

HYDREX[®]

UNDERWATER TECHNOLOGY

Magazine

Number 247



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In-water 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



Hydrex takes care of the entire underwater part of your vessel and does this all around the world. The drawing on this page of a diver cradling a ship in his arms symbolizes this perfectly. While the drawing has been present in our magazines for a long time, we feel that its meaning has not been stressed enough.

Keeping a ship in business is a very complex task that does not end at the close of an office day. For this reason all our offices are available 24/7 to assist you with all things concerning your vessel's underwater hull, whether great or small, whether emergencies or long term projects. All operations will be adapted to your vessel's sailing schedule, not the other way around.

A lot of harm can be avoided by timely maintenance, but damage can still occur due to collisions, grounding impact, ropes that get tangled in propellers and other situations. In these cases we can also assist you. Our diver/technician teams are on standby at all times, ready to carry out small standard repairs as well as complex and difficult operations.

This brings us back to the diver holding the vessel in his arms and keeping it safe from harm. If you

leave the care of your vessel's underwater hull to Hydrex you don't have to worry about it anymore and can focus again on more important matters.

Hydrex founder
Boud Van Rompay



ISO 9001 certified

Underwater services and technology approved by:



ClassNK



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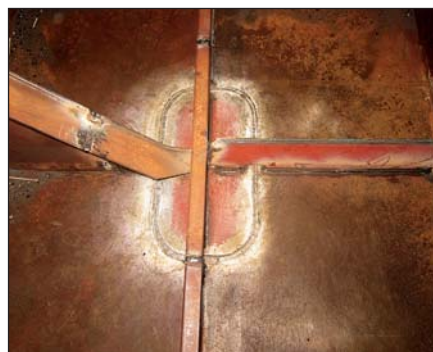
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Bow thruster replacement in stages keeps cruise vessel on schedule

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 hours 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



Hydrex diver preparing the thruster tunnel for removal of the unit.

leave again. A perfect planning and constant communication between our technical department in the

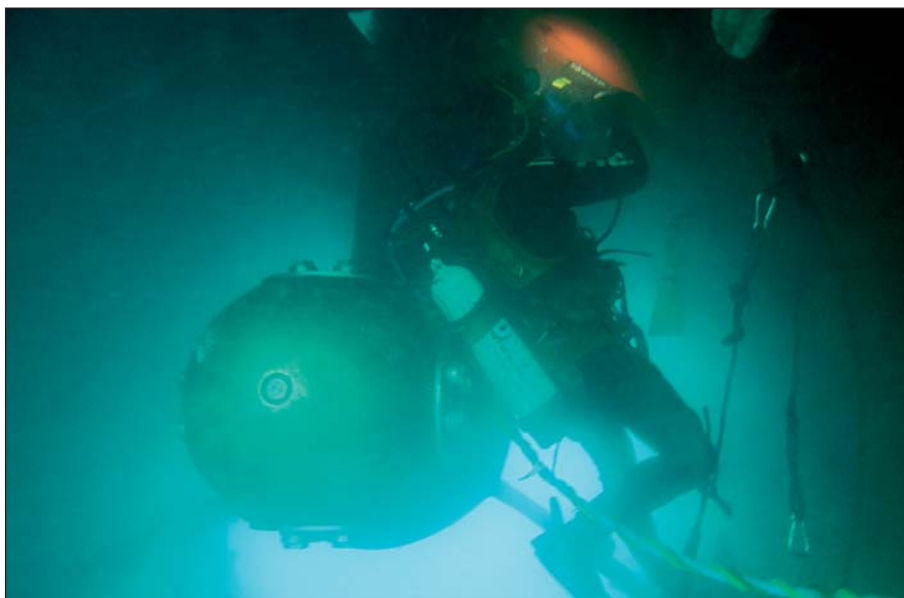
office and our team on location was essential in achieving this.



Diver/technician getting ready for underwater operation



and taking the plunge.



Diver inside the thruster tunnel during bow thruster operation.

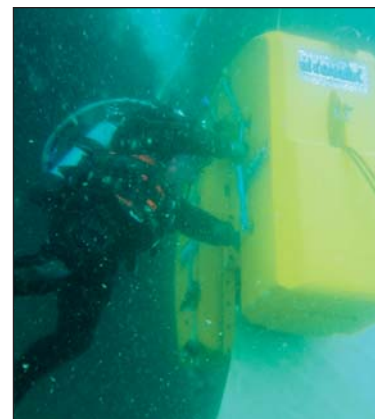


Old thruster unit brought to shore.



