FLOWRBI

Methodology For Designing And Following An

INSPECTION AND MONITORING PLAN

For Floating Offshore Wind Farms

Reducing operational expenditure will be vital for the further development of floating offshore wind farms. However, the quantity of assets and their environmental and operational exposure makes it difficult to create a reasonable inspection and monitoring plan.

It can be anticipated that the plan should be based on structural heath monitoring solutions, remote inspection techniques and risk-based inspection methods. Feedback from operators on these inspection and monitoring techniques solutions, lessons learned from existing offshore wind farms (including fixed ones), and an evaluation of risk and costs will be also be key in structuring the approach.

Bureau Veritas (BV) would like to propose a joint industry project (JIP) to develop a methodology for the design and follow-up of a monitoring and inspection plan for offshore wind farms: FLOWRBI.

OBJECTIVE

Bring together operators, engineering companies and inspection contractors to give an overview on the:

- Different types of field architecture and specificities of assets
- Anticipated risks and constraints
- Evaluation of risk acceptance criteria
- Inspection and monitoring solutions
- Evaluation of the cost of repair/inspection
- Assess design and operational constraints to establish the optimal risk inspection strategy
- Develop a methodology for designing and following an inspection and monitoring plan for floating offshore wind farms

SCOPE OF WORK

The proposed scope of work will be split into three work packages (WP).

WP I: Basis of review

All floating offshore wind farms differ from one another, owing to their different types of assets (floater/mooring type, turbine size), field environment and field architecture.

BV will organize a workshop to identify the range of different assets and field architecture types, and will define a list of critical elements.

Another workshop will be organized to identify potential failures in the wind system and to evaluate the potential impact of each of these points.

WP II: Risk assessment

BV proposes to assess the probability and severity of the failures and to evaluate the impact of necessary repairs.

This could allow groups of units to be identified depending on the performance and exposure of the assets.

JIP partners would then provide an overview of possible operational constraints related to inspection and would share their experience on the definitions of risk acceptability

WP III: Inspection strategy

In a first workshop, JIP participants will cover anticipated inspection and monitoring solutions.

Operators will then be expected to provide an overview of possible operational constraints related to inspection in a second workshop. BV will then build a model for the inspection strategy focused on minimizing the risks associated with failures and repair versus the cost of inspections.

A final workshop will be organized to present the methodology to design the inspection and monitoring plan. There will be discussion on how the plan is expected to evolve during the field life of the wind system depending on events and the inspection or monitoring findings.

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BENEFITS

- Uniform methodology to develop and follow a risk-based inspection and monitoring plan
- Control of operating costs

DELIVERABLES

BV will issue reports for all workshops discussions, as well as guideline, to be written in close collaboration with all participants.

All design data will be anonymous.

SCHEDULE

The JIP will start in the first quarter of 2025. It will have a duration of two years and the present minimum budget.

BUDGET and PARTICIPATION FEES

The cost of the JIP has been estimated at €200,000.

Participation fees will be equally shared between participants, with tentative participation fees of €20,000/year.

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BUREAU VERITAS TOOLS AND EXPERTISE

Experience:

- 12 Offshore Units operated under the risk-based inspection Classification scheme

BV Rules & Guidance notes:

- BV NI 567 Risk-based verification of floating offshore units
- BV NI 657 Classification scheme under risk-based inspection
- BV NI 635 Index in applicable risk analysis for Marine and Offshore

BV publications:

- **Unified Approach to Risk-Based Inspection Planning for Offshore Production Facilities**
  Faber, Straub, Goyet, OMAE 2001
- **Risk-Based Inspection Planning of Offshore Installations**
  Goyet, Straub, Faber / Structural Engineering International 2002
- **Industrial Implementation of Risk Based Inspection Planning - Lessons Learnt From Experience: Part 1 - The Case of FPSOs**
  Goyet, Rouhan, Faber / OMAE 2004
- **Survey and Inspection Management for FPSOs**
  Biasotto, Rouhan / OMAE 2004
- **Benefits of Risk Based Inspection Planning for Offshore Structures**
  Straub, Goyet, Sørensen, Faber / OMAE 2006
- **Risk Based Inspection on F(P)SOs' Hulls: Case Studies on New Built Units**
  Lanquetin, Rouhan, Gourdet / OMC 2007
- **Implementing Risk Based Inspection on our F(P)SOs: From a Practical Approach to the Edge of R&D**
  Lanquetin, Goyet, Esteve / OTC 2007
- **Risk Assessment in Engineering: Principles, System Representation & Risk Criteria – Annex: Example – Risk Based Inspection of Offshore Structures**
  Goyet, Rouhan, Castanheira, Farias, Faber, Nishijima, JCSS 2010
- **Probabilistic System Approach for Risk Based Inspection of FPSO**
  Goyet, Rouhan, L'Haridon, Gomez / OTC Brazil 2011
- **Risk based inspection for offshore structures**
  Goyet, Boutillier, Rouhan / Ships and Offshore Structures, 2013
- **Benefit of Monitas system to RBI**
  Rouhan, Goyet, Monitas JIP, 2013
- **Quantifying uncertainties for Risk-Based Inspection planning using in-service Hull Structure Monitoring of FPSO hulls**
  Hageman, van der Meulen, Rouhan, Kaminski / Marine Structures 2022

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