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REPORT

Kristin Offshore
Platform



Kristin is a new semi-submersible platform to be operated by Statoil for extraction of gas and condensate in the Kristin Gas field of the Haltenbanken

Vest area, in the Norwegian Sea. Now, as the project has entered the final stages of the build phase, it can be summarised as a good example

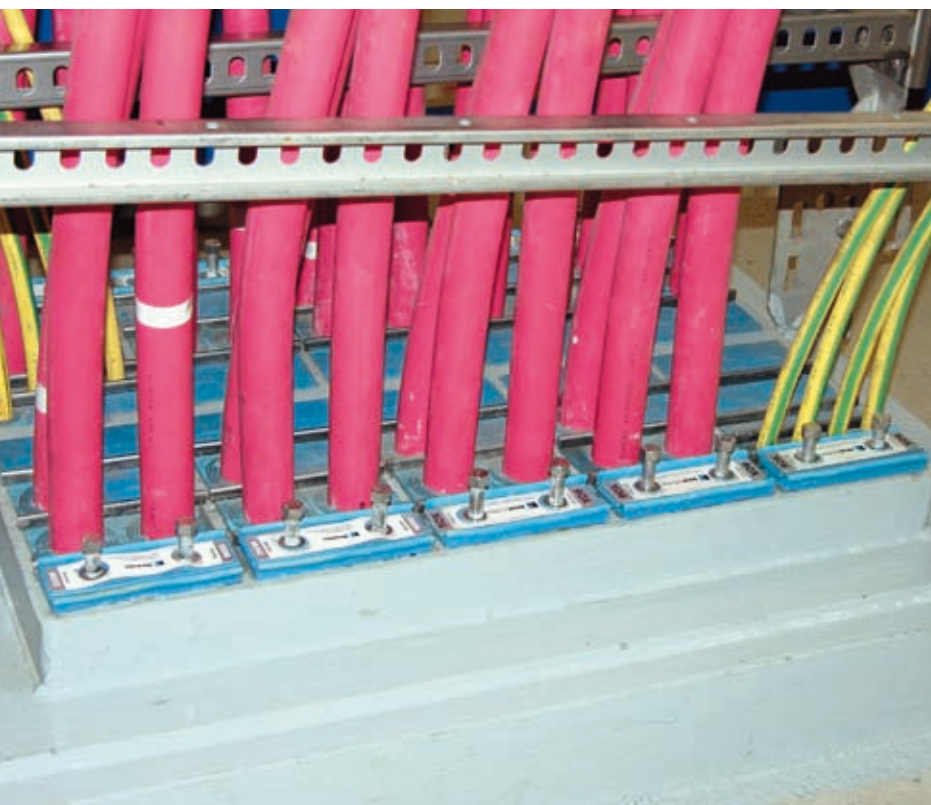
where Roxtec products fulfill the requirements of the technically advanced construction as the Kristin platform.

Roxtec team reports on site

From offshore gas and condensate platform
Kristin, Norway

We Seal Your World

Technical challenges solved with Roxtec transits



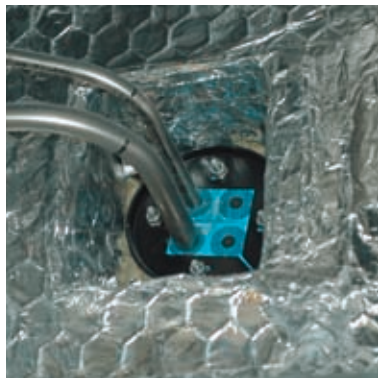
Rich gas from Kristin platform will be piped from the field through the existing Aasgaard Transport trunkline, to the Kårstø Processing Plant north of Stavanger. Here the gas will be processed. The natural gas liquids are extracted and the rest, the sales gas, is piped to the markets in continental Europe and the UK. The liquified products, in turn, are shipped to other countries, worldwide.

Roxtec finds total solutions for Kristin platform

Roxtec is the inventor and supplier of Multidiameter™, the Roxtec technology based on sealing modules with removable layers. The use is for the safe penetration and sealing of cables and pipes passing through hazardous areas and rated sections, either it be on ships, offshore platforms or even offshore windfarms. In the recent Kristin

project Roxtec has been involved in supplying and supporting solutions to several of the platform system modules, including seals to the Hull columns, built in Korea, the Living quarters, built in Sweden, the Riser balcony, built in Spain and the Utility and Process modules built in Norway. These platform modules were built at different locations around the world. Recently, all units were shipped to Aker

Stord, Norway, for final assembly. The biggest operation at this stage involves fitting the top section on to the hull. This phase is called Mating. When performed, ballast tanks and parts of the columns of the hull are filled with sea water to lower the under-carriage. Here the Roxtec seals play a critical role. 65 pieces of Roxtec 6x1 seals secure the penetrations in the columns. The Kristin project had a requirement for protection against 4.5 bar water pressure. In order to verify



the capacity of the offered solutions Roxtec performed an early pressure test witnessed by DNV, resulting in a specific certificate for the project.

