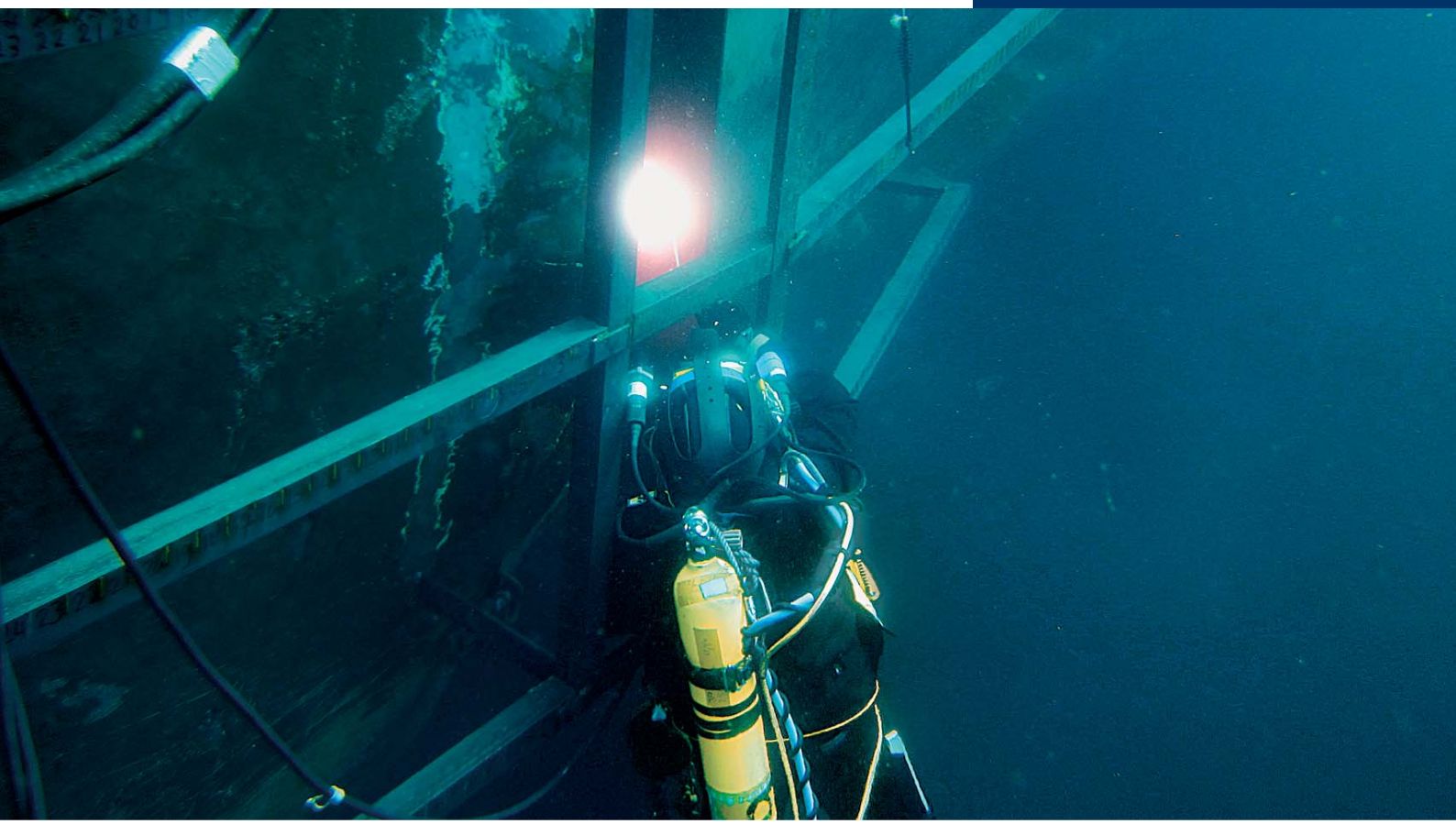
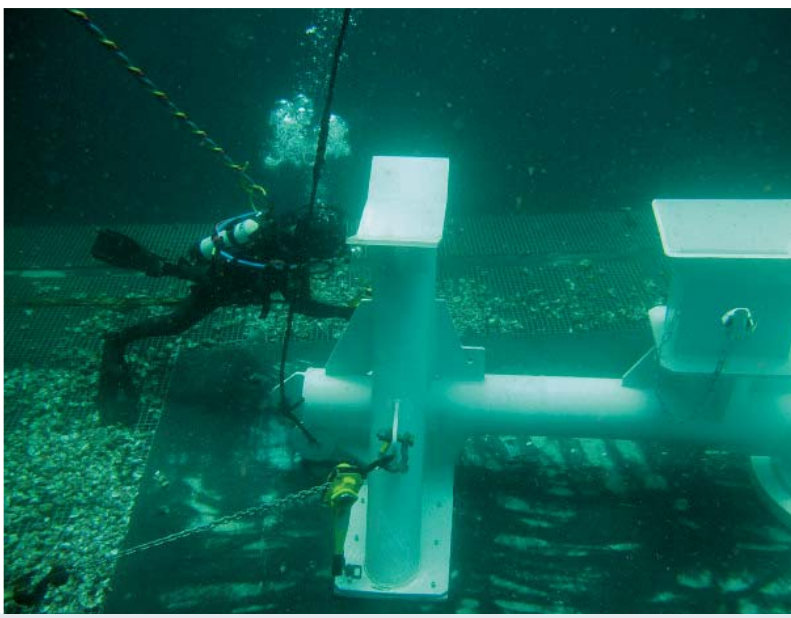
HYDREX®

