



Restoring damaged propeller blades to their original condition	3
Smoothing the creases.....	4
Afloat propeller blade cropping in Dunkirk.....	6
Hydrex Spain in Algeciras, Gibraltar: ideal for underwater operations.....	7

Contents

Page 3

Restoring damaged propeller blades to their original condition

Page 4 - 5

Smoothing the creases

Page 6

Afloat propeller blade cropping in Dunkirk

Page 7 - 10

Hydrex Spain in Algeciras, Gibraltar: ideal for underwater operations

KEEPING SHIPS IN BUSINESS

ISO 9001 certified

Underwater services and
technology approved by:



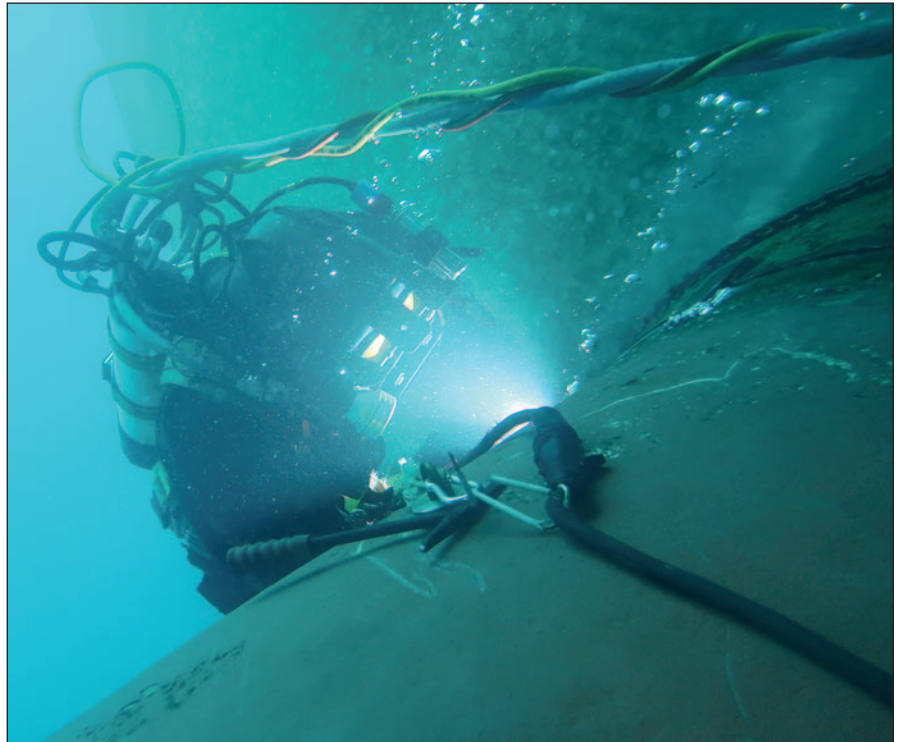
BUREAU
VERITAS



ClassNK



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.

+ 32 3 213 5300 (24/7)