Hydrex technician preparing the engine room for thruster removal.

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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New bow thruster unit arriving on-site.

Specific solutions for specific needs

Ever since Hydrex was founded in 1974 we have strived to keep the impact of our repairs for the owner as minimal as possible.

Performing operations afloat and underwater is a very important factor in doing this. Over the years we have developed techniques to

perform on-site repairs to every part of the underwater ship. From damaged hulls, over leaking seals and deformed propeller blades to malfunctioning thrusters, we have a repair solution that avoids unscheduled drydock visits.

Carrying out repairs on-site alone is off course not enough. Not only can our teams perform all operations afloat, they do this in the fastest

possible time and to drydock standards. Hydrex offers solutions to a wide range of underwater problems without sacrificing the high quality or safety standards we are known for.

Sometimes a very straightforward repair is needed. In other cases a specific, tailor-made solution is designed by our R&D department. In the case of the cruise vessel in the Caribbean the repair itself was one our teams had done on many occasions, but the ship's time table was the tricky part. Because of the nature of the vessel, its strict schedule included many short stops. Our technical department therefore proposed a scope of work that would allow us to perform the replacement in stages in several different ports.

Our diver/technician teams have performed repairs in phases on numerous occasions. Examples of this include another recent bow thruster operation, carried out in France and the Netherlands, and an underwater stern tube seal replacement on a cruise vessel sailing back and forth between Turkey and Greece.

Time is of the essence

The removal of the bow thruster



Preparing the old bow thruster for removal.



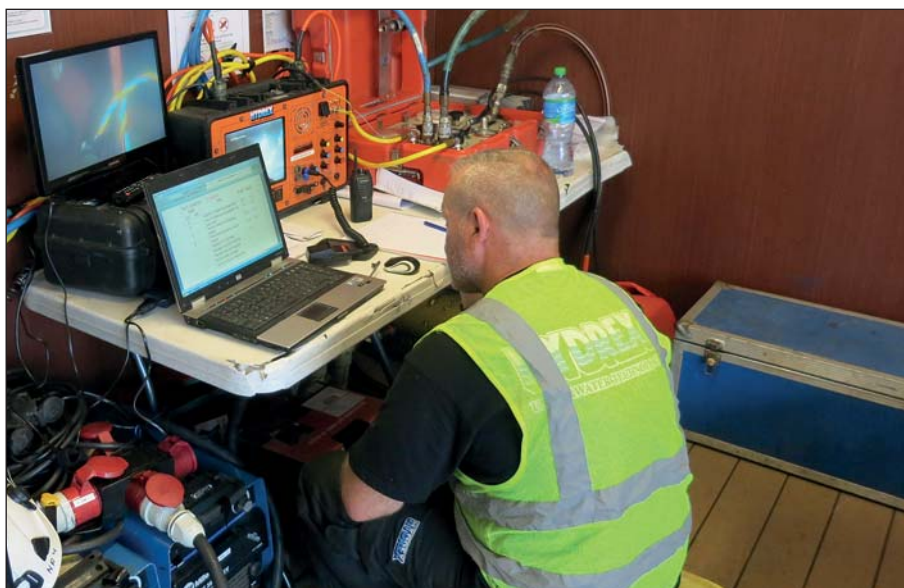
New bow thruster blades.



Preparing the new unit for installation.



New propeller blade being lowered into the water.



Hydrex team leader monitoring the operation from onboard the cruise vessel.

blades and the unit was done in the wet. The installation of the new bow thruster in the next port needed to be done in the dry to avoid water ingress into the unit. This was done with our flexible mobdocks.

The mobdock technology was developed by Hydrex in-house and is used to close off a thruster tunnel. Mobdock is short for 'Mobile mini drydock' because they enable our diver/technicians to create a dry environment to work in while the vessel stays afloat. These mobdocks have been used during thruster operations for over 20 years now.

Initially rigid mobdocks were used, but later a lightweight flexible variant was designed and put in use. These can be shipped to anywhere in the world by plane very fast.

Conclusion

We can assist shipowners with almost any problem they encounter with their vessel's thruster. A wide range of underwater repair or maintenance work can be carried out to 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 by Hydrex diver/technicians on site.

