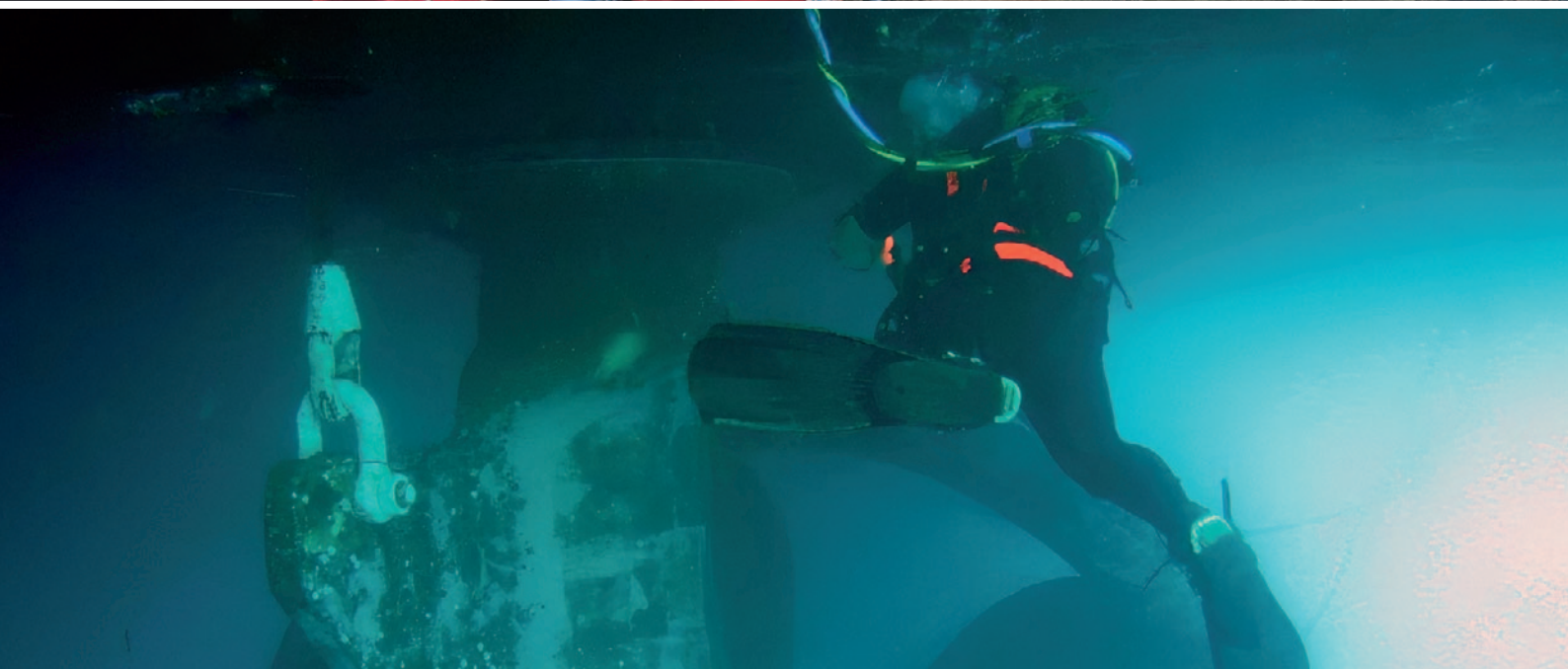


HYDREX[®]

UNDERWATER TECHNOLOGY

Magazine

Number 329



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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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Editorial

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At Hydrex we remain at your disposal 24/7 throughout the summer, because we know how important it is to have someone you can rely on available at all times.

We provide assistance from one of our offices and through our network of agents and local support bases. Our teams can mobilize on very short notice whenever you need us and, as always, our fast response centre is fully stocked for all eventualities.

If you have a problem with your ship which you are not sure can be solved afloat, please give us a call. Many solutions are available without the need for drydocking. We can inform

you whether the operation is feasible underwater. This consultation is free of charge, regardless of the answer.

