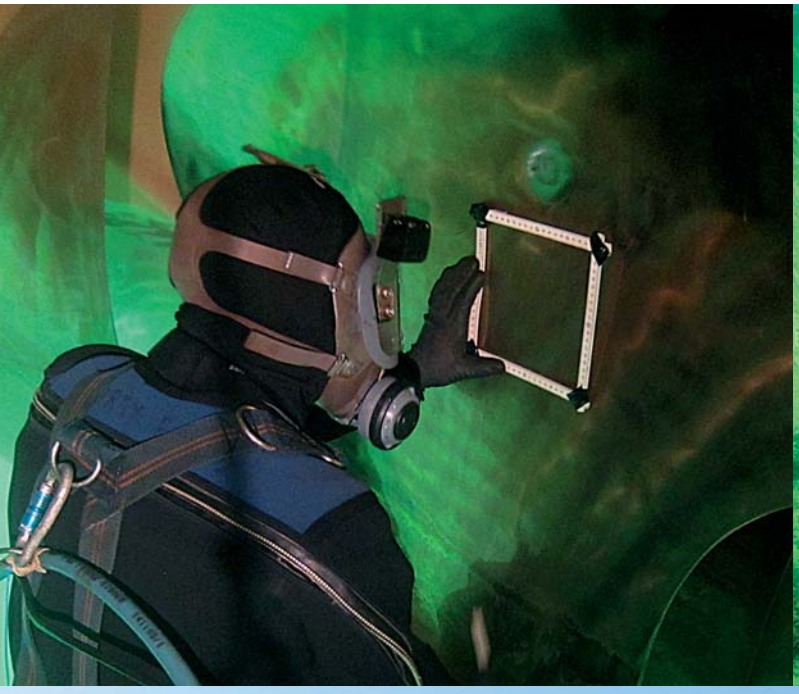
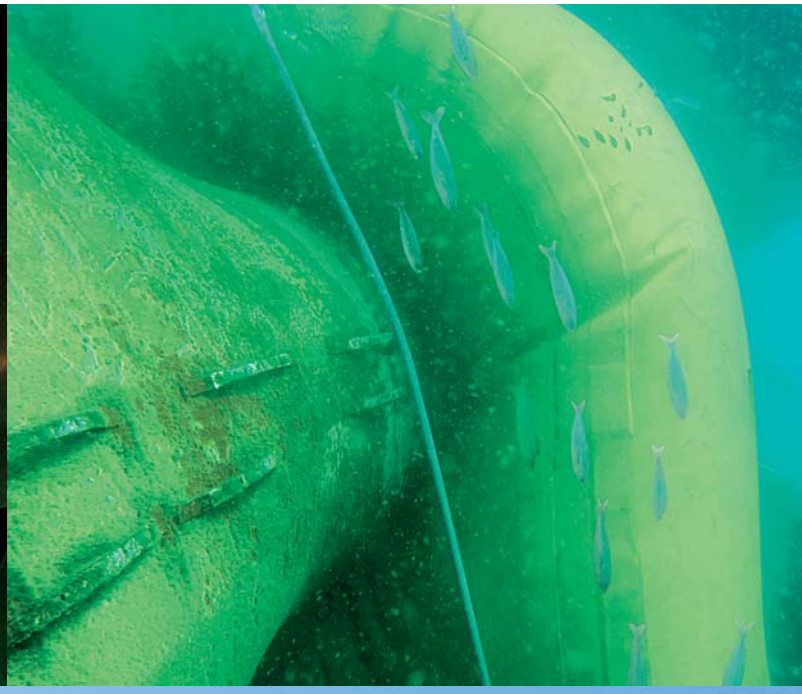
HYDREX®

UNDERWATER TECHNOLOGY

Number *199*





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.

HYDREX®
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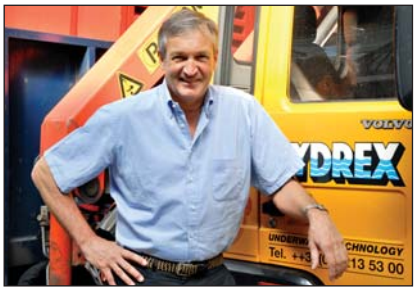
Editorial



We begin this magazine with a revolutionary breakthrough. I am proud to announce that Hydrex is now able to perform repair and maintenance work to all types of propellers on-site and underwater, but in drydock-like conditions.

With the implementation of this technique our diver/technicians can now perform permanent repairs to all parts of the underwater ship propulsion system in drydock-like conditions. Going to drydock for repairs to stern tube seals, bow thrusters, rudders or propellers is not necessary. This will allow you to keep your vessel in operation.

The second article in this magazine gives a good illustration of how the Hydrex underwater repair services can save you time, money and organizational problems. A container vessel was leaking oil. To enable the ship to continue its journey as planned, a Hydrex team mobilized to the vessel while it was berthed in Singapore. The diver/technicians replaced the three damaged stern tube seals underwater, repairing the oil leak.

Hydrex can also straighten or crop bent propeller blades on site. There were recent examples of this operation in Croatia and Denmark. In Dubrovnik all blades of the two propellers of a cruise vessel were cropped without interfering with the ship's very tight sailing schedule. In Kalundborg a similar operation was carried out on a bulk carrier.

Hydrex also performs underwater steel repairs. An example of this can be found further on in the magazine where we write about a permanent insert repair on a tanker berthed in Rotterdam. Like all Hydrex operations, this repair was performed in the shortest possible time frame and to the highest quality standards.

