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KEEPING SHIPS IN BUSINESS

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Underwater services and
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Scrubber pipe repairs and lasting protection



Exhaust scrubbers filter out all harmful toxins from exhaust gases of marine diesel engines. These hazardous pollutants can severely corrode the pipes of the scrubber. Using the experience we have accumulated over the years allows us to assist you at moment's notice if this happens.

We offer a full package to owners that are experiencing similar damage. Not only can we replace the

corroded exhaust pipe while your vessel stays on schedule, but we can make sure that you will not have to call us again in a few months time for the same problem. This is done by coating the pipes with a highly corrosion resistant coating called Ecospeed.

Contact us for more information on scrubber pipe replacements or other underwater repairs. We are at your disposal 24/7.

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HYDREX
UNDERWATER TECHNOLOGY

Underwater hull repairs save time and money

Our teams can mobilize immediately to perform a wide range of hull repairs on any type of vessel. In this article we give you a summary of a few operations to illustrate the diversity of shell plating repairs our diver/technicians are trained for.

Sea chest insert repair in Rotterdam

A tanker suffered leakage in the star-board side sea chest of its engine room. We were asked by the owner to provide an on-site solution and sent a team to the ship's location in Rotterdam to carry out an insert repair.

On request of the class surveyor, an NDT specialist was arranged to take thickness measurements of the star-board sea chest from inside the engine room. These measurements showed that the damage inside the sea chest was more widespread than had been presumed.



Hydrex workboat in Rotterdam on its way to an underwater operation.

With the result of this inspection, a complete repair plan was devised in cooperation between our team leader, the ship's crew and the classification society.

The sea chest was emptied of water and opened. All objects, including the water coolers and piping work, were removed from inside the sea chest by the crew. The affected plating was then cut away. Our

diver/welders worked in shifts to fit and weld the two insert plates. This was done with class approved full-penetration welds.

When the installation was complete, a successful NDT test was carried out by an independent surveyor. As a result, the class representative gave his approval of the repair.

Fast intervention in Las Palmas ends ongoing delay

A fully loaded 180-meter bulk carrier suffered grounding damage in Las Palmas, Spain. An underwater repair was needed so that the vessel could sail to her unloading destination safely. Unfortunately, a first repair attempt proved unsuccessful. After the ship had been delayed for almost two weeks we were contacted to take over the operation and get the bulker sailing again as soon as possible.



Positioning one of the new sea chest inserts.





Securing the new inserts in Rotterdam with full penetration weld.



Preparing one of the doubler plates for installation in Las Palmas.



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

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 repair 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.

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.

Repair in Port of Santander avoids drydock visit

A 115-meter LPG tanker needed to have a new insert installed on a damaged section of its flat bottom.

Because the vessel had just left drydock in Port of Santander when the damage was discovered, going back to dock was not a feasible option. Our technical department was contacted and asked to design and install a special mobdock. This would allow the shipyard to perform the repair underwater in drydock like conditions while the ship was berthed outside the yard.

A team of our diver/technicians traveled to Santander. First they performed a preliminary underwater inspection of the damage. This revealed that the required insert would be 400 x 300mm. Next they used a special frame to take the measurements needed to design the



Hydrex diver getting ready for underwater operation.

mobdock so that it would perfectly fit the rounded shape of the hull.

The mobdock was constructed at the shipyard following the design plan provided by our R&D department. When it was finished, it was in-

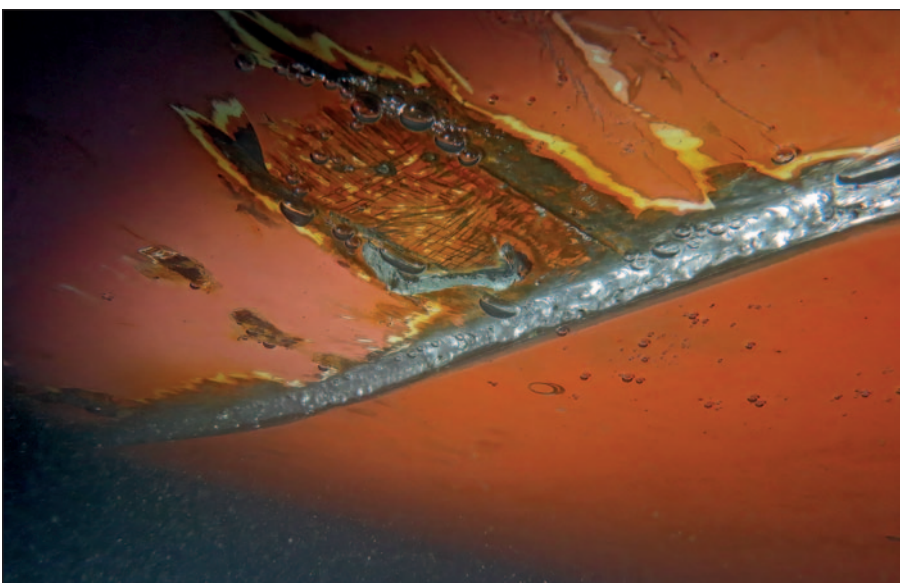
stalled by our team. The shipyard could then perform the insert repair in the best possible conditions. Once the repair was finalized and approved by the representative of the classification society, our team removed the mobdock.

