

# **HYDREX**<sup>®</sup>

## **UNDERWATER TECHNOLOGY**

Magazine

Number 253



# Arriving on site

# In water bow thruster repairs



**T**he 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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# Editorial



**T**he first article in this month's magazine talks about two pipe repairs carried out by our teams on oil tankers in the Netherlands and Denmark.

The sister vessels were on standby to transport oil from offshore oil fields whenever required. We were contacted to offer an on-site solution. Luckily for the owner we have almost 45 years of experience in doing exactly this!

Further on in this magazine you can find an overview of the many different underwater services we can perform to keep your vessel afloat and on schedule. All these operations can be carried out at any location around the world by our experienced teams.

The last article describes a range of propeller blade operations performed in Belgium and the Netherlands. In Antwerp the blades of a roro vessel were cropped while in Amsterdam and Rotterdam the blades of two bulkers were modified to allow the ships to sail at lower RPM and save fuel.

Hydrex founder  
Boud Van Rompay



Cover: Arriving on site



## ISO 9001 certified

Underwater services and  
technology approved by:



**BUREAU  
VERITAS**



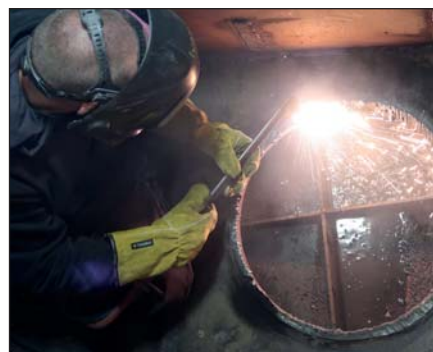
## ClassNK



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# Emergency scrubber overboard repair in the Netherlands and Denmark

**I**n December our teams of diver/technicians carried out pipe replacements on two sister vessels. These shuttle tankers were berthed in Rotterdam and Skagen respectively and experienced water ingress as a result of corroded scrubber cooling pipes.

Exhaust scrubbers are systems that filter out all harmful toxins from exhaust gasses of marine diesel engines. These hazardous pollutants can severely corrode the pipes of the scrubber.



*Water leak as result of corroded scrubber pipe.*



*Heavily corroded scrubber pipe.*



*Removing the old pipe.*

The two vessels were on standby to transport oil from offshore oil fields whenever required. Going to dry-dock was therefore not an option and we were contacted to offer an afloat solution.

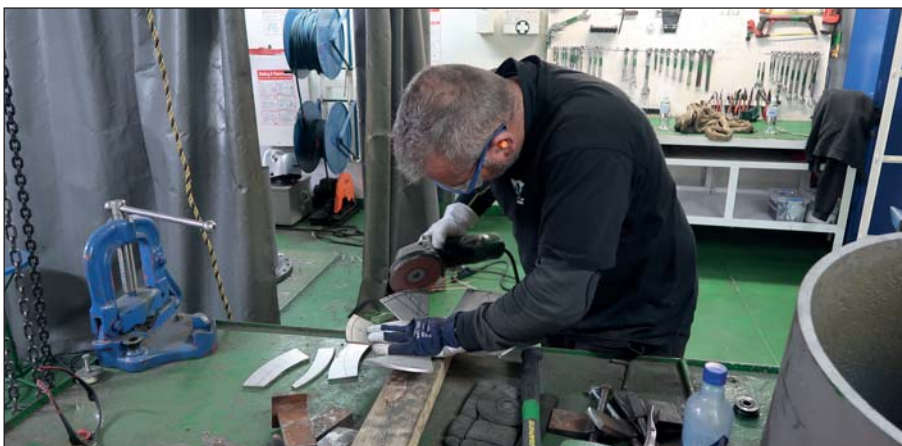
A small team traveled to the location of the first vessel with one of our workboats to perform an inspection of the damaged pipe on both the waterside and the onboard side of the hull. This revealed that the scrubber outlet was corroded, causing the leak. Replacing the affected part of the pipe in its entirety was the only option.

With the measurements of the inspection a detailed scope of work was devised and suggested to the customer. Because we could offer a start-to-finish afloat solution he gladly accepted the proposal. This meant that we would take care of the planning of the operation as well as the adjustment of the new pipe and its installation. As a result





*Preparing the shell plating for installation of the new pipe.*



*Constructing the new diffuser for the pipe.*

he was released of all the hassle surrounding the repair. He knew that we would take care of everything within the available time frame and this to our renowned high quality standards.

