Case Study

Hydratight’s MORGRIP® weldless connectors achieve underwater success

A team from Hydratight and Statoil ASA successfully completed a major, diverless repair to a 762.0 mm (30”), 210 bar pipe, 200 m down in the Norwegian oil and gas fields—one of the deepest, largest-diameter pipes Hydratight has worked on.

The Problem
The pipe—the link between two large platforms, Kvitebjørn and Visund in the North Sea, and shore operations near Bergen—was damaged by the anchor of an unknown vessel about 10 km from the Kvitebjørn platform. Repairs were originally planned into a long-term work schedule. A routine inspection then discovered a slight leak at the damage site and a permanent repair became essential.

The Solution
A new section of pipeline and two huge MORGRIP® mechanical connectors had to be moved into place from giant steel frames in an intricate operation using remotely-operated installation systems.

This highly-complicated repair involved the Hydratight team, engineers from Statoil ASA and Statoil ASA’s repair contractors.

Because the pipe was at a depth of around 200 m, a diverless repair was essential—and Hydratight’s unique connector system came into its own. Under a working agreement, Statoil ASA maintains a contingency stock of connectors with Hydratight to allow emergency repairs to start as soon as possible after repairs receive a go-ahead.

The repair operation was far from simple. Even in perfect conditions, the depth, size and weight of the pipe would have caused problems; occasionally poor weather on the surface only added to the complexities.

The damaged pipe was coated with concrete and asphalt. So, before the repair team arrived on site, the seabed around the pipeline was cleared by Statoil ASA to allow adequate working conditions.

As the repair began, 100 tonne, H-frame rigs were lowered from the surface to hold the severed ends of the pipe. These are designed to hold and manoeuvre the pipe ends into position using dynamic positioning and remote cameras.

A separate coupling installation frame (CIF), capable of ultra-precise alignment movements, was lowered to the sea bed holding a new 25 m section of pipe with a connector on the end. The two pipe ends were carefully aligned inside the connector and hydraulically energised.

“The experience gained from the Kvitebjørn repair will boost the knowledge base for future pipeline repairs in emergency response work on the Norwegian continental shelf.”
Ronny Larsen,
Vice President Kvitebjørn Operations Statoil ASA

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The CIF was repositioned on the other end of the insert pipe and the procedure repeated, to complete the repair. External pressure testing facilities within the connector ensured that the installation could be fully tested prior to any further pipeline operations or testing.

Joint testing and other repairs allowed oil and gas flow from the two platforms to resume just five months after it was originally shut down.

As all North Sea contractors know, there are many challenges to overcome in any job in such inhospitable weather conditions, even though the weather was relatively mild for December.

Hydratight and Statoil ASA have developed a close working relationship over many years and that meant the teamwork vital to the successful completion of such a complex job was in place from day one.

**MORGRIP® Mechanical connector key features**

- Hydratight's mechanical connector system had already been proven in deep water: in 2002 the company mounted the first diverless repair over 300 m below the North Sea on a 304.8 mm (12") pipe. The system is capable of diverless repairs to pipes up to 1066.8 mm (42") in diameter.

- Hydratight MORGRIP connectors are designed to accommodate the installation forces caused by pipe stab as pipes are aligned. Seals and ball bearings are retracted during these phases, so loads are minimized.

- Following pipe stab-in, the ball bearings are released and a multi-stud tensioner tightens stud bolts along the length of the connector body. Ball bearings on the inner surface of the connector indent and the seals tighten on to the pipe ends, holding them tight. Hydraulically operated motors rotate the hexagonal nuts to mechanically lock the connector on to the pipes, and joint integrity can be checked with an external pressure tester on the connector.

- MORGRIP connectors are available in pressure ratings of up to 1134.0 kg (2,500 lbs), and are DNV approved as a permanent replacement for a welded connection.

For more information, visit [hydratight.com](http://hydratight.com).