Finally we are very pleased to announce Hydrex White Paper No. 12: Ship-hull Performance Optimization Tool (SPOT), describing a simple method for a ship's officers and crew to ensure that their ship achieves and maintains optimum hull efficiency, thus saving enormous amounts of money on fuel.

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 Recognized Specialist · GL · Lloyd's Register Quality Assurance ISO9001 · Lloyd's Register Quality Assurance VCA · Bureau Veritas · Nippon Kaiji Kyokai ClassNK · RINA · ADC International

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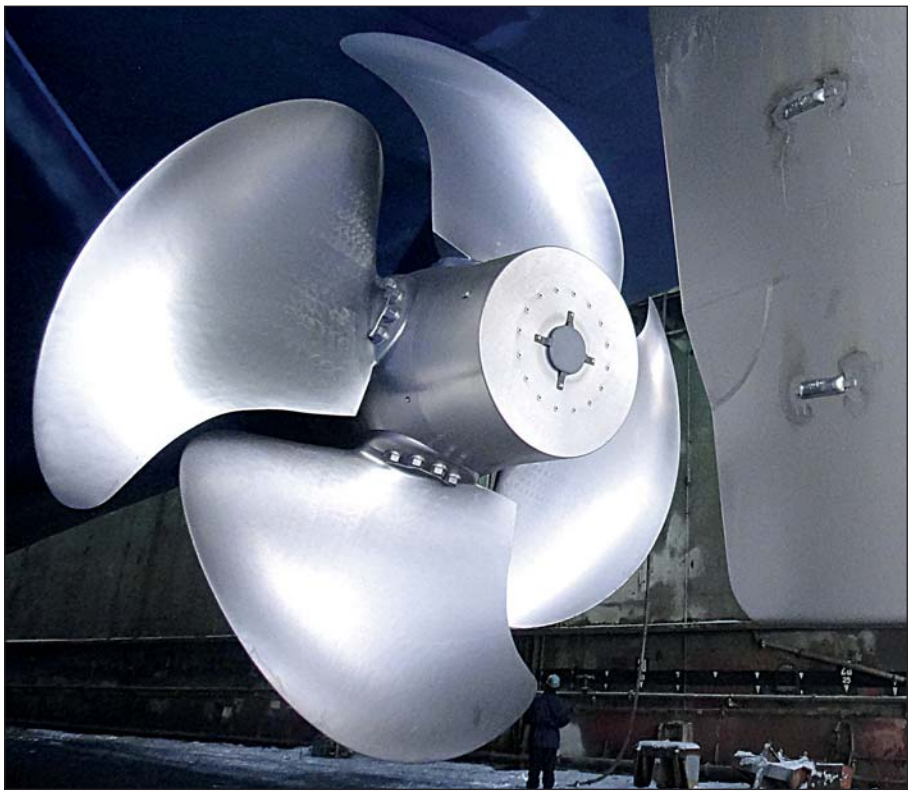
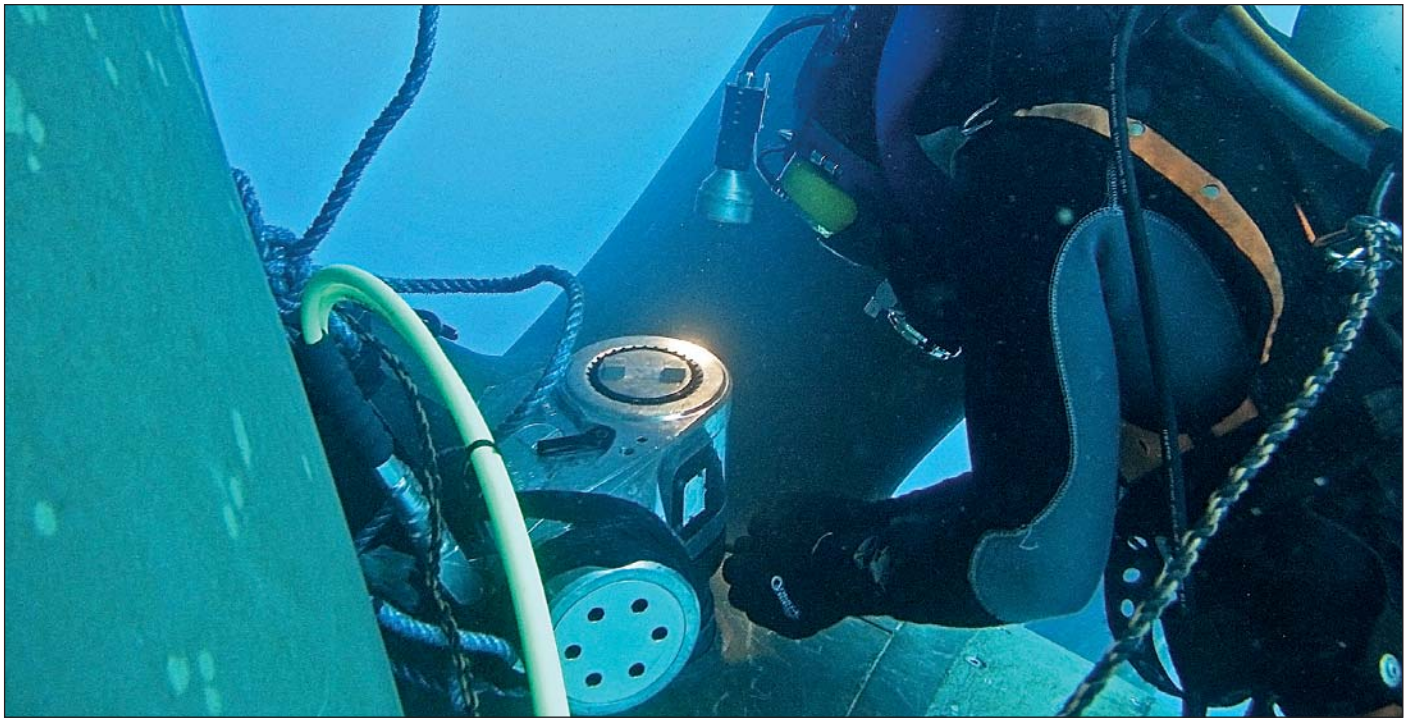
World premiere: permanent underwater repairs to all types of propellers now possible