I hope you will sail safely and without trouble. However, should a problem arise with a vessel in your fleet or if you require maintenance work to be carried out, do not hesitate to contact me.

Hydrex founder
Boud Van Rompay
bvr@hydrex.be
www.hydrex.be



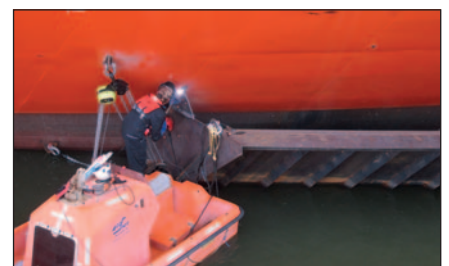
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Underwater thruster repairs

For Hydrex's 50th anniversary we are looking back at the history and a few memorable case studies of each of the services we offer to our customers. This month we are focusing on underwater thruster repairs.

We can perform a wide range of repair or maintenance work on all types of thrusters. An entire unit can be overhauled, propeller blades and seals can be replaced or repair work on another specific part of a thruster can be performed on-site or inside the tunnel. These repairs are performed in cooperation with OEMs. They can be carried out with the vessel afloat with minimum impact on its schedule.

Tunnel thruster operations specifically are carried out using our flexible mobdocks that close off the tunnel on both sides. This allows divers to work in a dry environment around the unit. Our range of flexible mobdocks can quickly be transported to any location.



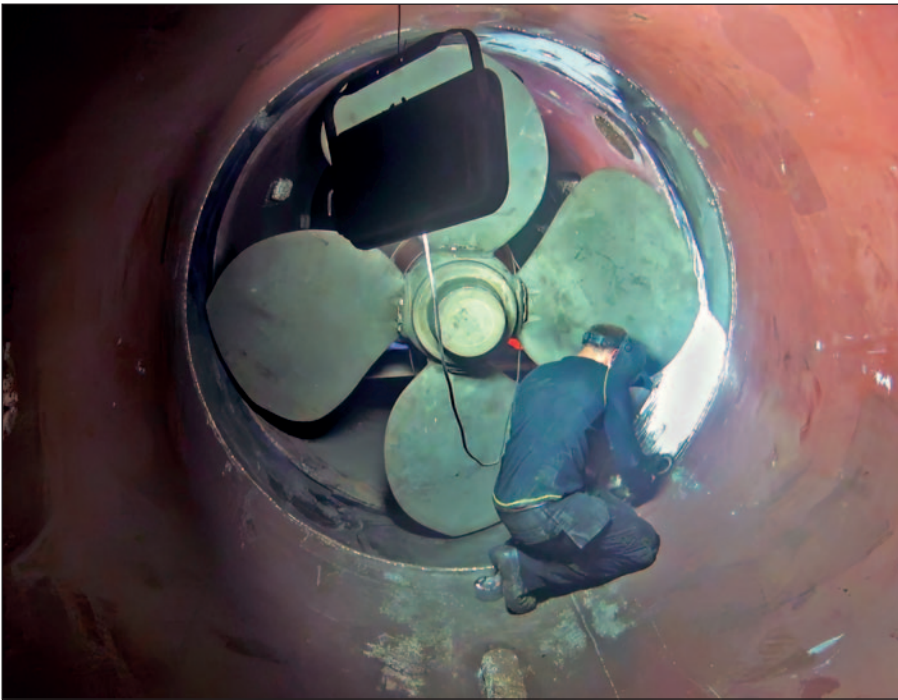
40-ton swing-up azimuth thruster of an offshore crane barge. Behind it the 9x6x2 meter yellow mobdock we designed and constructed for the removal of the unit.

The size of the thruster does not matter. Hydrex flexible mobdocks can easily be adapted to the circumstance. They can be used for a wide range of repair or maintenance work on all types and sizes of thrusters and vessels.

In most cases a thruster overhaul is planned in during a scheduled dry-docking. This usually means that the unit is removed in drydock and taken to the repair shop. The ship then has to wait for the overhauled thruster to be returned and rein-



Bow thruster in Italy ready for overhaul after removal by our team.