UNDERWATER TECHNOLOGY

NEWS

LETTER | 224





Complex steel and cofferdam repairs carried out afloat

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Complex steel and cofferdam repairs carried out afloat

KEEPING SHIPS IN BUSINESS

ISO 9001 certified

Underwater services and technology approved by:

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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Complex steel and cofferdam repairs carried out afloat

Hydrex has an in-house Research & Development department that can take care of the engineering aspects of an operation. In this way turnkey solutions can be offered for complex hull and other repairs that require the construction of specific equipment.

Hydrex equipment leaving the fast response center in Antwerp.

All the projects we undertake are engineered and carried out in close cooperation with the customer and any third party suppliers. We begin with evaluating the feasibility of an underwater repair, continue through design and construction of customized equipment and go all the way through to successful execution of the repair or replacement and subsequent follow-up. We take on, organize and execute the entire job, start to finish, relieving the customer of all the hassle of coordination, planning and supervision.

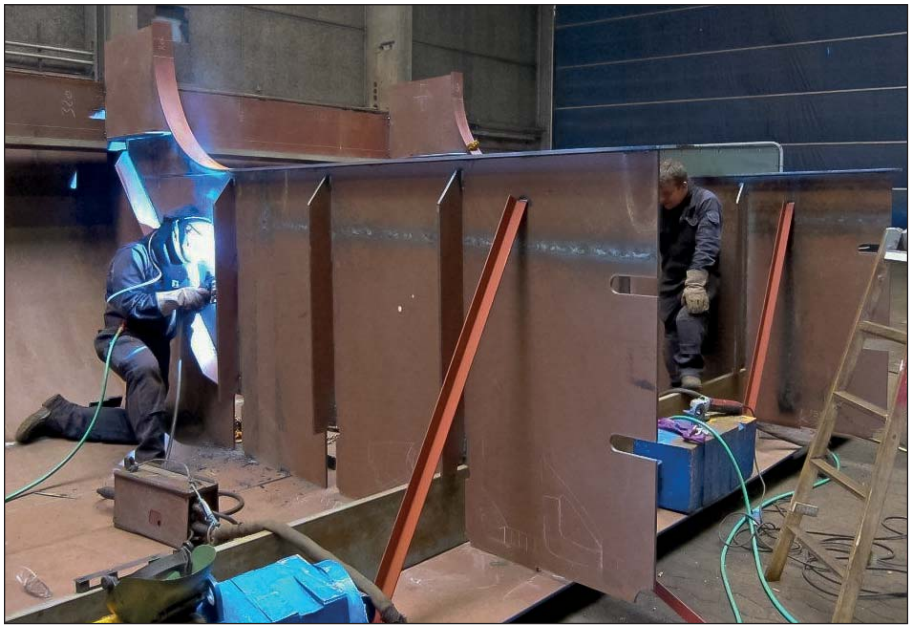
Below you can read some examples of the many customized solutions our R&D department has designed for ship owners over the last couple of years.