Over the years the Hydrex R&D department has continuously improved underwater repair techniques to make it possible for Hydrex diver/technicians to perform permanent repairs on seals, thrusters, rudders and almost any other part of the underwater vessel without the ship needing to go to drydock.

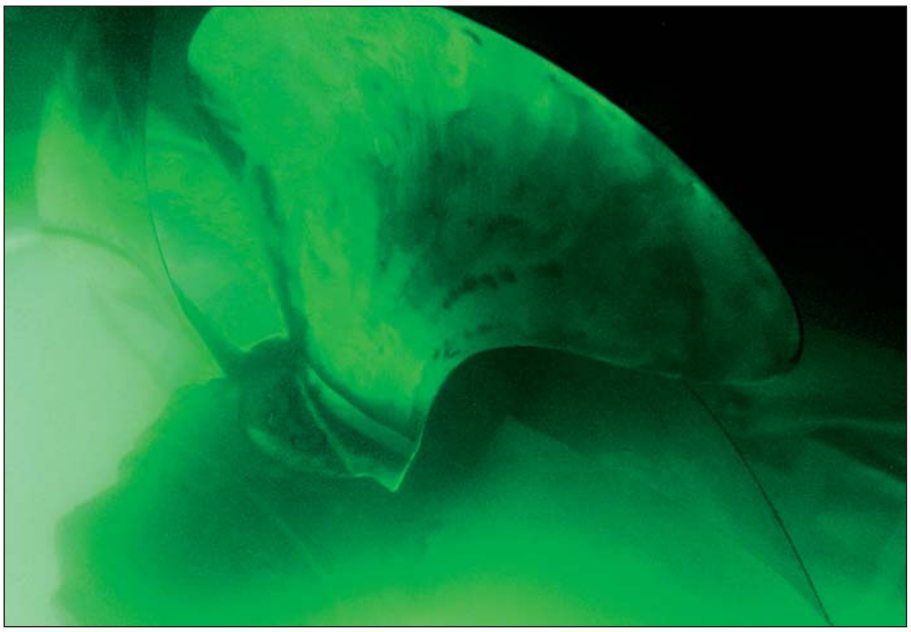
The final step has now been taken by the development of a repair system that allows Hydrex to perform permanent underwater repairs to every type of propeller in dry conditions. All kinds of repair or maintenance work can be carried out to propellers, twin propellers, variable pitch propellers, azipod and collapsible thrusters.



Permanent repair and maintenance work to all types of propellers can now be carried out underwater.



Previously only basic repairs could be carried out on-site.

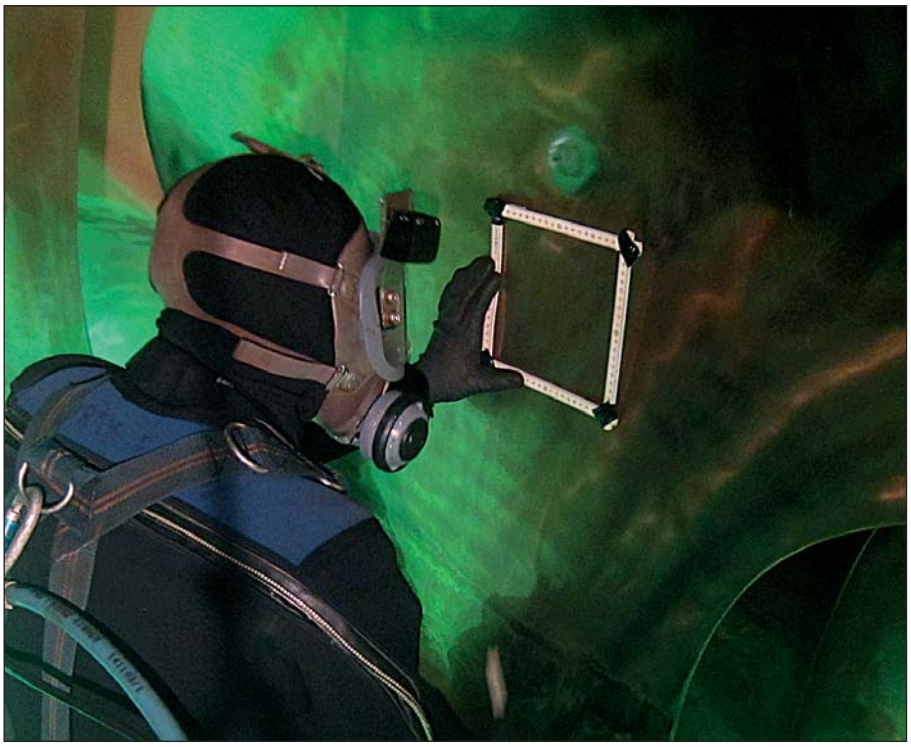


Hydrex can perform underwater work to the propeller or thruster in drydock-like conditions.

