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Feasibility Assessment of a Mid-Water Transfer System

R. A. Alvim, 2H Offshore; and P. Elman, 2H Offshore

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Abstract

The development of deepwater oil fields based on a production platform with dry trees, connected to a Floating Production Storage and Offloading (FPSO) vessel, has proved to be technically and economically attractive. However, a key issue for the practical implementation of this production concept is the availability of a cost-effective oil and gas transfer riser solution.

The use of conventional catenary or self-standing riser technologies is sometimes avoided by operators due to high costs and flow assurance issues. To counter these problems operators are seeking a cost-effective solution for fluid transportation between two vessels at a water depth close to the surface. This type of riser system has been used successfully in benign environments like West Africa and is now being considered for harsher environments such as offshore Brazil.

2H Offshore conducted a preliminary feasibility study encompassing installation and in-service dynamic response, to prove the technical feasibility of a system composed of a group of large diameter free-hanging flexible pipes, required to connect two platforms offshore Brazil.

The paper demonstrates that this configuration is practical and simple because it can be designed with regular flexible pipe and standard components. Additionally, it can be deployed using conventional flexible pipe laying vessels.

Introduction

The design of a riser solution to connect a spread moored Floating Production Storage and Offloading vessel with a dry completion platform (Tensioned Leg Wellhead Platform - TLWP) is a complex engineering process which is being sought by operators as a novel and cost effective solution for fluid transportation.

The objective is to transfer the produced oil from the TLWP to the FPSO for processing, storage and later off-loading to a shuttle vessel. Additionally water is injected from the FPSO back to the TLWP and into the wells. This type of system has been proposed by several companies and is referred to as a "Mid-Water Transfer System", hereinafter referred to as MWTS.

Due to the increasing demand for riser solutions in deep water developments, the use of conventional catenary risers (Flexible/SCRs) or Free Standing Hybrid Riser (FSHR) technologies, are sometimes avoided due to their cost. This paper evaluates a novel and cost effective solution for fluid transportation between the two rigs, considering flexible risers which are suspended close to the water surface. This allows the use of cheaper flexible risers with low collapse pressure limits which, reduces the cost of the riser system.

2H Offshore has conducted a preliminary feasibility study to prove the technical feasibility of a system composed of a group of large diameter free-hanging flexible pipes required to connect two platforms in offshore Brazil. The study covers the installation, in-service dynamic response and slugging behaviour of the system.