

Integrity Management of Bundle Hybrid Riser Towers

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ABSTRACT

As fields are being developed in deeper water, bundle Hybrid Riser Towers (HRT), emerge as one of the leading possible riser solutions.

This is due to the capability of HRT's to accommodate the requirement for large diameter risers, reduced load on FPSO, demanding flow assurance requirements, and robust layout for later developments phases.

Based on experience on several bundle HRT's which have already been put on stream, Acergy has conducted a thorough review of the design, installation and operating conditions in order to develop an architecture consistent with Integrity Management.

The paper will describe how the selected HRT architecture, its installation and monitoring contribute to Integrity Management (IM).

KEY WORDS: Integrity management; deepwater; hybrid riser towers.

NOMENCLATURE

API	American Petroleum Institute
CRA	Corrosion Resistant Alloy
FPU	Floating Production Unit
GOM	Gulf of Mexico
GSEF	Glass Syntactic Epoxy Foam
GSPP	Glass Syntactic Polypropylene
GSPU	Glass Syntactic Polyurethane
HIPPS	High Integrity Pressure Protection System
HRT	Hybrid Riser Tower
IM	Integrity Management
ISO	International Organization for Standardization
JIP	Joint Industry Program
MRU	Motion Recording Unit
OHTC	Overall Heat Transfer Coefficient
ROV	Remotely Operated Vehicle
SCR	Steel catenary riser
SDV	Shutdown Valve
SIMOPS	Simultaneous Operations
URTA	Upper Riser Tower Assembly
VIM	Vortex Induced Motion
VIV	Vortex Induced Vibrations

WHSIP Wellhead Shut-in Pressure

INTRODUCTION

The aim of integrity management is to provide the operator with a structured risk-based approach for the development of a program to monitor the capacity of a major component of its field to perform in accordance with its functional requirements throughout its operational service.

A practical example of such a program has been proposed and implemented by Total for the Girassol HRT's (Chapin, 2005). Since then the industry has set in place a Joint Industry Program (SCRIM JIP, 2007) for the integrity management of Steel Catenary Risers, and the program of this JIP is now extended to cover HRT's. The subject will also be addressed in the new issue of API RP 2RD/ISO 13628-12.

Integrity Management requires first a review of the components of the bundle HRT and identification of failure modes. Therefore the architecture of the HRT plays a fundamental role in IM both because it defines the components and because it arranges them in an optimized way.

From the Girassol (Rouillon, 2002) and Greater Plutonio (Sworn, 2005) experience, Acergy (Alliot, Legras, 2006) has analyzed the lessons learned from these bundle HRT based projects. This has lead to an architecture which will be detailed hereafter and screened for the failure modes. It must also be noted that the interference between the HRT's themselves and the other facilities of the field will also be analyzed.

Consequently the paper will cover:

- the preferred architecture (the components and their arrangement)
- the review of the failure modes (internal and external)
- the conclusions

PREFERRED ARCHITECTURE

With due respect to the requirements of specific projects, there is a necessity to standardize the design. This necessity was clearly expressed by the clients, by the contractor's project management team, and by the engineering team, in order to cut short unnecessary over design, costs, and schedule delays.