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Petrobras Experience on FPSO Structural Integrity Management

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Abstract

Risk Based Inspection (RBI) and on-site maintenance are the key points to ensure the success of a structural integrity management program for FPSO's. Generally, as the structure get older and some operational changes or extended life are requested by the operators, the in-service planning of the inspection and repair activities increases in complexity. This paper provides guidance on in-service inspection planning and management, drawing directly from the operating and risk based inspection experience of a fleet consisting of five Petrobras' units located at Campos Basin (P31, P32, P33, P35 and P37). Specifically, the paper outlines the inspection planning that addresses these unique features and applications and discusses experiences related to the implementation of the inspection plans. It also provides general guidance on the organization, presentation and steps to ensure the asset is fit-for-purpose (i.e., meets class and regulatory requirements) while being functional and easy to manage and implement for operations.

In a companion paper [1], available structural reliability methods developed to date were summarized, and then applied to determine the inspection intervals based on site specific loading as applied to strength considerations of the hull girder as well as to stiffened and un-stiffened plate panels. By tracing the time-varying reliability index for these structural components, the risk-based inspection intervals can be determined. This methodology has recently been implemented to provide the foundation in a risk-based inspection (RBI) plan for the FPSO Petrobras fleet classed by ABS located at Campos Basin, Brazil.

This paper shows in an overall view the tools and advantages for the RBI implementation and program review of the inspection results for the Petrobras FPSO fleet. The main topics of this paper focus on the Structural Integrity Management, Hull Inspection Database, RBI updating and New Maintenance Technologies for Offshore Application.

The Structural Integrity Management Program for FPSOs involves many groups including operator, Class, and engineering companies that give technical and management support. The success for the implementation and updating is the right fast communication between all the parties and some of the tools have been shown in this paper. Certainly, this is a new methodology and the process for inspection and maintenance activities will continue to develop and improve during the next years. However, the main objective of RBI program is to be a tool for the offshore companies to minimize the impact on the production and also to optimize maintenance/repair costs while guarantees the structural integrity of the unit. The important role of Class approval and continued interface with them during the process of inspection/repair activities are the focus for the operator.

Introduction

The pioneer development of RBI for FPSO has been done during the year of 2001 for "PETROBRAS 35" unit. It has been a result of significant joined efforts from different companies and the first implemented RBI in the world. Since this time, the methodology has been improved and for different purposes ABS also establishes different levels for the methodology and respective requirements.

More recently, Petrobras has decided to implement the RBI to all of the FPSOs of its fleet. In 2006, it has started the RBI development for "PETROBRAS 31" and followed by others ABS classed units of UN-BC, Campos Basin.

Up to now, there are five units from Petrobras in the RBI program and a new group on-shore and off-shore has been established to give all the technical support on different subjects.