HYDREX®

UNDERWATER TECHNOLOGY

Magazine

Number *225*

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

Our flexible mobdocks can be used worldwide to perform a wide variety of operations. The technology was developed by our in-house R&D department. It allows us to create a dry environment underwater for our divers to work in.

The first article in this magazine deals with this technology. Some recent examples can also be found in the article.

The next article talks about an emergency propeller operation in Dubai. This repair allowed a chemical tanker to keep a five year drydock interval instead of having to go off-hire immediately, saving the owner precious time and money.

In the last article you can read about propeller cone fin operations. By carrying these out afloat, owners do not have to wait until the next drydocking to start benefitting from the savings propeller cone fins can bring.

If you would like to learn more about Hydrex services, please visit our website (www.hydrex.be) or call us 24/7 with your underwater repair needs, routine or emergency.

Hydrex founder
Boud Van Rompay

Cover: Hydrex diver grinding cropped propeller blade.

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ISO 9001 certified

Underwater services and technology approved by:

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Fast underwater repairs using flexible mobdocks

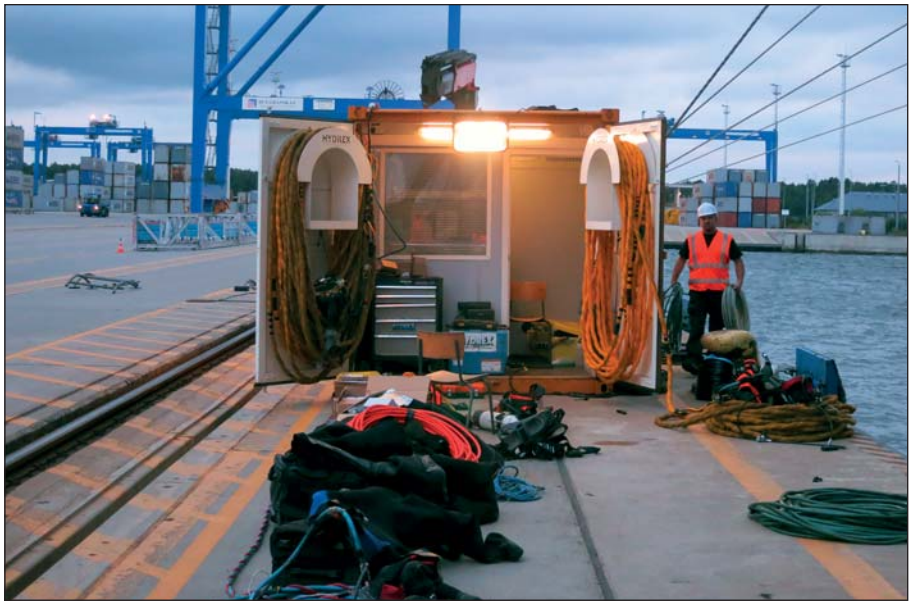
Hydrex is able to perform a wide variety of operations with its flexible mobdocks. These enable us to create a dry environment underwater for our divers to work in. There is no need to send the vessel to drydock as all operations can be carried out alongside or at anchorage. Normal commercial activities can therefore continue without interruption.

Every Hydrex office has a fast response center equipped with all the latest facilities, equipment and tools. These centers were designed specifically to increase speed of service. They allow us to mobilize our lightweight mobdocks almost immediately to operations around the world.

This technology was first used in 2002 and has been further developed by our in-house R&D department ever since. Hydrex constantly invests in the research necessary to continue to evolve repair techniques and procedures. Over the years the Hydrex R&D department has constantly improved the flexible mobdock (mobile mini drydock) technique to make it possible for Hydrex diver/technicians to perform permanent repairs on seals, thrusters and any other part of the underwater vessel without the vessel needing 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.

Diver/technician working on the shaft seal assembly.



