



# UNDERWATER TECHNOLOGY

Number 194



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# Hydrex offers an immediate response and a fast mobilization to vessels around the world



**T**hrough an ever-expanding, worldwide network of offices and service stations, Hydrex can provide a wide range of services. From these locations, specialized repair and diver teams can be mobilized immediately to almost anywhere in the world.

All the lightweight equipment used by the teams is stored in fast response centers which are designed specifically for the pur-

pose of speed and are equipped with all the latest facilities and tools. A good example of the easy to transport equipment is a range of unique flexible mob-docks which are used to perform stern tube seal, thruster, rudder and other permanent repairs that require a dry working environment.

With close to 40 years of experience and well trained diving teams at its disposal, the Hydrex

technical department knows how to handle any kind of situation without loss of quality or loss of time for the customer.

Because Hydrex brings drydock-like conditions to the ship, the customer does not have to take his vessel off hire and into drydock. This saves him valuable time and money



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# Editorial



The first article in this magazine focuses on an extensive emergency repair. A Hydrex team performed a large doubler plate repair in Ivory Coast. This was necessary after a bulker had suffered severe collision damage while unloading.

Only a fast on-site operation prevented a forced drydocking. This solution was devised and executed by Hydrex within the very short available time frame. The classification society now allows the owner of the vessel to take his ship to drydock where and when it fits into the schedule.

The second article deals with a series of bow thruster blade replacements. These were carried out by Hydrex in Rotterdam. The operations were performed during commercial activities. On each occasion the Hydrex team finished the replacements well before the vessel had to leave Rotterdam.

In the last article in this magazine you can read about two propeller blade repairs. A propeller straightening carried out in Antwerp and, in Algeciras, four of the five blades of a tanker's propeller were cropped.

Best regards,

Hydrex founder  
Boud Van Rompay



Hydrex certified welders securing doubler plate on bulker in Abidjan.



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Underwater services and technology approved by:



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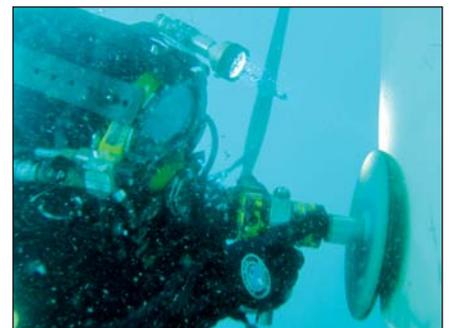
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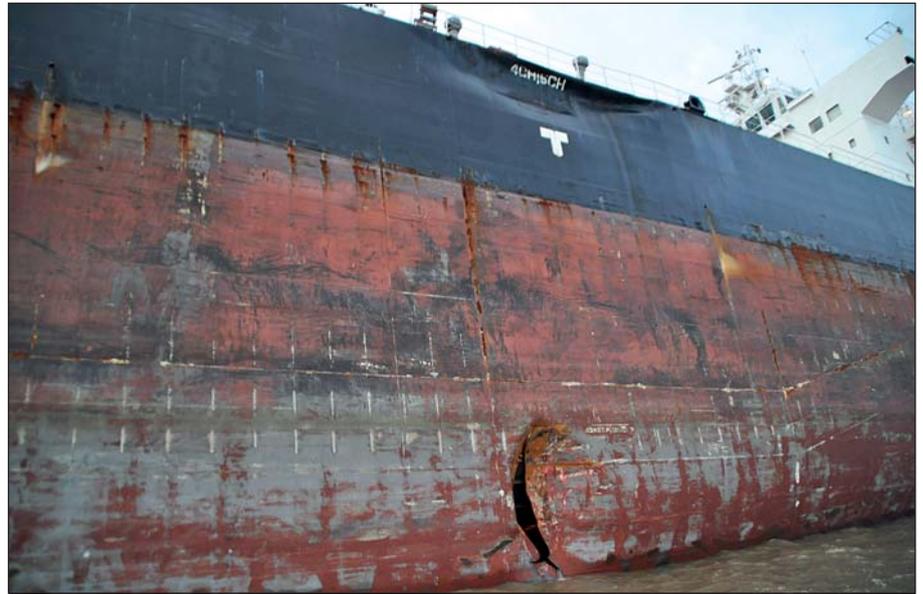


# Extensive doubler plate repair in Ivory Coast allows bulker to sail after collision

**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.

## Accident during commercial operations

A dredger had smashed its bow into the port side of the bulker while the ship was unloading its cargo in Nigeria. A large hole in the vertical side of the ship was the result. In total an area of 4.35 meters wide and 4.10 meters high was deformed. Only a stroke of luck prevented an



*Severe collision damage on bulker required an emergency repair.*

enormous ingress of water, with a possible disastrous result.