Our team members are trained to be flexible and adapt to rapidly changing circumstances. They worked in shifts around the clock and finished the job as fast as possible. By performing the operation in steps on-site and underwater, Hydrex made it possible for the owner of the cruise vessel to stick to his schedule. ■

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You can contact us at:
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or at
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**KEEPING SHIPS
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High quality in-water ship re

Permanent insert repairs

Specialist class approved insert repair work carried out 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.



Echo sounder inspection and replacement

Speed log
Checks for damage, marine fouling and replacement.

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

Hull cleaning on suitable coatings

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

pair and fuel saving services

KEEPING SHIPS IN BUSINESS



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

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

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

Pintle and bushing repair and replacements

On-site permanent insert repairs in Belgium, the Netherlands and Cameroon

Hydrex teams of diver/technicians mobilized to vessels berthed in Zeebrugge (Belgium), Amsterdam (the Netherlands) and Douala (Cameroon) to perform insert repairs on a ro-ro vessel and two tankers. These repairs were carried out according to the Hydrex class approved procedure for the welding of inserts in a vessel's shell plating while afloat by using an external cofferdam.

A 560 mm crack in the bottom shell plating of a 203-meter ro-ro vessel needed to be repaired during the ship's stop in Zeebrugge. The Hydrex team therefore carried out a detailed inspection of both the onboard as well as the water side of the shell plating, after which they installed a cofferdam over the affected area.

This allowed them to remove the frames covering the damage and cut away a 610 mm x 320 mm piece of



Hydrex diver/technician preparing for underwater operation in Zeebrugge.

the shell plating around the 560 mm crack. Next they positioned a new insert plate of the same dimensions and secured it with a full penetration weld. An independent tester then carried out ultrasonic testing and the

repair was approved by the DNV surveyor who was present during the operation. The diver/technicians then reinstalled the frames and removed the cofferdam, concluding the repair.



Securing the new insert plate with full penetration weld on ro-ro vessel in Zeebrugge.

In Amsterdam a round insert with a diameter of 300 mm was installed on a 144-meter tanker to stop the leak in one of the ballast tanks of the vessel.

After the ship had been declared gas free, the Hydrex diver/technician team started with a detailed inspection of the damaged area, both underwater and inside the ballast tank. The team then installed a cofferdam over the crack and removed the damaged area. Next the diver/technicians prepared the edges of the hole and installed the new insert with a full penetration weld. This was done under the supervision of a LR surveyor. After successful



New insert plate with reinstalled frames on roro vessel.



Round insert plate positioned on tanker in Amsterdam.

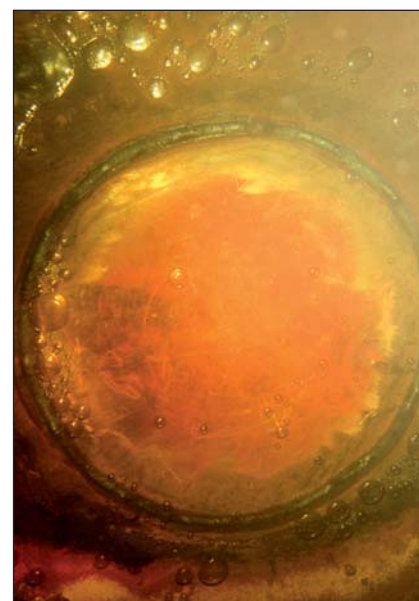
ultrasonic testing of the weld seams of the new insert, the cofferdam was removed. The owner could sail his vessel free of cracks.

Another Hydrex diver/technician team removed the cavitated area on the flat bottom area in the ballast tank of a 228-meter tanker. The operation was carried out during the ship's stop in Douala, Cameroon.

