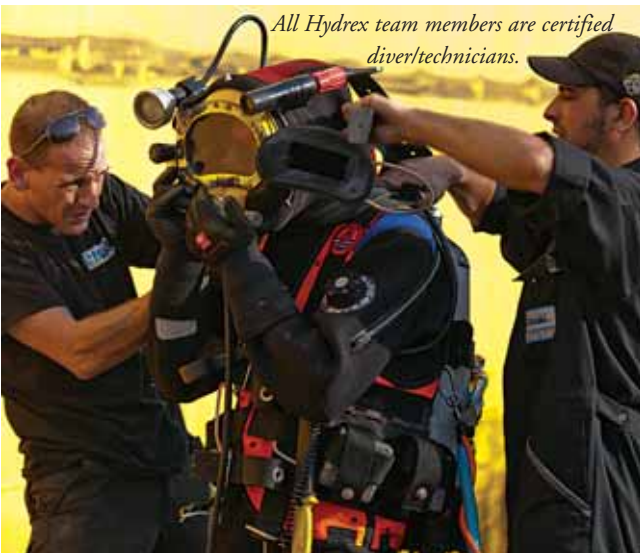


## Hydrex designs tailor made cofferdam for underwater replacement of boss head bolts of main propeller of ro/ro vessels



*Hydrex designed a tailor-made cofferdam for the specific needs of these operations.*



*All Hydrex team members are certified diver/technicians.*

When several of the boss head bolts of the main propeller of a ro/ro vessel were found to be missing, the manufacturer asked Hydrex, headquartered in the Belgium port of Antwerp, to engineer a solution that would allow the replacement of these bolts on the vessel and similar vessels without having to go to drydock.

In close communication with the manufacturer, the Hydrex engineering department designed a special cofferdam that would fit the specific needs of these operations. This was complemented with a special procedure set up by the Hydrex technical department that would make sure that all safety and quality demands could be met during the replacement.

After the proposed cofferdam had been approved and constructed, the boss head bolts on the first of the ro/ro vessels were successfully replaced underwater by a Hydrex diver/technician team during the ship's stop at Port of Koper, Slovenia.

At time of writing a second vessel has been serviced in the same port and two more operations are being scheduled.

Working closely together with the manufacturer to devise a



*A feasibility study of any kind of operation is also done in-house.*

solution for this very specific problem, Hydrex took on, organized and executed the entire job, start to finish, relieving the customer of all the hassle of coordination, planning and supervision.

## On site seal repairs around the world keep ships out of drydock

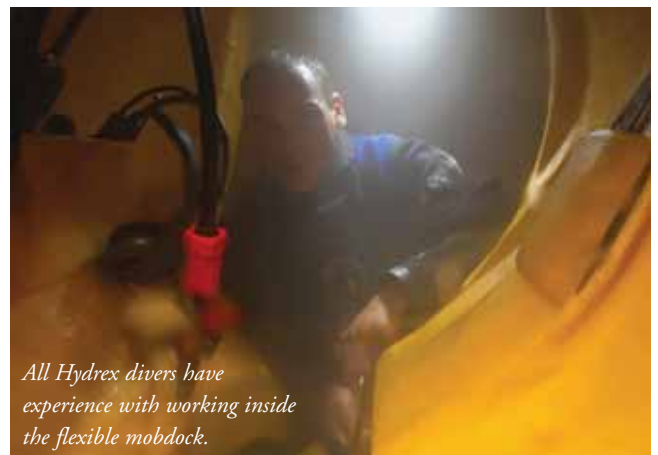
**The following case studies give an account of some of the more important recent seal repairs performed by Hydrex.**

### UNDERWATER STERN TUBE SEAL REPAIRS IN FRANCE

The Hydrex flexible mobdock technique was used to reposition the aft stern tube seal assembly of a 210-metre container ship in Le Havre. A Hydrex diver/technician team performed this operation to stop an oil blockage that occurred just after the vessel came out of drydock.

Every Hydrex office has a fast response center equipped with all the latest facilities, lightweight equipment and tools. These centers were designed specifically to increase speed of service. This made it possible for Hydrex to mobilize a diver/technician team to Le Havre from the headquarters in Antwerp immediately.