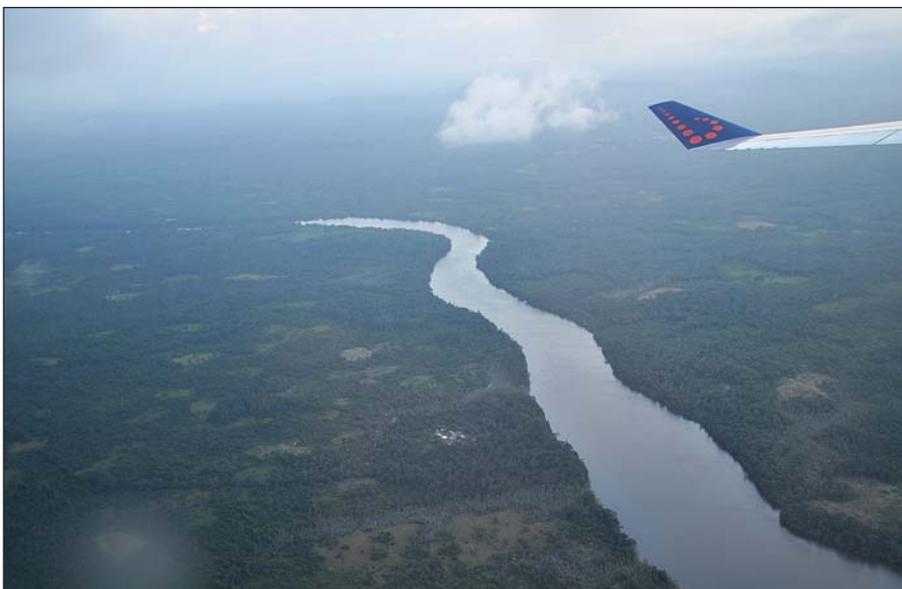
The dredger hit the hull plating at the location of a ballast tank. This made it possible to close off the area behind the hole before too much

water had flooded into the vessel. A second fortunate factor was that the bulker was still relatively full when the accident took place. This allowed the crew to bring most of the gap above the water by unloading the ship further and deballasting it.

In this new condition the ship was only allowed to sail at a minimum speed and for a very short distance. It was essential to devise a plan that could be carried out as soon as possible and on-site. But who could come up with a solution and have the means to perform the repair on such short notice?

## A fast response saves the owner time, money and a great deal of worry

A temporary repair was proposed to the owner shortly after he contacted



*A Hydrex team was immediately mobilized to perform a repair.*



*A full inspection of the damage was first carried out.*



*The damage was located in way of a ballast tank.*



*Hydrex technician making a crack arrest.*

Hydrex. A special doubler plate would be made and installed over the opening. This would give the owner the opportunity to take his ship to drydock when he wanted and where he wanted.

The owner did not have to think about the proposal and it was not long before a Hydrex diver/technician team hopped on a plane. They were on their way to Abidjan, Ivory Coast to assist the damaged vessel. 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.

The bulker left Lagos at a diminished speed and sailed for Abidjan where it would meet up with the Hydrex crew.

### **On-site repair creates freedom to dock where and when desired**

After the bulker let down anchorage in Abidjan, the vessel was listed towards the starboard side to bring the hole in the port side entirely above water. This allowed the Hydrex divers to make a full inspection of the damaged area.

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.

The bottom part of the doubler plate was then lowered from the deck and positioned over the lower half of the