The LPG tanker could continue its schedule without having to wait for a drydock space to become available, much to the satisfaction of both the owner and the shipyard that performed the repair.

Shell plating replacement in Palm Beach

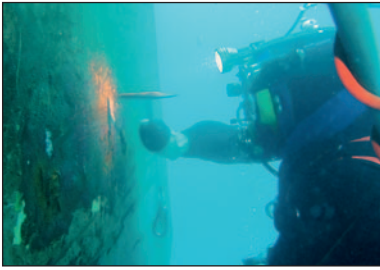
Besides designing and installing a tailor-made mobdock, our teams can also perform the actual insert repair. An excellent example of this was the operation performed in Palm Beach, U.S.A. on a ro-ro vessel.

The ship had suffered corrosion damage to the aft starboard side shell plating. Because the damage was situated in the turn of bilge it was again essential that the mobdock was modified to fit perfectly over the rounded shape of the hull.



The doubler plate repair in Las Palmas allowed the owner to continue the ship's voyage and unload its cargo.

Hydrex under-water inspections



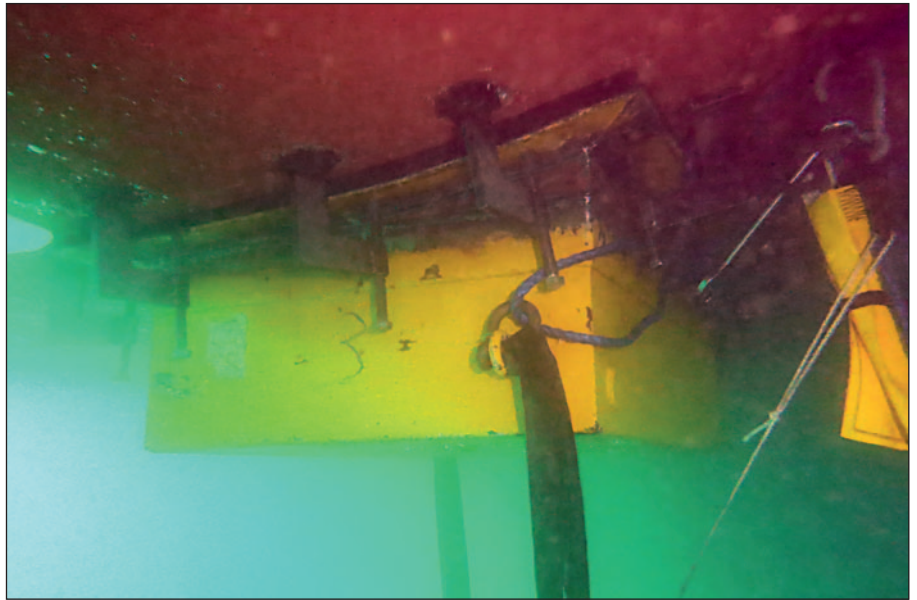
Underwater inspections are an essential aspect of ship repairs. Building upon conventional technical skills and know-how while also taking advantage of the latest technology, Hydrex offers a unique hull monitoring service to its customers. This gives ship owners total control of the underwater hull and the underwater gear of their vessels. An informed decision can then be made concerning any required follow-up action. Catching problems early can save you much money in the long run.

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 to see if actions are required.

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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Tailor-made mobdock secured over flat bottom of LPG tanker.



Hydrex monitoring station on one of our multi-purpose workboats.



Hydrex welder preparing the insert plate in Palm Beach.



Preparing the cofferdam for installation on ro-ro vessel.



Finished insert with reinstalled frame.



All welding work is done by our certified welders.

After the mobdock was installed, the frame covering the damage was removed. This allowed the team to cut away the damage and the surrounding area. A new insert plate was then positioned and welded following our class-approved procedure.

An independent inspector carried out ultrasonic tests and the repair was approved by the classification surveyor who was present during the operation.

Permanent underwater insert repair in 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 insert plate and a steel mobdock were fabricated at our headquarters in Antwerp.