This is especially important news for supply vessels, navy ships or any vessel under contract or on a location far away from available drydock possibilities. Staying on hire for underwater repairs will save precious time and money.

This new repair system can be transported by air transport to any location around the world from the Hydrex fast response centers within a very short time frame. It can be assembled very quickly (12 hours) on-site.

With the implementation of this technique our diver/technicians can now perform permanent repairs to all parts of the underwater ship propulsion system in drydock-like conditions. ■



Hydrex diver/technician performing a propeller blade inspection underwater, in a dry environment.

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.

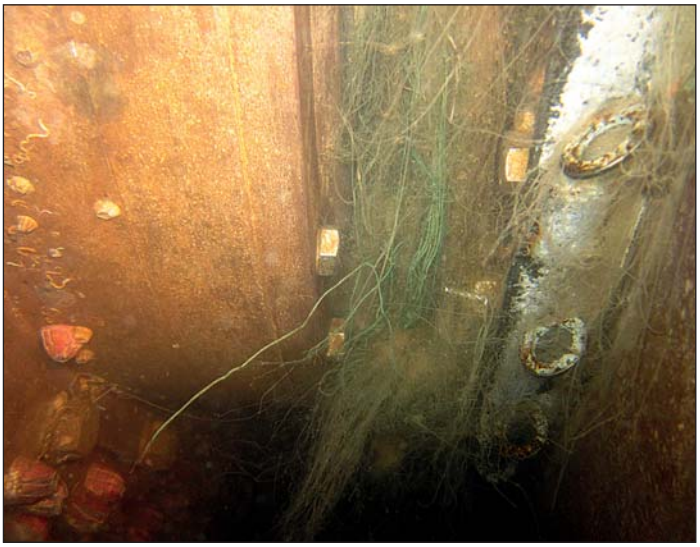
No drydocking needed after fast underwater stern tube seal repairs in Singapore

In May, Hydrex diver/technician teams carried out underwater stern tube seal repairs on a 292-meter, 50,644 grt container vessel in Singapore. The ship was suffering from an oil leak, making a fast repair necessary. Using one of the company's flexible mobdocks the team was able to carry out the entire operation on-site and underwater, saving time and money for the owner.

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. The lightweight flexible mobdocks packed in flight containers allowed for a very fast mobilization and a timely arrival in Singapore of the Hydrex team.

After the diving team had set up a monitoring station, the operation

The damaged stern tube seals were replaced underwater in a dry environment.



Fishing lines entangled around the stern tube assembly caused an oil leak.

The Hydrex mobdock allows on-site stern tube seal repairs.

Hydrex diver/technician inside the mobdock communicating with the surface.

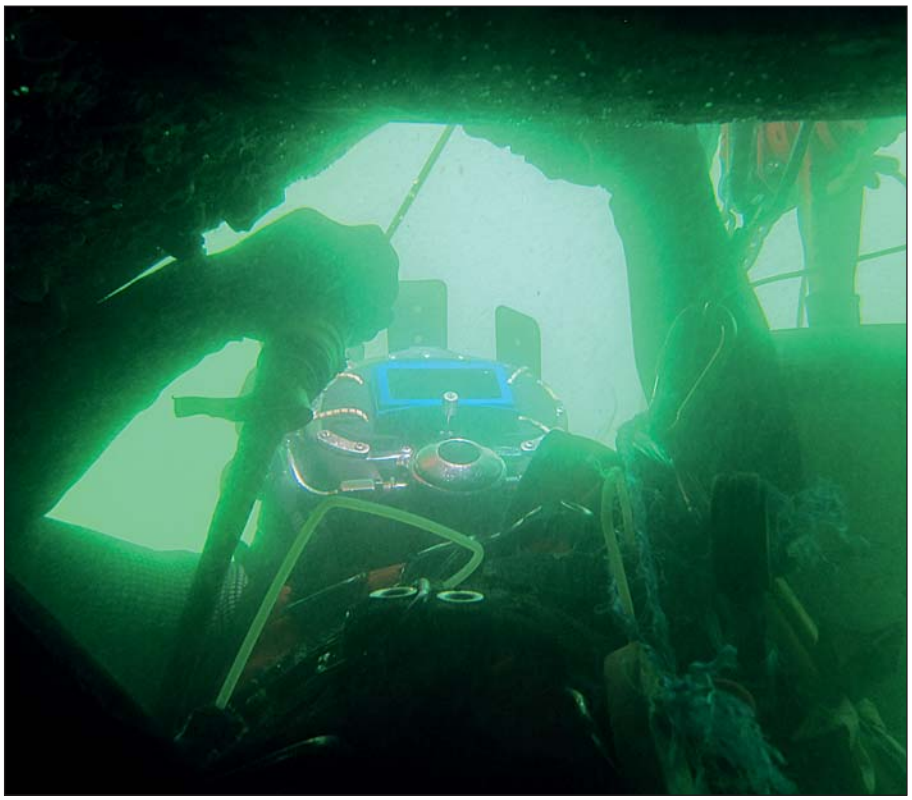
started with a thorough underwater inspection of the stern tube seal assembly. This revealed that a fishing line had caused the leak.

After the inspection, the team detached the rope guard of the vessel. The fishing lines entangled around the liner were then removed. The divers then installed the flexible mobdock around the stern tube seal assembly creating a dry underwater environment for the divers to work in drydock-like conditions. The split ring was then disconnected and brought to the surface to be cleaned. After cleaning the entire assembly, the divers removed the first seal and replaced it with a new one which was then bonded. This procedure was repeated with the other two damaged seals.