## Class Accepted underwater stern tube seal repairs under warranty



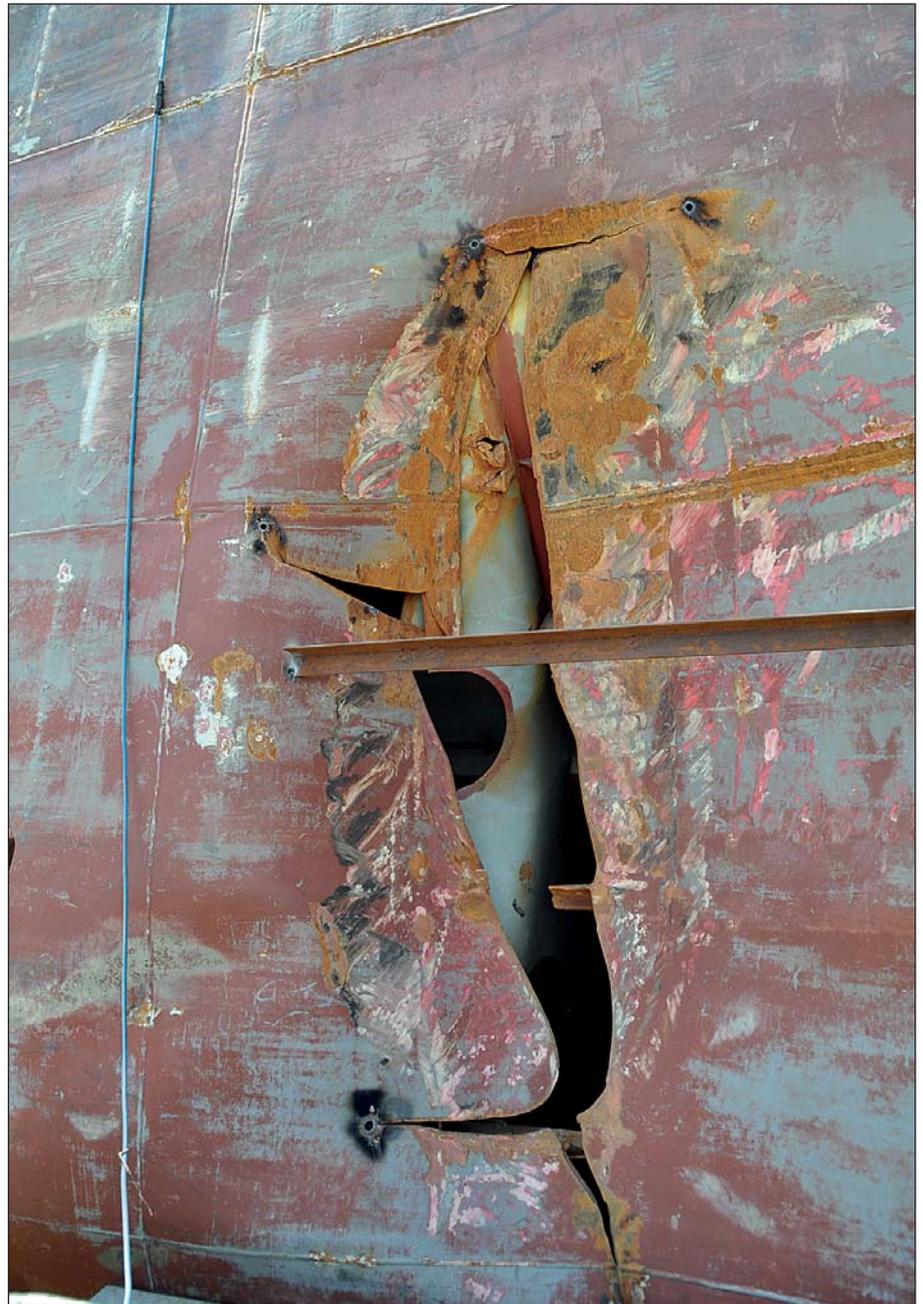
**U**sing our flexible mobdock method to create a dry underwater environment, we have carried out stern tube seal repairs and replacements underwater for some years now in cooperation with top specialist suppliers.

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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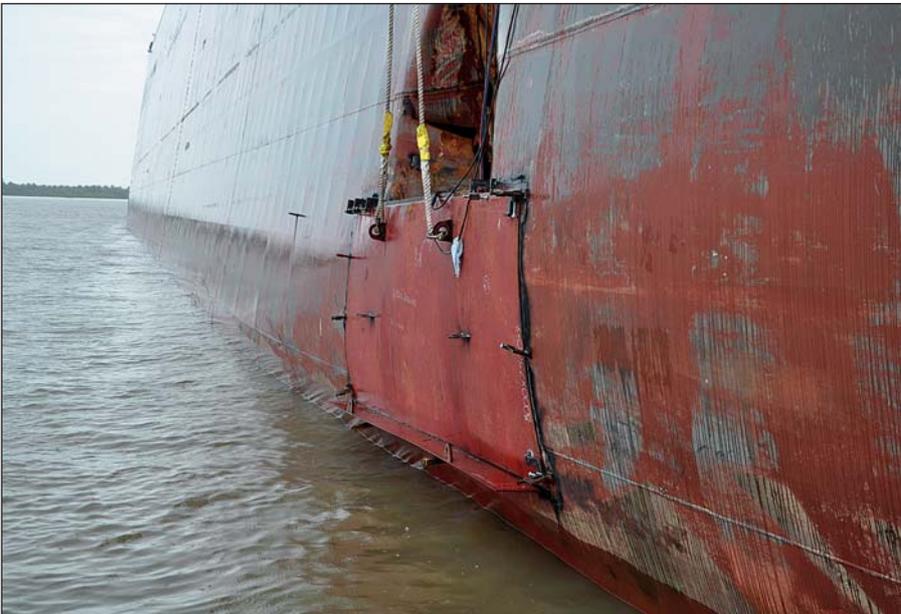
*Crack arrests prevent the cracks from spreading.*



*The lower part of the doubler plate being lowered from the deck.*



*The bottom half of the doubler plate was fitted to the hull.*



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



*Stiffeners were then lowered and installed on the doubler plate.*

## Cold straightening of severely bent propeller blades

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.