Successful mating

The hull was lowered into the sea for a total of three weeks, exposing every Roxtec transit to the hazards of the elements. It should be noted that any substantial leaks occurring at this stage could jeopardise the entire mating operation. The seals



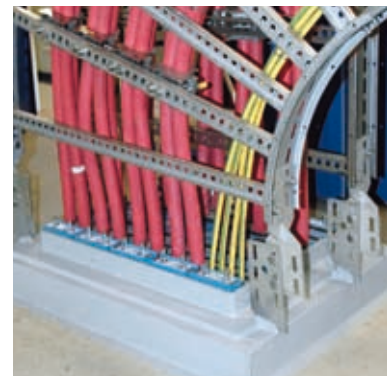
passed the inspection and the mating process was subsequently initiated. The entire mating was finished in the new record time of only 14 days. As a comparison it is normal for a mating of similar platforms to take up to one or two months.

Roxtec in the process area

The entire process area is controlled through a Distributed Control System, or DCS. The input to the system is delivered by a vast

number of sensors and gauges, distributed over the entire process area. In order for this process to run smoothly and effectively it is important to facilitate installation and to minimise future operational disturbances. For this purpose the builders decided to choose Roxtec's ES and PE solutions for electromagnetic shielding. These systems were effectively installed in both the Remote I/O cabinets and Field Termination Cabinets.

(Left page) Roxtec rectangular and round seals protect the columns of the hull. (Above) The living quarters utilise a variety of Roxtec products. (Right) EMC solutions are installed, among other, in the Process and Utility area.



Facts

Project type:	Semi-submersible platform for gas extraction and condensate from undersea reservoirs at Kristin gas field, Haltenbanken Vest, Norway.
Client/Owner:	Statoil (Operator), Petoro, Norsk Hydro, Exxon Mobil, Norsk Agip, TotalFinaElf.
Engineering & Main contractor:	Aker Kvaerner Engineering and Technology, Oslo, Norway
Construction:	Aker Stord, Norway - Main Deck Structure, Utility and Process Area. FC Samsung Heavy Industries, Korea - Hull Structure EPC Emtunga, Sweden - Living Quarters Dragados, Spain - Riser Area
Time:	17 December 2001 to 1 October 2005.
Roxtec Support:	<ul style="list-style-type: none"> - Roxtec Transit Calculation Support - Installation Training - On-site Inspection and follow up <p>Roxtec International och Roxtec AS supported the customer from start to finish of the project, including technical solutions, dimensioning, installation and validation on site.</p>
Roxtec transits:	S frame transits welded in decks, bulkheads and cabinets. SF frame transits welded in decks and bulkheads. G and GE frame transits bolted in internal architectural walls. R frames mounted in decks and bulkheads. KFO frame transits without flange, bolted in panels and switchboards. CF 32 compact entry seals bolted in panels.
Roxtec frames:	2400 pcs SF 6x1 frame openings, 850 pcs S 6x1, 200 pcs G+GE 6x1, 50 pcs KFO 6x1, 100 pcs R 100/150/200.
Roxtec packing materials:	73 000 RM modules, 15 000 ES B RM and PE RM modules, 18 500 Stayplates AISI 316, 3 500 Wedge AISI 316 and 5 000 Lubricant.
Sealing requirements:	<p>Fireprotection A0-A60, H0</p> <p>Water pressure 4.5 bar (45 mwp) in Hull Structure</p> <p>Gas tight and explosion proof</p> <p>Electromagnetic shielding of Distributed Control System operating input from approximately 20 000 signals.</p>



Roxtec General Offshore References (extract)

Aker Stord AS, Norway
 Aker Elektro AS, Norway
 Aker Kvaerner Engineering, Norway
 Brown & Root, USA
 Conoco, China
 ELF, France
 EPC Emtunga, Sweden
 Esso, UK
 FC Samsung Heavy Industries, Korea
 ETPM/McDermott, France
 Hyundai Heavy Industries, Korea
 Kvaerner Oil & Gas AS, Norway
 Mobil, France
 Norsk Hydro, Norway
 Phillips Petroleum Co, Norway
 Schlumberger, France
 Semco Maritime AS, Denmark
 SNEF, France
 Statoil, Norway
 Total, France



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