



OTC 18904

Riser Integrity Management—Recent Advances in the Deepwater Industry Practice

Muthu Chezhan and Kim Mørk, Det Norske Veritas; Patricia Lespinasse, Total; Tim Farrant, BP; and Martin Søreide, Statoil

Copyright 2007, Offshore Technology Conference

This paper was prepared for presentation at the 2007 Offshore Technology Conference held in Houston, Texas, U.S.A., 30 April–3 May 2007.

This paper was selected for presentation by an OTC Program Committee following review of information contained in an abstract submitted by the author(s). Contents of the paper, as presented, have not been reviewed by the Offshore Technology Conference and are subject to correction by the author(s). The material, as presented, does not necessarily reflect any position of the Offshore Technology Conference, its officers, or members. Papers presented at OTC are subject to publication review by Sponsor Society Committees of the Offshore Technology Conference. Electronic reproduction, distribution, or storage of any part of this paper for commercial purposes without the written consent of the Offshore Technology Conference is prohibited. Permission to reproduce in print is restricted to an abstract of not more than 300 words; illustrations may not be copied. The abstract must contain conspicuous acknowledgment of where and by whom the paper was presented. Write Librarian, OTC, P.O. Box 833836, Richardson, TX 75083-3836, U.S.A., fax 01-972-952-9435.

Abstract

Riser Integrity Management (RIM) could be defined as a continuous process of 'knowledge and experience management' applied throughout the lifecycle of the riser system. The high cost, complexity and potential consequences of failures of riser systems in the challenging deepwater environment, where limited operational experience exists, is one of the main motivations for RIM. In deeper waters, significant uncertainties can exist in metocean data, analysis methods, riser monitoring and riser inspection technologies. Validated and proven instrumentation strategies for deepwater risers are still the subject of research and development and the technical difficulties associated with real-time data collection and interpretation can complicate detection and mitigation of potential failures in critical riser components. In this context, there is a need to understand how integrity management should be applied during riser design, fabrication and operation. At present, industry standards provide limited guidance on life cycle integrity management of risers.

As part of a major JIP, a new Recommended Practice on Riser Integrity Management has been developed by DNV in co-operation with six oil and gas majors, fourteen riser specialist companies, and the major regulatory authorities from across the globe. The ultimate aim of the project is to achieve an industry recommended practice, which can be practically applied on all types of deepwater risers, such as SCRs, TTR, Flexibles and Hybrids. This recommended practice summarizes good practice for riser integrity management both for project design and operational phases, based on the industry experience from a wide range of operations and riser types.

Various aspects of RIM such as early stage planning, establishing safe operational limits for the riser system, riser dynamics monitoring, riser condition monitoring, risk based inspection, reliability based maintenance of riser components and emergency response are addressed within this work. The operational integrity issues are addressed using a 'risk based

approach' for selecting the RIM strategy. Using an integrated approach between risk based inspections, reliability centered maintenance and riser monitoring systems, an optimal cost effective and safe RIM solution can be achieved. By means of realistic deepwater RIM case studies, for different riser-floater concepts and environmental conditions, the RIM approach is demonstrated.

Introduction

Riser Integrity Management (RIM) could be defined as a Continuous Process of "Knowledge and Experience Management" applied throughout the Lifecycle to assure that the riser system is managed Cost effectively and Safely and remains Reliable and Available, with due focus on personnel, assets, operations and environment. Typical RIM program includes various aspects such as early stage planning, safe operational limits for the riser system, riser monitoring, condition monitoring, processing and analysis of monitored data, risk based inspection, inspection /maintenance/repair aspects, emergency response and periodic demonstration of in-service integrity.

With good industry support and interest, a major JIP was managed and executed by DNV and its JIP partners in 2005 and 2006, with the main objective of developing a Recommended Practice (DNV-RP-F206) on Riser Integrity Management. The target was to develop an RP which shall be a state-of-the-art document, which provides proven technology and sound engineering practice, as well as guidance, developed in close co-operation with the industry, addressing all aspects of riser integrity.

Six oil and gas majors, were part of the JIP as steering committee members and shared operational experience and expertise. There were 14 specialists companies involved, which included riser manufacturers, riser component manufacturers, riser monitoring companies, riser engineering companies, URF (Umbilical Riser Flowline) contractors, inspection and integrity management companies and research & development organisations. The major regulatory authorities across the Atlantic have been involved as 'Advisors' to this JIP so as to provide regulatory perspectives.

Due to broad nature of the subject, only a few key areas are addressed within this paper. More detailed information and practical guidelines on RIM can be found in DNV-RP-F206.

Motivation & Background

The motivation for focusing on RIM comes from numerous valid reasons, though the focus areas, strategies and importance varies with the operators and the geography! The