In-house technology gives Hydrex an edge

The Belgian underwater repair specialist, Hydrex, has undertaken work in Europe, Australia and South America in recent months, drawing heavily on systems and technology developed by its research department

Late last year a Hydrex diving team was mobilised to a 170m long container vessel to install a doubler plate over the cavitated area of its rudder during the ship's scheduled maintenance stop in Rotterdam.

An earlier inspection carried out in Algeciras had revealed the extent of damage to the rudder. As a result, a condition of class was imposed on the vessel and it was agreed a customised solution was needed. Hydrex proposed a repair plan to the classification society concerned that would allow the vessel to keep sailing until the next scheduled docking and this was accepted.

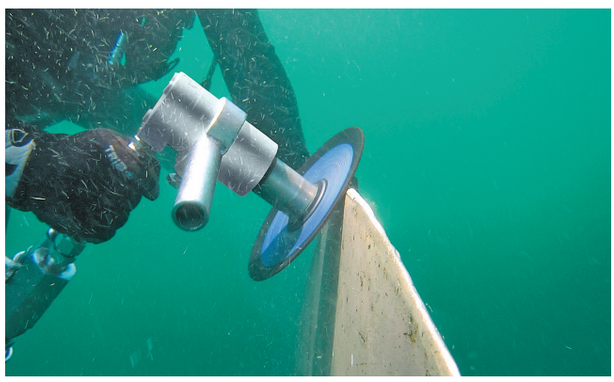
Deployment to the vessel was achieved using one of Hydrex's own workboats loaded with all the necessary equipment. These catamarans are fully equipped as dive support stations with hydraulic cranes, winches and a dive control room. They can be used for a wide range of operations in Belgium, the Netherlands and France, providing a high degree of operational flexibility.

After the Hydrex team arrived on-site with the workboat, they performed an underwater inspection of the leading edge of the rudder, where the damage was situated. The divers then started preparing the affected area for the installation of the doubler plate, which had been manufactured in advance based on information gained during the preliminary inspection in Algeciras.

Once the rudder had been prepared, Hydrex diver/welders fitted the plate and secured it. They then installed anodes on both sides of the rudder to provide further protection. This concluded the repair.

In another recent project on the other side of the world, the Hydrex team removed and reinstalled an underwater bow thruster on an offshore support vessel in Australia. This was carried out while the ship was at anchorage in the port of Dampier, Australia. By carrying both parts of the operation underwater the vessel did not have to go to drydock, Hydrex points out.

A Hydrex team leader monitoring underwater work on a containership in Rotterdam



A Hydrex diver grinding the edge of a propeller blade

As soon as the ship was at anchorage, a small Hydrex team went onboard and prepared the bow thruster engine room for the removal of the unit so that there would be no ingress of water once the unit was taken out. In the meantime, the majority of the repair team started the underwater operation. They first removed the thruster tunnel grids. Then they detached the blades one by one and replaced them with blind flanges to prevent oil from leaking from the thruster.

Company spokesman, Christophe Verhoeven, says: "We have a special R&D department that is continuously looking for new ways to streamline the repair procedures used by our teams. One of the results of their research is a cradle designed especially for thruster operations. This device has been used on many thruster operations around the world and in this case it allowed the Hydrex divers to remove the bow thruster unit from the thruster tunnel and bring it onboard the workboat in one take, using the ship's crane."

The unit was then brought to a local workshop where it was overhauled by a team of technicians from the OEM. The overhauled thruster unit was brought back inside the tunnel using a reverse procedure. Then one of Hydrex's 'mobile mini drydocks'

- or mobdocks - was used to create a dry environment to work in while the vessel remained afloat. "These mobdocks have been used during thruster operations for 20 years now. Because they are flexible they can be shipped to anywhere in the world by plane very fast," states Verhoeven.

The diver/technicians repositioned the gearbox using chain blocks and secured it with bolts. All thruster propeller blades were then reinstalled one by one and the thruster unit was reconnected to the engine room.