Replacement of a complete, prefabricated hull section at anchor

In July 2011 the Tsavliris Salvage Group urgently dispatched a salvage tug in response to a call for assistance from bulk carrier *Navios Sagittarius*. The vessel had run aground on the Tonneberg Banke, about 23.5 miles east of Frederikshavn, Denmark.

The vessel was towed to Frederikshaven for a detailed underwater inspection, extensive bottom repairs, and reloading of cargo. The chief subcontracting company for the inspection, planning and repair work was Hydrex. The complex salvage operation lasted three months.

Without accurate measurements and data, the naval architects could not produce drawings and plans which would make this repair possible. So the first step for the Hydrex divers was to perform a detailed inspection of the two major areas of damage on a hull that was badly deformed, pierced, torn and indented.


Fabrication of the section used to repair the 5 x 5 meter hole in the aft section of the hull, port side.

The finished section being lowered into the water.

Using these measurements and the original drawings of the ship, the naval architects were then able to produce final drawings from which a section and a doubler plate could be fabricated and installed. As fabrication of the section and the doubler plate was completed, preparation for installation began. In the case of the section it was necessary to cut through the hull plates where the hull was distorted and broken. Divers proceeded to cut a hole in the hull about 5 x 5 meters in size. The prefabricated insert was lowered into the water and rigged into place with chain blocks. While work was going ahead with the section, another Hydrex team worked on the fabrication and installation of the 8 x 1.8 m doubler plate in the area of DBBT No. 1. The frame was fabricated and used for measurement and then the plate itself was cut, pre-shaped and attached.

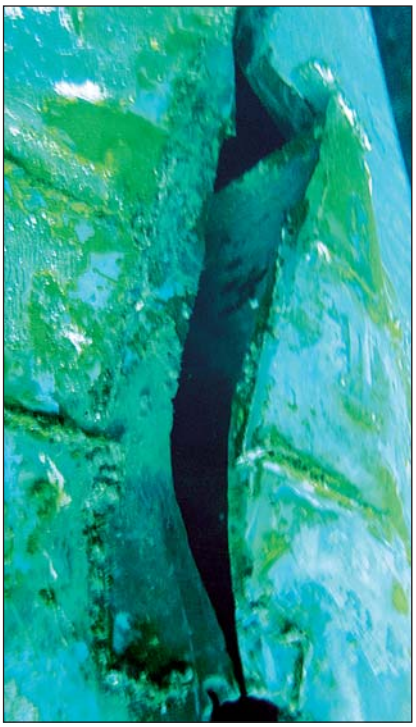
Speed was of the essence for this operation as the ship was on a long term charter and each day it was out of service was costing tens of thousands of dollars. It was the first time that an entire hull section had been prefabricated and inserted into a ship's hull, cutting away the existing damaged plates, with the ship still afloat.

Preparing and lowering the doubler plate into the water so that it could be welded in place to repair the 8 x 1.8 m rip in the hull near the forepeak.

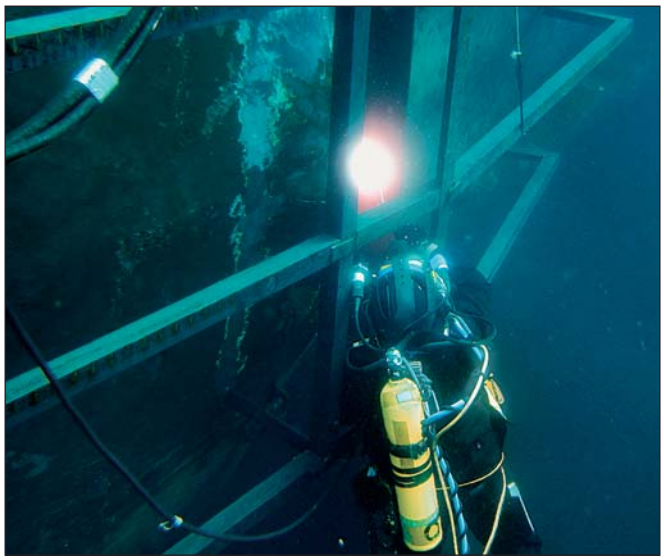
Underwater repairs in the U.A.E. allow ship to sail on after a 150-meter large grounding damage

