HULL INSPECTION TECHNIQUES & STRATEGY (HITS)

Proposal for a Joint Industry Project

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1.0 EXECUTIVE SUMMARY

Floating Offshore Installations (FOIs), ship shaped or otherwise, are increasingly required to spend extended periods on station.

Consequently hull structural integrity is becoming increasingly recognized as a safety and business critical element by operators.

In many instances drydocking for hull inspection and maintenance is not a desired, or a practical option and alternatives must be sought.

However, many operators find that classification requirements for in-water hull inspections, originally conceived as a methodology to be used for trading ships, are difficult to implement on FOIs and may not address the integrity or operational issues of their particular asset.

Operators wish to have a practical, effective and compliant methodology of establishing hull structural integrity for their FOIs.

The JIP will establish operator, Class and regulatory requirements, review current and future methodologies and make recommendations to industry with which to establish guidelines for FOI hull structural integrity.

There are a number of innovative methods that promise to provide the industry with significant safety, cost and operational improvements compared to current methodology.

The JIP is planned in two phases that will a) establish industry requirements and b) evaluate and develop optimum methodologies.

The JIP methodology for Phase 1 will be to invite participants from operators, equipment manufacturers and service providers and gather input from Classification Societies and regulatory bodies.

The Phase 2 methodology will require practical testing of the selected methodology and equipment and will require access to suitable facilities such as the National Hyperbaric Centre and potentially access to an FOI along with equipment and site technical operatives.

This JIP document details costs, time and resources for Phase 1 only.

2.0 INTRODUCTION

Background

As understanding in the management of Floating Offshore Installations (FOIs) has grown across the offshore Oil & Gas industry, so too has an appreciation of the criticality of FOI hull structures.

Previously the hull was seen by many operators as merely the platform upon which the production and/or process equipment was located.

The hull condition was considered as low risk by many, the product of a probability of failure that was considered low and a consequence that was not generally well understood, but considered not particularly significant. The hull had, after all, been designed and constructed to Classification Society Rules which stemmed from over 200 years of experience with ocean going vessels.

However, the philosophy in Classification Society Rules is that the hull undergoes a robust five yearly cycle of surveys to confirm and assure its continued integrity. Part of that cycle includes drydocking the vessel.

This has traditionally allowed the asset owner to inspect, clean and repaint the hull, renew sacrificial anodes for cathodic protection, clean sea-chests and overhaul shipside valves and penetrations. It has also afforded the owner the ability to carry out bottom plating renewals where coating deterioration has caused the onset of corrosion.

Unfortunately, as the industry is well aware, an FOI is not as easy to drydock as a trading ship and indeed when drydocking has proved necessary, the costs and production deferment penalties have been significant. Furthermore, as oil prices increase and FOIs grow larger and more complex, the desire to stay on station and in production for extended periods becomes more important.

The Challenge

This has resulted in significant challenges to operators in managing the hull integrity of their floating installations whether ship-shaped or otherwise.

Many operators desire to Class their FOIs but find the prescriptive nature and survey requirements of Class increasingly challenging.

Consequently some operators have chosen not to class their assets. Instead they extend the concepts used for managing the structural integrity of their fixed assets and apply them to their floating assets.

However, the safety and financial implications of inspecting floating assets pose a number of technical challenges that differ from the fixed installation experience

- Use of divers versus ROVs
- Confined space entry concerns with tank inspections
- Tank cleanliness for inspections
- Production impact
- Dealing with marine growth
- Subsea hull coating condition
- Sea chests and shipside valves
- Rudders and propellers

Inspection techniques and the information obtained therefrom are key parameters in the assessment of structural integrity. But are these parameters well identified?

a) What data is needed to assure hull integrity?

b) What is the safest and most cost effective way to obtain this data?

c) Will the data gathered assure class and/or regulatory compliance?

d) How do we assure data reliability and critical defect probability of detection?

e) How do these requirements vary with different types and locations of asset?

It is sensible that the industry collectively assess exactly what they wish to achieve from their hull integrity strategies and that these strategies can be translated into practical, effective and compliant hull integrity and inspection plans.

There are a number of innovative methods that claim to provide the industry with significant safety, cost and operational improvements in comparison to the current methods being applied, for example:-

- Use of Risk and Criticality Based methods may lead to a more focused inspection scope.

- Combining inspections of internal tank structures with inspections of in-water components from within the hull (sea-chests, hull penetrations, weld zone corrosion, etc.) which reduce safety risk and costs while minimizing the need for multiple tank entries.

- Improved ROV technology could lead to smaller and more powerful deck-deployed ROVs that will improve the safety profile further and be less costly than existing equipment.

Investigating the industry's needs, investigating the emerging technologies and ensuring compliance is the basis of a Joint Industry Project (JIP). This will be implemented in two Phases.

- In Phase 1 of the JIP (joint industry project) we intend to address the question of operator requirements, discuss these with Class and Regulators and thus develop clear guidance on hull structural integrity requirements and strategies that meet industry needs.

- In Phase 2, the JIP will focus on identifying and developing selected methodologies and testing them in the field, resulting in a report with recommendations and a cost benefit analysis for implementing an optimised hull structural integrity strategy.

The methodology for Phase 1 of the JIP will review published data, existing classification and regulatory requirements as well as taking a broad input from Operators, Classification Societies, Regulators, Equipment Manufacturers and Inspection Contractors.

The methodology for Phase 2 of the JIP will involve a technical evaluation of selected methods, development of the techniques where required and site validation of the selected optimum methods.

Phase 1 is intended to start in early 2012 and will be completed within 12 months.