After the rope guard was removed the diver/technicians discovered that the oil flow through the stern tube seal assembly was blocked because part of the assembly had been positioned 180 degrees the wrong way. After the flexible mobdock was installed, the assembly was opened and all parts were closely examined and cleaned. This inspection revealed that all seals



*All Hydrex divers have experience with working inside the flexible mobdock.*



*All welding work is carried out by experienced welders.*



*All Hydrex offices have state-of-the-art equipment at their disposal.*

were in good condition but that the bonding was faulty. The seals were rebonded and the seal assembly refitted correctly.

The superintendent of the container ship in Le Havre was very satisfied with the service offered by Hydrex. He said, "Even after the typical late call on a Friday afternoon and even later that evening, Hydrex still managed to assemble and organize a team of divers that arrived the next day in Le Havre. The job was completed after four days, including full re-welding of the rope guard and shifting of the vessel to another berth. In between, new divers and technicians arrived, all of whom seemed very professional and skilled in their work. We had also used Hydrex on this ship before it went into drydock for a propeller polishing in Dunkerque and the response at that time was also very fast and the job professionally executed."

#### **RUDDER AND STERN TUBE SEAL REPAIR ON TANKER IN BELGIUM**

A Hydrex diver/technician team performed a crack repair on the pintle area of the rudder of a 181-metre tanker and carried out a detailed inspection of the stern tube seal assembly of the vessel while it was berthed in Ghent, Belgium. Following this inspection the team replaced the worn seals and installed a spacer ring, thus creating a new running area for the seals.

Prior to the operation the vessel was trimmed as much as possible. The Hydrex team then built a scaffolding around the rudder pintle and the stern tube seal assembly. Next they removed the rope guard and the damaged areas of the outer plating of the rudder. This allowed them to perform an inspection of the stern tube seal assembly and start the repairs to the rudder.

While the team prepared a first insert plate on shore, the inspection of the seal assembly revealed that the seals were worn and needed replacement. Next they installed the first insert and secured it while the second plate was prepared. Simultaneously another part of the team opened the stern tube seal assembly and it became clear that they needed to renew the

running area of the seals as well. The team did this by installing a new spacer ring on the stern tube flange after which they replaced and bonded the three seals.

Hydrex performed all operations under DNV requirements which were verified by an attending surveyor. The diver/technician team rotated in shifts to finish both repairs in the shortest possible time and avoid any unnecessary delays for the vessel.

#### **FAST RESPONSE PREVENTS TIME LOSS FOR GENERAL CARGO VESSEL IN THE U.S.A.**

When oil was leaking from the stern tube seals of a general cargo vessel, Hydrex mobilized a certified diver/technician team to the vessel's location in Mobile, Alabama, to perform underwater stern tube seal repairs before the ship was transferred to a new chartering party.

Hydrex had already performed a similar operation on one of the customer's other vessels so he was aware of Hydrex's well-trained diving teams and ability to handle this kind of situation without loss of quality or time for the customer.

Because the U.S. Coast Guard has very strict policies concerning environmental risks, they would not allow the vessel to sail to a different location before the oil leak had been permanently fixed.

A team immediately left from the Hydrex office in Clearwater, Florida, together with the needed equipment, and set up a diving station at the berthing location of the ship. After the Hydrex flexible mobdock was installed around the stern tube seal assembly and a dry underwater environment was created, the damaged seals could be replaced.

In order to provide the customer with the fastest possible response, flexibility was essential throughout the entire operation. Hydrex was able to perform the repairs in a very tight timeframe and made sure that the new charterer could sail the vessel free of oil leaks.



*Left: Hydrex diver inside flexible mobdock communicating with team leader.*



*Right: The Hydrex flexible mobdock allows The company to create a dry underwater environment.*

#### **TYPHOON DOES NOT STOP STERN TUBE SEAL REPAIR IN THE PHILIPPINES**

When an oil leak prevented a 225-metre bulker from continuing its sailing schedule, a Hydrex diver/technician team mobilized to Manila together with one of the company's flexible mobdocks to perform emergency underwater repairs at anchorage.



*Damaged stern tube seal.*

A typhoon was crossing over the Philippines at the time the team arrived. The storm grew to a climax just after preparations had been made for the repair. Unfortunately this delayed the underwater operation by a day, beginning when the weather had improved slightly and full safety could be guaranteed for the divers.