When the shell plating of a 300-meter bulker was indented over a length of 150 meters after a grounding in the Suez Canal, a large crack 1.5 meters long appeared, making it impossible for the vessel to sail any further. To close off the crack and allow the vessel to continue its route, Hydrex sent a nine man diver/technician team to the vessel's location, 21 miles off the coast of Fujairah, United Arabian Emirates.

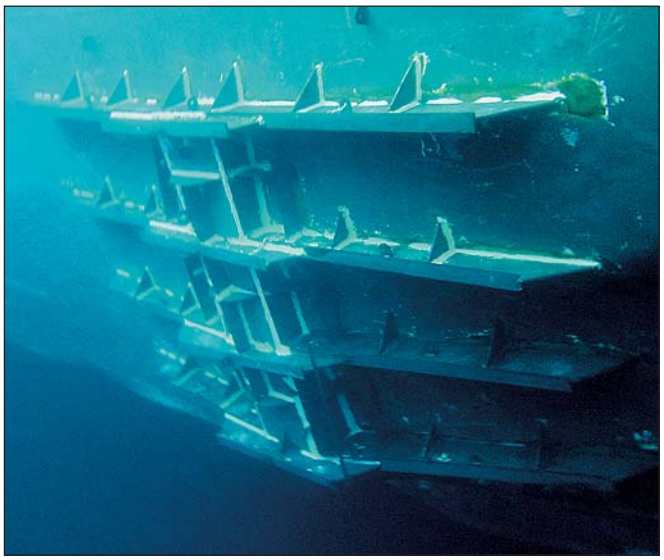
The flooding had lowered the fully loaded ship from a draft of 18 meters to 22 meters. Because such a water depth means shorter diving intervals, a large diving team was imme-



A crack of 1.5 meter appeared after sailing to Fujairah, making it impossible for the vessel to continue its voyage.



A rotating diver/technician team was mobilized to make sure that the operation could continue for 12 hours each day, despite the working depth of 22 meter.



The cofferdam allowed the ship to sail to China for unloading.

diately mobilized to the vessel to allow the team to work continuously for the 12 hours that were available each day.

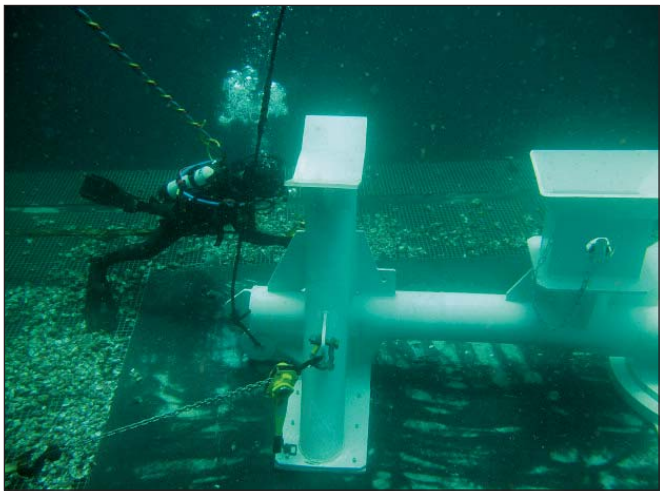
To get a perfect assessment of the way the shell plating had been compressed, a special frame was made and secured over the damaged area. This allowed the diver/technician team to get exact measurements of the distorted plating. These measurements were then used to create a special cofferdam that would cover the crack and prevent it from growing further. After the cofferdam had been positioned and secured, it was reinforced with longitudinal stiffeners and additional fortifications until it was strong enough to hold the water pressure. The tank behind the crack was then emptied, bringing the vessel back to its previous draft of 18 meters. In total the reinforcements covered an area of 18m2 and the combined length of all the welds was over 500 m. When the operation was finished, only a few reinforcements needed to be added to the inside of the hull to prepare the ship for its journey to China.