By installing the new insert to repair the large crack, this area of the ship did 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.

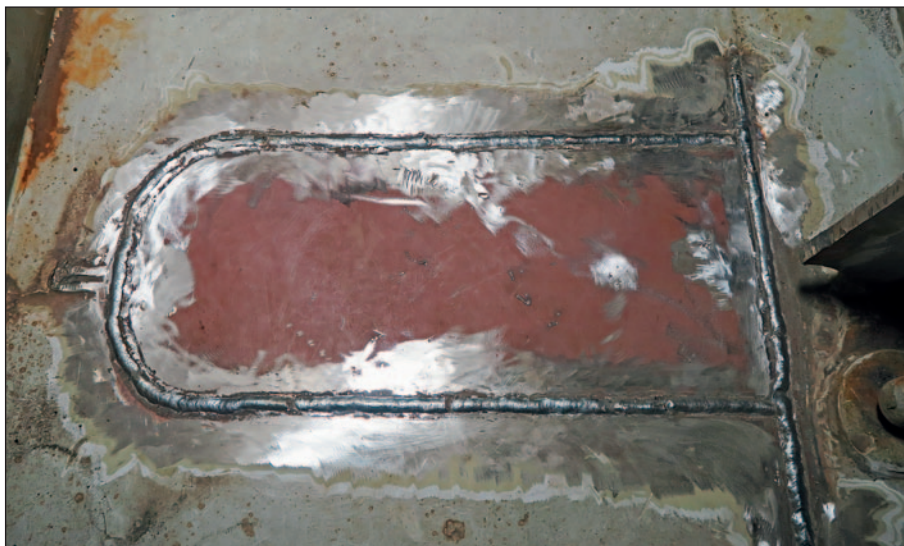
Conclusion

Know-how and experience are needed to find the best solution for any problem you might encounter with





Hydrex technician working on new insert in Amsterdam.



Insert on chemical tanker after full penetration weld.

your ships. This can be a simple routine repair or a unique complex one, as illustrated by these case studies.

All repairs are performed to 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 no delay. ■

If you have any questions regarding a possible hull repair, do not hesitate to contact us. We are at your disposal 24/7 and ready to mobilize almost immediately.

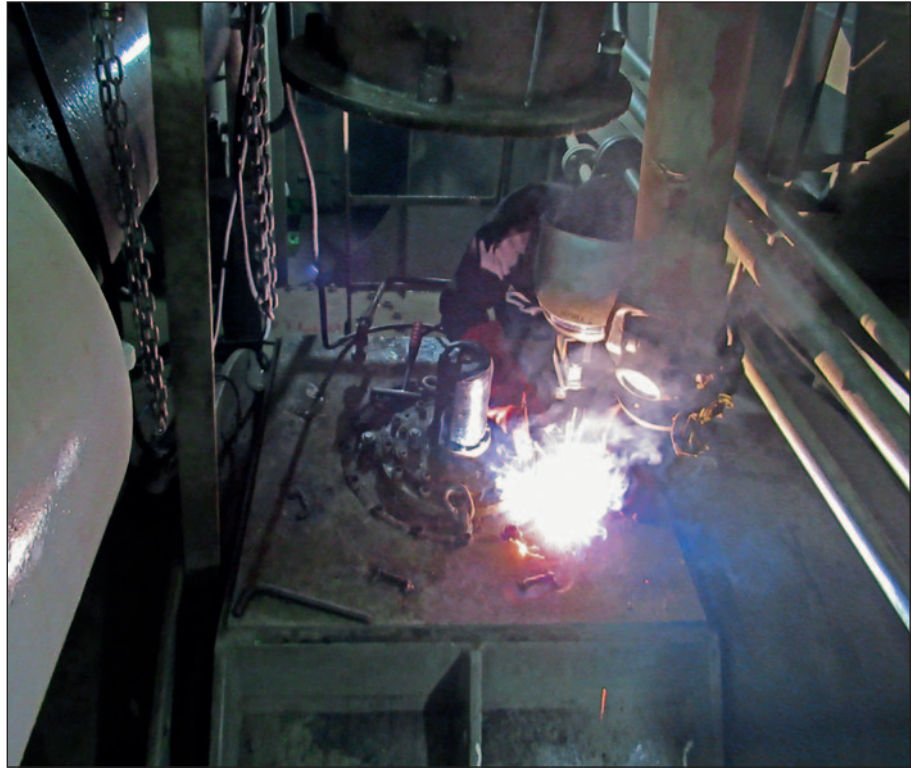
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Underwater bow thruster removal and reinstallation in Zeebrugge

To save time and money for the owner of a 170-meter container ship, our divers removed the bow thruster of the vessel and reinstalled the unit two months later after it was overhauled. This was done during two subsequent stops of the ship in Zeebrugge, on schedule and without having to go to drydock.