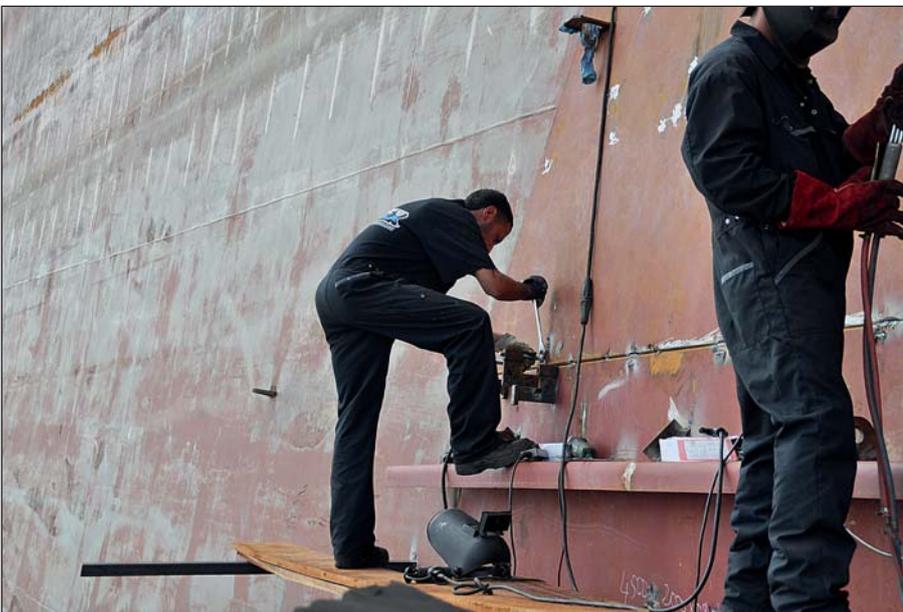
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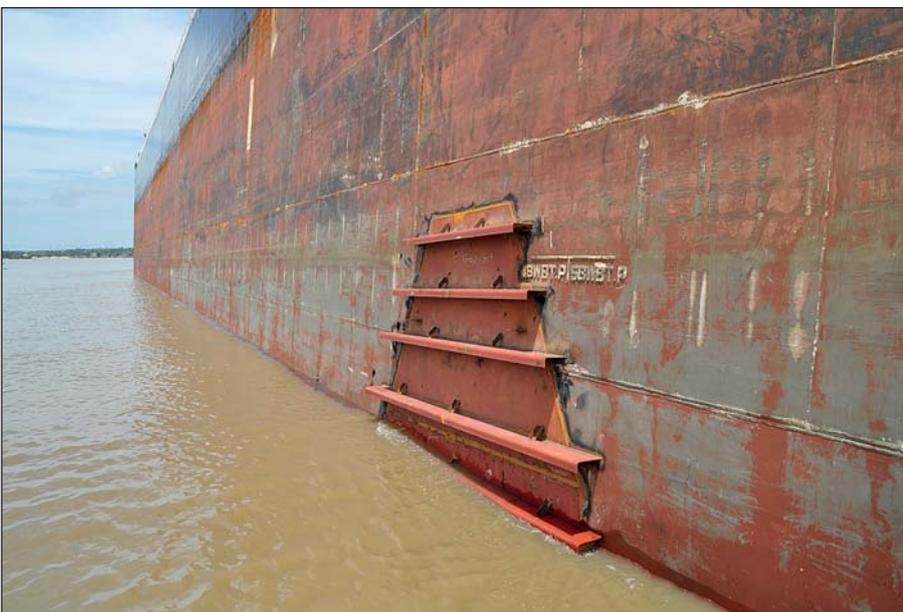
*The doubler plate was given extra strength with horizontal stiffeners.*



*Hydrex certified welders working on the stiffeners.*



*The top part of the doubler was then installed and connected to the bottom half.*



*The fully installed doubler plate allows the vessel to continue its schedule.*

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 hull.

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.

### **Conclusion**

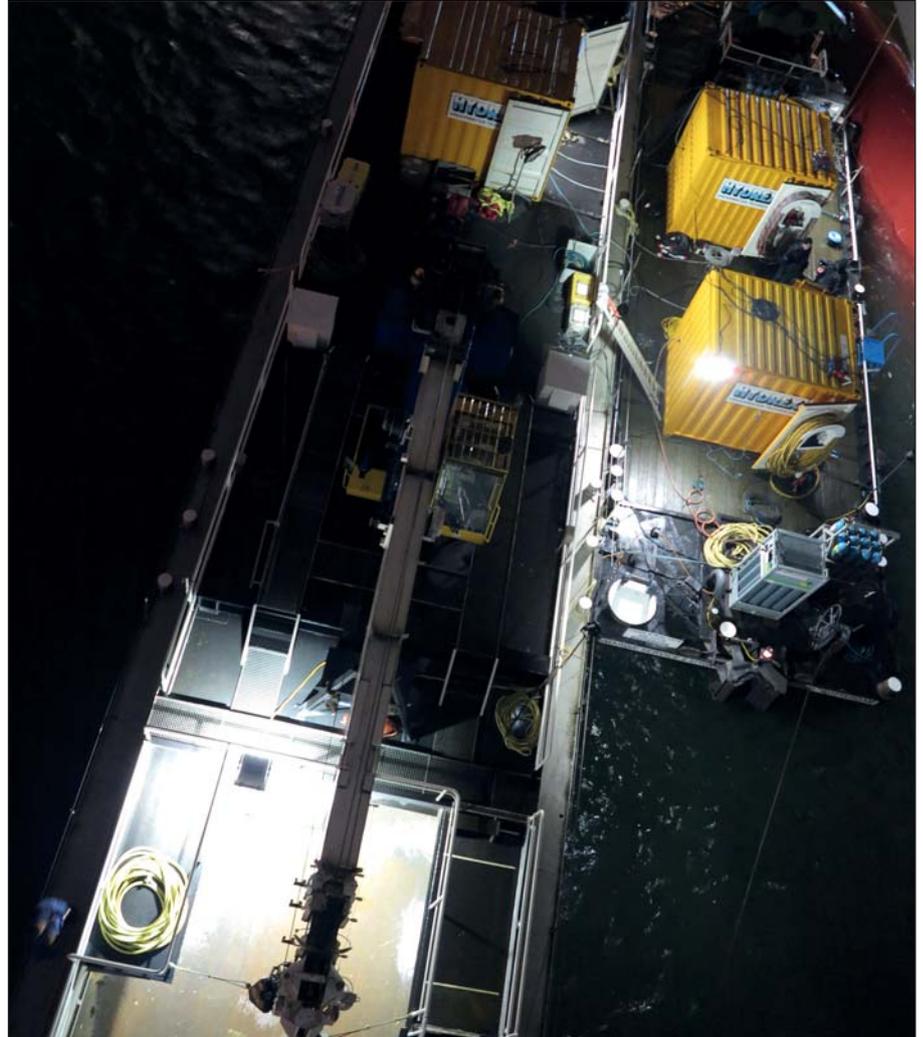
A surveyor of Bureau Veritas was present during the operation and gave his approval for the repair. The owner of the ship could then schedule a drydock visit for his vessel where and when it would fit best into his schedule. ■