The operation ended with the conducting of pressure tests with positive results, the removal of the flexible mobdock and the reinstallation of the rope guard.

Hydrex has carried out repairs and replacements on all types of seals on-site and underwater, for a number of years now. 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 almost any other part of the underwater vessel without the vessel needing to go to drydock. The latest generation of flexible mobdocks allows Hydrex to carry out on-site replacement of virtually any type of stern tube seals very quickly.

Going off hire causes a substantial loss of money for the owner. The



Hydrex diver performing welding work on the rope guard of the container vessel.

teams therefore worked in shifts to perform the stern tube seal repairs within the shortest possible time frame. This allowed the owner to let the ship continue its schedule without unnecessary delay, saving him precious time and money. ■

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You can contact us at:
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or at
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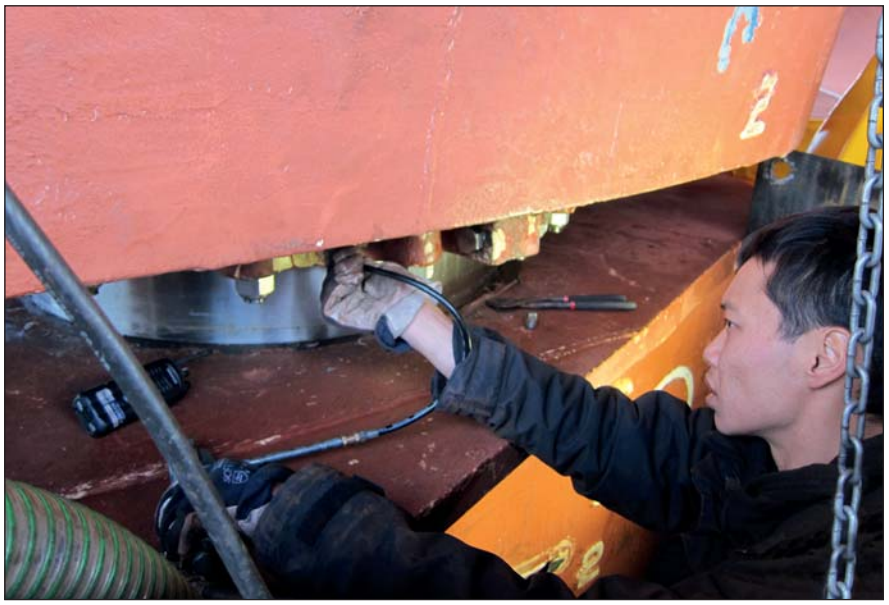
Permanent in-water rudder repairs now possible without drydocking

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 lightweight and can be mobilized very rapidly in our special flight containers. Therefore this new service is now available worldwide.



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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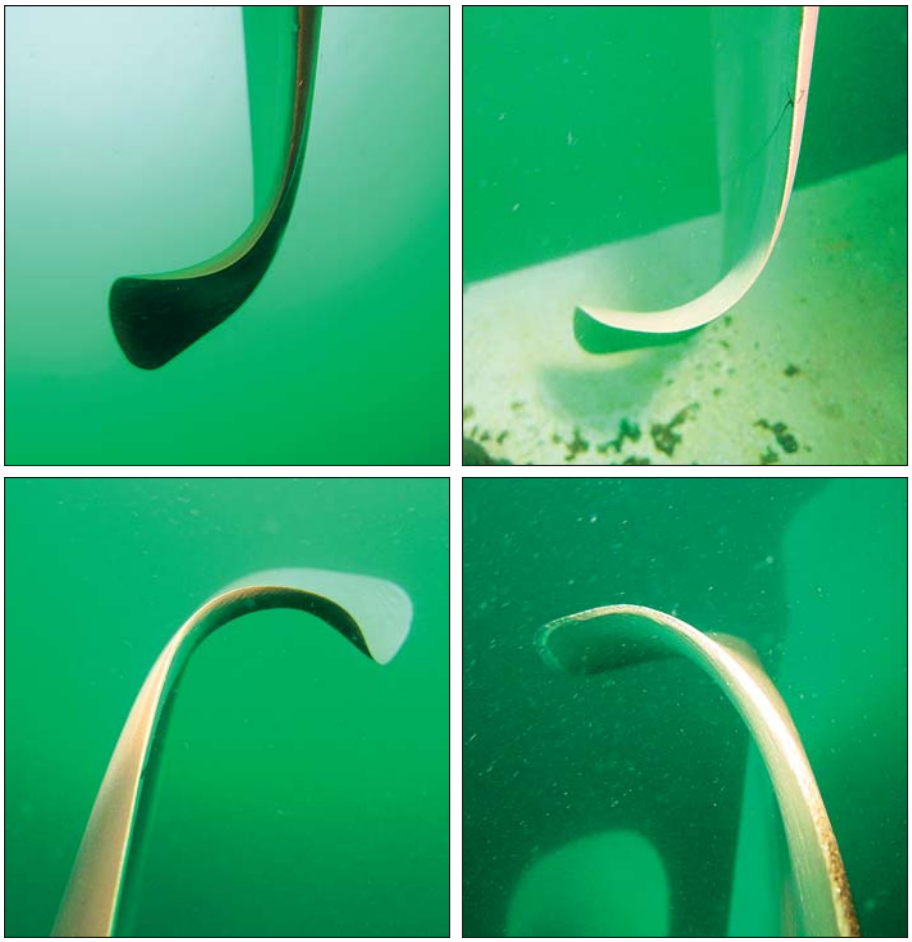
New generation propeller repair equipment used for operations in Denmark and Croatia

Recently teams of Hydrex diver/technicians performed propeller blade croppings on several vessels across Europe. In Kalundborg, Denmark the four propeller blades of a 170-meter bulk carrier were cropped. A similar operation was carried out on a 330-meter cruise vessel in Dubrovnik, Croatia.

