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PRESS RELEASE

SUBSEA 7 PRESENTS PAPERS ON UNDERWATER DEEP RISER SYSTEMS AT OTC 2013

Subsea 7, a global leader in seabed-to-surface engineering, construction and services to the offshore energy industry, will deliver three papers in the Underwater Deep Riser Systems Session at this year's OTC on 8 May, in Houston, USA.

The first paper is titled 'COBRA: An uncoupled riser system for ultra deepwater in harsh environments'. Subsea 7 and Statoil present this paper on a new un-coupled riser concept, the Catenary Offset Buoyant Riser Assembly (COBRA). This consists of a catenary riser section with a long, slender buoyancy module on top which is tethered down to the seabed. COBRA is an efficient riser arrangement for host platforms with large motions, e.g. FPSO or semi-submersibles.

The second paper by Subsea 7 is on 'High strength carbon steel and CRA lined pipe for reel-lay installation' with Vallourec and Mannseman Tubes and BUTTING. The paper looks at the use of high strength steel, Grade X80, and the significant benefits it offers , including a reduction in pipeline weight and savings in material and fabrication costs. Similarly, reel-lay is a cost effective offshore installation method for high strength steel.

In the final paper by Subsea 7 in this session, Jean-Luc Legras will present a paper on the Tethered Catenary Riser (TCR), a new riser concept for field development in deep and ultra deepwaters. Jean-Luc shows that the TCR is a credible option for use in deepwater developments as all the components, design methods and installation procedures are fully qualified and that it is cost effective and ready for project application.

ENDS

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PRESS RELEASE

OTC 23986
COBRA: An Uncoupled Riser System for Ultra deep Water in Harsh Environments
Daniel Karunakaran, Subsea 7 and Rolf Baarholm, Statoil

Abstract
Steel Catenary Risers (SCR) and hybrid riser towers have been an attractive choice for recent deep-water field developments. However, design of SCRs for harsh environments or from large motion host platforms remains a significant challenge. The key issues for the design of SCRs in harsh environments are the fatigue near the hang-off and at the touchdown point. Hybrid riser towers have their own challenges and need special bottom assemblies with heavy foundation and complicated spools.

A new un-coupled riser concept is presented called the Catenary Offset Buoyant Riser Assembly (COBRA). COBRA consists of a catenary riser section with a long, slender buoyancy module on top which is tethered down to the sea bed. The top of the catenary riser section is connected to the host platform by a flexible jumper. COBRA is an efficient riser arrangement for host platforms with large motions, e.g. FPSO or Semi submersibles. The flexible jumpers in this riser system effectively absorbs the platform motions, and consequently the steel catenary riser section has almost no dynamic motions, which improves both strength and fatigue performance.

The riser system is developed for water depths ranging from 750 m to 3000 m in harsh Northern Norwegian environments. The results clearly indicate that it is possible to have a robust design of COBRA risers from large motion host platforms in harsh environments using presently qualified material and technology. The first order wave fatigue response of the steel riser section is negligible and the fatigue is purely controlled by VIV and can be mitigated by the use of VIV strakes. The preliminary work also showed that this riser system can easily be installed in harsh environments. The riser components used in this riser system are all field proven as they are used in other riser systems.

This concept is also applicable in less demanding environments, such as in Brazil. Furthermore, due to reduced dynamics in the SCR part of the risers, cost effective CRA materials like mechanically lined pipes can be used in the SCR section, thereby reducing the costs considerably.

The COBRA riser concept will make the applicability of catenary risers a credible alternative option for use in increasingly harsh environments or from host platforms with large motions. Since the components in this riser system are all fully qualified material they are cost effective and ready for project application.

OTC 24053
High Strength Carbon Steel and CRA Lined Pipe for Reel-Lay Installation

PRESS RELEASE

Richard Jones, Subsea 7
Nuno Pepe, Subsea 7
Graeme Barritte, Subsea 7
Gregory Toguyeni, Subsea 7
John Mair, Subsea 7
Tanja Schmidt, Vallourec and Mannesman Tubes
Joachim Banse, BUTTING

Abstract
There is increasing demand for pipeline installation, including SCRs, in deeper water, coupled with a requirement for higher operating pressures and temperatures and the need to transport corrosive constituents. For such applications, the use of high strength steel, Grade X80, offers significant benefits including a reduction in pipeline weight and savings in material and fabrication costs. Furthermore the reduction in linepipe weight reduces buoyancy module requirements and facilitates installation by existing pipelay vessels which would otherwise require increased top tension capability if lower strength pipe was used.