# Fast underwater bow thruster blade replacement in Rotterdam during commercial activities

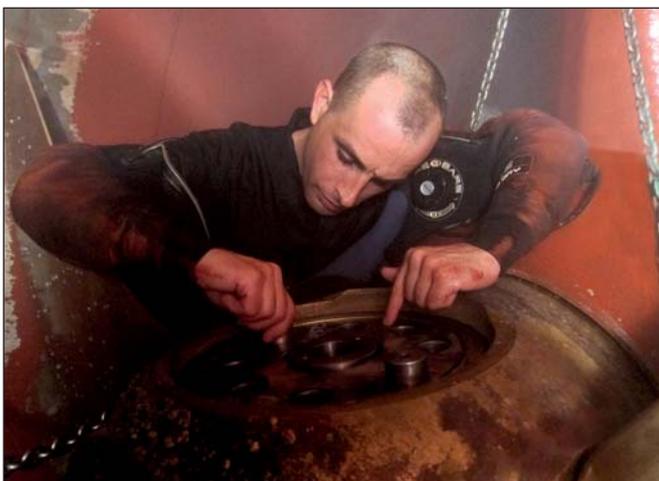
In recent months Hydrex has carried out bow thruster blade replacements on several occasions in Rotterdam. Three 366-meter container ships belonging to one owner were given the same speedy treatment during unloading. More ships are scheduled for the same operation in the upcoming months.

The owner of the ships had the luxury of being able to schedule the blade replacements well in advance. This allowed the Hydrex technical department to get a team on the road before the vessel arrived. As a consequence, the diver/technicians were ready to start the operation as soon as the ship was berthed.

The same procedure was used during each of the operations. The new blades were lowered from the deck onto the workboat with the ship's crane. Meanwhile the rest of the Hydrex team prepared the bow



*Hydrex equipment on workboats next to container vessel in Rotterdam.*



*Hydrex diver/technician preparing the bow thruster unit for blade installation.*



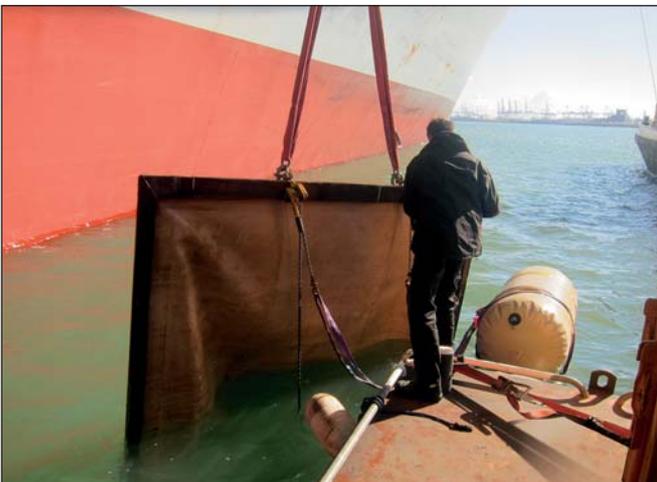
*New bow thruster blade ready to be positioned in thruster tunnel.*



*Hydrex diver getting ready for underwater operation.*



*Replacement bow thruster blades.*



*Hydrex flexible mobdock lowered into the water.*



*Positioning one of the new thruster blades.*

thruster tunnel for the operation.