One of our technicians grinding a weld during installation of a new stainless-steel belt in the thruster tunnel of a research vessel in Congo.

stalled before the vessel can leave drydock. This results in a longer drydock time and consequent extra costs. Our teams can, however, remove the unit before the ship enters drydock so it that can be brought to the manufacturer for overhaul ahead of time. When the vessel enters drydock the overhauled unit is ready for reinstallation without any delay.

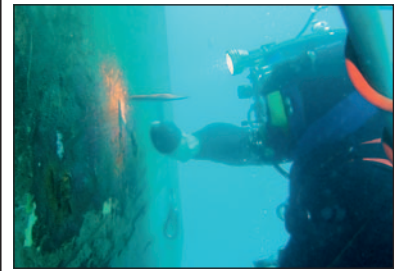
The reverse procedure is also possible. If the thruster is removed in drydock, we can reinstall it underwater in dry conditions at a later date after it has been overhauled. In this way the ship can leave drydock while the unit is still with the manufacturer.

Contact us for more information on bow thruster or other underwater repairs. We are at your disposal 24/7. ■



Hydrex certified welder reinstalling the rope guard of portside azimuth thruster in Mexico.

Hydrex underwater 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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Bow thruster replacement keeps cruise vessel on schedule

A bow thruster failure can have profound consequences not only for navigational safety but also the shipowner's operational expenditure, especially if tugboats are required to berth the vessel. But when the vessel is a cruiseship facing disruption to schedules, then the consequences can be even more severe, denting both the balance sheet and the corporate reputation.

The owner of a 208-meter cruise ship sailing off the Caribbean was faced with such a dilemma when one of the vessel's two bow thrusters malfunctioned. A solution was needed that could be carried out on-site without interrupting the vessel's schedule.

Enter our tried and tested underwater repair facility mobdock.



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

The repair was straightforward, but an eight-hour window in various locations added an altogether different dimension, as Dave Bleyenbergh, Tech Services at Hydrex, recounts; "The repair itself was one our teams

had done on many occasions, but the ship's timetable was the tricky part. Its cruise itinerary included several short port-stays so we had to devise an effective repair plan that would allow us to carry out the thruster replacement in eight-hour stages, across several different ports. It was a logistical challenge."

The moment the cruise ship berthed in one port, our divers set about removing the bow thruster unit and blades in the wet, ensuring everything was watertight before the vessel made way to her next port of call, where the new bow thruster would be installed.

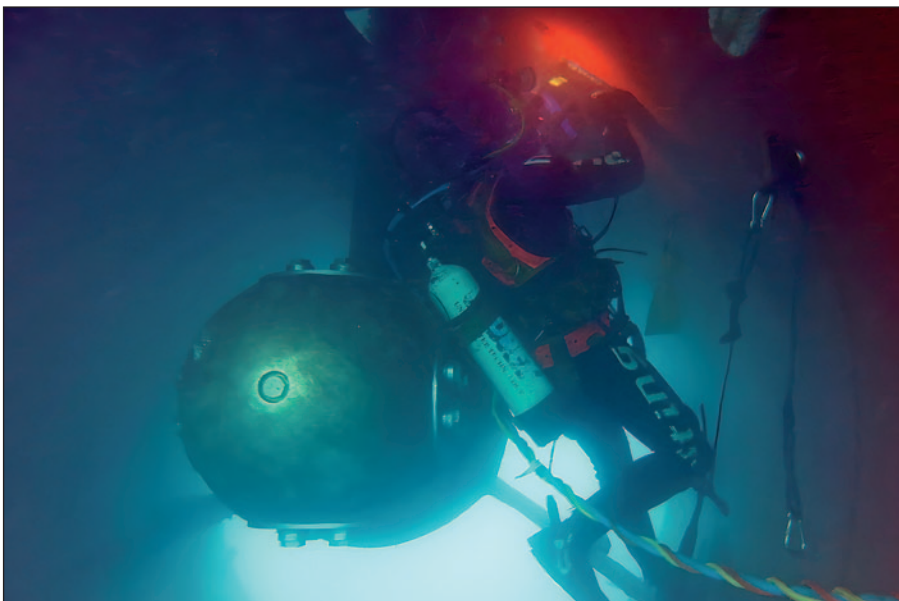
"By the time the vessel had arrived at the second port, our mobdock team had also arrived and swiftly got to work erecting the flexible habitat in-situ, closing off the thruster tunnel. This part of the repair can only be carried out in a



Preparing the old bow thruster for removal.



