



OTC 20027

Meeting the Future Challenges of Flexible Pipe Technology - Advances in Industry Standards

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This paper was prepared for presentation at the 2009 Offshore Technology Conference held in Houston, Texas, USA, 4-7 May 2009.

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Abstract

The Flexible Pipe Technology JIP (*FPT JIP*), being managed by MCS, is tasked with the first major revision of the API and ISO standards for unbonded flexible pipes since they were written in the mid-90's. The outcome of the JIP will be completely revised versions of API Spec 17J and RP 17B, and their ISO equivalents, based on the current state-of-the-art of flexible pipe technology.

These new versions of the standards will incorporate new industry experience and learning on design criteria, materials selection, qualification and prototype testing, life-cycle integrity management and manufacturing requirements for flexible pipes. Furthermore, a design philosophy will be developed by the JIP to provide a mechanism for reappraising design criteria in future standard revisions, in response to constantly increasing operational experience, improved understanding of limit states and the opportunities presented by new enabling materials and manufacturing technology.

In so doing the standards will ensure that flexible pipes remain a competitive, enabling solution for the challenges of future offshore Exploration and Production in deepwater and harsh environments.

As the *FPT JIP* completes its work, this paper considers some of the activities of the JIP since its inception in 2005, focusing on investigations in key technical areas and provides an overview of some of the revisions to be proposed for the next generation of the API and ISO standards.

Introduction

Background:

The industry standards for unbonded flexible pipe design were developed in their current form through two JIPs, managed by MCS, from 1994 to 1998 (Grealish 1996). A Specification for flexible pipes was released as API Spec 17J, 1st Edition, in late 1996 and a major revision to the Recommended Practice for flexible pipes was released as API RP 17B, 2nd Edition, in June 1998. API Spec 17J and RP 17B replaced the many company Specifications that were used up to that time.

Since their publication the API standards have been universally accepted in the industry. This success is based on:

1. Identification and collation of the start-of-the-art of flexibles as it existed at that time
2. Identification of settled technology
3. The development of a consensus on the minimum requirements to be incorporated into the standards between operators, suppliers and regulatory bodies

However in recent years, another generation of company Specifications that give significant supplementary requirements to Spec 17J and RP 17B have become prevalent. These supplementary requirements have arisen because of significant new learnings arising from increasing industry knowledge in areas such as annulus environments, wire fatigue, polymer degradation and increased operational experience and failure histories. The extent of the increased experience with flexible pipes is illustrated in Fig. 1 below which shows the increase in flexible pipe operational experience in the North Sea/West of Shetlands from 1990 to 2002 (UKOOA 2001, SUT 2007). In the period since 1996 flexible pipe operational years grew from 200 to in excess of 1400.

In addition to company Specifications a wide range of JIPs and cross-industry initiatives related to flexible pipe technology are on-going or have been recently completed, such as the *Flexible Pipe Ancillary Equipment JIP (MCS)*, *Real Life JIP (MCS)*, *High Temperature Polymer JIP (MCS/MERL)*, *Rilsan User's Group*, *Permeation JIP (Sjim Last)*, *Corrosion Fatigue JIP (Marintek)*, *PA-X JIP (InDec)*, *SESAM PA11 (InDec) JIP* and *SESAM XLPE JIP (InDec)*.