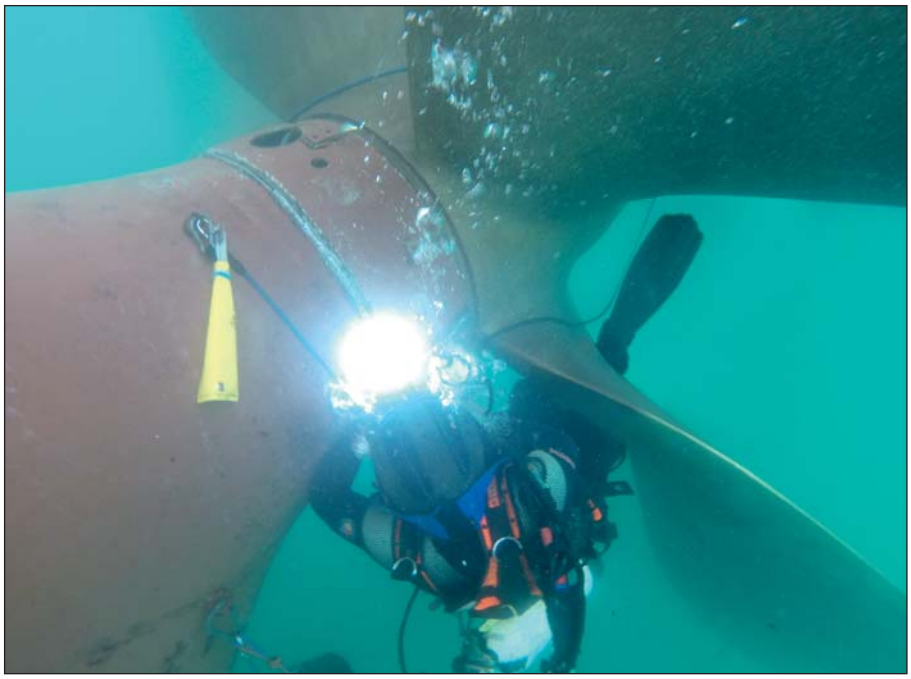
A monitoring station was set-up next to the vessel.

All the necessary equipment can be transported in lightweight flight containers.

Stern tube seals

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 Hydrex keeps 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 allowed to enter ports, or they can receive very heavy fines.

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


Hydrex diver/technician re-installing rope guard after successful seal repair.

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 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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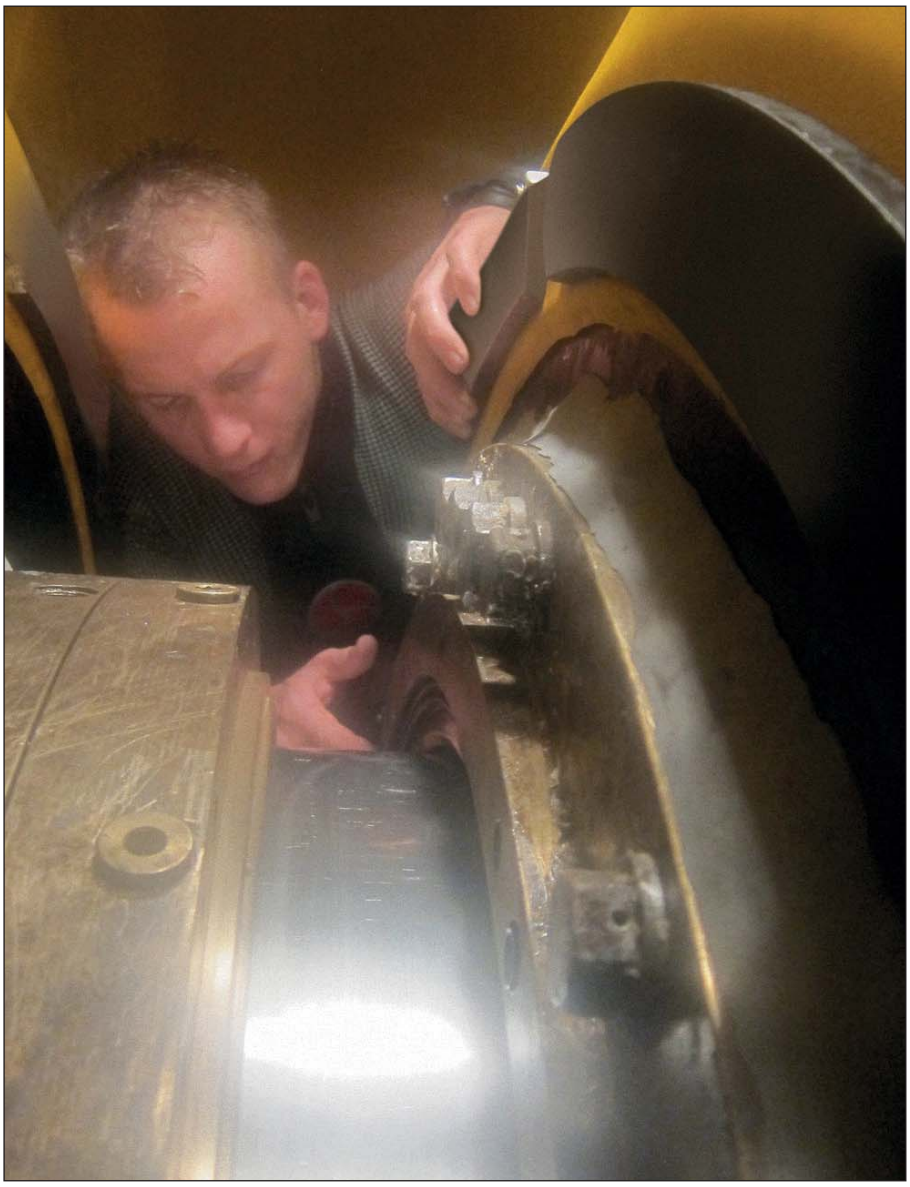