Replacement of 40-ton azimuth thruster on crane barge in Gabon

A Hydrex diver/technician team mobilized to an offshore crane barge stationed at its service base in Gabon to replace one of the vessel's swing-up azimuth thrusters with the spare. The operation had to be carried out in a very short time frame because the crane barge was scheduled to leave for an operation in Nigeria. All repairs and other servicing needed to be performed before the start of this operation. For this reason going to drydock was not an option as the nearest suitable location was South Africa which would have taken the repairs far beyond the available time frame.

Hydrex had carried out a similar operation on this vessel on two occasions. Four years earlier, when the first azimuth thruster was re-

Tailor made 9x6x2 meter mobdock stored in Gabon allows very fast mobilization whenever needed.



A special support cradle was used to transport the 40 ton thruster underwater.

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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Spare thruster unit brought onto work barge.

placed, a large mobdock (measuring 9 x 6 x 2 meters and weighing over 25 tons by itself) was constructed under Hydrex supervision in Belgium and transported to Gabon. There it was stored after the repair. It was to be used at short notice whenever future repairs were required on thrusters. This allowed for a very fast mobilization and thruster replacement on the next two occasions.

The replacement was concluded well before the start of the barge's next operation and presented a major saving in time and money for the owner as he did not have to take the offshore unit off hire and all the way to drydock.

Comprehensive bottom plating repair on bulk carrier in Peru

When bad weather caused a 195-meter bulk carrier to roll heavily while at anchorage in Chicama, Peru, it scraped against the seabed and suffered severe damage to the forward end of its bottom plating. This resulted in an ingress of large amounts of water which caused the ship to trim by the head.

The vessel had just been loaded and the degree of trim was significant. Under those circumstances the vessel was not allowed to enter any port for unloading. We were therefore asked to find a solution to perform any possible repairs afloat. This would enable the ship to sail to its next stop and continue its schedule for the subsequent three months until the next planned drydocking.

Because the bottom plating had been damaged in two different places it was decided to carefully sail the vessel to a nearby and more suitable location in Lima at the reduced speed of 7 knots. There two doubler plates would be installed at anchorage: one on the port side to cover a crack with a length of 1500 mm, the other to close off an opening situated on the starboard side that measured up to 3500 mm at its widest point. While the smaller doubler plate, still measuring 1200 mm x 1800 mm, was installed, a local workshop

Large doubler plate ready to be lowered into the water in Peru.

ship to drydock when he wanted and where he wanted.

Because of the rainy season in Nigeria, underwater visibility was almost non-existent and the current was too strong to carry out repairs at anchorage. Abidjan was the closest location suitable for this type of operation.

At this new location the team cut away part of the deformed plating. This created an even surface to position the doubler plate. Next the team made crack arrests to make sure that the cracks would not spread any further.

Welding work on the smaller of two doubler plates.

Severe damage inside the bulk carrier in Peru.

started working on the second one. Due to its size the plate was delivered in three parts and was then welded together by the Hydrex team to its full size of 6 m x 6 m. Next it was reinforced with stiffeners to make sure it would be able to withstand the water pressure.

The plate was then lowered into the water with hoisting equipment. Due to the very specific shape of the affected area it was essential that the plate was precisely positioned over the designated section. Next it was welded underwater by our certified welders.

Extensive doubler plate repair in Ivory Coast allows bulker to sail after collision

A 190-meter bulker suffered severe collision damage in Lagos, Nigeria. A large hole in the hull plating prevented the ship from sailing at full speed. The classification society also demanded that the vessel go to drydock immediately unless an on-site solution was found. Hydrex therefore sent a diver/technician team to the vessel's location to carry out an emergency doubler plate repair at anchorage. This would give the owner the opportunity to take his

The bottom part of the doubler plate was then lowered from the deck and positioned over the lower half of the opening. This part of the plate was 4.5 meters wide and 2 meters high. The diver/technicians then welded the plate onto the hull. Horizontal stiffeners were installed on the plate to give it extra strength. This could not be done in advance because it would have prevented the team from adjusting the plate to the exact shape of the damaged hull.

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 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.