hydrex@hydrex.be

www.hydrex.be

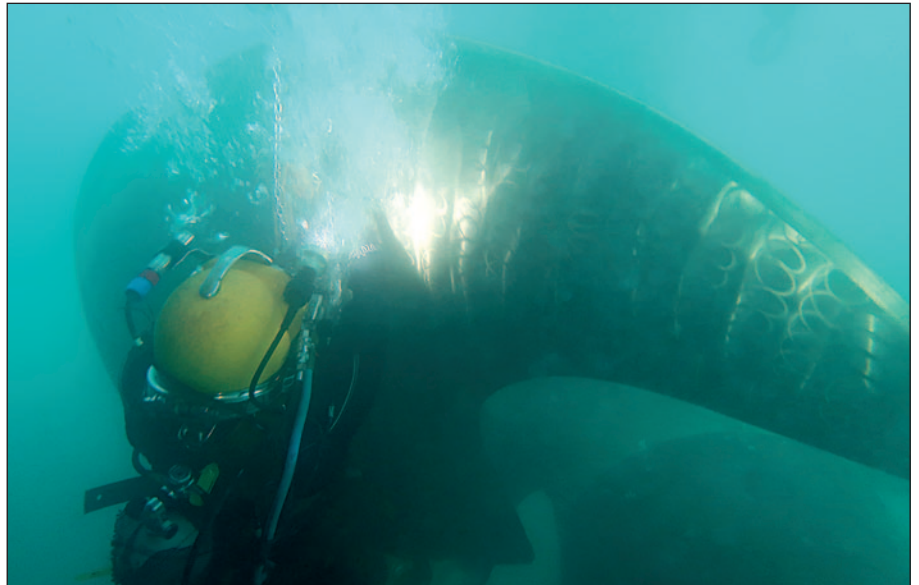
HYDREX
UNDERWATER TECHNOLOGY

Restoring damaged propeller blades to their original condition

When damage to propellers occurs due to impact with ice and other debris we can help you, even if the damage is quite extensive.

A ship with bent or cracked propeller blades might experience severe vibrations while sailing. The classification society may demand a repair before the vessel is allowed to continue its voyage. Our teams can restore the propeller's balance and efficiency, resulting in class approval.

A propeller modification can easily be combined with any other maintenance or repair operation that needs to be carried out on the vessel. Thanks to the flexibility of our teams this allows a vessel to keep its schedule.



One of our divers guiding the new blade during installation.

Straightening, cropping and any other repair done afloat

By taking advantage of the in-house developed cold straightening tech-

nique, damaged blades can be straightened underwater, allowing the ship to return to commercial operations without the need to dry-dock.

If straightening is not an option, the affected area of the blade will be cropped. This is done to achieve the greatest possible efficiency. Cropping is carried out using our propeller blade cutting equipment.

Our teams can also carry out any other repair work on the propeller. Examples of this are the removal and reinstallation of entire propeller blades or replacement of the propeller seal ring.

On the next pages you can read some case studies that illustrate the wide range of afloat operations our teams can carry out. ■



Cropping a damaged blade can restore a propeller's balance.