Reel-lay offers a cost effective offshore installation method for high strength steel pipe. Hitherto reel-lay installation has been limited to Grade X65/70 strength pipe. Subsea 7, in collaboration with Vallourec and Mannesman Tubes, (refer to hereafter as V&M Tubes) has performed a qualification programme for reelable X80 linepipe. V&M Tubes manufactured seamless X80 pipe of 323.9mm OD x 18mm WT pipe in accordance with DNV OS-F101, supplementary P requirements. Subsea 7 developed and qualified a mechanised girth weld procedure based on the GMAW-CMT/PGMAW welding process. Procedure qualification was successfully performed in compliance with DNV OS-F101, including mechanical, fracture toughness and sour service testing.

In order to address the need to transport more corrosive constituents, Butting manufactured Alloy 625 and 316L mechanically lined or BuBi® pipe(323.9 x17.5+3.0mm) using the X80 pipe supplied by V&M Tubes. Subsea 7 developed a novel girth welding procedure utilising internal welding of the CRA lining and external welding using conventional C-Mn filler wire. The latter facilitated the achievement of overmatching weld metal strength which is necessary for reeled pipe. Girth weld procedure qualification was successfully performed in accordance with DNV OS-F101 including a full scale bending trial.

The development of linepipe material and welding solutions for reelable high strength carbon steel and CRA lined pipe are considered to be key enabling technologies for the exploitation of deep water oil and gas reserves in the future.

OTC 23972
Tethered Catenary Riser: A Novel Concept for Ultradeep Water
Jean-Luc Legras, Subsea 7

PRESS RELEASE

Abstract
A new riser concept is proposed by Subsea 7 for field development in deep and ultradeep waters: the Tethered Catenary Riser (TCR)-patent pending. The concept consists of a number of steel catenary risers supported by a subsurface buoy which is tethered down to sea-bed by means of a single pipe tendon and anchored by means of a suction pile; flexible jumpers are used to make the connection between the Floating production Unit (FPU) and the buoy. Umbilicals run without interruption from the FPU to their subsea end while being supported by the buoy.

The system has all the advantages of de-coupled riser arrangements: flexible jumpers effectively absorb platform motions, thereby the rigid risers and tendon have very small dynamic excitation. The system can be installed before FPU arrival on site, which improves the time before first oil. Analyses have shown that, with adequate geometry of the buoy, the latter is sufficient stable to induce acceptable tilt and twist when different arrangements of SCRs and flexible jumpers are installed, and under accidental scenarios during the in-place life.

The riser system is best designed for a number of risers between 4 and 8, in addition to a number of umbilicals, thus convenient for one or two drilling centers. Results of the basic engineering work on the TCR clearly indicate that it is possible to have a robust design using presently qualified materials and technology. The components used in the TCR are all field proven as they are commonly used in existing riser systems.

As a result of installation studies, a method very similar to the one commonly used by Subea7 for Single Hybrid Risers (SHRs) has been selected for the buoy and tether system. Placement of rigid risers, jumpers and umbilicals is as done by Subsea 7 for the BSRs. This method is well adapted for installation by the new Subsea 7 flagship vessel Seven Borealis which is able to perform heavy lift and pipe laying.

The Tether Catenary Riser is a credible option for use in deep water developments all over the world. Since all the components, design methods and installation procedures are fully qualified and familiar to Subsea 7, the concept is cost effective and ready for project application.

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Notes to editors:

1. Subsea 7 will have a major presence at this year's event. As well as presenting conference papers, it will be exhibiting at stand 1641. On display

will be examples of the Company's deepwater and ultra-deepwater technical expertise and its investment in its fleet.

2. Subsea 7 is a seabed-to-surface engineering, construction and services contractor to the offshore energy industry worldwide. We provide integrated services, and we plan, design and deliver complex projects in harsh and challenging environments.
3. For further information visit www.subsea7.com