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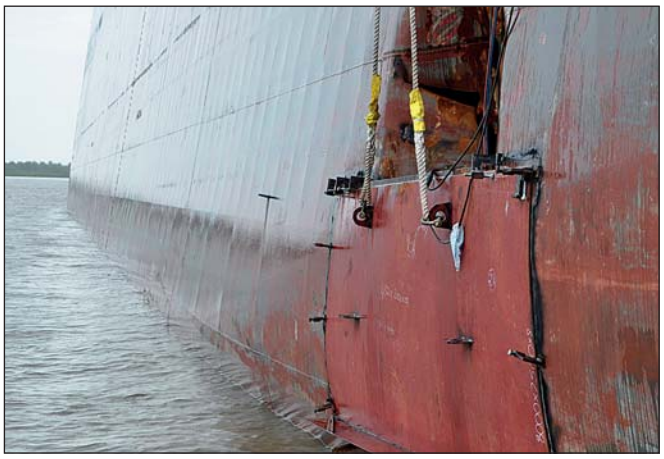
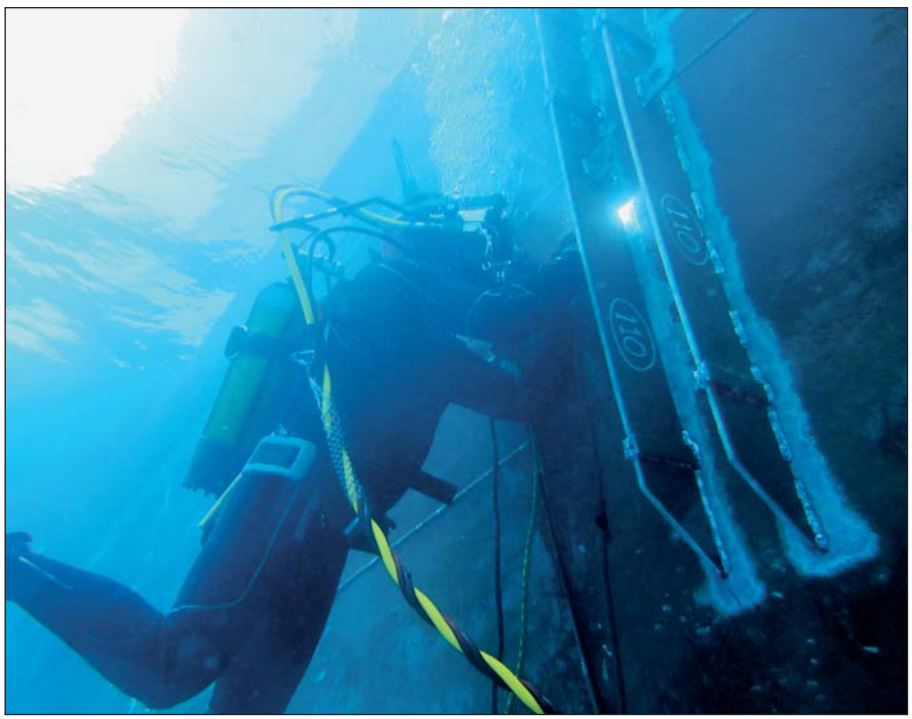
A full inspection of the damage was first carried out.



The doubler plate was fitted to the slightly rounded shape of the hull.

Hydrex certified welders securing doubler plate on bulker in Abidjan.



Hydrex diver/technician welding temporary stiffeners on the starboardside plating.

