

### Magazine

Number *327* 



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## Scrubber pipe repairs and lasting protection



E xhaust 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**



Hydrex was established fifty years ago in Antwerp. Since then, it has steadily grown into a company the shipping and offshore industry can depend upon whenever there are tough and difficult jobs to do as well as for regular, routine maintenance and repairs.

We continue to invest in the research necessary to keep evolving the available repair techniques along with continual training and development of our engineers and diver/technicians. This is done to offer customers the most efficient solution, whether the required services simply involve the inspection of a vessel's external condition and any required maintenance work, or highly technical major repairs and replacements of a ship's external underwater equipment and machinery.

Every operation we carry out is performed with the same purpose in mind: to keep the customer's vessel out of drydock and enable his ship to stay on schedule.

So do not hesitate to call us when your ship needs any repair or maintenance work. Hydrex has the means and knowledge to provide you with a fast, underwater solution.

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



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### **Restoring propellers above or under the water**

This year Hydrex celebrates its 50<sup>th</sup> anniversary. To commemorate this, we will be looking back at a few memorable case studies of each of the services we offer to our customers. We are starting with propeller repairs.

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 machine, which was first used in 2002. By taking advantage of this technique, damaged blades can



Bent blades can be straightened on-site with our in-house developed cold straightening machine.



Sometimes cropping a blade is the only option.

be straightened underwater, allowing the ship to return to commercial operations without the need to drydock. New models of the straightening machine are regularly put into service. They are compatible with the existing models and are used to restore more severely bent propeller blades to their original condition.

If the damage is beyond repair, the damaged blade will be cropped by our team, along with a corresponding section of the opposite blade, to restore the hydrodynamic balance. This kind of repair is carried out with the propeller blade cropping equipment developed by the Hydrex research department in 1985.

#### **Blade replacement**

On some occasions, an entire blade of a variable pitch propeller needs to be replaced. This work can also be carried out by our divers. They are trained to perform a wide variety of



Entire propeller blades can be replaced without having to go to drydock.



The best possible efficiency can be returned to severely damaged blades.

operations, both above and below the waterline, anywhere in the world and sometimes even in the most extreme conditions.

#### Permanent underwater propeller repairs

The Hydrex R&D department has also developed a repair system that allows Hydrex to perform permanent underwater repairs to every type of propeller in dry conditions with the ship still afloat and out of drydock. All kinds of repair or maintenance work can be carried out to propellers, twin propellers, variable pitch propellers, or other propulsion units.

This repair system can be transported by air to any location around the world from the Hydrex fast response centers within a very short time frame. It can be assembled and deployed very quickly (12 hours) on-site.

With the implementation of this technique, our diver/technicians can perform permanent repairs to all parts of the underwater ship propulsion system in drydock-like conditions while the ship is still afloat.

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



Hydrex 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.

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.



### Underwater propeller blade straightening in the British Indian Ocean Territory in 2012

With all five blades of its propeller severely bent, a 290-meter container vessel needed a fast, on-site solution to restore the propeller's balance and efficiency. Our divers are trained to carry out repairs underwater in the shortest possible time frame. A team was therefore mobilized to the ship's location in Diego Garcia in the British Indian Ocean Territory to perform a cold straightening of the blades.

After the equipment arrived at the vessel's location, the divers installed a monitoring station on a workboat and made all the required preparations. The workboat was positioned next to the vessel. The team leader then went on board to go over the safety procedures and to discuss the details of the operation with the cap-



Hydrex diver positioning the cold straightening machine.

tain and the chief engineer of the ship.

Next the team started the underwater

operation with a detailed survey of the damaged propeller blades. Because fouling was present on the blades, the divers carried out a



One of the five bent blades of the container vessel's propeller.



Hydrex diver smoothening the trailing edge of one of the blades.



*With the cold straightening machine, bent blades can be restored to their original form.* 

cleaning to be able to inspect the blades for stress fractures and cracks. The inspection revealed that the five blades had suffered multiple deformations along the trailing edges and that there were stress fractures and nicks in the same areas. Cracks were also found going up to 15 mm deep into the blades.

Part of the team then started the repair with grinding work on the blades to remove the cracks. Once



Straightening the blades and polishing their trailing edges restored the propeller's optimum efficiency.

this was done the locations were smoothed to recreate the hydrodynamic profile on the trailing edges. Meanwhile the rest of the team prepared the in-house developed hydraulic cold straightening machine for the operation. The divers then carefully positioned the machine over the bends of the trailing edges of the first blade. In close communication with the team leader on the workboat they applied pressure to return the bent blade to its original state. This procedure was then successfully repeated for the other four blades.

When the divers had also completed grinding and polishing repairs on all identified cracks and gouges, they made a full inspection of the newly modified blades for the attending ABS surveyor and the captain of the vessel. With all parties involved satisfied, the divers demobilized their equipment and returned home.

The operation restored the balance and the efficiency of the propeller. By carrying out the straightening onsite and underwater, we avoided a costly and time consuming drydock visit for the owner of the vessel.

#### 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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### **Underwater propeller blade replacement in Tasmania**

In early 2020, our team was mobilizing to a stern tube seal repair on a roro ship in Tasmania, when the owner of the vessel asked us to also carry out an underwater propeller blade replacement on the vessel's sister ship at the same location. These operations were carried out back to back by our team.

As soon as the seal replacement was finished the two ships changed place and our diver/technicians started the second repair. This operation con-



Hydrex diver assisting with the lifting of the propeller blade.



Damaged propeller blade lifted onto the dock.

sisted of the underwater replacement of the damaged blade as well as the opposite blade of the main propeller of the vessel.