One of our divers taking the plunge during operation in the Caribbean.



Diver inside the thruster tunnel during bow thruster operation.



Old thruster unit brought to shore.

Hydrex US ready to mobilize immediately



Hydrex has an office located in Clearwater in the Tampa Bay area that is ready to mobilize immediately. The office has a fast response center that is equipped with an extensive range of state of the art logistics, trucks, tools and diving support equipment. This enables Hydrex US to efficiently service vessels and offshore units calling on ports in Canada, North, Central and South America as well as the Caribbean.

All staff members of the Hydrex office in Clearwater undergo stringent training at the Hydrex headquarters in Antwerp. They can carry out both simple and complex high quality jobs even in the harshest of circumstances.

Repairs to thrusters, propellers, rudders, stern tube seals, damaged or corroded hulls and all other underwater repair as well as maintenance services are done while the vessel is afloat. This eliminates the need to drydock.

All used methods are fully approved by all major classification societies.

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New bow thruster unit arriving on-site.



Preparing the new unit for installation.

clean, dry environment to avoid water ingress to the new thruster unit,” says Bleyenbergh.

The in-house designed mobdock technology differs from other rigid underwater habitats, providing a more lightweight, flexible structure that can be rapidly deployed and erected. We have been using the technology to expedite a wide range of underwater repair or maintenance work for well over twenty years.

“The mobdock and our underwater repair know-how saves shipowners considerable time and money,” says Bleyenbergh. “I can’t imagine the financial losses that would be incurred should a vessel have to cancel its itinerary, but we completed that job across multiple sites in just eight hours... and the passengers were none the wiser.” ■

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You can contact us at:
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or at
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**KEEPING SHIPS
IN BUSINESS**

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

straightened 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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Underwater removal and reinstallation of 60-ton azimuth thruster in Cartagena

In 2010 we mobilized equipment and a diver/technician team to perform a class-approved operation on the heavy-lift semi-sub crane vessel Saipem 7000. The inspection and the underwater removal and reinstallation of one of its 60-ton azimuth thrusters were performed in Cartagena, Spain where the vessel was given a full maintenance service as part of the preparations for an assignment in the Gulf of Mexico.

The work began with a class approved UWILD inspection of both hulls and all twelve of the vessel's azimuth thrusters. The inspection revealed that the leading edges of two of the propeller blades of one of the thrusters were damaged. The owner asked us to repair these blades in addition to the thruster removal and reinstallation.



Heavy-lift semi-submersible crane vessel stationed in Cartagena for maintenance.

Both operations were successfully performed under the supervision of the factory representative and the classification surveyors.

The removal of the thruster began with the lowering of three winch wires through the designated tubes.

Next, each wire was secured to one of the padeyes on the azimuth thruster unit. This allowed the unit to be lowered steadily after it had been disconnected from the engine room. During this part of the job the divers were in constant communication with the surface operator to ensure



Hydrex diver/technician guiding azimuth thruster during removal.



Azimuth thruster being lifted out of the water prior to overhaul.

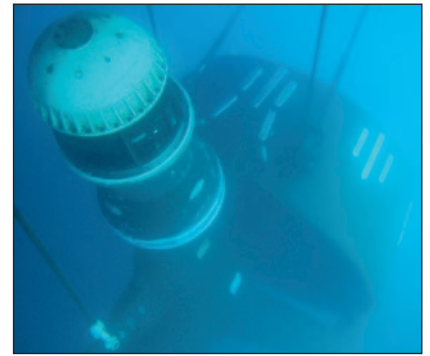


Overhauled thruster lowered back into the water.

that the thruster was lowered perfectly straight. The unit was then connected to the main crane's slings and brought out from underneath the platform. Next it was disconnected from the winch wires, lifted to the

surface, and brought onboard the vessel where it was overhauled by the manufacturer's technician.