Still under terrible sea conditions, the rope guard was removed and an inspection revealed that a fishing net had been caught in the assembly and was tangled around the entirety of the seals. The flexible mobdock was then installed. This created a dry working environment for the divers at a depth of twelve meters in which they could replace the damaged seals.

Even though they were forced to halt the repair briefly during the peak of the typhoon, the team worked through the rest of the storm to make sure that the delay for the customer was kept to an absolute minimum. Very strict safety measures were taken during the entire operation, as is the case with every job Hydrex performs.



*Diver working on a seal assembly.*

#### **IN-SITU PROPELLER BLADE SEAL REPLACEMENT IN TOGO**

Oil was leaking from one of the blades of the propeller of a 210-metre RORO vessel and the vessel could not use its propeller anymore. Hydrex therefore mobilized a team to the ship's location in Port of Lome, Togo to perform emergency repairs.

The operation was carried out while the vessel was at anchor and trimmed so that the affected blade seal surfaced. After all the necessary equipment had arrived on site together with a workboat and a pontoon, the repair started with the installation of chain blocks to enable the team to lift the blade from which the oil was leaking.

Seven of the eight blade bolts were easily removed, but the last bolt was firmly stuck and could only be removed by cutting it with the aid of special equipment. Subsequently the propeller blade was lifted and the damaged seal was replaced. After the new seal was bonded, the blade was repositioned and the remaining seven bolts



*Stormy weather conditions did not stop stern tube seal repair in Manila.*

were secured again.

Finally a successful oil pressure test and an underwater inspection of the entire propeller were performed, concluding the repair. With the oil leak repaired the vessel could use its propeller again and was able to leave Port of Lome.

#### **UNDERWATER STERN TUBE SEAL REPAIR ON VESSEL IN NIGERIA**

Recently a Hydrex diver/technician team performed an in-situ underwater stern tube seal repair on the mechanical seal of a 150-metre general cargo vessel in Lagos. A rope was caught in the seal assembly causing an oil leak.

The owner asked Hydrex to assist his vessel in Lagos because a similar operation had been performed on one of his other vessels and he knew Hydrex could carry out the repair in-situ within a very short

time frame.

As the ship was equipped with a mechanical seal assembly there was no need to mobilize a flexible mobdock as the repair could be performed in the wet. This allowed the underwater team to arrive at the location at the same time as the vessel and



*Dry underwater stern tube seal repair inside flexible mobdock.*



*Diver working on a stern tube seal assembly.*

only days after the enquiry was made.

The repair started with the removal of the rope that had caused the oil leak. With the aid of special tools the spring unit was compressed and a small opening was created between the different parts of the assembly. The team could then remove the remains of the rope and clean the area. Next the spring unit was repositioned. The repair was completed in less than a day.

Much to the satisfaction of the ship owner Hydrex was able to perform the repair in a very tight timeframe and keep the loss of time to the bare minimum.

#### **UNDERWATER STERN TUBE SEAL REPAIR IN PANAMA**

When a 295-metre container ship developed an oil leak from its stern tube seal assembly, caused by an entangled fishing net, Hydrex mobilized a diver/technician team to Panama where underwater repairs were carried out using the Hydrex unique flexible mobdock technique.

Working closely together with a local support base, three seals were replaced in one smooth operation while the vessel was anchored at the entrance to the Panama Canal. Corrosion on the running area of the seals prevented the new stern tube seals from completely closing off the inside of the ship, so the decision was made to remove the spacer ring. This adjustment brought the seals beyond the corroded area.

Hydrex special lightweight equipment allows for an almost immediate mobilization to the location of a vessel. We combine this capability with a worldwide network of offices and service



*Removal of the fishing net on container ship in Panama.*

stations established over the last 37 years so that we can offer the best and fastest service to our customers. This gives them the opportunity to have damaged seals replaced without having to change the sailing schedule of the vessel or to take it into drydock, saving valuable time and money.

#### **ABOUT HYDREX**

Hydrex offers turnkey underwater repair and maintenance solutions to shipowners wherever and whenever they are needed. Our large and 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 any location around the globe to carry out necessary repair work without the need to drydock.