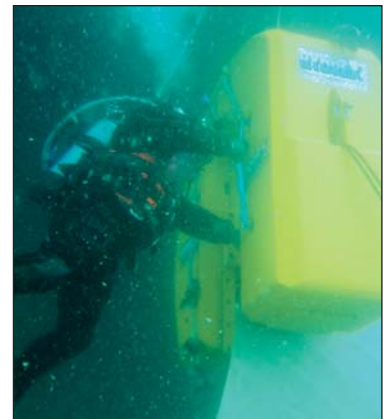
### **Removal, construction and installation by one team**

A tailor-made mobdock was constructed at our fast response center

with the measurements taken during the preliminary inspection. The team installed this mobdock over the outlet of the pipe of the 270-meter tanker berthed in Rotterdam. This allowed them to perform work inside the engine room without further water ingress.

Because there was very little space the work in, several of the frames around the pipe were first removed.

## **Fast underwater propeller blade straightening**



**I**n 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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# Stern tube seal repairs



**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 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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*New and old diffuser.*



*Welding a flange on the new pipe.*

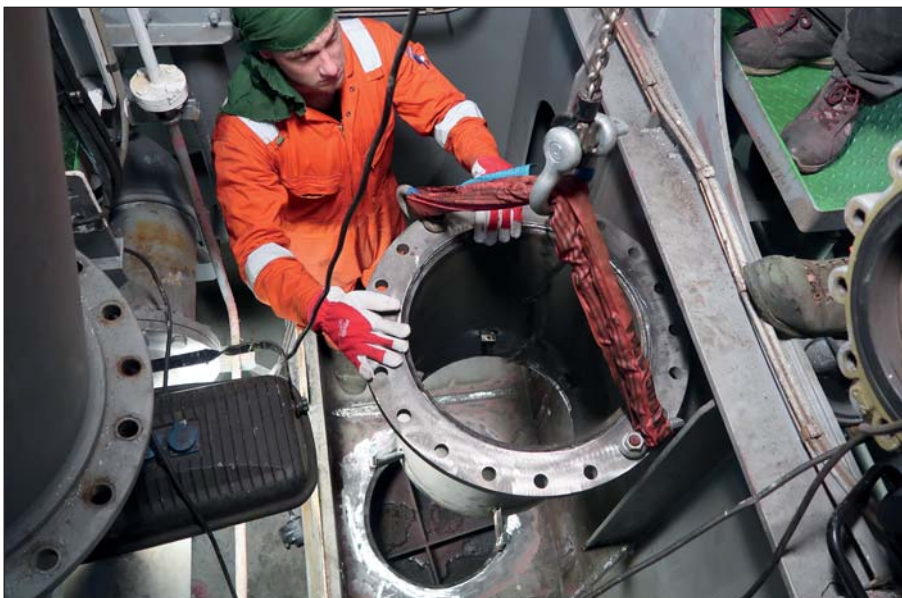




*Shell plating ready for installation of the new pipe.*



*Hydrex truck and equipment next to tanker in Denmark.*



*Positioning the new scrubber pipe.*

## Hydrex under-water inspections



**U**nderwater 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 much time and money.

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 for a wide range of actions.

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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*The pipe was secured with full penetration weld by our certified welders.*



*NDT testing of the welding.*



*New pipe and diffuser seen from outside.*

Next the team cut away the corroded part of the old pipe. While the shell plating was prepared for the installation of the replacement pipe, a new diffuser and flange were constructed. This was done on-site by our diver/technicians.

The pipe was then positioned and secured with a full penetration weld. The new flange was also installed. Next and independent inspector carried out NDT testing of the welding work.

To prevent the new pipe from corroding, the inside was coated with Ecospeed. This product is produced by Hydrex sister company Subsea Industries ([www.subind.net](http://www.subind.net)). Ecospeed is highly chemically resistant. Taking into account the nature of the process taking place inside a scrubber, this is essential for a lasting protection of the pipe.

The team then installed the new diffuser and repositioned the frames around the pipe.

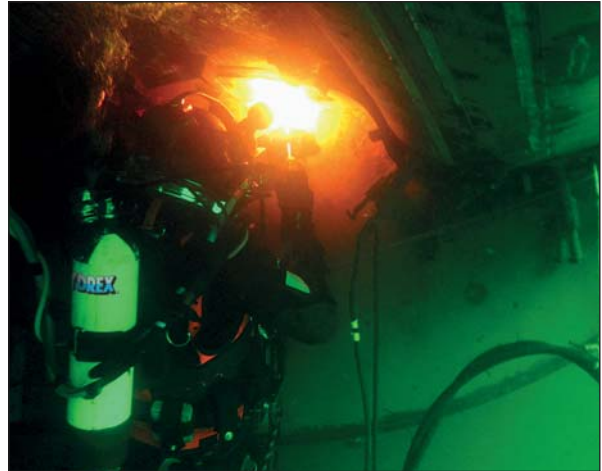
Initially the customer only wanted us to perform the replacement on one ship, but satisfied with the first operation he asked us to carry out the same on the 276-meter sister vessel. This second shuttle tanker was berthed in Skagen, Denmark.