Hydrex diver working on the aft assembly inside the flexible seal mobdock.

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

New bow thruster unit installed and secured.

Bow thrusters

With the mobdock technology Hydrex diver/technicians can carry out repair or maintenance work on all types of thrusters. A unit can be removed when it needs to be overhauled. When this is completed, it can then be reinstalled by Hydrex. With the flexible mobdock technology all water is removed from the thruster tunnel. This allows other operations to be carried out afloat as well. For example propeller blades can be replaced or repair work on the gearbox can be done on-site.

It's 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 ruts. 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.

Recent case study:

Dry shaft seal renewal underwater in Australia

In May a Hydrex diver/technician team carried out underwater stern tube seal repairs on a 200-meter roro vessel in Port Kembla, Australia. The ship's stern tube was suffering an oil leak, making an on-site repair necessary.

Taking advantage of the Hydrex flexible mobdock technique the team was able to carry out the entire repair on-site and underwater. During the operation the team removed the three damaged seals and replaced them with new ones provided by the OEM.

A Hydrex team carried out underwater stern tube seal repairs on an offshore supply vessel in Australia.

Despite the remote location of the vessel, our technical department was able to arrange a rapid mobilization of a team and equipment to Australia. In the past we have carried out several operations in Australia, among which an emergency stern tube seal repair on an offshore supply vessel in cooperation with Wärtsilä.

In most cases a thruster overhaul is planned in during a scheduled drydocking. This usually means that the unit is removed in drydock. The ships then has to wait for the repaired thruster to return and be reinstalled before the vessel can leave

drydock. This means costly extra off-hire time. Hydrex can however remove the unit while the ship is still afloat so it can already be brought to the manufacturer for repair. 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, Hydrex 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.

Inside the stern tube seal flexible mobdock divers can work in drydock-like conditions.

Recent case study:

Underwater bow thruster installation in stages allows vessel to stay on schedule

Two and a half months after Hydrex diver/technicians removed the bow thruster of a 363-meter container vessel in Rotterdam, a Hydrex team once again mobilized to reinstall the overhauled unit underwater with the use of the Hydrex flexible mobdock technique. Like the removal, the operation was performed in stages at several locations to allow the vessel to keep to its sailing schedule.

The superintendent of the ship was very happy with the first part of the operation. For this reason the customer asked Hydrex to take care of the reinstallation as well. The job was completed well within the available time frame thanks to good team work of the ship staff and the Hydrex divers.