Phase 2 is intended to start in early 2013 and will be completed within 18 months.

3.0 SCOPE

The scope of the JIP is in two phases as described below

Phase 1

Review international regulatory, flag and Classification Societies (IACS) compliance requirements for hull inspection and current methodology
Establish operators requirements and expectations from hull inspections by face-to-face meetings and discussions
Prepare a report comparing regulatory/flag/class requirements and operators requirements
Prepare recommendations for improved inspection strategy, scope, methods and periodicity
Agree recommendations with JIP representatives through the Steering Committee
Carry out high level review of innovative inspection methodology and equipment capabilities and make recommendations on optimum systems
High level evaluation and report on JIP agreed inspection strategy and techniques to meet the new hull inspection strategy requirements
Present and discuss report on evaluated inspection strategy and techniques to JIP representatives, classification societies and regulators for comment
Prepare final Phase 1 Report of findings and recommendations

Phase 2

There is an expectation that within Phase 1, inspection techniques will be identified that will require further investigation and practical evaluation or even development to satisfy the scope of requirements developed in Phase 1.

It is proposed that this work forms the scope for Phase 2 which is proposed in outline form only, below, recognizing that a more detailed scope proposal will be developed once Phase 1 is completed

Agree areas for detailed investigation, assessment, practical evaluation and further development of improved strategies and techniques
Prepare a budget and plan to carry out the detailed investigation, assessment, practical evaluation and further development of improved strategies and techniques.
Implement the approved plan.
Prepare a report with recommendations and Cost Benefit Analysis for proposed methodologies.

4.0 METHODOLOGY

The methodology proposed for the JIP is a conventional approach based on the JIP Project Organisation chart illustrated in Figure 1.

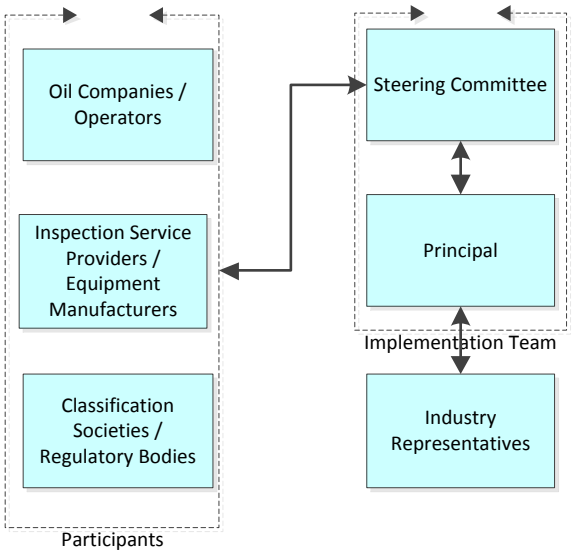

Figure 1 - JIP Organisation Chart

Participants will be invited to join the JIP from all sectors of the industry and will elect representatives to a Steering Committee.

Each Participant Representative on the Steering Committee will have a number of votes dependent on their level of participation.

The Steering Committee

The Principal (EM&I) will propose that the JIP members elect a Chairman from within the Participants.

The Principal will propose suitable persons as Project Director and Project Manager

The Principal will also be a Participant.

The Principal will prepare a Project Plan with a defined scope of work and budget and will manage the project and produce regular reports on progress and results.
A detailed Cost Time Resource sheet (CTR) is available on request from interested parties which defines the workscope and the cost, time and resources needed to execute the project.

Phase 1 will involve gathering information from Industry Representatives by means of face-to-face meetings wherever practicable with the various sectors of the industry (Oil Companies, Lease Operators, Classification Societies, Regulatory Bodies, Inspection Service Providers, and Equipment Manufacturers).

The information gathered will include input from a comprehensive range of asset types, of varying age, covering a wide range of geographic locations and environmental conditions. This will ensure that the data obtained will accurately represent the industry requirements and views.

The information will be compiled and assessed and presented to the Steering Committee for their review at a Project Workshop.

The output from the workshop will be a report with recommendations which will be submitted to the Participants once approved by the Steering Committee.

The report will provide proposals for improving hull structural integrity management based on the data gathered and with suggestions for more detailed studies of selected methodology.

The report will provide a basis for constructive discussions with Classification Societies and regulatory bodies who will have already been widely consulted in Phase 1.

5.0 PROGRAMME

The programme proposed is described in a high level Gantt chart, available on request to interested parties, and summarized below:

- Initial JIP information circulated – August / September 2011
- JIP presented at the FPSO Forum in Houston – October 2011
- Participants invited to join – October 2011 to March 2012
- JIP Kick Off Meeting - FPSO Forum – March / April 2012
- JIP Workshop with Steering Committee – July / August 2012
- JIP Phase 1 Report Presentation and Discussions – October 2012

6.0 COMMERCIAL CONSIDERATIONS

The project commercial considerations are described in two parts:

- Financial
- Contractual

The estimated cost for Phase 1 is US$ 280k inclusive of expenses.

Financial

It is proposed that Phase 1 is funded as follows, based on the scope described:

Category of Participant	US$ / Participant	Number of Participants	US$ Total	Remarks
Oil Company / Operator	50,000	4	200,000	4 votes on committee
Inspection Services Providers / Equipment Manufacturers	15,000	4	60,000	1 vote on committee
Class Societies / Regulatory Bodies / Academic Institutions	5,000	4	20,000	1 vote on committee
Total Funding	**US$ 280,000**			

Commercial

A conventional commercial contract will be drawn up which will define the JIP terms and conditions, deliverables and ownership of the resulting Intellectual Property.