



UNDERWATER TECHNOLOGY

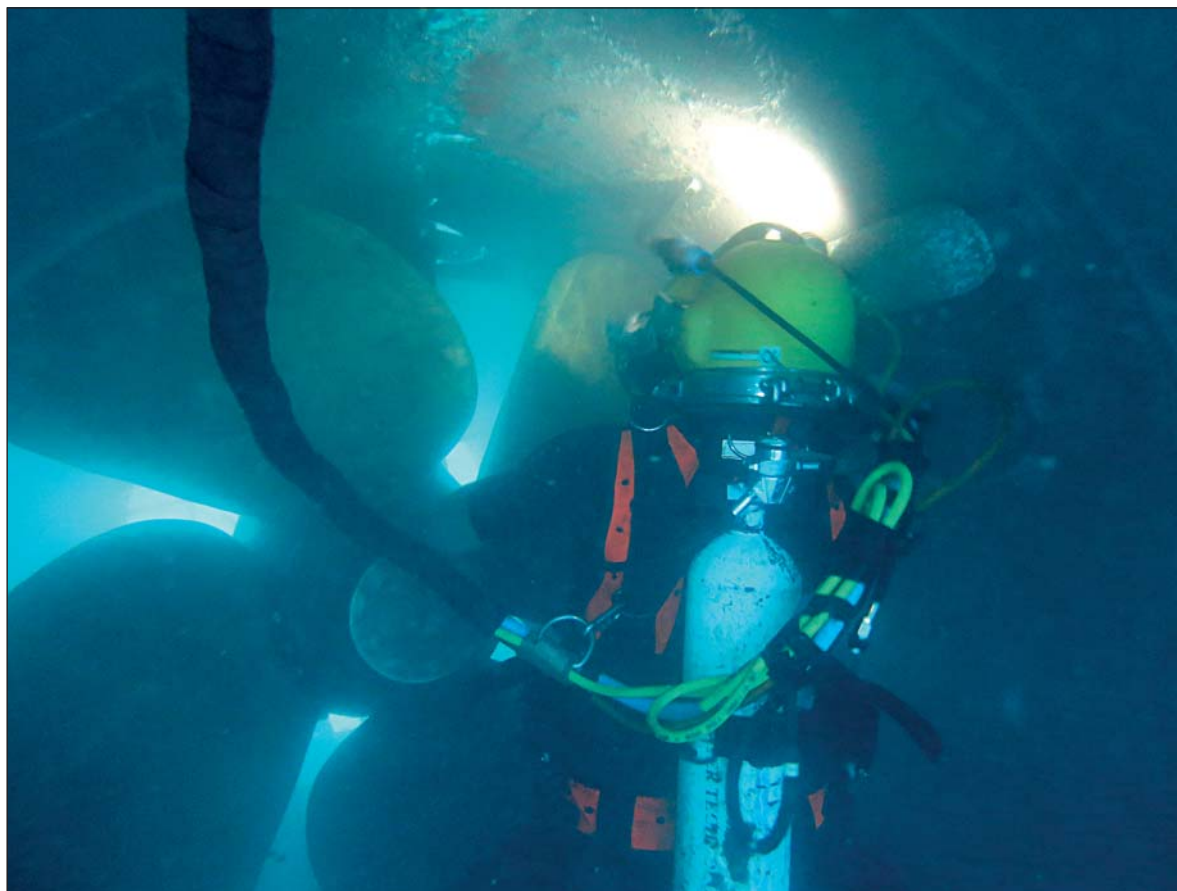
Magazine

Number 255



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In-water bow thruster repairs



The Hydrex lightweight flexible mobdocks are designed to be easily transported around the world and are used to close off the thruster tunnel on both sides, allowing divers to perform repairs and other operations in a dry environment around the bow thruster unit.

This technique enables them to reinstall the propeller blades of an overhauled thruster inside the thruster tunnel after the unit has been secured or replace the blades or seals and perform repair work on a specific part without removing the unit.

Since the development of this flexible mobdock technique, numerous

thruster repairs have been carried out by Hydrex diver/technicians around the world.

There is no need to send the vessel to drydock as all operations can be carried out in port or while the vessel is stationary at sea. Normal commercial activities can therefore continue without disruption.

HYDREX
UNDERWATER TECHNOLOGY

Phone: + 32 3 213 5300 (24/7)

Fax: + 32 3 213 5321

hydrex@hydrex.be

www.hydrex.be

Editorial



In the first article in this month's magazine we give an overview of some of the recent hull repairs our teams have performed around the world.