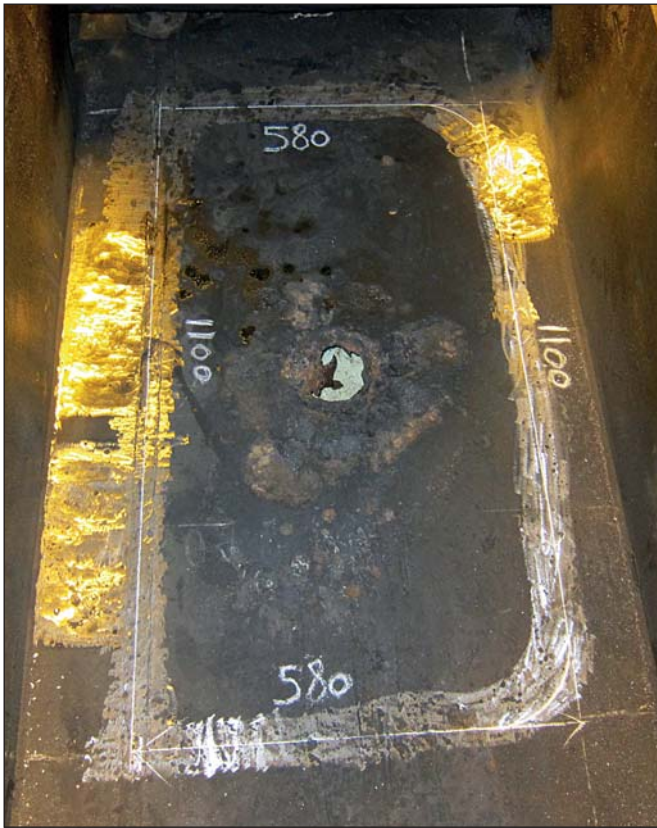
A temporary doubler plate had been installed over the cavitation. The team therefore performed the underwater part of the inspection after



All welding work is performed according to class approved procedures.



New insert in Amsterdam seen from the outside.



Cavitated area on tanker in Cameroon, ready to be cut away.



New insert in Cameroon positioned and ready to be welded.

which they installed the cofferdam. The diver/technicians then removed the doubler plate and inspected

the onboard side of the cavitation damage. A 1100 mm x 580 mm area was cut away, removing the area

that had been damaged the most. After the team installed and welded the new insert plate, they filled up three smaller cavitation spots around the insert. An ultrasonic tester carried out the required NDT test and the BV surveyor approved the operation.

Our divers are trained to perform a wide range of procedures; they stayed in close communication with each other and with the technical department in the office, throughout these operations. This allowed them to finish these jobs within the shortest possible time frame and this without any compromise of the high quality standards Hydrex is known for.

These permanent repairs allowed the owners of the vessels to continue their schedule without having to go to drydock. As a result, no further attention to the hull cracks will be needed. ■



Class approved permanent insert plate in Cameroon.

Underwater propeller blade straightening in the British Indian Ocean Territory

With all five blades of its propeller severely bent, a 290-meter container vessel needed a fast, on-site solution to restore the propeller's balance and efficiency. Hydrex divers are trained to carry out repairs underwater in the shortest possible time frame and a team was therefore mobilized to the ship's location in Diego Garcia in the British Indian Ocean Territory to perform a cold straightening of the blades.

After the equipment arrived at the vessel's location, the divers installed a monitoring station on a workboat and made all the required preparations. The workboat was positioned next to the vessel. The team leader



One of the five bent blades of a container vessel's propeller.



Hydrex diver positioning the cold straightening machine over one of the blades.

then went on board to go over the safety procedures and to discuss the details of the operation with the captain and the chief engineer of the ship.

Next the team started the underwater operation with a detailed survey of the damaged propeller blades. Because fouling was present on the blades, the divers carried out a cleaning to be able to inspect the blades for stress fractures and cracks. The inspection revealed that the five blades had suffered multiple deformations along the trailing

edges and that there were stress fractures and nicks in the same areas. Cracks were also found going up to 15 mm deep into the blades.

