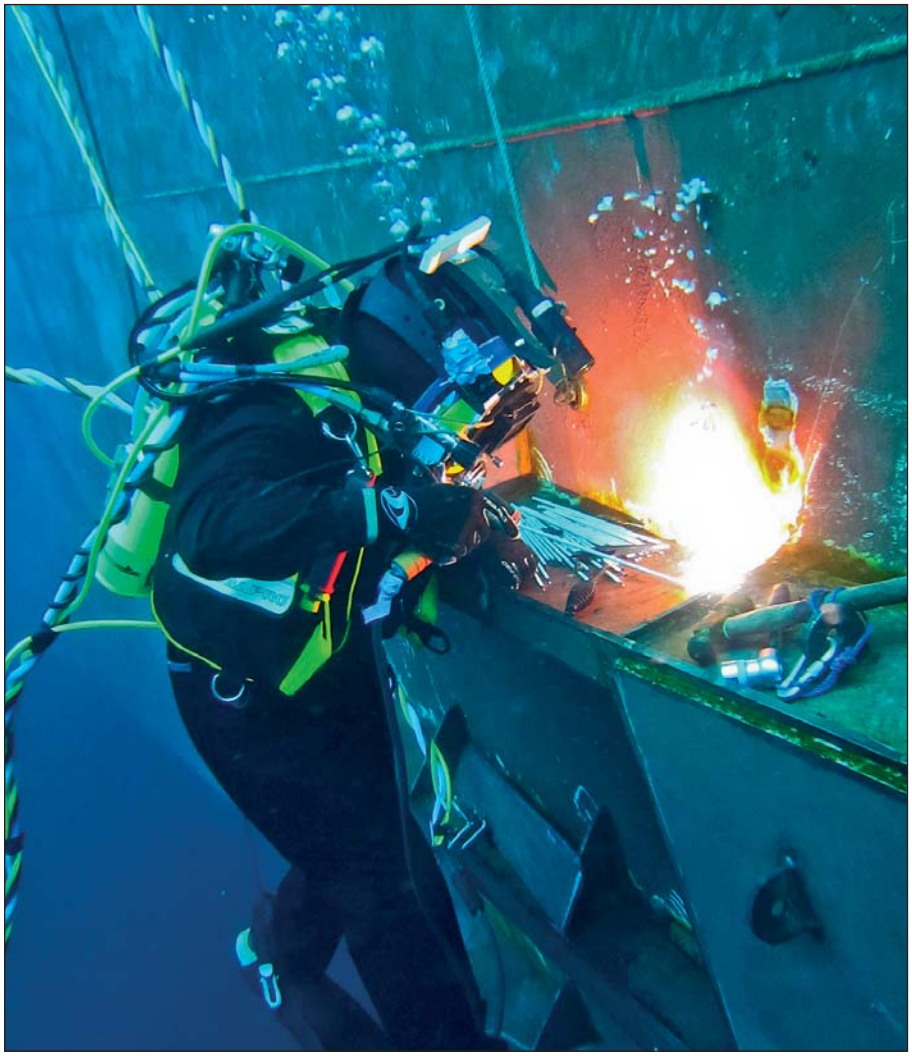


Emergency repairs allow vessels to keep sailing

Hydrex offers fast on-site repairs in emergency situations. Our offices have fully operational fast response centers. This allows us to immediately mobilize teams to locations around the world for a wide range of operations.

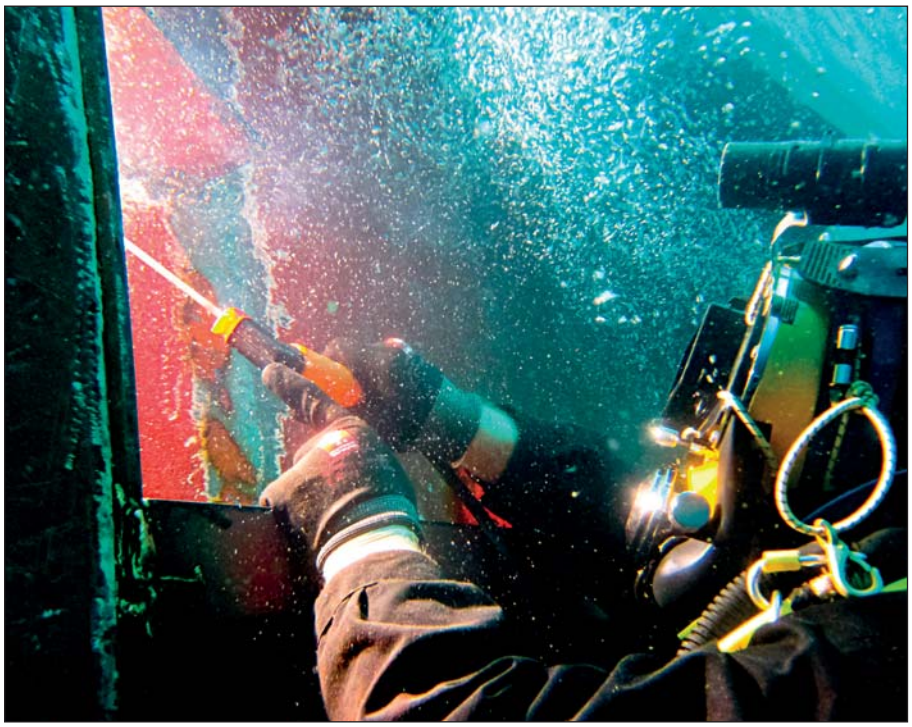
Hydrex can perform routine as well as more complex repairs underwater.

There are many unfortunate events that can stop a ship from sailing. Ships with a leaking stern tube are often not allowed to enter ports. A vessel can be tied up after a collision or a malfunctioning rudder can prevent safe maneuvering. Going to drydock is obviously not an option in such cases. Arranging the vessel to be unloaded at sea is an organizational and financial disaster for the owner. On top of this it does not solve the problem, because the damaged ship is still unable to leave its location.



We can mobilize teams to locations around the world.

Hydrex can perform routine as well as more complex underwater repairs to thrusters, propellers, rudders, stern tube seals and damaged or corroded hulls. Our divers create drydock-like conditions around the affected area so they can carry out these operations on-site and within the shortest possible time frame. This allows the vessel to sail again. In most cases a permanent repair can be performed and no follow-up is needed. If this is not possible, a class approved temporary solution is offered. The ship can then continue its schedule or can go to drydock at a more convenient time and location.



Hydrex divers can carry out operations on-site and within the shortest possible time frame.

In most cases a permanent repair can be performed and no follow-up is needed.

By their very nature, emergencies occur unexpectedly. However, being prepared for an emergency goes a long way in salvaging the situation when they do occur. We encourage you to get in touch with us, to find out what we can do and how quickly we can respond and then keep us on file as your first port of call in case an emergency does occur.

Contact us 24/7 if you need immediate assistance. Our technical department is ready to create a tailor-made solution for your specific needs. ■

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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 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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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) 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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