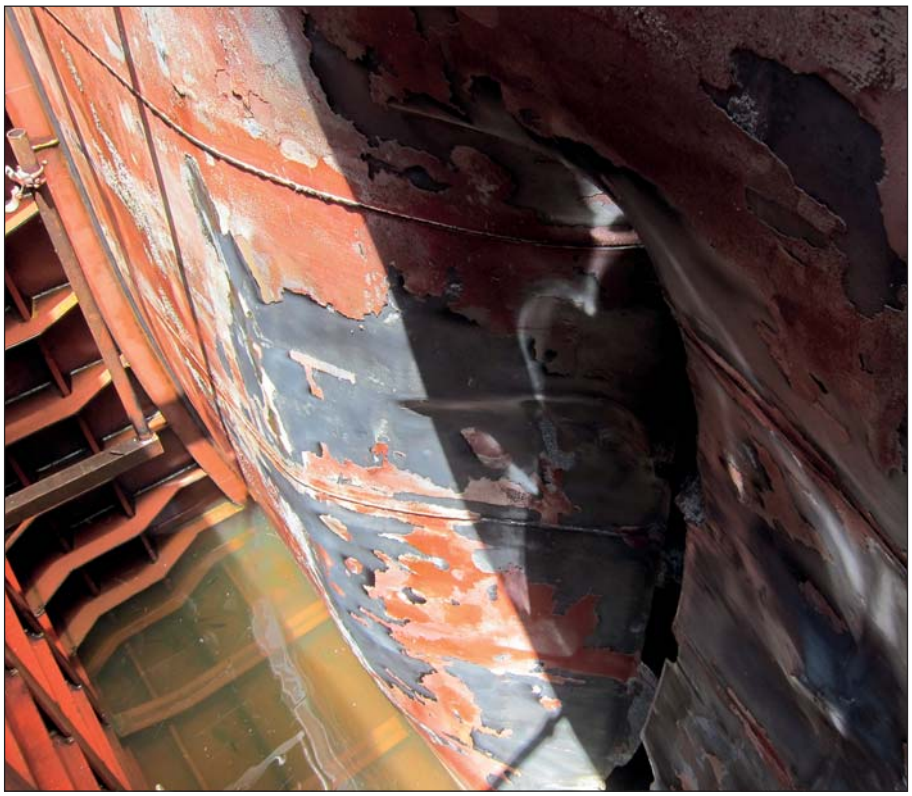
The same procedure was repeated for the top part of the doubler plate. This part of the plate was trapezium-shaped with a base of 4.5 meters wide and a height of 2.5 meters. Both parts of the plate were then welded together to finalize the repair.

Permanent on-site collision damage repair in Greece at Neorion Syros Shipyards

In July 2014 Hydrex mobilized a team of diver/technicians to Syros, Greece, for a complex repair operation on a 118-meter, 8550 DWT chemical tanker. The vessel had suffered large cracks in her hull plating as the result of a collision.

The tanker was berthed in Egypt when another vessel struck her portside hull. This caused a large hole, severe cracks and dented plating. The collision also pushed the vessel's starboardside hard against the fenders, denting the plating on that side as well.

She was not allowed to continue her schedule. Because it was fully laden, going into drydock was also not feasible. An on-site underwater solu-



The damaged plating inside the emptied cofferdam.

tion was needed. Hydrex therefore proposed a permanent on-site repair using an open top cofferdam.

In consultation with Hydrex, the ship's owner opted to take his vessel to the Neorion Syros Shipyards, situated on the island of Syros in Greece. When the ship arrived, the classification society decided that the damage to the portside hull plating was too severe to let the tanker sail any further.

Open top cofferdam ready to be lowered into the water.

The damaged area on the portside was closed off with an open top cofferdam. All water was then removed from inside the cofferdam. The yard replaced the dented shell plating. The affected web frames were also replaced. While the yard was performing the insert repair, the Hydrex diver/technicians installed temporary stiffeners on the outside of the dented starboard plating.

The repairs to both sides of the vessel were approved by the classification society. This allowed the vessel to sail from Syros. The tanker then made her way to Germany where she was unloaded before paying a quick visit to drydock for permanent repairs to the starboardside hull plating. Because no further attention was needed for the portside, the visit to drydock was very short and economical.

Summary

Our goals is to offer customers the most efficient solution, whether the required services involve the inspection of a vessel's condition along with any required maintenance work, or highly technical major repairs and replacements of a ship's external underwater equipment and machinery. In all cases we strive to reduce cost and off-hire time for customers while maintaining the highest quality standards of repair and maintenance.

If you have a problem with a ship or a fleet, or any underwater structure for that matter, give us a call. We will evaluate the problem and let you know whether an underwater solution is feasible. If it is we will provide you with a clear cost and time frame. You would be amazed at what can be solved without the need for drydocking. ■

If you have received this magazine at the wrong address or if your company is going to move, please let us know.