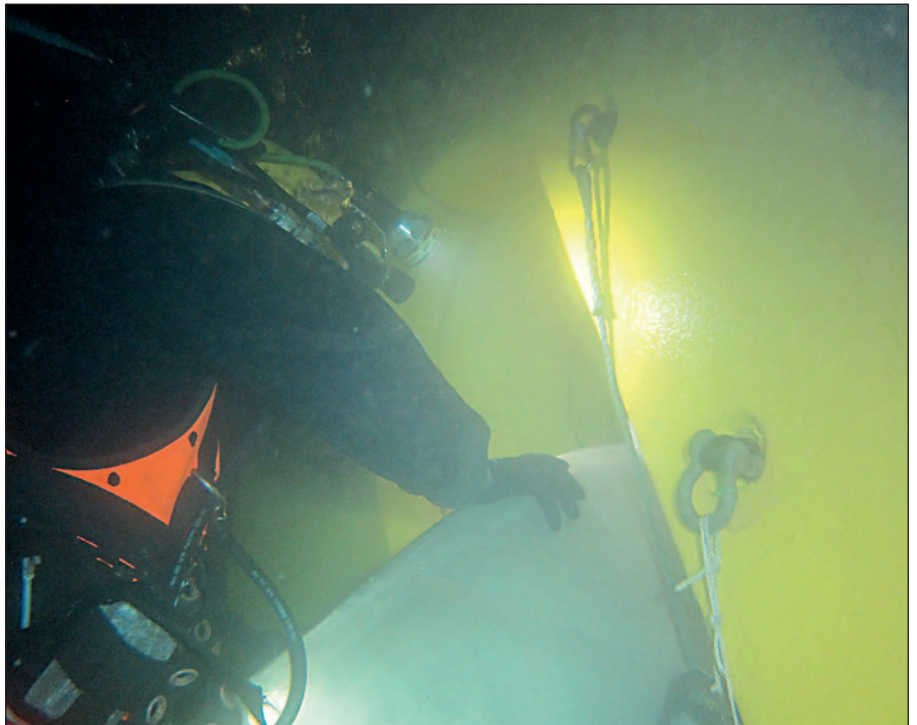


Smoothing the creases

One of the propeller blades of a 180-meter bulker was severely bent. A fast, on-site solution to restore the propeller's balance and efficiency was needed. We therefore sent a team to the ship's location in Rotterdam with one of our workboats.

After the equipment arrived the team started the operation with a detailed survey of the ship's propeller. This revealed that one of the other three propeller blades was also bent slightly. It was decided to straighten this blade as well.

With the survey completed and in close communication with the team leader in the monitoring station onshore, the divers returned the bent blade to its original state. When the straightening was complete, our technicians polished the blade to make sure that any remaining loss of efficiency would be minimal. The same procedure was then repeated on the other damaged blade.



Diver positioning our propeller blade straightening machine.

Ice and cold no match for Hydrex

The conditions for a similar repair in Tornio, Finland were a lot less warm. All 4 blades of a 144-meter general cargo ship were bent. We

mobilized a team to straighten the blades using the same procedure as on the vessel in Rotterdam. They traveled through the snowy landscapes with two vans and the needed equipment to the ship's location.



Bent propeller blade on bulker in Rotterdam.



Propeller blade after straightening.



Hydrex vans and equipment next to general cargo vessel in Finland.



Icy winter conditions do not affect the quality of our work.

During the operation our divers had to work in water filled with chunks of ice, but these conditions offered no problem for them. They are used to adapt to different circumstances and carried out the repair without any loss of quality.

By performing these repair and maintenance operations underwater and on-site Hydrex saves ship owners precious time and money. It allows ships to return to commercial operations without the need for dry-docking. ■

Afloat propeller blade cropping in Dunkirk

The four blades of a 229-meter bulker's propeller were severely bent. An on-site solution was needed to restore the propeller's balance and efficiency. A team was therefore mobilized to the ship's location in Dunkirk, France, to modify the damaged blades.

After the equipment arrived at the vessel's location the team started the operation with a detailed survey of the affected propeller blades. The inspection revealed that the four blades were bent over angles of up to 90 degrees.

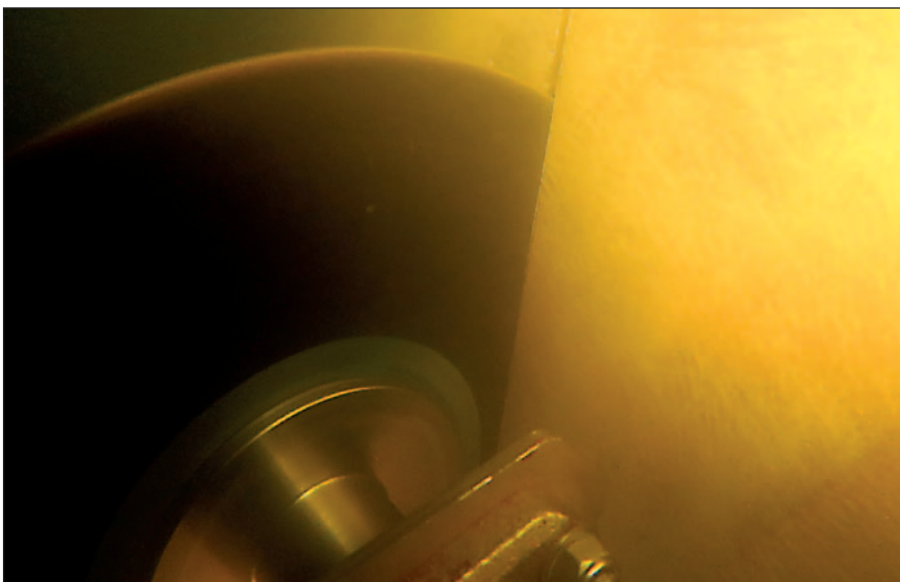
The team then used the information acquired during the inspection to calculate and determine the correct measurements needed to modify the trailing edges of the propeller blades. Next the divers cropped the blades and ground their edges to give them the correct radius. When the cropping was complete, the



Hydrex technician cropping one of the blades in France.