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. ■

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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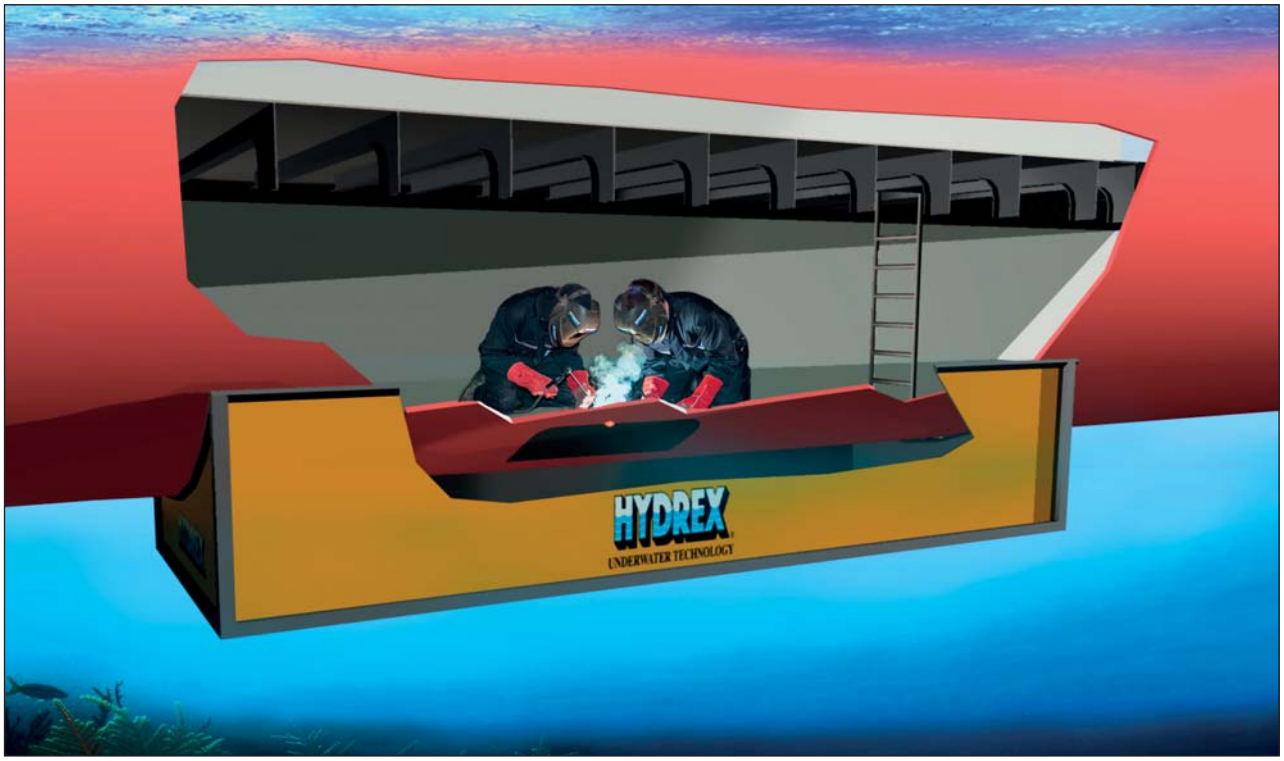
Hydrex diver working in the bow thruster room during thruster operation.

Overhauled thruster unit on workboat, ready for installation.

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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Emergency repair in Dubai keeps vessel on long drydock interval

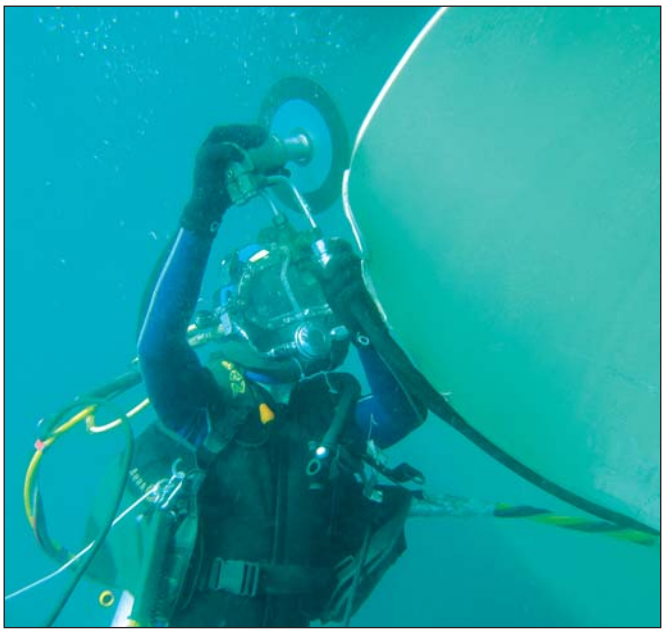
A 184-meter, 50.885 DWT chemical tanker had hit a buoy. A full underwater inspection and repair was needed. The vessel was only launched last year and was on a long drydock interval. Coming in for repairs now would have been a financial disaster for the owner. We therefore immediately mobilized an emergency team to Dubai to perform the inspection and any required follow up repair afloat.

Workboat with equipment in Dubai.