Bulk carrier arriving in Kalundborg for propeller blade cropping.

Having developed different procedures for different kinds of damage, Hydrex is equipped and trained to make the best out of a bent or broken propeller. Ideally, the in-house developed cold straightening technique is used. This procedure enables Hydrex to straighten damaged blades in-water, allowing commercial operations to continue without the need to drydock.



All four blades of the bulk carrier were severely bent.

In the following examples cropping was the only option as the damage to the propeller blades was too great to allow cold straightening. This kind of repair is carried out with the propeller blade cutting equipment developed by the Hydrex research department. In cases where there is an even number of blades an identical piece will be cropped from the opposite blade to restore the hydrodynamic stability of the propeller. By doing so, the best possible efficiency is obtained.

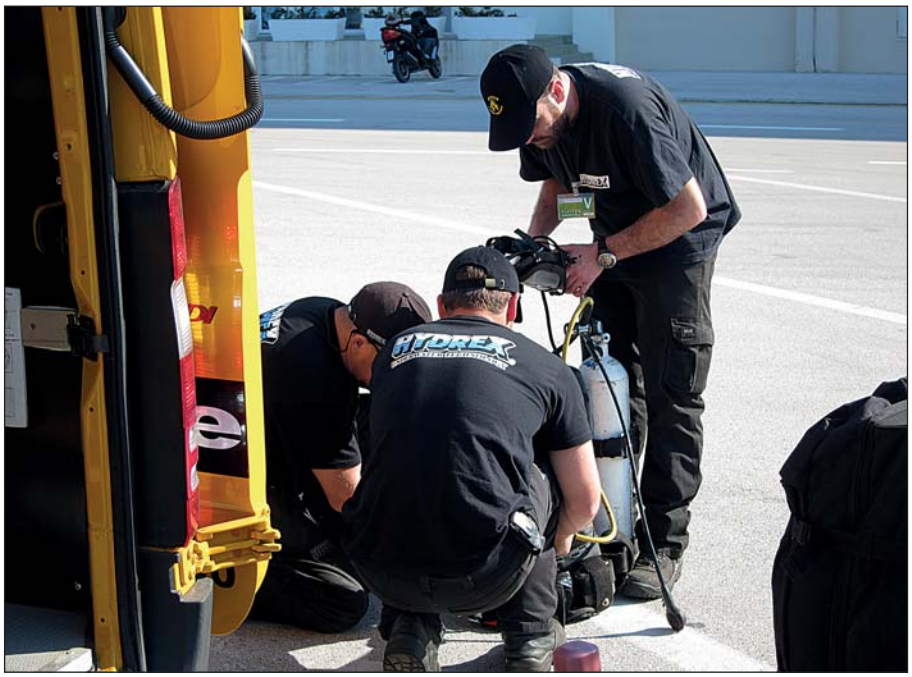
A 330-meter cruise vessel needed the blades of both its propellers cropped.

Underwater blade cropping in Kalundborg

The Kalundborg Fjord is a perfect location to carry out repair work. Vessels at anchorage there are sheltered from the current. This makes it ideal for underwater repair work to be performed.

The four blades of a bulk carrier's propeller were severely bent. A fast, on-site solution was needed 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 therefore rapidly mobilized to the ship's location to restore the damaged blades to as close to their original condition as possible.

After the equipment arrived at the vessel's location the team started the underwater operation with a detailed survey of the affected propeller blades. The inspection revealed that the four blades were bent over angles of 90 degrees or more. The team then used the information acquired during the inspection to calculate and determine the correct measurements needed to modify the trailing edges of the propeller blades. Next the divers cropped the blades and ground their edges to give them the correct radius. When the cropping was complete, the Hydrex technicians polished the blades to make sure that any remaining loss of efficiency would be minimal.



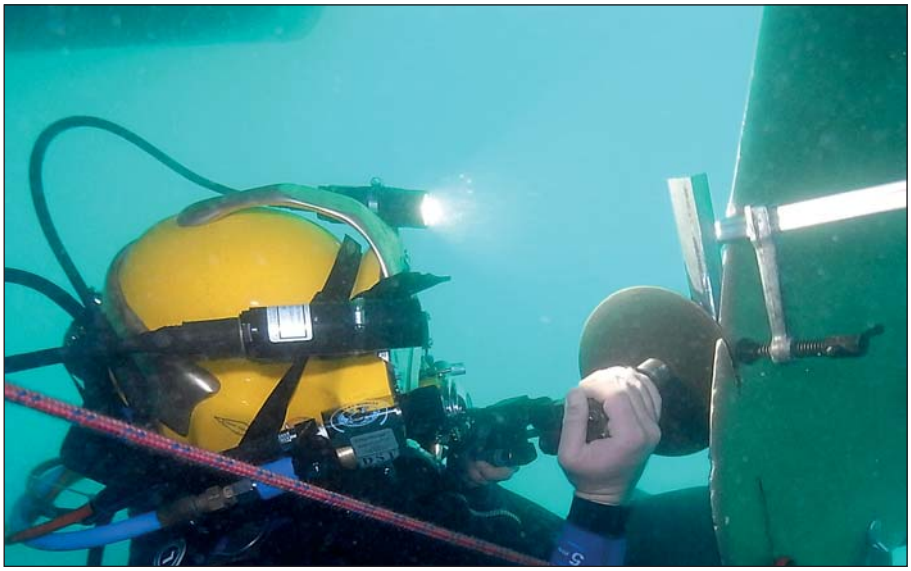
Hydrex diver/technicians preparing diving equipment for underwater operation.