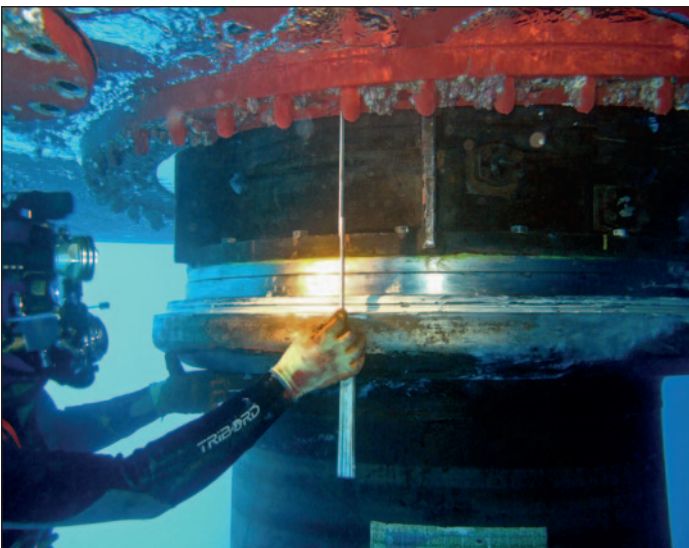
After the repair, the azimuth thruster was reinstalled following the reverse



Azimuth thruster guided underwater with wires.

procedure. Meanwhile the cracks in the propeller blades of one of the other thrusters were ground out.

Our teams had performed maintenance and repair work for this customer before. Familiar with our procedures, he asked us to send an experienced and fully certified diver/technician team to carry out a detailed, high-quality underwater inspection and azimuth thruster removal. According to the customer's Lifting Fleet Manager, the, "...work went very well. The team and equipment were readily available for the task and the operation was carried out in a safe, professional and time-efficient manner, which is not less than what we have grown to expect from Hydrex." ■



Hydrex diver making sure the unit is installed correctly.

Hydrex enables OEM to access bow thruster out of drydock

When a 162-meter pipe laying vessel suffered an oil leak in 2015, going to drydock for bow thruster repairs seemed the only option. The owner contacted us to see if we could develop an underwater solution that would allow the OEM specialists to access the thruster tunnel while the vessel was still afloat. This would enable the vessel to stay on project.

One of our technicians met with the owner and representatives of the OEM in Mobile, Alabama, to discuss the repair plan devised by our technical department. This proposal included the installation of two open-top cofferdams to close off the thruster tunnel. The OEM specialists could then freely gain access to the bow thruster to examine the unit and make the necessary repairs.