After the equipment arrived at the vessel's location the team started the operation with a detailed survey of the underwater ship. Fortunately this revealed that only a single blade of the propeller had been damaged. Because the damage to the blade was minimal only a small part of the blade needed to be cropped.

The team used the information acquired during the inspection to calculate and determine the correct measurements needed to modify the tip of the propeller blade. The repair proposal was then discussed with the class and the owner. After it was approved, the divers cropped the blade and ground its edge to give it the correct radius and shape. Some small nicks and cracks along the trailing edge were also repaired.

One of the blades was damaged by a buoy.



Hydrex diver/technician cropping the blade.

Smoothing the edge of the cropped area.

One of the repaired nicks along the trailing edge.

When the cropping was complete, the Hydrex technicians polished the blade to make sure that any remaining loss of efficiency would be minimal. No rebalancing of the propeller would be needed in this case as the part of the blade that was removed was within the acceptable range.

The operation took less than a day. Thanks to the emergency repair the ship could keep its schedule instead of having to go off-hire. No further actions will be needed until the vessel docks in four years. ■

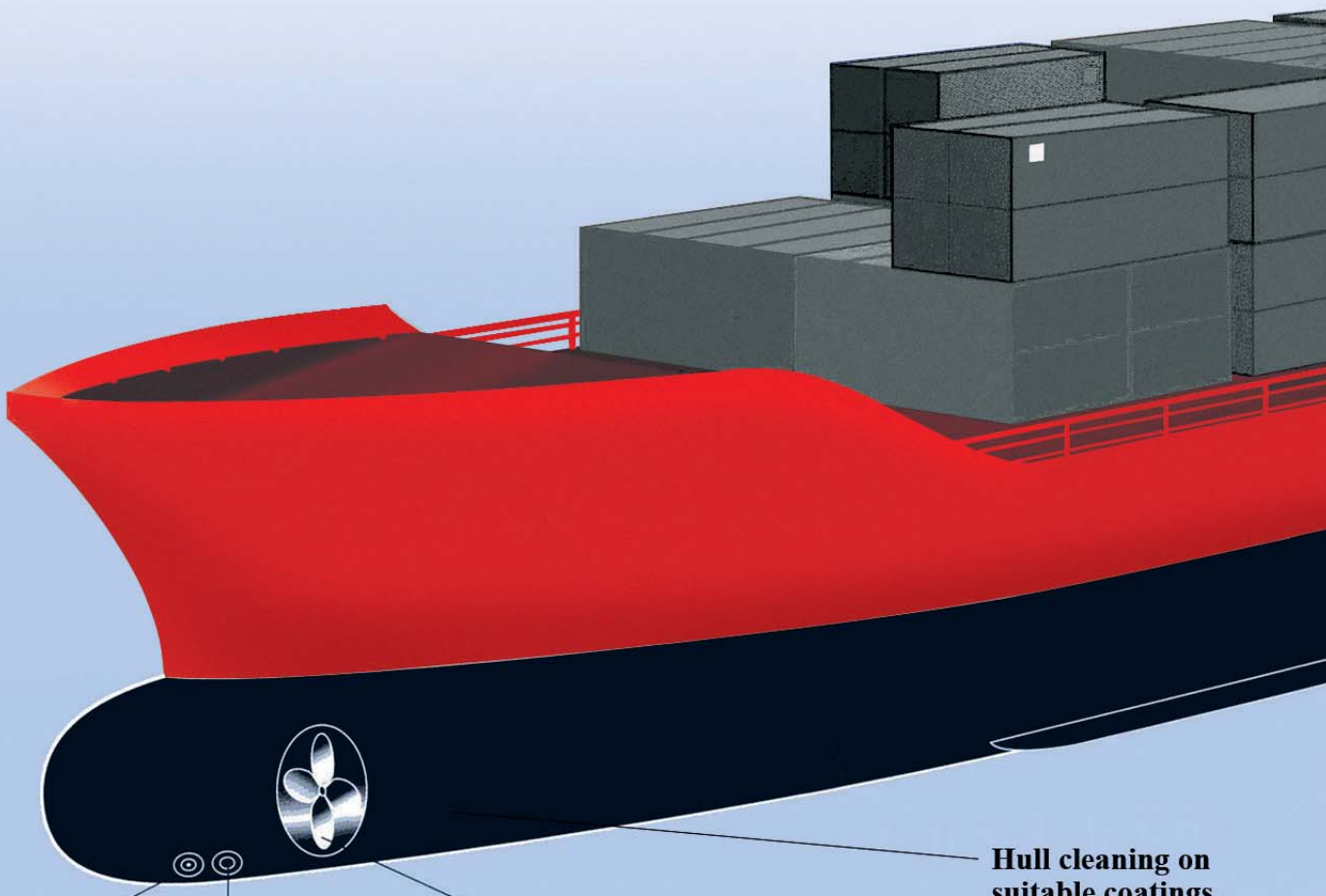
The edge of the cropped and ground blade.