Hydrex plans operation around cruise vessel's strict schedule

A 330-meter cruise vessel needed all five blades of both its propellers cropped, ten in total. At the same time both the ship's stern thrusters needed to be inspected. This had to be done without interrupting the ship's sailing schedule. As a consequence only a very short time frame was available when the ship was berthed in Dubrovnik. For this reason the Hydrex technical department proposed to carry out the operation in two parts.

During a first stop in Dubrovnik, three of the five blades of the starboard side propeller were cropped.

Cropping work on a blade of one of the cruise vessel's propellers.



The operation was split in two parts to allow the cruise ship to keep its schedule.

The cropped pieces of eight of the ten propeller blades.

Both stern thrusters were inspected during this part of the operation. This revealed several cracks on the grids and blades of the two thrusters.

When the cruise vessel returned to the same location two weeks later, a Hydrex diver/technician team was ready in Dubrovnik for the second part of the operation. The remaining two blades of the starboard side propeller and all five blades of the portside propeller were cropped. Simultaneously the cracks that had been found on the thrusters were ground.

Both parts of the operation were finished before the cruise ship had to leave for the next stop with its passengers.

Conclusion

Our R&D department is constantly looking into ways to enhance the available propeller repair techniques even further to improve our services. New types 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. Both types of repairs can be carried out on-site and underwater, allowing the ship to return to commercial operations without the need to drydock. ■

KEEPING SHIPS IN BUSINESS

Permanent underwater hull repairs keep tanker out of drydock

Last month a Hydrex team mobilized to a 100-meter tanker vessel berthed in Rotterdam to perform underwater hull repairs. Despite the relative small scale of this operation, it was nonetheless vital for the shipowner. It allowed him to keep his vessel out of drydock and avoid having to go off hire.

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 and inserts in the vessel's shell plating and they are approved by the major classification societies.

Preparing the insert plate at the Hydrex fast response center.

Permanent insert repair in Rotterdam

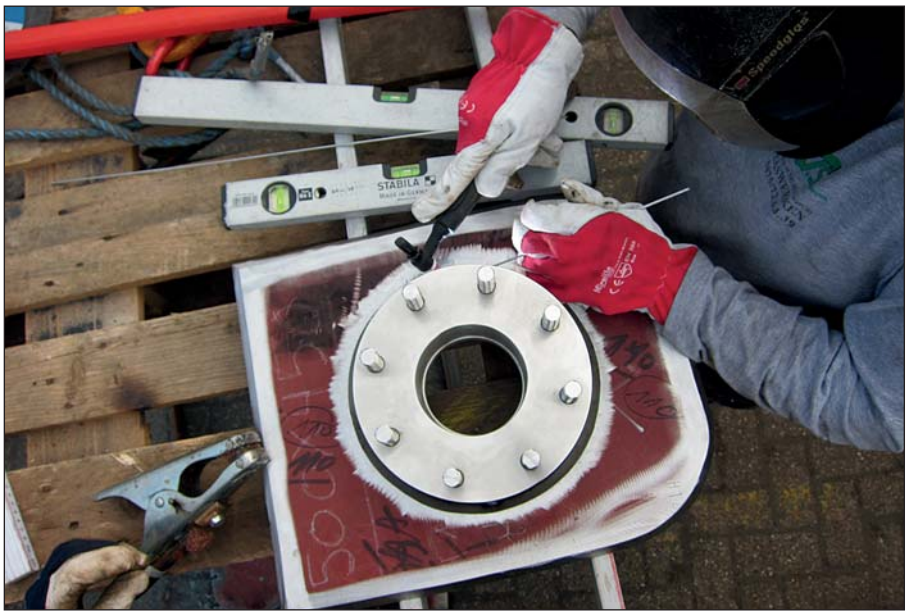
A cavitation hole needed to be repaired in the bottom plating of the tanker. A Hydrex diver/technician team therefore carried out a detailed inspection of both the onboard as well as the water side of the affected plating.

Next the team installed a cofferdam over the area. This cofferdam was modified to fit perfectly over the rounded shape of the hull.

This allowed them to remove the frames covering the damage. The diver/technicians could then cut away the damage and the surrounding area, including the speedlog. Next they positioned a new insert plate, measuring 500 mm x 450 mm, with a new speedlog. The insert was then secured following the Hydrex class approved procedure for insert plates, using a full penetration weld.

An independent tester carried out ultrasonic testing and the repair was approved by the classification


One of the frames covering the damaged area.



Installing a new speedlog into the insert.

The fitted insert, ready to be welded.

Ultrasonic tests were carried out by an independent tester.

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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surveyor who was present during the operation. The diver/technicians then refitted the frames. They then removed the cofferdam, concluding the repair.