## Conclusion

Our divers are certified wet and dry welders as well as technicians. This allowed us to offer the full repair from start to finish, including creating the new diffuser. By doing everything ourselves and on-site we made sure that the tankers could remain on standby to mobilize when needed. ■



# When your ship has a problem, we will assess the underwater repair options free of charge



**You need to know your options. Is underwater repair possible? How long would it take? How could it be done?**

You can call us any time for an expert assessment, free of charge.

An underwater solution might save you days or even weeks of

lost income. We'll tell you what can and can't be done.

We pretty much wrote the book on underwater repair, and our experience is at your disposal. Our engineering team will give you fast and clear answers to your questions.

Hydrex delivers underwater solu-

tions based on over 40 years of experience, with a long history of pioneering underwater repairs. We'll give you certainty about what is possible while your vessel is afloat.

Do not hesitate to contact us. Our consultation is free and we are ready to help.



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# High quality in-water ship re

## **Permanent insert repairs**

Specialist class approved insert repair work carried out on a permanent basis. Providing a real alternative to drydock.

## **Emergency repairs**

Fast response emergency repairs worldwide.

## **Inwater video inspections**

Professional video surveys provide a reality of the problem and enable owners and classification surveyors to directly diagnose any problems.



**Echo sounder inspection and replacement**

**Speed log**  
Checks for damage, marine fouling and replacement.

**Bow thruster and propellers**  
Permanent on-site repair, maintenance and replacement with the award winning flexible mobdock technique.

**Hull cleaning on suitable coatings**

**Bilge keel**  
Check and repair broken welds, renewal of sacrificial anodes.



# pair and fuel saving services

## KEEPING SHIPS IN BUSINESS



**Sea valves, sea chests and gratings**  
In-water inspection, cleaning and repair of intakes and valves, installation of new sea chests, condensers and coolers afloat.

**Stern tube seal replacement**  
Permanent inwater stern tube seal replacements and repairs with the unique Hydrex flexible mobdock technique.

**Propeller operations**  
Propeller cleaning with special tools, on-site blade straightening and cropping. Permanent repairs to all types of propellers or installation of propeller cone fins.

**Rudder repairs**  
Permanent on-site repairs on all types of rudders with groundbreaking new technology.

**Pintle and bushing repair and replacements**



# Afloat propeller operations in Northwestern Europe

**H**ydrex diver/technicians carried out afloat propeller operations on vessels in Belgium and the Netherlands. In Antwerp the damaged blades of a 190-meter roro vessel were cropped, while in Amsterdam and Rotterdam the propeller blades of two 229-meter bulkers were modified to allow the ships to save fuel while sailing at lower RPM.

When damage to propellers occurs due to impact with ice and other debris, Hydrex will 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 might demand a repair before the vessel is allowed to sail on. By straightening the blades or cropping them, Hydrex can re-



*Hydrex workboat and equipment next to a roro vessel in Antwerp.*

store the propeller's balance, resulting in a green light from the class for the vessel.

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 the Hydrex teams impact on a sailing schedule can be minimized.

In the following case study cropping was the only option as the damage to the propeller blades was too great to allow cold straightening. This kind of repair is carried out with the propeller blade cutting equipment developed by the Hydrex research department.

## Overnight cropping in Antwerp

Three of the five blades of a roro vessel were severely bent, with one of these blades bent at an angle of 70°. An on-site solution was needed to restore the propeller's balance and