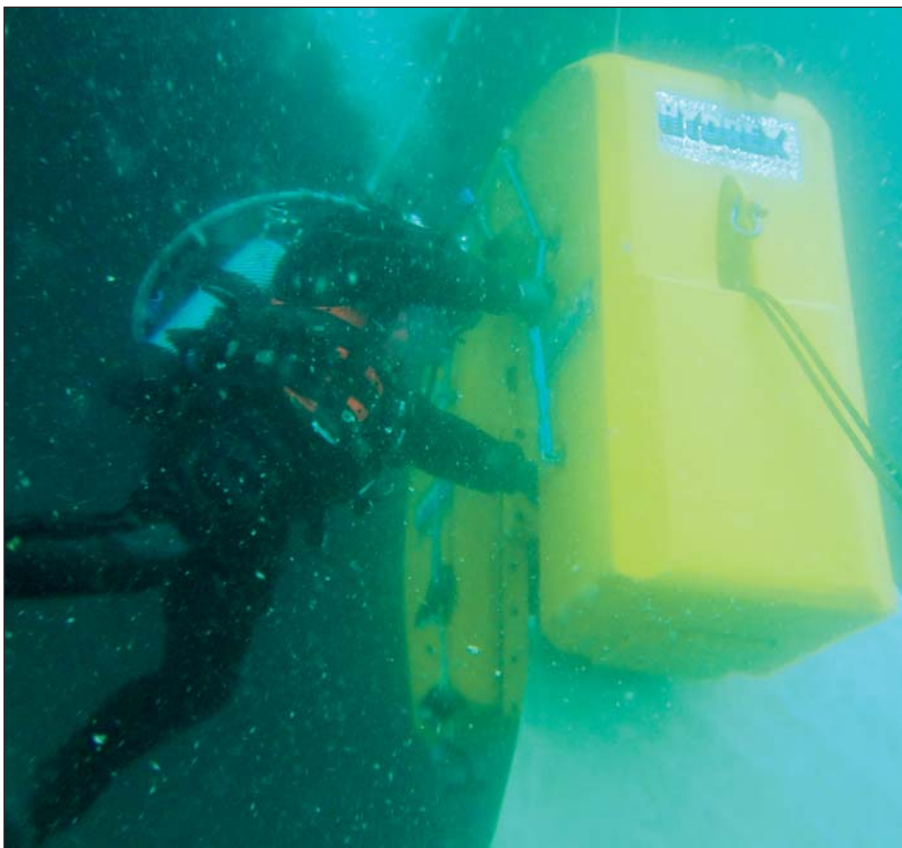
Part of the team then started the repair with grinding work on the blades to remove the cracks. Once this was done the locations were smoothed to recreate the hydrodynamic profile on the trailing edges. Meanwhile the rest of the team prepared the in-house developed hydraulic cold straightening machine for the operation. The divers then carefully positioned the ma-



Hydrex diver carrying out grinding work on the trailing edge of one of the blades.

chine over the bends of the trailing edges of the first blade. In close communication with the team leader on the workboat they applied pres-

sure to return the bent blade to its original state. This procedure was then successfully repeated for the other four blades.



With the cold straightening machine bent blades can be restored to their original form.



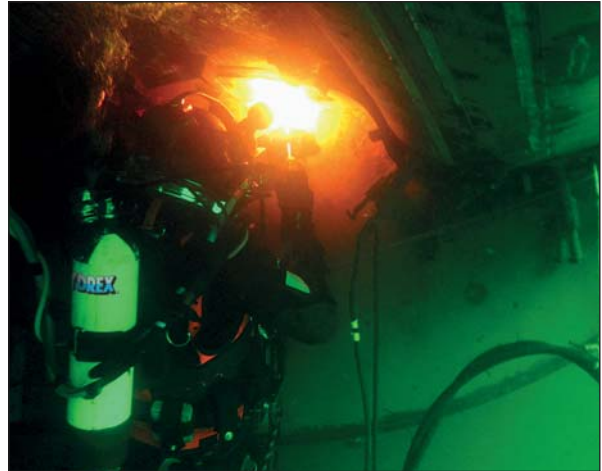
Straightening the blades and polishing their trailing edges restored the propeller's optimum efficiency.

When the divers had also completed grinding and polishing repairs on all identified cracks and gouges, they made a full inspection of the newly modified blades for the attending ABS surveyor and the captain of the vessel. With all parties involved satisfied, the divers demobilized their equipment and returned home.

The operation restored the balance and the efficiency of the propeller. By carrying out the straightening on-site and underwater, Hydrex avoided a costly and time consuming drydock visit for the owner of the vessel. ■

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When your ship has a problem, we will assess the underwater repair options free of charge



You need to know your options. Is underwater repair possible? How long would it take? How could it be done?

You can call us any time for an expert assessment, free of charge.

An underwater solution might save you days or even weeks of

lost income. We'll tell you what can and can't be done.

We pretty much wrote the book on underwater repair, and our experience is at your disposal. Our engineering team will give you fast and clear answers to your questions.

Hydrex delivers underwater solu-

tions based on over 40 years of experience, with a long history of pioneering underwater repairs. We'll give you certainty about what is possible while your vessel is afloat.

Do not hesitate to contact us. Our consultation is free and we are ready to help.



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Keeping ships in business

Hydrex offers turnkey underwater repair solutions to ship-owners wherever and whenever they are needed. Hydrex's multi-disciplinary 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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