Conclusion

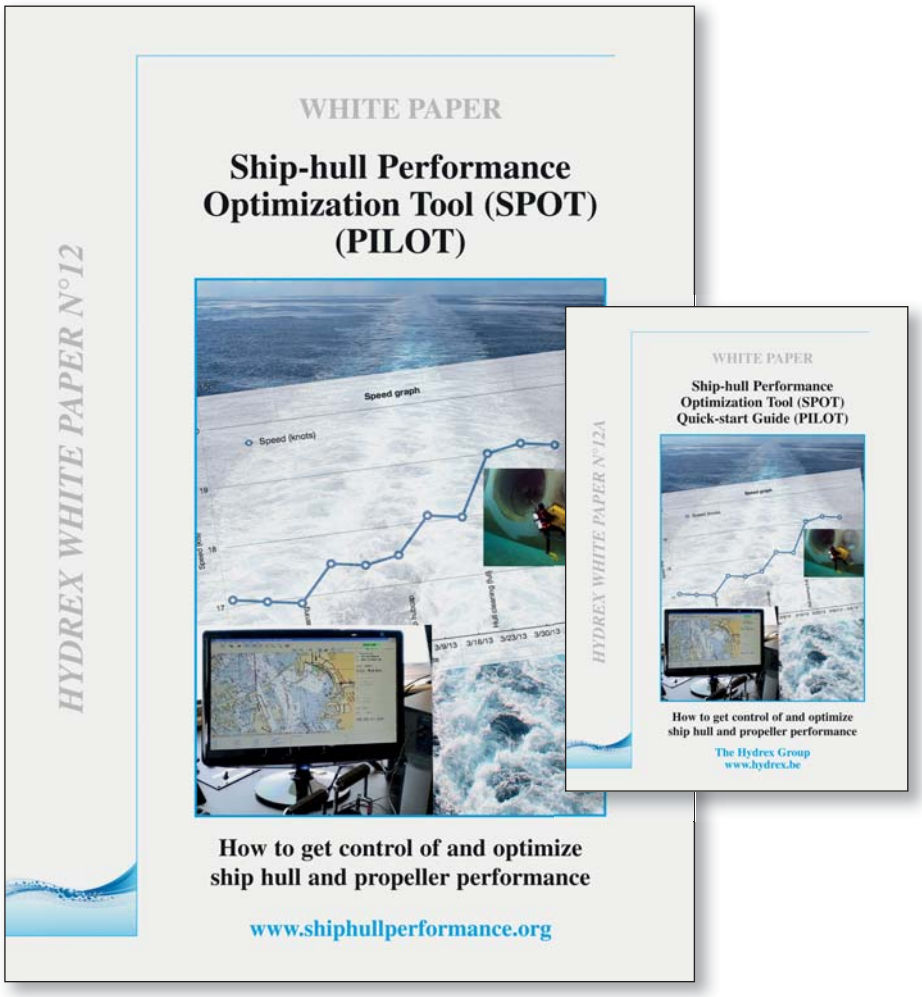
Repairs of this kind can only be done rapidly and successfully by trained divers/technicians who are familiar with the procedures and who have the relevant know-how to resolve all of the technical difficulties encountered during underwater operations. This is why all Hydrex technical staff from all offices undergo stringent training, enabling them to perform a wide range of operations. Hydrex diver/technician teams carry out these on-site hull repairs all over the world.

Certified welder reinstalling the frames covering the affected area.

Throughout this operation diver/technicians stayed in close communication with each other and with the technical department in the office. This allowed them to finish this job within the shortest possible time frame without any compromise of the high quality standards Hydrex is known for. ■

Hydrex White Paper No. 12 and 12A, Ship-hull Performance Optimization Tool (SPOT) Pilot Project

There has been a great deal of attention amongst ship hull paint manufacturers on the subject of a transparent standard for measuring ship hull performance and efficiency. This came in the wake of a series of claims on the subject that "so-and-so paint will save x% of fuel bills."



Of course a standard of this type would be of value to shipowners in deciding on bottom paint for their ships. Bunker prices have spiraled. The pressure to reduce air emissions from shipping is growing. Even a few percent more or less fuel efficiency can make a huge difference, especially when extrapolated across the world fleet. But such a standard needs to be comprehensive. Ideally it would take into consideration the entire life cycle of a ship and compensate for increased hull roughness from paint degradation and spot repairs. The International Standards Organization has expressed a willingness to help develop such a standard.

In the meantime, there is a great need for shipowners, ship officers and crew to gain control of the fuel efficiency of their own ship (or fleet) and adopt measures that will enable them to achieve maximum hull efficiency and performance and maintain it.

What is needed is a simple method which puts the owner, Captain, Chief Officer, Chief Engineer in charge of their own ship's hull efficiency and provides a pathway for inevitably and invariably achieving the most efficient hull coating system and hull and propeller husbandry regimen for the entire life of their ship.

Hydrex White Paper 12 "Ship-hull Performance Optimization Tool (SPOT)" is just such a method, presented with all applicable detail so that any officer of any ship anywhere can simply take the White Paper and its accompanying "Quickstart Guide" (Hydrex White Paper 12A) and begin applying the information using existing resources and immediately start seeing results in terms of improved hull efficiency. Over time, this will lead to the optimization of the hull coating system and hull and propeller maintenance program for a ship or fleet. With enough information gathered, this system would lead to the optimization of the hull efficiency of the entire world fleet with consequent enormous reduction in fuel consumption and resulting air emissions from shipping worldwide.

SPOT is being piloted and refined and any and all feedback from use of this system is encouraged so that a final version can be published.

Hydrex White Paper No. 12 is available now for download at www.shiphullperformance.org or can be requested from any Hydrex office.

We are hoping to receive a flow of feedback from implementation of SPOT. ■

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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