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FAYARD

Underwater Repairs

Underwater work at Hydrex

The transit flap of a 225-m drill ship in Dakar came loose and started swinging dangerously.

This caused damage in the aft bulkhead and a leak in the ballast tank situated behind the moonpool hull. A fast solution was needed to prevent further damage.

Belgium's Hydrex mobilised a team of diver/technicians. After an inspection of the damage, they disconnected the transit flap. It was then brought to shore, cut in three pieces and taken away. The divers also took all the measurements needed to design a repair plan for the second phase. Because of the instable condition of the flap, it was essential to keep to the highest safety standards, especially during this first part of the operation.

The second part of the operation consisted of the installation of six doubler plates over the damaged areas in the aft bulkhead. Constructed with the exact measurements taken during a detailed inspection, they were positioned and secured underwater by our certified diver/welders. All water was then emptied from the damaged ballast tank. The crew performed an inspection of the tank and confirmed that the compromised hull was once again fully sealed.

Thanks to the installation of the doubler plates the ship could safely start its contract. A permanent solution can now be planned at a more opportune time.

Mobdock work at Hydrex

A leaking seal is always an unpleasant experience for a ship owner or operator. It forces him to go off-hire, costing time and money. Hydrex has developed a flexible mobdock repair method that enables the underwater replacement of all types and

Underwater Repairs



A Hydrex mobdock

sizes of shaft seals. This technology has been successfully used by diver/technicians for over a decade.

Damaged stern tube seals will cause an increasing amount of oil leaking or water ingress as the damage worsens. By replacing the seals when the damage is first discovered, Hydrex keeps the down time low. The ship can keep its schedule as seal repairs can be performed during cargo operations. Hydrex does this by creating a dry underwater working environment around the shaft.

Shaft seal repairs are performed in co-operation with OEMs. This allows Hydrex to provide customers with original spare parts which guarantees the best quality material.

Hydrex performs repairs at anchorage on any type of rudder or while the vessel is berthed without interrupting cargo operations. In most cases these repairs are permanent and do not require follow up.

The following case studies give an account of some of the more important recent underwater rudder repairs performed by Hydrex. They showcase the wide variety of repair solutions Hydrex can offer to shipowners.

The rudder of a 250 m crude oil tanker started showing wrong readings. An inspection uncovered that the rudder was not aligned correctly anymore and that its movements did not match the readings. The ship was unable to sail any further and an on-site solution was needed. A Hydrex diver/technician teams therefore mobilised to Le Havre, France to perform an emergency repair operation.

After arriving at the vessel's location the divers performed a detailed inspection of the rudder. This revealed that the rudder pintle needed to be removed to perform a permanent repair. The stormy weather conditions in Le Havre could cause the rudder to move, which

would make it impossible to reinstall the pintle in-situ. For this reason it was decided that the ship needed to be towed to the nearest available drydock, in Brest for permanent repairs. This changed the scope of the work completely. Because Hydrex teams are trained to handle challenging and constantly changing circumstances, they adapted to the new task without any problem or delay. Hydrex proposed to secure the rudder so that the vessel could be towed safely.

The team pulled the rudder to a zero angle. They also took the exact measurements needed to fabricate four securing plates that would fully lock the rudder in the neutral position.

Once the plates were delivered, they were modified by the team to the correct size. Next they installed the stiffeners on both sides of the rudder. This would prevent the rudder from moving and causing further damage while the ship was towed.

Upon completion of the operation the attending surveyor, together with the superintendent and captain, inspected and approved the repairs. Thanks to the Hydrex team the ship could be towed safely to Brest for permanent repairs.

A 228 m vehicle carrier had several cracks along the hinges connecting the rudder flap to the main rudder blade. Fortunately most of those could be repaired by grinding them away and filling the area with clad welding.

Three of the cracks were too big and needed a different approach. Hydrex diver/welders first drilled arrests on all sides of these cracks to prevent them from spreading. They then positioned a C-shaped plate over each of the cracks and secured it with wet welding.

This allowed the owner to sail the vessel without having to worry about the condition of the rudder. He can have a permanent repair

carried out during the ship's next scheduled drydock visit at a more convenient time and location.

Luckily the cracks on the rudder were spotted during an underwater inspection before they caused problems for the ship. This once again shows the benefits of having regular inspections carried out by competent divers, followed by comprehensive and accurate reports. Hydrex teams can detect any problem so that they can be corrected early and prevent the more costly repair which neglect and further damage would bring about.

The Hydrex technical department was contacted by the owner of a 200 m vehicle carrier because the rudder of his vessel was not functioning properly. A diver/technician team therefore mobilised from the company's headquarters with one of the workboats loaded with all the needed equipment. After arriving at the ship's location in Antwerp, the team first performed a detailed underwater inspection.

This revealed several irregularities on the rudder seals.

The Hydrex universal rudder repair mobdock allowed the rudder specialist that was present to perform further inspections in drydock-like conditions. He could then make a detailed assessment of the situation of the rudder and observed several reasons for the malfunctioning.

Following the inspection Hydrex proposed a repair plan which was accepted by OEM and the owner. The team then carried out several repairs to remedy the rudder problems. First the existing rudder seal was tightened. Next the two wrong-sized rings were replaced with correct ones and both the upper and lower casing of the rudder seal assembly were reinstalled.

The team pumped grease into the system and secured all nuts and bolts. The vessel could then continue its schedule with a fully functioning rudder.

This equipment can be mobilised to any port in the world at moment's notice. This enables Hydrex to offer this service very swiftly on a worldwide basis.

An underwater inspection revealed cracks in the welding seams of both rudder cover plates of a 144 m tanker. To prevent the pintle nut from corroding, the classification society demanded that the owner had the damage repaired as soon as possible. When the tanker was on its way to Rotterdam Hydrex was contacted to find an on-site solution that would prevent an unscheduled and unwelcome trip to drydock.

The Classification Society had given the

owner a very strict deadline. It was therefore essential that Hydrex's technical department came up with a repair plan that could be carried out very quickly. A diver/technician team immediately mobilised to the vessel's destination so they could start the operation as soon as the ship arrived in Rotterdam.

Because the tanker was empty, the rudder could be trimmed enough to allow a repair above water. The team first carried out a detailed inspection of the rudder cover plates.

This enabled them to make a full assessment of the damage and communicate the information with the technical department. A dye check of the cracks quickly revealed that the damage of the cover plate welding seams was of such extent that replacing both plates in their entirety was the best option.

The team removed the plates and bevelled the edges of the rudder plate to fit the new inserts. In the meantime two new plates were arranged by the technical department. They needed to be the right shape to fit the curve of the rudder perfectly. They were collected from the supplier and cut to the right size in the Hydrex fast response centre where a large stock of equipment is available for emergency repairs as this.

The plates were then transported to the vessel. The diver/technicians fit them in the rudder plate and secured them with a full penetration weld. Ultrasonic and magnetic particles tests were successfully carried out by an independent inspector, finalising the repair. Seven bolt-on anodes were also installed on each side of the rudder.

The entire operation was supervised and approved by a surveyor of the classification society and the condition of class was lifted.

The Hydrex team worked in shifts to finish the repair in the shortest possible time. When they left the tanker, the satisfied owner could sail his vessel again without having to worry about costly off-hire time.