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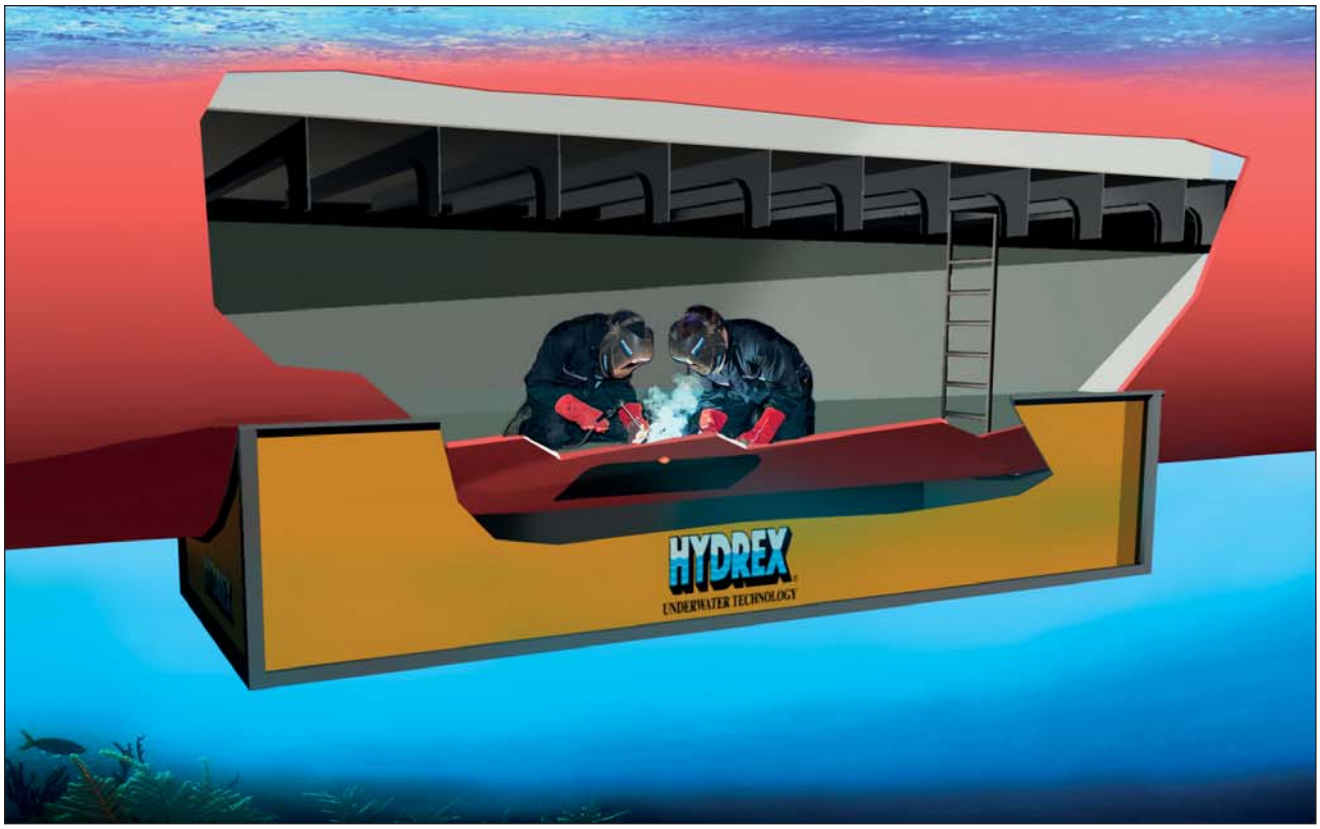
Fast underwater ship hull repairs save time and money



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

Hydrex diver/technician teams carry out these on-site hull repairs all over the world. In most cases the damaged area can be replaced with a permanent insert and no condition of class is imposed. On the rare occasions where the damage does not allow such a repair, a temporary doubler plate is installed over the affected area. This allows the owners to keep to their schedule and have a permanent repair carried out during the next scheduled drydock visit.

To offer the fastest possible service to customers, Hydrex offices have fast response centers where an extensive range of state-of-the-art tools and diving support equipment is available at all times for the repair teams.

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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) 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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