High quality in-water ship rep

Permanent insert repairs
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.



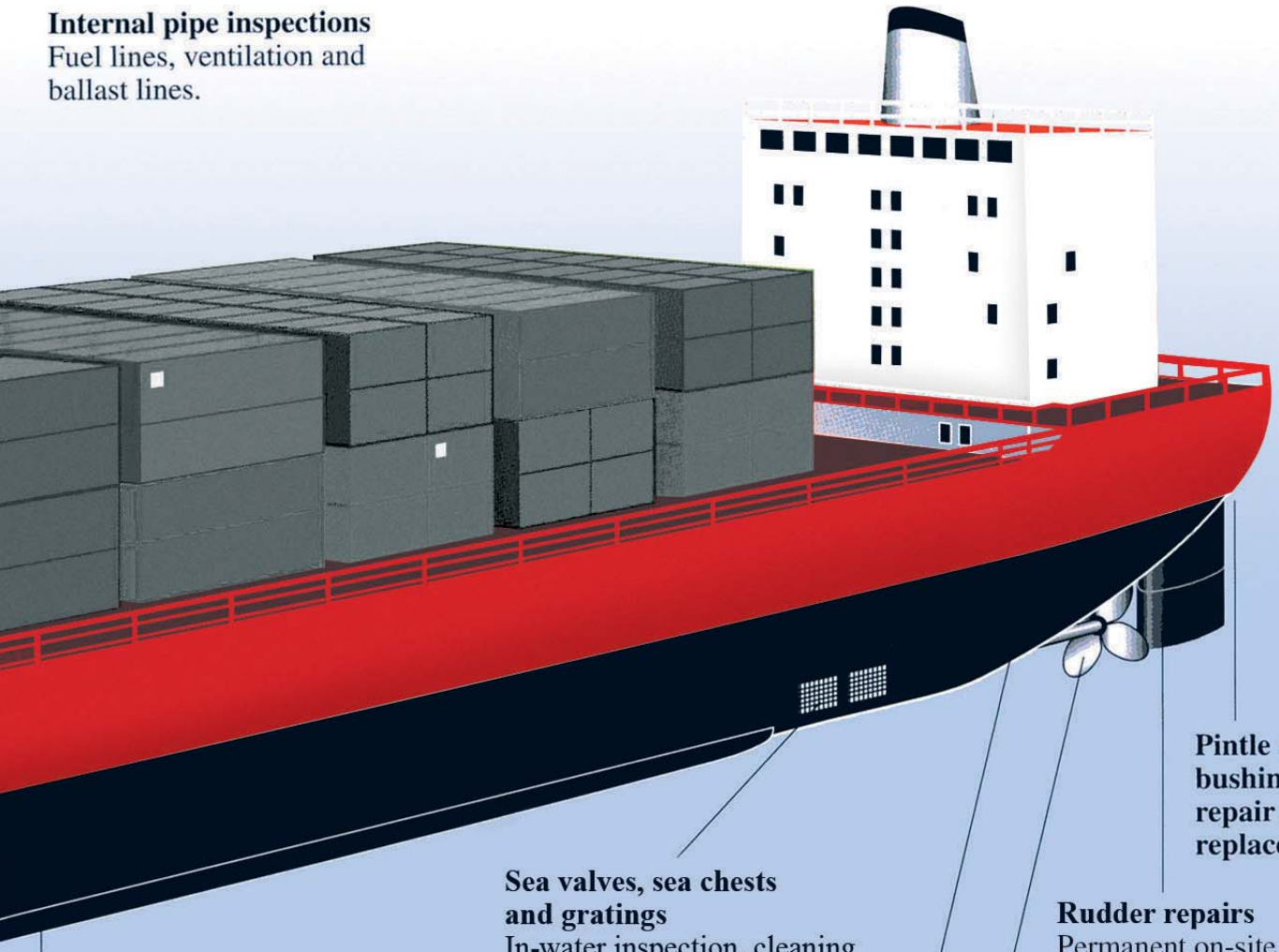
Hull cleaning on suitable coatings

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 fuel saving services



Internal pipe inspections
Fuel lines, ventilation and ballast lines.

