Structural Integrity Management of Fixed Offshore Structures

API RECOMMENDED PRACTICE 2SIM
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Introduction

The purpose of this recommended practice is to provide guidance to owner/operators and engineers in the implementation and delivery of a process to manage the structural integrity of existing fixed offshore platforms. This process is called structural integrity management (SIM).

The SIM process described in this recommended practice is based on internationally recognized industry standards, including API 2A-WSD, 22nd Edition and ISO 19902:2007, and on global industry best practices. This recommended practice details engineering practices for the evaluation, assessment, and inspection of existing fixed offshore structures to demonstrate their fitness-for-purpose. This recommended practice incorporates and expands on the recommendations of Section 14, “Surveys” and Section 17, “Assessment of Existing Platforms” as previously provided in API 2A, 21st Edition.

The principal section describing the recommended SIM process is Section 5. It contains details of each aspect of the SIM process and provides a roadmap for using the recommended practice. Each of the remaining sections provides self-contained detailed guidance on performing the relevant SIM task.

Section 6 contains guidance on underwater surveys of fixed platforms. Two approaches are provided: a risk-based underwater survey (6.5.2) and an exposure-based underwater survey (6.5.3). When the owner/operator has not adopted a risk-based SIM strategy, an exposure-based (default) inspection program should be used.

In particular, Section 9 contains guidance on the selection of calibrated metocean criteria used for the fitness-for-purpose assessment of platforms designed and constructed to API 2A-WSD, 19th Edition and earlier editions that are located in the U.S. waters of the Gulf of Mexico or West Coast. In addition, Section 9 contains guidance on the selection of appropriate metocean criteria used for the fitness-for-purpose assessment of platforms designed and constructed to API 2A-WSD, 20th Edition and later for platforms located in the waters of the U.S. Gulf of Mexico or U.S. West Coast.

Structural Integrity Management of Fixed Offshore Structures

1 Scope

This recommended practice provides guidance for the structural integrity management (SIM) of existing fixed offshore structures used for the drilling, development, production, and storage of hydrocarbons in offshore areas. However, the general principles of SIM apply to any structure.

Specific guidance is provided for the evaluation of structural damage, above- and below-water structural inspection, fitness-for-purpose assessment, risk reduction, mitigation planning, and the process of decommissioning. This recommended practice incorporates and expands on the recommendations of Section 14, “Surveys” and Section 17, “Assessment of Existing Platforms” as previously provided in API 2A-WSD, 21st Edition. See Annex A for additional information and guidelines on the provisions stated in the numbered sections of this document.

The SIM process provided in this recommended practice is applicable to existing platforms installed at any location worldwide. However, the recommended practice provides specific metocean criteria, which are only applicable for use in fitness-for-purpose assessments of platforms located in the U.S. Gulf of Mexico and the U.S. West Coast.

For guidelines, recommended practices, and other requirements relating to planning, designing, and constructing new fixed offshore platforms, including reuse and change-in-use of existing platforms, reference should be made to the latest edition of API 2A-WSD.

For guidelines, recommended practices, and other requirements relating to planning, designing, and constructing new offshore floating production systems, including reuse and change-in-use of existing floating production systems, reference should be made to the latest edition of API 2FPS.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Recommended Practice 2A-WSD, *Planning, Designing, and Constructing Fixed Offshore Platforms—Working Stress Design*, 22nd Edition

API Recommended Practice 2EQ, *Recommended Practice for Seismic Design Procedures and Criteria for Offshore Structures*

API Recommended Practice 2MET, *Recommended Practice for Derivation of Metocean Design and Operation Conditions*

API Recommended Practice 2N, *Planning, Designing, and Constructing Structures and Pipelines for Arctic Conditions*

3 Terms, Definitions, Acronyms, and Abbreviations

3.1 Terms and Definitions

For the purposes of this document, the following definitions apply.

3.1.1
air gap
The clearance between the highest water surface that occurs during the extreme metocean conditions and the underside of the cellar deck.

3.1.2
anomaly
An in-service survey measurement that is outside the threshold considered acceptable from the design or most recent fitness-for-purpose assessment.

3.1.3
assessment initiators
Changes in platform condition or operating experience, such as storms, which require an existing platform to undergo an assessment to demonstrate fitness-for-purpose.

3.1.4
collapse
The ultimate load bearing capacity of the platform at which the jacket structure or deck columns are no longer able to support vertical loads.

3.1.5
condition assessment
The process of gathering the information on the platform's present condition needed in order to perform a fitness-for-purpose assessment.

3.1.6
consequence
The adverse effects of an extreme event, such as metocean, seismic, ice, or accidental, on personnel, the environment, or property.

3.1.7
consequence of failure category
A system applied to categorize the consequences of failure of an existing offshore platform.

3.1.8
corrosion
Degradation of a component or components due to corrosion. Corrosion may be categorized as either general or local and may cause pitting, holes, or crevices.

3.1.9
damage tolerance
The quantity of deterioration or damage that a structure can withstand without failing.

3.1.10
deck elevation
The measured distance from the underside (bottom-of-steel) of the support structure of a topside deck structure to a confirmed datum, such as the mean sea level (MSL).

3.1.11
decommissioning
A process followed to plan, gain approval for, and implement the removal, disposal, or reuse of the platform structure, equipment, and associated pipelines and wells.

3.1.12
defect
An imperfection, fault, or flaw in a component of an existing platform. As used in this recommended practice, the term "defect" does not necessarily denote that the platform is not fit-for-purpose.

3.1.13
design level analysis
A fitness-for-purpose analysis of a platform using linear-elastic methods with an appropriate safety margin, similar to the analysis methods used for new platform designs

3.1.14
design life
The planned time period from initial installation or reuse until permanent decommissioning, which may include extensions justified through the SIM process.

3.1.15
deterioration
The reduction in the ability of a component to provide its intended purpose.

3.1.16
exposure category
The classification used to categorize the platform consequence of failure based on the consideration of life safety, environmental pollution, and business disruption.

3.1.17
extreme event
An extreme metocean, seismic, and/or ice condition that a structure may be subjected to during its operational life.

3.1.18
fitness-for-purpose
A demonstration that an existing structure has adequate strength to resist the imposed assessment loads.

3.1.19
full population hurricane
A population of hurricanes that includes all hurricanes that develop inside or outside of the Gulf of Mexico, used for statistical analysis.

3.1.20
in-service
A platform that has been placed in operation.

3.1.21
inspection
The visit to the platform and the associated survey activities for purposes of collecting data required in evaluating its structural integrity for continued operation.

3.1.22
life extension
The process of extending the operational life of a structure beyond the life considered during the structure's design.

3.1.23
mechanical damage
A defect type that includes dents, bows, gouges, holes, and separated or severed members.

3.1.24
mitigations
Platform strengthening, modification, and/or repairs (SMRs) and/or operational procedures that reduce loads, increase capacities, or reduce the exposure category.