HIGH PRESSURE COMPOSITE DRILLING RISER FOR DEEPWATER APPLICATION

Fact Sheet

Project information

- Grant agreement ID: OG-00045-97
- Start date: 1 December 1997
- End date: 31 July 2000
- Funded under: FP4-NNE-THERMIE C
- Overall budget: € 1 442 808
- EU contribution: € 577 123
- Coordinated by: KVAERNER FSSL LTD, United Kingdom

Objective

The project is to overcome the technical, emotional and economical barriers that are hindering the commercialization of composite risers which can be used to develop hydrocarbon reserves in deepwater. Risers are critical tubular components used to transport downhole drilling and production fluids to and from the ocean floor to the platform deck in a typical offshore installation. Riser performance demands a high degree of structural and hydraulic integrity over long service periods i.e. 20-30 years. The project involves field demonstration of a high pressure composite drilling riser using a multi-company, multi-disciplinary team. For field test purposes, the composite riser joint is designed to be compatible with an existing 31 MPa pressure rated, 558 mm ID. 22 mm wall, titanium riser string already installed on the Heidrun Tension Leg Platform. The results of the project are intended to support the development of a European business plan to make composite products available to the oil industry worldwide.

Design of "trap Lock" with internal titanium liner completed and has undergone successful verification/review. Impact tests on composite laminate with and without protection have been completed and indicate that the pipe can withstand 50 kJ without impact protection and up to 250 kJ with proprietary protection panels. With these results, it may not be necessary to install protection systems for demonstration in water depths beyond 50 m. Weld qualifications have been successfully completed and all Grade 9 liner materials and heavy wall Grade 23 titanium extrusions have been successfully manufactured.
and delivered. Static and dynamic tests are initiating.
The composite riser joint is designed to be fully compatible with an existing 31 MPa pressure rated, 558 mm ID, 22 mm wall, 15 m long standard titanium riser joints already installed on the Heidrun TLP. The design of the composite portions of the riser joint primarily encompass, a) a predominantly carbon fiber laminate construction for the pipe section, b) titanium inner liner integrally welded to the end flanges to ensure hydraulic integrity, c) "trap lock" design for the MCI to carry the structural loads and d) a detachable external protection system capable of withstanding impact loads specified in Heidrun performance requirements. The design analysis fully accounts for the service conditions imposed at the most critical locations, such as, the top of the taper stress joint.
During phase 1 (not part of the Thermie project) full cross-section 6 m specimens will be subjected to burst tests, combined load tests including internal pressure and bending as well as fatigue tests. Additionally, impact protection schemes are planned to be qualified to withstand up to 250 kJ of dropped object loads. During Phase 2, the 15 m field joint will be constructed to specifications validated from design and testing activities pertaining to Phase 1. The joint will be assembled with accessories such as booster lines, etc. and Factory Acceptance Tested (FAT) to Heidrun requirements. After installing the internal wear liner, the 15 m joint will be transported to the onshore base in Norway where it will formally handed over to Heidrun Operations.
In Phase 3, the 15 m joint will be demonstrated in the field trial by running and retrieving it in a minimum of three locations along the riser string of varying severity, i.e. mid-string, top of the taper stress joint and near the splash zone. After each excursion, which corresponds to a drilling cycle, the joint will be examined as to its performance. Completion of the field demonstration constitutes the end of the project.

Programme(s)

FP4-NNE-THERMIE C - Specific programme for research and technological development, including demonstration in the field of non-nuclear energy, 1994-1998

Topic(s)

1 - OIL AND GAS

Funding Scheme

DEM - Demonstration contracts

Coordinator