The Hydrex flexible mobdocks were then installed on both sides of the thruster tunnel. Next the team could remove all water from the tunnel. In this manner a dry working environment was created.

The diver/technicians then removed the first blade of the bow thruster. They brought it to the surface. A replacement blade was then lowered into the water and taken to the thruster tunnel. The team positioned the new blade on the bow thruster and secured it with bolts. This procedure was repeated for the other blades.

After the blades had been replaced, the divers removed the flexible mobdocks. This finished the repair.

During each of the replacements a local representative of the bow thruster manufacturer was present. He supervised the operations and gave his approval.

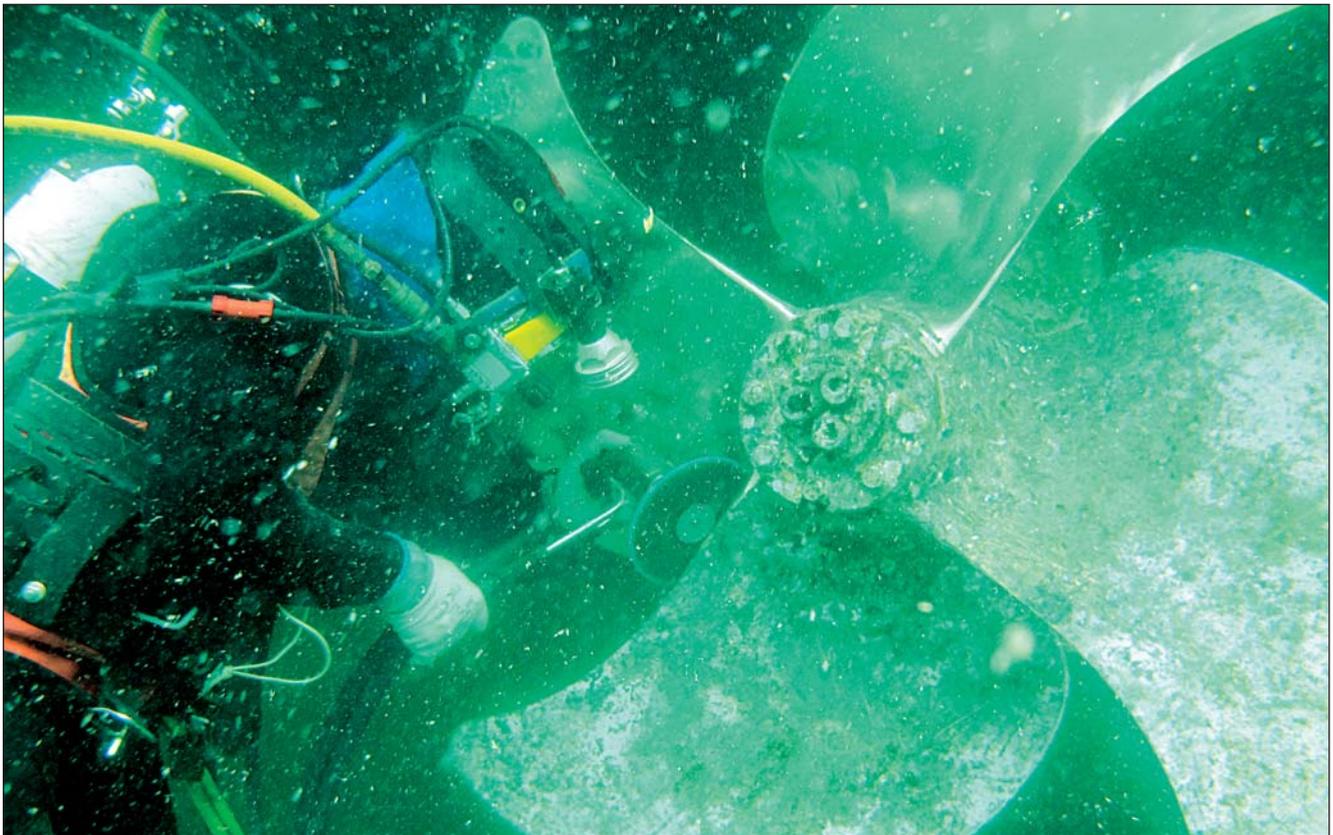
In cases like these, timing is of the highest importance. Hydrex team members are trained to carry out the approved procedures within a short time frame. Only a skilled and efficient team can perform this kind of operation without mistakes or delays. The bow thruster blade replacements in Rotterdam were

carried out during loading or unloading. The operations were concluded well before the end of these commercial activities. This allowed the container vessels to leave Rotterdam again perfectly on schedule. ■

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# Propeller cleaning offers large cost savings



**T**he effect of a rough propeller on the vessel's fuel consumption is big. The cost of remedying a rough propeller is very minor. Remedies for a rough propeller are not only simple and quick to execute, they also represent a fast, high return on investment.

A rough propeller results in a fuel penalty for the ship. How large that penalty is depends on the degree of roughness. At

current fuel prices, the fuel penalty from a rough propeller adds up to a high cost. Conversely, the savings attainable from keeping a ship's propeller clean and smooth are significant.