Verhoeven adds: "Performing both the removal and reinstallation of a thruster at such a short notice can only be done successfully by people who have experience with such challenges and the relevant know-how. This is why Hydrex has a technical department capable of arranging such a fast mobilisation, an in-house R&D department that can take care of the engineering aspect, and highly experienced diver/technicians who are trained to perform the required class-approved repair procedures."

Hydrex divers were also recently dispatched to Uruguay to crop the blades of a bulk carrier propeller in order to enhance efficiency after they were damaged. The work was carried out with propeller blade cutting equipment developed by the Hydrex research department. The team used information acquired during an initial inspection to calculate and determine the correct measurements needed to modify the tip of the propeller blades. The repair proposal was then discussed with both class and the owner. After it was accepted, the divers cropped the damaged blades and ground their edges to give them the correct shape. The fourth blade, which had not been damaged, was also cropped to keep the propeller's balance. When the cropping was complete Hydrex technicians polished the blades to make sure that any remaining loss of efficiency would be minimal.

Damaged propeller blades will inevitably have a performance level that is below average, resulting in increased fuel consumption and added stress. This type of repair can be performed on-site and underwater, allowing a ship to return to commercial operations without the need to drydock, Hydrex points out. *SRCT*

Underwater drill and fixing system from Miko

Divers working on underwater hull repairs could benefit from the new technology

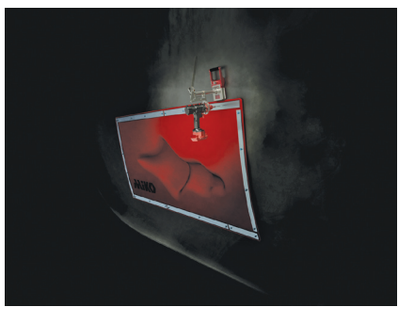
A new electric underwater drill and fastening system that can penetrate and join two metal plates up to 22mm thick in one action has been developed by Miko Marine of Norway. The battery-powered Miko Fix drill is designed to be operated by divers at depths of up to 50m.

It is mounted on a specially designed stand that is clamped to the work piece by permanent magnets. When in use the drill is loaded with a bolt, the end of which is shaped and hardened to function as the drill bit. This cuts through the metal to be joined and enables its upper end to function as a self-tapping bolt that continues to penetrate so that it is screwed through the pieces that become securely joined.

According to the company, when using the Miko Fix system two steel plates each 10mm thick can be drilled and joined in approximately one minute. When the bolt has been driven home the magnetic clamps are released, enabling the process to be repeated at a new location.

The new drills and their stands weigh just 6kg in water and have been tested by Norwegian dive company Kambo Marina. "We used it to fix an anode to a steel plate and were very impressed with its efficiency and ease of use," says general manager Ketil Svelland. "It is bound to have an impact upon the professional diving industry as it will increase the options available to us when we are doing repair work underwater. We are very proud to have been the first divers to use a new tool that is likely to be seen everywhere in a few years."

The new Miko Fix system can be used for a wide variety of repair tasks underwater, although it was developed specifically for use with the Miko FlexiShape patch. These are manufactured by Miko to provide a temporary water-tight seal that can be used to close-off damage to a ship's hull and make it seaworthy for sailing to a drydock for permanent repair. The patch is positioned over the hole by divers and held tightly against the hull by aluminium strips. In the past these have been fixed in place by a hand-held Miko gun which can fire rivets through up to 25mm steel plate to create a water tight seal. Unfortunately the small explosive charges used to drive-in the rivets are challenging to transport because of safety regulations. This limits their use internationally, so Miko designers invented the new drill-based system, which can do the same job but without the transport restrictions faced by the gun.



A Miko Fix drill being used to affix a FlexiShape patch

Miko Marine was established in Oslo, Norway, and is widely known for its magnetic patches that have been used to prevent ships from sinking on numerous occasions around the world. Miko also produces high-power permanent magnets that can be used in conjunction with the patches. A more recent innovation has been the Moskito oil recovery tool, which has been introduced to enable bunker fuels and other hydrocarbon cargoes to be quickly and easily extracted from the tanks of sunken vessels. *SRCT*