These examples show the wide range of shell plating operations we can offer to our customers, all of which are carried out very fast and to the high quality and safety standards we are known for. This brings us to the second article in which you can find out how we are able to adhere to these standards.

Our diver/technicians are trained and qualified to perform all required class approved repair procedures in even the harshest conditions. This has led to an outstanding safety record and results in the extraordinary dependability that our customers deserve.

The magazine ends with a groundbreaking new propeller cleaning technique we have developed. This award-winning technology results in 5% or more fuel savings and is 100% environmentally safe.

Hydrex founder
Boud Van Rompay



Cover: Underwater hull repairs save time and money



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hydrex@hydrex.be

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Underwater hull repairs save time and money

Our teams fly all over the world to perform a wide range of hull repairs on any type of vessel. In this article we give you a summary of the more recent operations. They illustrate the diversity of shell plating operations our diver/technicians are trained for.

Amsterdam

An emergency call came in on a late Friday afternoon to carry out a permanent insert repair on board a 145-meter chemical tanker that had suffered a crack in its port side grey water tank. The job was carried out during the vessel's stop in Amsterdam.

In close communication with the superintendent of the vessel and the attending class surveyor, it was decided that a 700 x 300 mm insert would need to be installed. The new



Preparing the edges of the area for the insert.

insert plate and a steel mobdock that perfectly fit the rounded shape of the hull were fabricated at our headquarters in Antwerp.

After the mobdock had been installed diver/technicians cut away the crack and the surrounding area. The

new insert plate was then positioned and welded with full penetration weld following our class-approved procedure. An independent NDT inspector approved the insert repair and the classification surveyor who was present during the operation gave his greenlight.

By removing the large crack and installing a new insert this area of the ship will not require further repairs during her next drydocking. The vessel could sail on time as the repair was carried out well within the stipulated time frame.

Las Palmas

A fully loaded 180-meter bulk carrier suffered grounding damage in Las Palmas, Spain. An underwater repair was needed to allow the vessel to sail to her unloading destination safely. Unfortunately a first repair attempt proved unsuccessful. After the ship had been delayed for



A special mobdock was constructed that would perfectly fit the shape of the hull.



Welding the insert.



New insert after reinstallation of the frame covering the area.

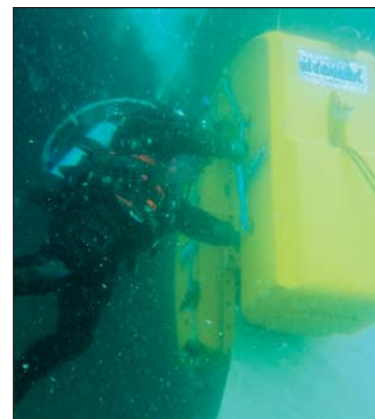
almost two weeks we were contacted to take over the operation and get the bulker sailing again as soon as possible.

The classification society knew we had all the certificates and skills for (emergency) underwater repairs. They informed the owner that the repair would be given the greenlight if Hydrex was involved. Just days after we were contacted our repair

team was on-site and ready to salvage the operation.

The first step of the operation consisted of removing the cofferdam that had been installed during the previous effort to repair the damage. Once this was done our diver/technicians installed two doubler plates over the affected areas of the flat bottom.

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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Hydrex diver/technician preparing the hull for installation of doubler plate.



The repair allowed the owner to continue the ship's voyage and unload its cargo.

The owner and port authorities were very satisfied that Hydrex was able to step in and resolve the issue so fast. Working in shifts, we made sure that the ship would suffer no additional delay.

Zeebrugge

We were contacted by the representative of a 163-meter ro-ro vessel to carry out a crack repair during the ship's stop in Zeebrugge. Because our fast response centers have a large stock of state-of-the-art equipment ready, mobilization for smaller operations like this can be almost immediately.

When the work area was certified gas free, our divers started the operation with an inspection of the damaged area and this on both sides of the hull. This allowed the team to take the exact measurement of the crack: 600 mm on the outside. Next a blank was installed over the area. The diver/technicians could then perform work on the crack inside the engine room without water ingress.

The team removed the frames, bulkheads and a cement box to get access to the crack. Inside the engine room it measured 700 mm. To prevent it from spreading, crack arrests were drilled at its extremities. Next our diver/technicians ground out the crack over its entire length. It was then filled with our class approved full penetration welding.

As a result of this temporary repair the owner of the vessel does not have to go off schedule for an emergency visit to drydock, but can make arrangements for a follow up repair at a more convenient time and location.



Diver getting ready for underwater operation.