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

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

Pintle and bushing repair and replacements

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

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

KEEPING SHIPS IN BUSINESS

Underwater propeller cone fin installation offers immediate fuel savings

Over the last few months Hydrex installed propeller cone fins on several general cargo vessels. These operations were carried out near the Hydrex offices in Antwerp and Tampa, but can be performed economically almost anywhere. A direct result of this underwater operation is that an owner can instantly start benefitting from the fuel savings a propeller cone fin brings. He does not have to wait until the next scheduled drydocking for the installation.

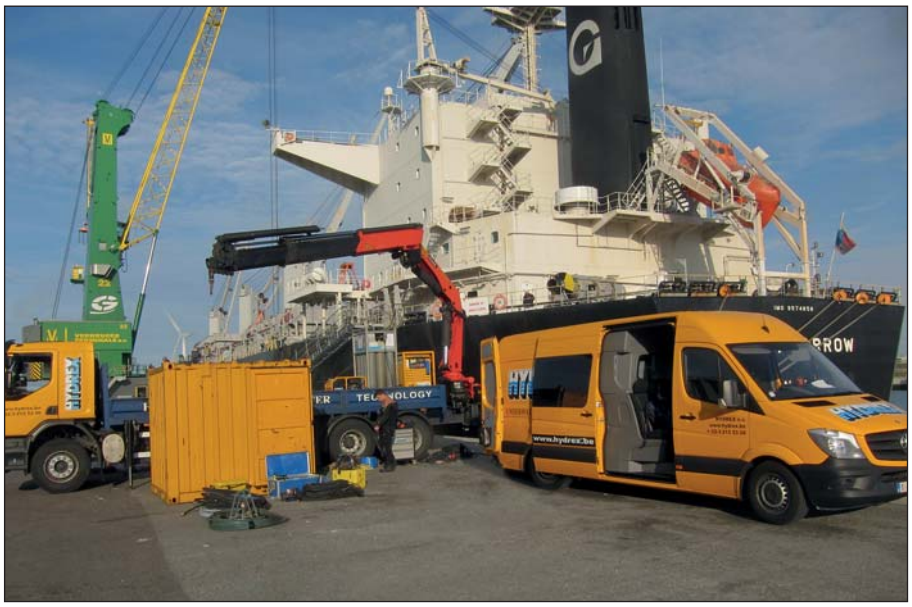
Propeller cone fine ready for installation.

Propeller caps like these can recover energy loss of a propeller hub vortex in the propeller's slipstream. This decreases fuel consumption from 3% up to 5% according to the manufacturers and reduces cavitation on rudders and hulls. Hydrex can install propeller cone fins underwater on any size and make of propeller, on both new build or in-service vessels.

Installation afloat prevents a long wait for fuel savings

Hydrex carries out these operations following the specific procedures required by the involved OEM, adapted for an installation afloat. After a preliminary inspection the divers remove the propeller cap and clean the flange where the device is to be installed. They then lower the propeller cone into the water and position it on the propeller. The bolts are put on the correct torque and secured if needed. Hydrex teams can work in shifts around the clock to


Hydrex carries out these operations following specific OEM procedures adapted for underwater installation.



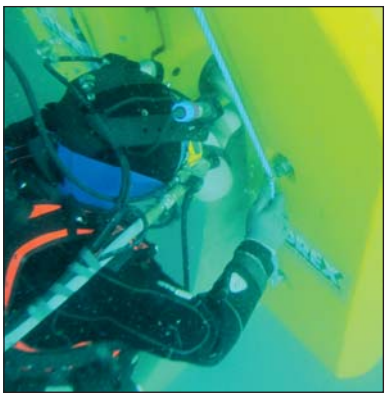
Hydrex trucks and equipment during propeller cone fin installation.

Diver/technician being dressed up for underwater operation.

finish the operation as quickly as possible.

The owner of the vessel can start enjoying the fuel savings the propulsion improving device creates right away. Not having to wait for the next scheduled drydocking to have the propeller cone fin installed can win him up to two years of fuel savings. In contrast, he will have earned back the cost of the underwater installation in only a few months. The savings are considerable. ■

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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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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