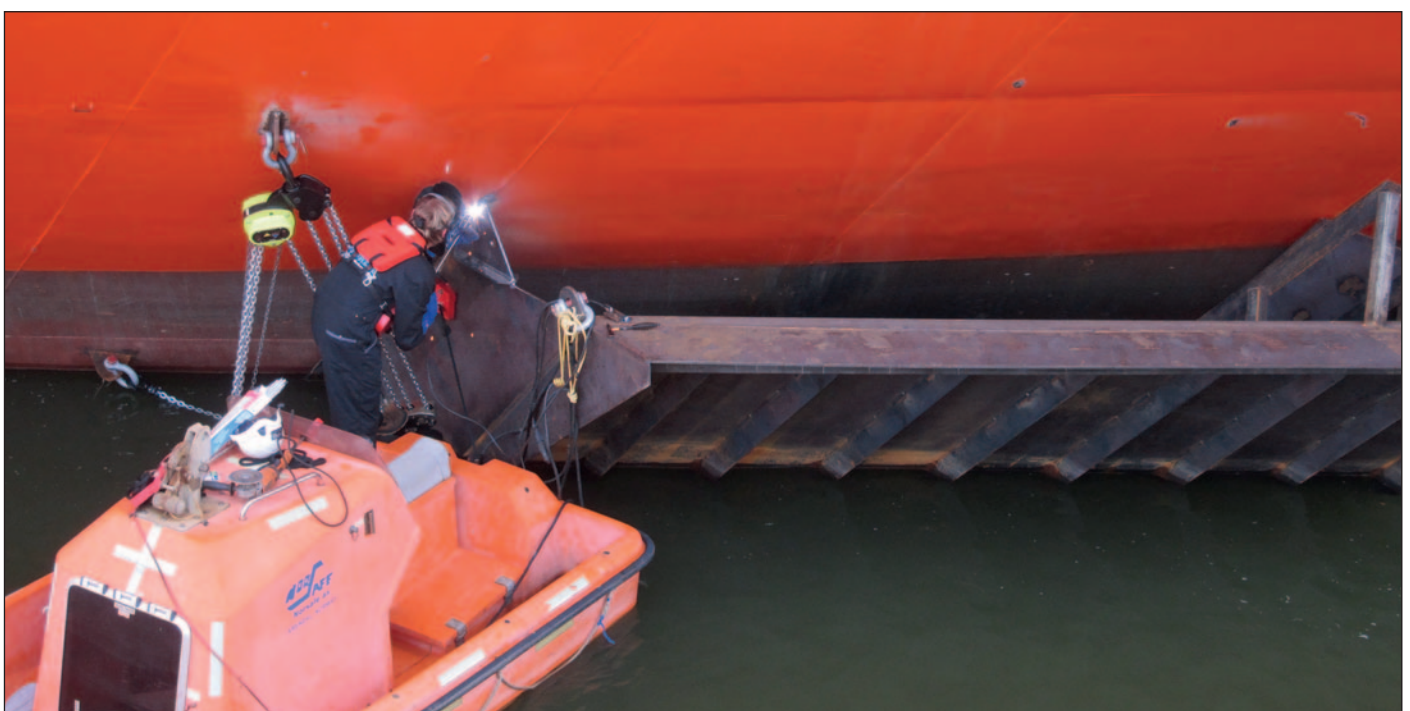


Final touches being made to one of the open top cofferdams.

The cofferdams were designed by our in-house R&D department to fit the rounded shape of the ship's hull. They were built at a local workshop in Mobile. The construction started almost immediately after the operation was approved and the design was finished, to make sure the

cofferdams would be ready as soon as the vessel arrived in Mobile.

The cofferdams were positioned and secured with rigging points. All water was then removed from the thruster tunnel to create a dry environment inside the tunnel. The



Hydrex diver/technician securing one of the cofferdams.



Hydrex technician working on the rigging points in the thruster tunnel.



Pulling the liner out of the bow thruster unit.



Installing the propeller on the assembly.



Hydrex monitoring station next to the pipe laying vessel in Mobile.

required inspection and repair work could now be performed in conditions similar to those in drydock. Next our technicians removed the tunnel grid to gain access to the bow thruster unit. The oil was then drained from the thruster.

The OEM's specialists entered the tunnel and examined the bow thruster unit. They decided that the seals needed to be replaced. This specific type of seal assembly required the liner to be pulled out

of the assembly in its entirety to work on the seals. To do this, the thruster's propeller first needed to be removed. Our technicians therefore installed two anchor points in the tunnel to secure the propeller during its removal.

The liner was pulled out of the unit in one piece including the rope guard and the three seals. The rope guard and the seals were then removed from the liner and the seals were replaced. Next the liner and

rope guard were repositioned in the assembly and the propeller was reinstalled. Pressure and leakage tests confirmed that the replacement was successful.