Cleaning a propeller once every month or every two months would in many cases be optimum. If carried out this frequently, cleaning with a relatively soft tool is adequate to keep a well-maintained propeller smooth enough for maximum fuel savings.

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.

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# Underwater propeller operations restore balance without the need for drydocking

**R**ecently Hydrex teams carried out underwater propeller operations in Belgium and Spain. In Antwerp the bent blade of a 197-meter dry cargo vessel was straightened. In Algeciras a 183-meter chemical tanker had four of its five propeller blades crooked. Both repairs were carried out on-site and underwater.

## Underwater propeller blade straightening in Antwerp

One of the blades of a dry cargo vessel's propeller was severely bent. The others propeller blades were also damaged, but less severely. A fast, on-site solution was required to restore the propeller's balance and efficiency. A Hydrex team therefore mobilized rapidly to the ship's location in Antwerp.

The team started the underwater operation with a detailed underwater



*Hydrex propeller straightening equipment arriving on-site.*

survey of the damaged propeller blades. Next the team positioned the straightening machine over the bends of the trailing edges of the first blade. The blade was then returned to its original state. The other blades were not bent. They had

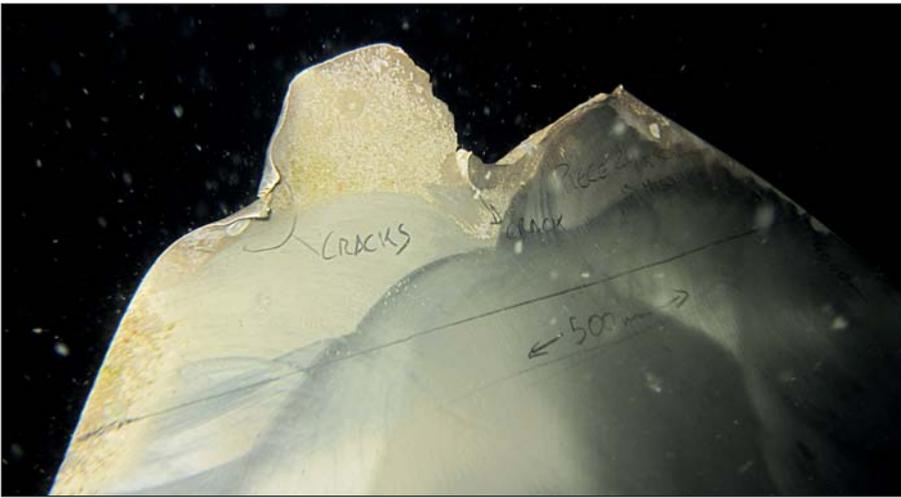
however suffered smaller cracks and dents along their trailing edges. The Hydrex diver/technicians ground away the cracks and polished the edges of these blades. This restored the propeller's efficiency.



*Diver/technician performing welding work on rope guard in Antwerp.*



*A rope in the stern tube seal assembly had caused damage to the rope guard.*



*One of the severely damaged propeller blades of the tanker in Algieras.*

At the same time part of the team removed the rope guard of the vessel. This was necessary because it was damaged by a rope tangled around the stern tube seal assembly. After the team removed the rope, they installed a new rope guard.

Both parts of the operation were carried out simultaneously, without any loss of time for the owner of the vessel.

### **Underwater cropping of damaged propeller blades in Algieras**

Last month a diver/technician team carried out a propeller blade cropping in Algieras on a 183-meter tanker.

The equipment arrived at the vessel's location with one of the Hydrex workboats. The team then started the un-

derwater operation with a detailed underwater survey of the damaged propeller blades. The inspection revealed that four of the five blades had suffered deformations along the trailing edges.

Cropping the affected areas of the blades was the only option. This would restore the propeller's balance. The team then calculated the cutting line needed to modify the trailing edges of the propeller blades. The area to be cropped was marked out on the four blades and verified. Next the divers cropped the blades one by one and ground their edges. This gave them the correct radius. Finally, the Hydrex technicians polished the blades to minimize any remaining loss of efficiency.

### **Conclusion**

Damaged propeller blades will have a performance below average. The

## **Permanent rudder repairs now possible without drydocking**

**H**ydrex has developed an entirely new method enabling permanent repairs of rudders without drydocking the ship. Permanent repairs were hitherto not possible and ships had to drydock in case a major defect was found. The newly designed equipment is lightweight and can be mobilized very rapidly in our special flight containers. Therefore this new service is now available worldwide.

Major defects on rudders very often cause unscheduled drydocking of ships. The new method designed by our technical department allows engineers, welders and inspectors to perform their tasks in dry conditions. Class approved permanent repairs on-site, without moving the ship, are now possible and commercial operations can continue. Steel



repairs and replacements can be performed and pintle and bushing defects can be solved without the loss of time and money associated with drydocking.

The equipment can be mobilized within hours to any port in the world and is avail-

able for rapid mobilization from the Hydrex headquarters in Antwerp.