Polishing the cropped blades prevents performance loss.



Propeller blade cropping can be done above and below the water.

Hydrex technicians polished the blades to make sure that any remaining loss of efficiency would be minimal.

The bulker could continue its schedule without going offhire to drydock and with the performance of its propellers restored. ■

Hydrex Spain in Algeciras, Gibraltar: ideal for underwater operations

As part of the Hydrex group, our office in Algeciras takes advantage of our 47 years of experience in the ship repair and maintenance industry. The ideal location of the office allows for a fast response in the bay of Algeciras and Gibraltar.

Hydrex Spain offers a large variety of maintenance programs and repair works for ship owners and the off-shore industry, including underwater and afloat repairs.

Diving conditions are very good in Algeciras making it a perfect location for repair work. The shelter of the bay and the visibility are ideal to anchor a vessel and have repair or maintenance work carried out. For all ships making their way across the Atlantic to the American continent



Hydrex diver taking the plunge, ready for underwater operation.



Hydrex van during underwater operation in Algeciras.

Algeciras is also an ideal place for berthing or bunkering.

Maintenance

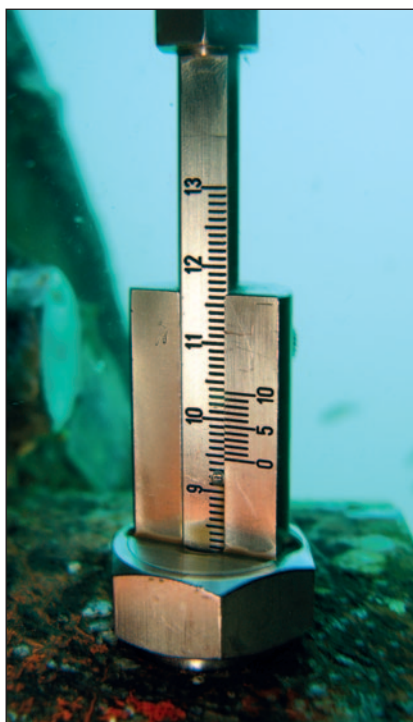
Underwater maintenance services are available for vessels of any size, including propeller cleanings, class accepted video surveys, visual and photo surveys or tail-shaft wear down readings.

Underwater inspections represent a small investment and, if properly done, have the potential to save an owner a great deal of money. If any





The location of the office allows for a fast response in the bay of Algeciras and Gibraltar.