The propeller was designed with a special system to close it off from water ingress during a blade replacement. The operation was performed under the supervision of an engineer of the propeller's OEM.

Our men started the repair with the installation of chain blocks to rig the first blade. They then removed the blade bolts and lifted the blade. A spare blade was lowered into the water and put in position. After it was secured and the bolts put on torque, the ship crew turned the propeller  $180^{\circ}$  to bring the opposite blade into the 12 o'clock position. This blade was then rigged with the chain blocks. The diver/technicians repeated the same procedure on this blade to replace it with its spare.





*The blade had suffered a very deep crack and needed to be replaced as per OEM recommendation.* 



One of our divers guiding the new blade into position during installation.



Diver getting ready to take the plunge for installation of the new blade.

The operation was finished swiftly to enable the owner to sail his ship on schedule. No costly drydock visit had to be planned.

Linking jobs like this is no problem for Hydrex. Our technical department has many years of experience in organizing jobs on a tight schedule as well as back-to-back operations. Our teams are also trained to go from one job to the next without losing any time and without quality suffering in any way.



Roro vessel arriving at the quay with our team ready to start the operation.

### The real value of underwater inspections

**B**uilding upon conventional technical skills and knowhow 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 their ship's hull condition and consequently its performance, with only a minimum of work on their part.

Underwater inspections represent a small investment and, if properly done, have the potential to save an owner a great deal of money.

Competent underwater inspections, particularly if carried out regularly can detect

• Problems with the propeller such as bent or damaged blades (which can put undue strain on bearings), roughness due to fouling, cavitation damage or bad polishing which can reduce the propeller's efficiency.



Hydrex diver/technician during the inspection of a stern tube seal assembly.

- Anodes which have wasted away, rendering the cathodic protection system unworkable, leading to corrosion and added hull friction.
- Hull cracks or other damage which, if not rapidly arrested, can worsen and increase the cost of any subsequent repair.
- · Ropes inside the stern tube



Hydrex team arriving next to a ferry in Calais for a bow thruster inspection with a very short window.

assembly which may cause seal problems if neglected.

- Leaking stern tube or thruster seals which can cause an environmental problem in port and lead to costly changes to a ship's schedule if not caught quickly and repaired.
- Clogged sea chest grids (preventing proper cooling of the ship's engines), or loose or damaged grids.
- Loose or broken grids on thruster tunnels which can result in damage to thruster propellers.
- Damaged, bent, broken or detached bilge keels which again can become much worse if not caught early.
- A damaged rudder which will continue to deteriorate if not addressed rapidly, resulting in the need for much more costly repairs and representing a safety hazard in extreme cases.



All three bow thrusters were inspected in the short time before the ferry had to sail again.



Hydrex divers are experienced in both maintenance and repair operations.

Regular inspections carried out by competent divers and followed by comprehensive and accurate reports can detect any of these or other problems so that they can be corrected early and prevent the more costly repair which neglect and further damage would incur.

Because we have 50 years of experience in both maintenance and repair services, we can carry out any required follow up repair very fast without any unnecessary loss of time. Planning in a new slot is not needed as all our diver/technicans are skilled to perform the repair work as well.

If the damage found during an inspection can be anticipated, the required equipment can be mobilized in advance. Otherwise it can be transported to the location of the vessel immediately from one of our fast response centers where a large stock is available for our teams at all times.

This was demonstrated when a rope guard had come loose, which was revealed during an underwater inspection. The Hydrex team secured the rope guard without any delay for the owner.

#### Inspections before drydocking

There is another important way for underwater inspections to be used to save costs. A thorough inspection carried out a week or two before a ship is due to go to drydock can save a great deal of money in drydock. An accurate estimate of work required can lead to efficient scheduling. If thrusters are to be repaired in drydock they can be removed prior to the ship's drydocking and can be repaired and ready for reinstallation when the ship is in dry-



If damage is found during an inspection, our team can offer advice on possible repairs and carry these out.



We can carry out inspections for the shipping as well as the offshore industry.



Hydrex diver working on the rope guard.

dock, rather than waiting until the docking to find out and then having to extend time in drydock in order to repair and replace the thruster.

An accurate report on the state of the rudder can lead to effective repair and recoating of the rudder so that it does not suffer further damage.

The all-too-frequent scenario of a low estimate for drydocking which grows exponentially once the drydock gate has closed and the ship is out of the water can thus be avoided.

### Easy to combine with other operations

Because an underwater inspection is a small operation, it can be combined with one or more other operations very easily. This can be another maintenance operation like a propeller buffing or any type of repair job.

By doing this, the shipowner is saved the hassle and cost of multiple mobilizations and possible delays to his vessel's sailing schedule.

#### Speed is of the essence

Hydrex diver/technicians can carry out inspections underwater and onsite very swiftly without disturbing the vessel's sailing schedule. A good example of this are the inspections of the bow thrusters carried out on two ferries in Calais. Because of the nature of these vessels, the time frame was extremely short. Both times all three bow thrusters needed to be inspected in the small window available. A change to the schedule was out of the question as it would do great harm to the reputation of the owner.





An inspection will give a shipowner a perfect assessment of any damage, so that he can take an informed decision on what to do.



Hydrex team leader monitoring an underwater operation.

We have always put great effort into minimizing the impact of our services to the schedule of a vessel. Our teams are trained to adapt themselves to the agenda of the ship and not the other way around.

#### **KEEPING SHIPS IN BUSINESS**

### 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.

### In-water bow thruster repairs



Our 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 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

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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.

# Underwater services in Rotterdam





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