*Hydrex diver cropping a propeller blade with the Hydrex cropping equipment.*

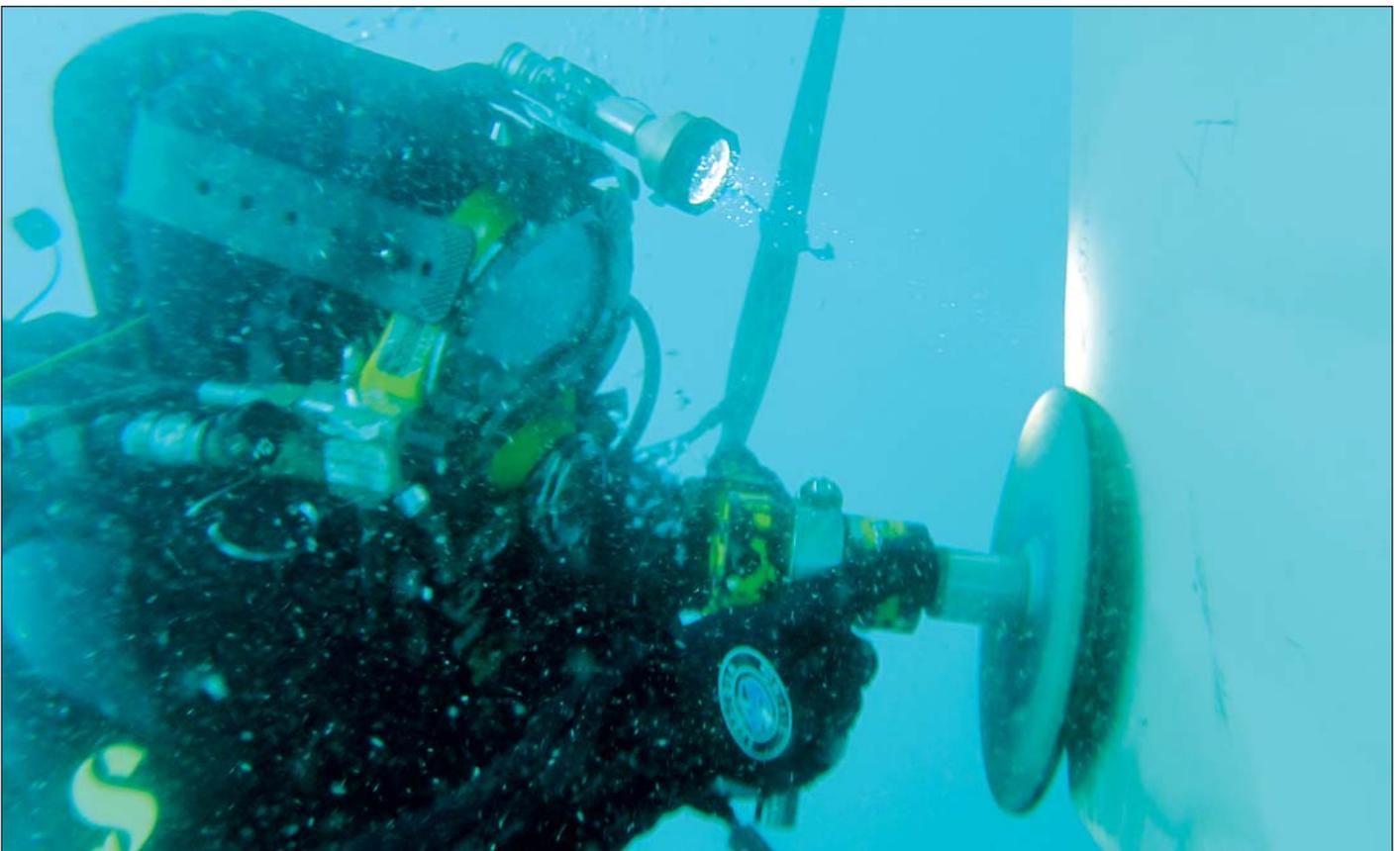
engine will have a higher work load. This results in increased fuel consumption and added stress. By taking advantage of Hydrex's in-



*Four of the five propellers blades of the tanker needed to be cropped.*

house developed cold straightening technique, damaged blades can be straightened underwater. In this manner optimum efficiency of the propellers can be restored. If straightening is not an option, the affected area on the blade will be cropped. By doing this the greatest

possible efficiency is achieved for the vessel. These repairs are carried out with the Hydrex propeller blade cutting equipment. Both types of repairs can be performed on-site and underwater. This allows the ship to return to commercial operations without the need to drydock. ■



*After cropping, the trailing edges were grinded and polished.*



**HYDREX**  
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**KEEPING SHIPS  
IN BUSINESS**

**Fully equipped for a  
worldwide fast response**



## Fast underwater repairs keep ships out of drydock

**H**ydrex offers turnkey underwater repair solutions to ship-owners wherever and whenever they are needed. Hydrex's multi-disciplinary 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), Algeciras (Spain), Visakhapatnam (India), and Port Gentil (Gabon).

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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