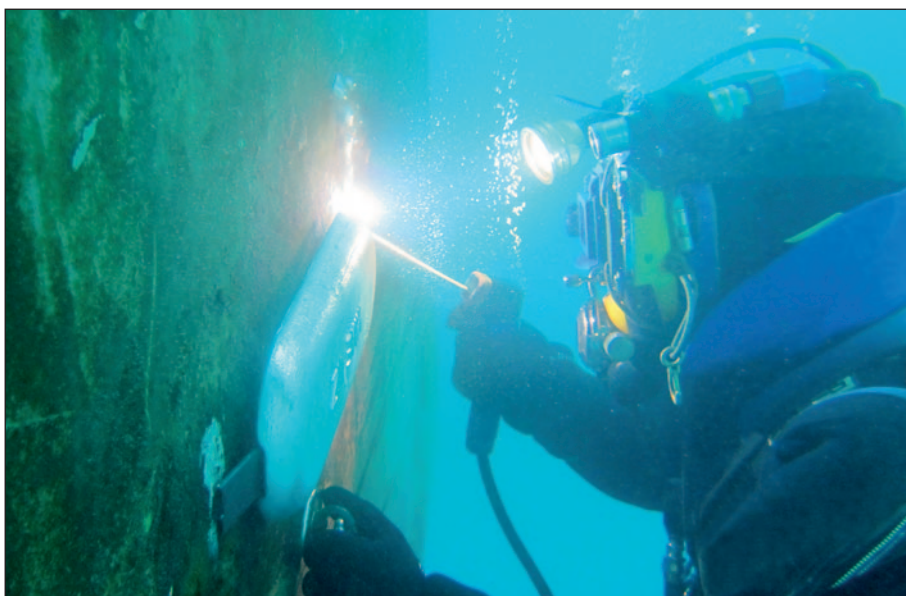


Underwater inspections can save a great deal of money.

damage is discovered the repair work can already start while the rest of the equipment is mobilized. This is possible because welding tools for both wet and dry welding work and a range of other repair equipment are already in the office's fast response center.

Repairs

Repair work consists of propeller repairs, temporarily or permanent shell plating crack repairs, mobdock repairs, rudder pintle repairs and any type of welding work. Hydrex Spain



Anode replacement and other maintenance work can be done at very short notice.



All welding work is carried out by certified welders.



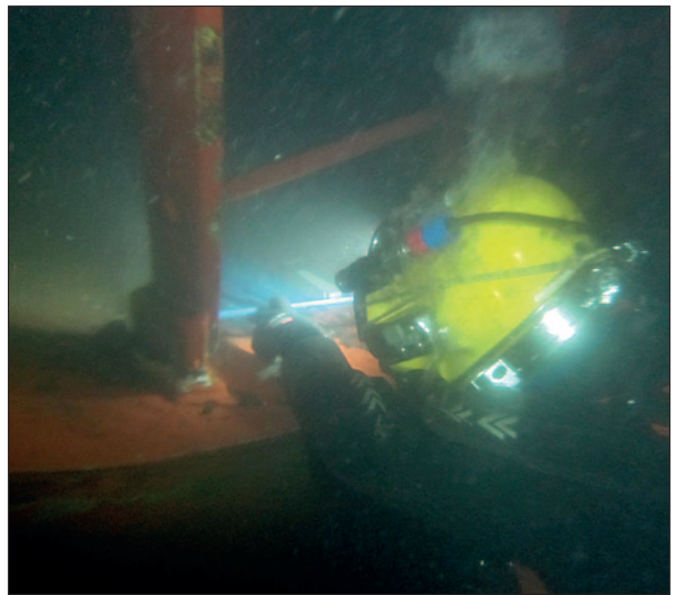
The shelter of the bay and the visibility are ideal to anchor a vessel and have repair or maintenance work carried out.



Hydrex Spain also offers a wide range of afloat repairs.



Overhauled unit in closed off thruster tunnel.



Removing the thruster tunnel grids.

also offers a wide range of afloat repair operations including any type of steel and pipe repair and conversions.

The office is fully geared to carry out repairs at anchorage, in port almost immediately. All operations are certified by the classification societies and carried out by highly qualified diver/technicians all of which have extensive experience.

Some case studies of operations performed by our divers in Algeciras.

Underwater bow thruster operation

Our team removed a bow thruster from a 229-meter bulker. Two weeks later the overhauled unit was reinstalled. Both operations were done during stops in Algeciras and had to be carried out within the tight sched-

ule available to the charterer.

All the necessary equipment was mobilized from our Algeciras fast response center. To keep the impact on the vessel's schedule to the absolute minimum the divers performed an inspection of the bow thruster unit and tunnel, followed by some preliminary work while the vessel was berthed at a lay-by.

The vessel could then shift and start cargo operations while our men performed the rest of the operation without any hindrance to the loading schedule.

Two weeks after we removed the thruster unit our men once again mobilized to the ship. They reinstalled the overhauled unit underwater with the use of our flexible mobdocks.