*Diver/technician measuring one of the cropped pieces of blade.*





*Testing one of the modified blades in Amsterdam for cracks.*



*Modification of one of the blades of a bulker in Amsterdam.*



*Any type of propeller modification can also be carried out underwater.*

## **Permanent in-water rudder repairs now possible without drydocking**

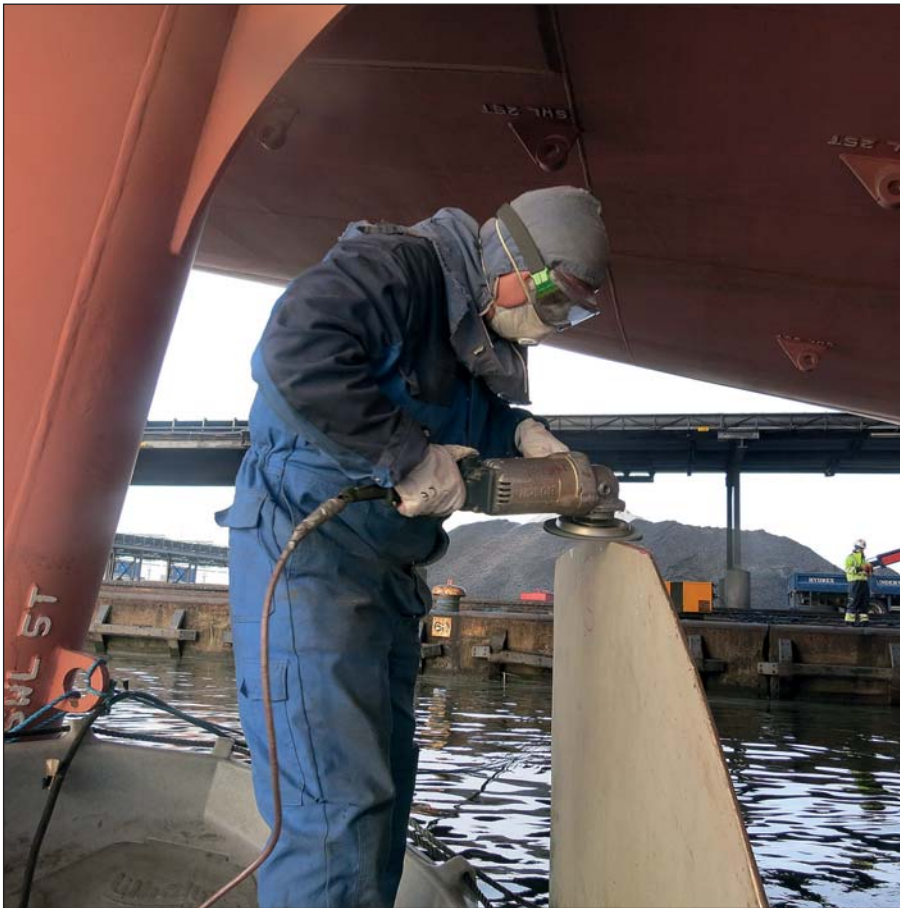


**H**ydrex has developed an entirely new method enabling permanent repairs of rudders without drydocking the ship. Permanent repairs were hitherto not possible and ships had to drydock in case a major defect was found. The newly designed equipment is light-weight and can be mobilized very rapidly in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

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 available for rapid mobilization from the Hydrex headquarters in Antwerp.

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*Grinding the edge of a modified propeller blade as specified.*

efficiency. A team was therefore mobilized from our headquarters in Antwerp to the ship's location.

After the equipment arrived the team started the operation with a detailed survey of the complete propeller. The team then used the information acquired during the inspection to calculate and determine the correct cutting line needed to modify the trailing edges of the blades and remove the damage. Next the divers cropped the blades and ground their edges to give them the correct shape. The two undamaged blades also needed to be cropped using the exact same cutting line to give the propeller back its balance.

When the cropping was complete, the Hydrex technicians buffed the blades to make sure that any re-

## Hydrex US ready to mobilize immediately

**H**ydrex 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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*Modified propeller blade of bulker in Rotterdam.*

maintaining loss of efficiency would be minimal.

### **Blade modification does not need to wait until drydock**

We do not only offers repair services, but can also help customers when they have the need for preventive or other special custom projects.

A good example of this is the project that was carried out recently on two sister vessels. These 229-meter bulkers were going to sail at a lower RPM. A modification of the propeller blades' diameter would allow them to save fuel while doing this.

We mobilized a team to carry out the modifications while the ships were

afloat. One operation was done in Rotterdam, the other in Amsterdam, but in both cases they were performed without disrupting cargo operations.

Another example are the preventive modifications that we made in Bremerhaven to the blades of three ice-going vessels. This was done by modifying the blades to a very specific design that made them less prone to damage while keeping the performance of the propeller as close to optimum as possible. The operation was performed in close communication with the manufacturer of the propellers.

### **Conclusion**

Over forty years of experience with propeller repairs have given us the tools and know how to offer fast repair and modification services to vessels around the world. All types of operations can be carried out fast, fluently and efficiently afloat and underwater. ■



*Cropped pieces of propeller blade of bulker.*

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# Always on time



**H**ydrex 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 dry-dock.

Hydrex performs 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

we 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.



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