Drilling of crack arrests to prevent crack from spreading.



Crack filled with full penetration weld.

Hydrex under-water 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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Uruguay

A 277-meter oil tanker suffered a hole in the shell plating of her ballast tank. We were contacted by the owner to provide an underwater solution that would allow the vessel to keep her schedule. A team of our diver/technicians therefore mobilized to Punta Del Este, Uruguay to perform on-site repairs.

The tanker's tight schedule only allowed for a temporary repair at this time. Because of the bad weather conditions and resulting fast current, no underwater welding work could be performed. Our technical department proposed a repair plan that incorporated both the limited time frame and the meteorological circumstances. Thanks to the quick doubler operation carried out by our divers, the vessel could keep on sailing until a larger time frame became available.

Three months later a Hydrex team mobilized to Punta Del Este again. The repair operation started with the



Independent ultrasonic testing.

removal of the doubler plate and the installation of a cofferdam on the waterside of the damaged area. The team then cut away the affected area of the bottom plating. Next they fitted the insert plate, which was welded following the Hydrex class-approved procedure for insert plates, using a full penetration weld. An independent inspector carried out ultrasonic testing and the repair was

approved by the classification surveyor who was present during the operation.

Rotterdam

We replaced two pipes on a 228-meter tanker while the vessel was berthed in Rotterdam. Both pipes were leaking and a fast on-site solution was needed to remove a condition of class. These class approved repairs were performed afloat with our cofferdam technique. This gave the owner a cost effective alternative for drydock.



Removing the corroded plating.



Fully welded insert.



Securing the frames on the starboard side pipe.



Fully installed new starboard side pipe.

Overboard pipe repairs are vital for a vessel because there is a direct connection between the outside hull and the pipes. This means that any damage to the pipes can compromise the integrity of the hull. For this reason the classification society will very strictly monitor the condition of the pipes and will demand a fast and thorough repair of the damage.

We offer permanent afloat solutions for situations like this. We bring a high standard of care and professionalism to any operation to guarantee that a ship can sail safely afterwards. Our divers always strive to meet these standards and make sure that the service is delivered in as short a time period as is possible. By performing the two replacements in one operation our divers did exactly this and kept the downtime to a minimum.

Conclusion

Our permanent welding repairs include the following operations:

- Renewal of damaged hull plating, large or small areas
- Crack repairs
- Pipe/flange repairs or replacements
- Clad welding of cavitated areas

- Seachest installation
- Installation of speed log or echo sounder housing

We have the know-how and experience needed to find the best solution for any problem you might encounter with your vessel. This can be a simple routine repair or a unique complex one, as illustrated by these case studies.

Most of these hull repairs are carried out afloat with the use of an external mobdock. Normal commercial activities can therefore continue without

disruption. We have a wide range of standard mobdocks available at our offices, but a tailor-made mobdock can also be created to fit a specific hull shape or purpose.

All repairs are performed at the highest technical standards by our teams following in-house developed procedures. These operations are approved by the major classification societies.

Our goal is to keep you sailing with as little delay as possible. ■



Cutting the port side overboard pipe.

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



Hydrex diver training programs result in exceptional safety and efficiency

Hydrex can offer its customers the high quality of service they deserve while guaranteeing the safety of the divers at all times. This can only be done successfully by staff who have experience with a wide range of operations as well as the relevant know-how. Our diver/technicians are trained and qualified to perform all required class-approved repair procedures in even the harshest conditions.

This is a result of the stringent training all divers go through. Whether they work for the Hydrex main office in Antwerp or for one of the other offices. Besides being required to have official international commercial diver certificates and taking high standard external courses, including safety and offshore courses, they also receive comprehensive in-house training.



Diver ready to enter one of the training tanks at the Hydrex headquarters in Antwerp.