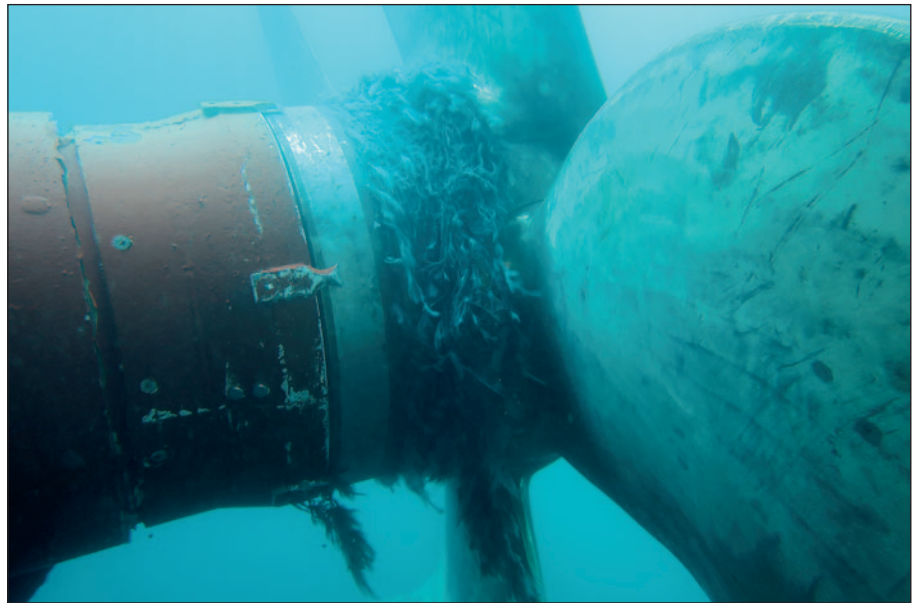
By performing the thruster removal and reinstallation underwater, our divers made it possible for the owner to keep the vessel out of drydock.

Underwater stern tube seal repair

One of our teams carried out an underwater stern tube seal repair on a tanker berthed in Algeciras. The ship was suffering from an oil leak and no drydock was available close by. Our divers replaced the damaged seals underwater using one of our flexible mobdocks. This saved the owner an expensive and time-consuming trip to a drydock further away.

During the operation our divers removed the three damaged seals and replaced them with new ones. Working together with the OEM allowed us to provide our customer with original spare parts which guarantees the best quality material. A technician of the seal manufacturer was also present during the operation.

Our team was able to carry out the entire repair on-site and underwater with our flexible mobdock technique. Because all the required material is ready to be transported at all times, no time was lost making preparations.



Fishing net entangled around the propeller.



Dry working environment around assembly created with our flexible mobdock.

We organized everything from start to finish for the owner. After the seals had been successfully replaced, he could sail his vessel to its next stop free of oil leaks. ■

Hydrex Spain S.L.
Poligono Industrial Palmones II
Calle Dragaminas Nave N29
11370 Algeciras
Spain
Phone: +34 956 675 049 (24/7)
E-mail: info@hydrex.es



Hydrex diver reinstalling the rope guard.

In-water bow thruster repairs



Our 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 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.