Conclusion

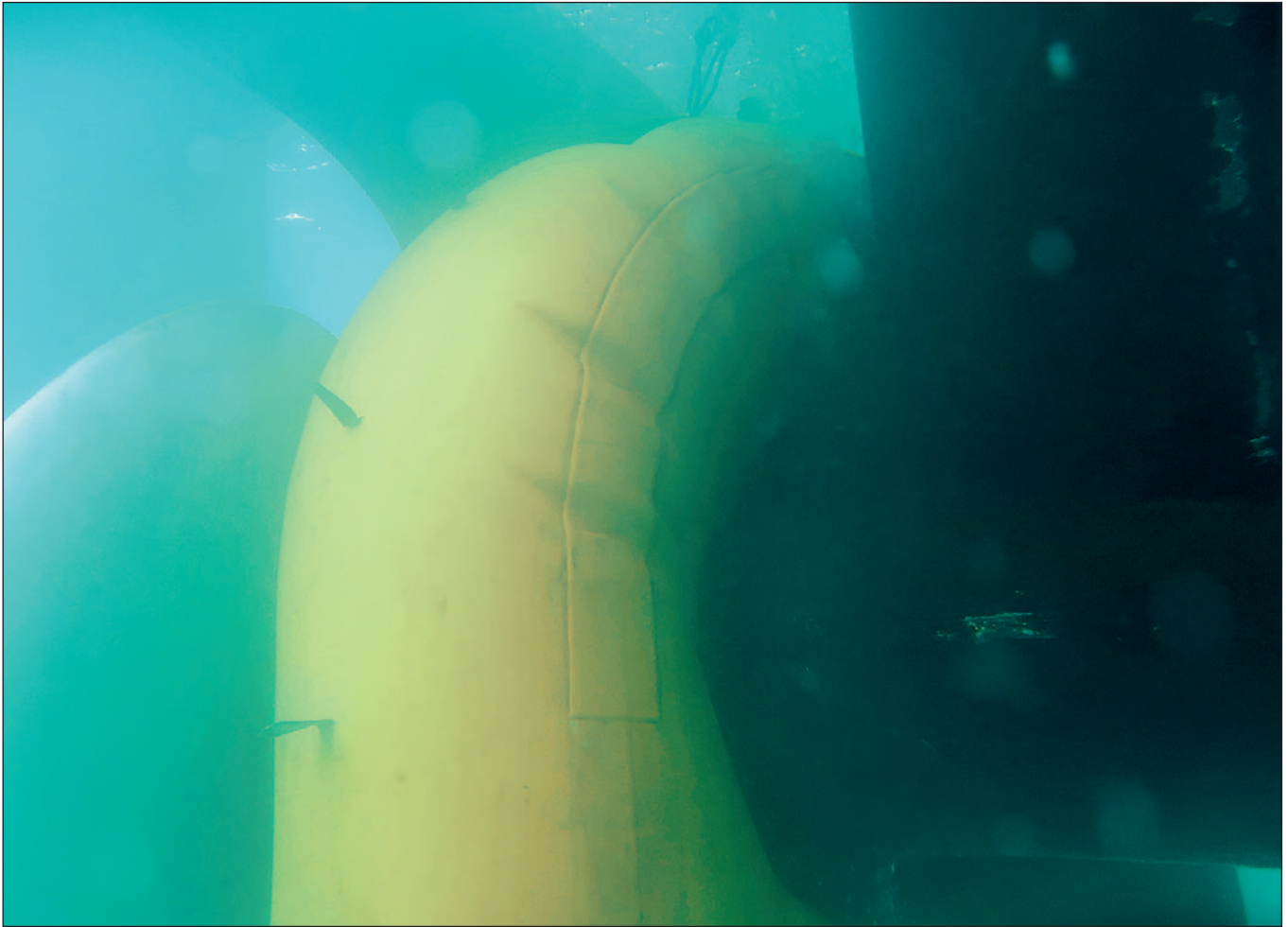
The operation required Hydrex to think and handle fast to allow the owner to keep his ship on project. The schedule of the pipe laying vessel offered only a window of two weeks to develop an underwater solution and two further weeks to carry out the operation, including the building of both cofferdams.

The limited time frame available, combined with the extra requirements of the job, are something we know how to deal with. We have fast response centers at our offices which were designed for a swift mobilization to anywhere in the world. We also have 50 years of experience with handling these kinds of situations, which allowed us to come up with the best possible solution that would keep the vessel afloat. ■



Bow thruster tunnel ready to be flooded again after the repair.

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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