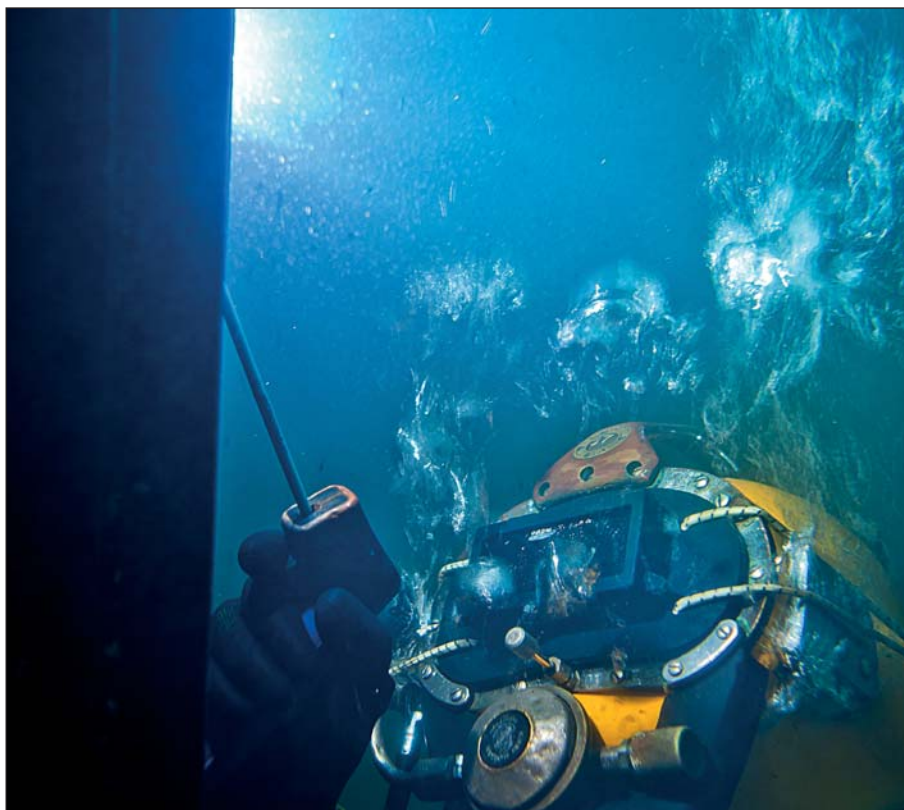
Our diver/technicians are trained to perform all repair procedures.



Dry welding practice.



Hydrex team members preparing to mobilize from the fast response center in Antwerp.



In-house practicing of wet welding.



Training tanks and equipment in fast response center.

Training consists of both theoretical classes in the course room and practical drills on the Hydrex premises. There they have access to a wide range of underwater tools and various other equipment, including three dive tanks in which to practice underwater welding and other repair work.

In addition to these classes, new divers also get the opportunity to assist experienced Hydrex diver/technicians during operations. The training enables them to become experienced divers and technicians themselves and to take advantage of the technical know-how and practical knowledge Hydrex has accumulated over the last 45 years.

When their training is completed, Hydrex divers can carry out both simple and complex jobs even in harsh circumstances and achieve this uniformly without unnecessary loss of time, quality or safety. This has led to an outstanding safety record, with no significant accidents occurring since the company was founded in 1974. This results in the extraordinary dependability that our customers deserve. ■