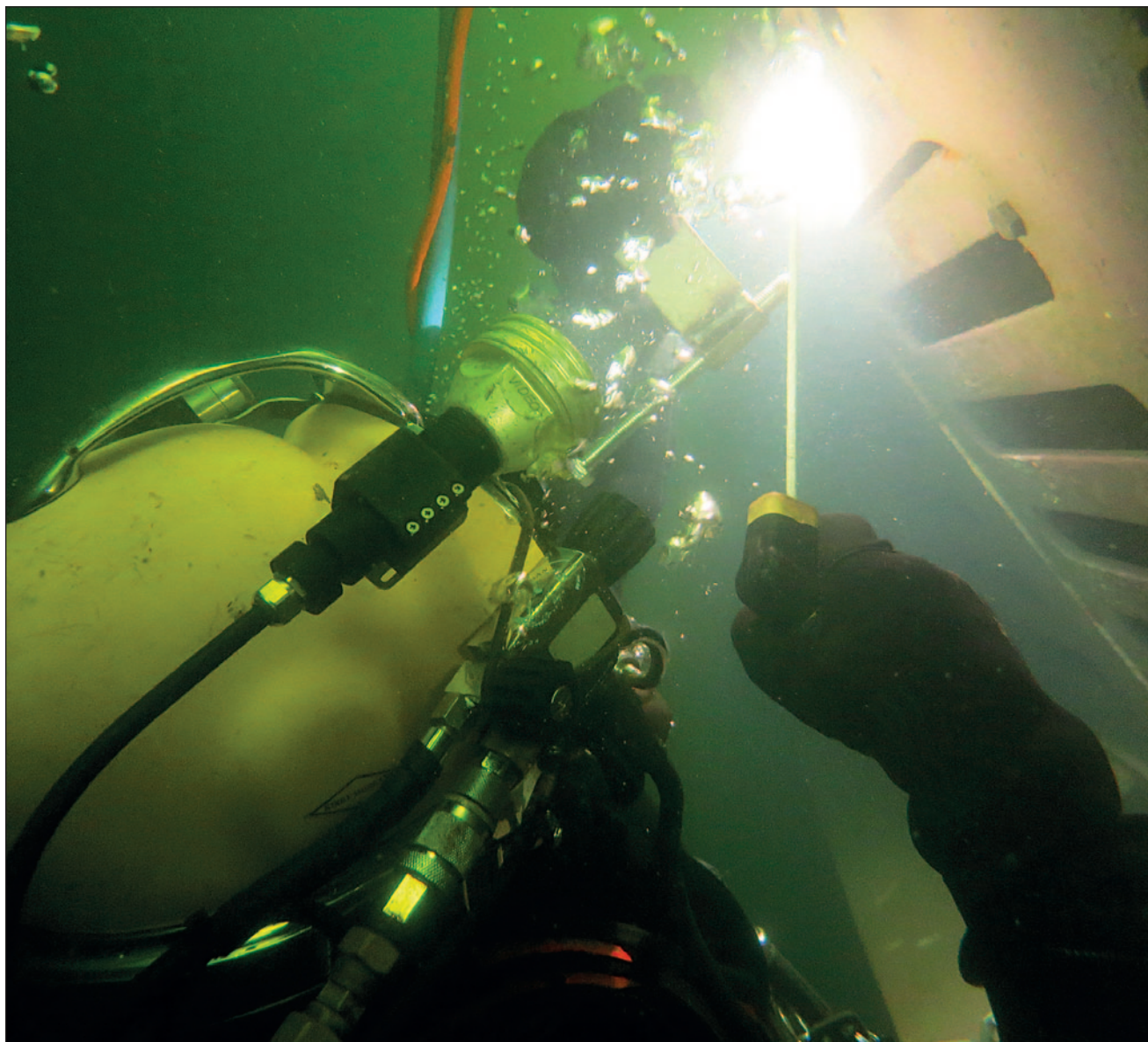
There is no need to send the vessel to drydock as all operations can be carried out in port or while the vessel is stationary at sea. Normal commercial activities can therefore continue without disruption.

HYDREX
UNDERWATER TECHNOLOGY

+ 32 3 213 5300 (24/7)
hydrex@hydrex.be
www.hydrex.be



Sail safe with Hydrex



Headquarters Hydrex N.V. - Antwerp

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

E-mail: hydrex@hydrex.be

Hydrex Rotterdam

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

E-mail: info@hydrex.nl

Hydrex Spain - Algeciras

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

E-mail: info@hydrex.es

Hydrex LLC - Tampa, U.S.A.

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

E-mail: info@hydrex.us

www.hydrex.be