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.