After the team set up a monitoring station next to the vessel, the divers started the operation with a detailed inspection of the bow thruster and tunnel. In the meantime, initial preparations were made in the bow thruster engine room for the removal of the unit so that there would be no ingress of water once it was taken out.



Hydrex technician preparing the engine room for removal of the thruster unit.



Bow thruster unit brought to the surface.



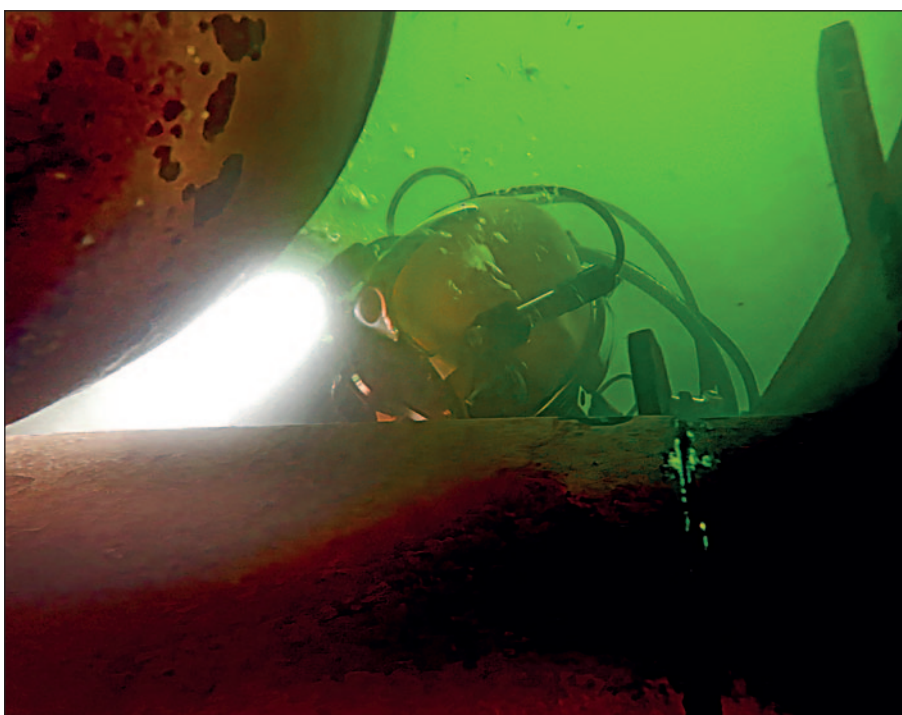
The unit at our warehouse in Antwerp, ready for transport to Rotterdam to be overhauled.

The divers' first action was to take off the external thruster tunnel grids to provide access for removal of the unit. Next padeyes were welded inside the tunnel to hoist the thruster unit up and down.

The next step was to secure the gearbox with hoisting equipment. The team then disconnected the unit

from the engine room and removed it from the thruster tunnel. It was then brought to the surface. Our team then transported the unit to Rotterdam to be overhauled.

Two months later we picked up the thruster again and brought it back to Zeebrugge during the ship's next stop in the port.



Hydrex diver during reinstallation of the bow thruster.

Because the thruster was fully assembled and prepared, it could be installed in its entirety without the need to create a dry environment in the tunnel as is required when the blades are installed separately. Our diver/technicians lowered it into the water and brought it into the thruster tunnel. The team secured the unit and connected it to the engine room.

The operation ended with the removal of the padeyes and the reinstallation of the thruster tunnel grids.

Conclusion

We assist shipowners with almost any problem they encounter with their vessels' thrusters. A wide range of underwater repair or maintenance work can be carried out on 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 performed by our diver/technicians while the ship remains afloat.

Performing the operation in Zeebrugge on-site and underwater enabled the owner to keep the vessel out of drydock. Our team worked in shifts around the clock to finish the operation as quickly as possible.

If you ever encounter a similar situation, give us a call. We can then tell you if the repair is feasible and start working on its handling.

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Inwater propeller repairs



When damage to propellers occurs due to impact with ice and other debris we can help you, even if the damage is quite extensive. Our teams can restore the propeller's balance and efficiency.

By taking advantage of the in-house developed cold straightening technique, damaged blades can be straight-

ened underwater, allowing the ship to return to commercial operations without the need to drydock.

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.

Contact us for more information on underwater propeller repairs. We are at your disposal 24/7.

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