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

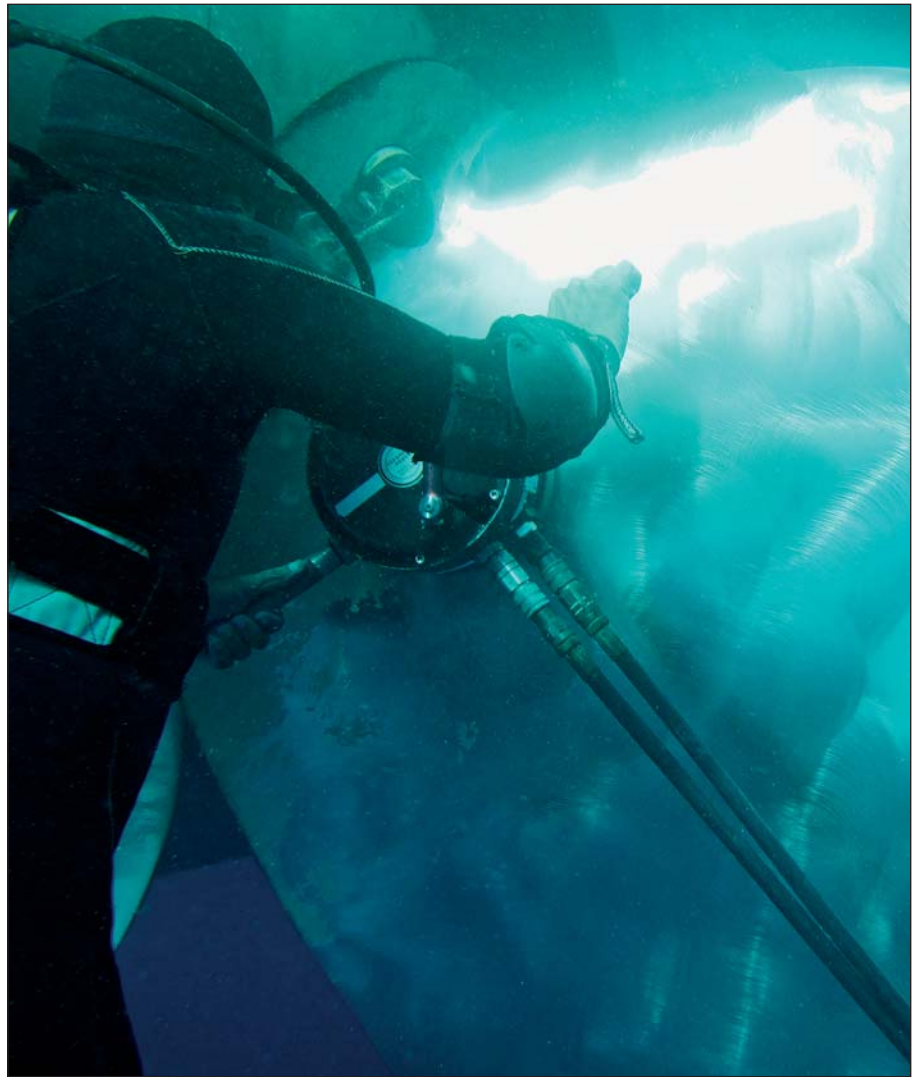


New propeller cleaning technique offers large fuel savings

Hydrex has a new approach to propeller cleaning. The traditional approach in the industry is to let the propeller get fouled and build up a calcareous growth and maybe polish it in the water once or twice a year or in drydock. This polishing is done with a grinding disk and can be quite damaging to the propeller. By the very fact of using a grinding disk, a substantial amount of metal is removed from the propeller itself. This can alter the shape and efficiency, cause roughness and increase rather than reduce friction. It can also be a source of marine pollution which is a problem in a number of ports.

We discovered that more frequent, lighter cleaning of the propeller using a different tool to a grinding disk, and catching the propeller before a calcareous layer builds up is actually the optimum approach to propeller cleaning. If done right and done regularly it can result in 5% or even more fuel savings. Obviously for a ship that has even a medium level of fuel consumption, these savings far outweigh the cost of the propeller cleaning itself. Because the propeller is being cleaned regularly, the cleaning is relatively light and quick. No material is ground away, which is good for the propeller and the environment. The propeller is kept in an ultra-smooth condition (Rubert A or A+) and that is where the real fuel savings can be achieved. This finish can only be accomplished with in-water propeller cleaning.

Many of our customers who have availed themselves of this service



If done right and done regularly propeller cleaning can result in 5% or even more fuel savings.

have noticed a remarkable difference in their fuel efficiency after each cleaning.

Thanks to its network of offices and service stations, Hydrex can offer propeller cleanings on a worldwide basis. These operations are carried out using underwater equipment designed and developed in-house specifically for propeller maintenance. Hydrex combines this service with underwater inspections where this is economically advantageous to the shipowner or operator.

We have prepared a full White Paper "Ship Propeller Maintenance: Polish or Clean?" which goes into the subject in detail. It gives the full story. This free White Paper is available on request. Contact us at info@hydrex.be

But even without the White Paper, let us know if you would like to know more about the subject. We would be happy to give you a call to discuss details. ■

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.



Phone: + 32 3 213 5300 (24/7)
Fax: + 32 3 213 5321
hydrex@hydrex.be

www.hydrex.be

Always on time



Hydrex offers turnkey underwater repair solutions to shipowners wherever and whenever they are needed. Hydrex's multidisciplinary team will help you find the best solution for any problem encountered with your ship below the water line. We will immediately mobilize our diver/technicians

to carry out necessary repair work without the need to dry-dock.

Hydrex performs complex permanent underwater repairs to thrusters, propellers, rudders, stern tube seals and damaged or corroded hulls. By creating drydock-like conditions around the affected area

we can carry out these operations in port or at anchor.

All the projects we undertake are engineered and carried out in close cooperation with the customer and any third party suppliers, relieving the customer of all the hassle of coordination, planning and supervision.



Headquarters Hydrex N.V. - Antwerp

Phone: + 32 3 213 5300 (24/7)

E-mail: hydrex@hydrex.be

Hydrex Spain - Algeciras

Phone: + 34 956 675 049 (24/7)

E-mail: info@hydrex.es

Hydrex Rotterdam

Phone: +31 10 313 25 19 (24/7)

E-mail: info@hydrex.nl

Hydrex LLC - Tampa, U.S.A.

Phone: + 1 727 443 3900 (24/7)

E-mail: info@hydrex.us

www.hydrex.be