2KG TRAINING

API 579-1 ASME FFS-1: FITNESS-FOR-SERVICE

Presenter: ASHVEER MAHARAJ

ABOUT THE PRESENTER: ASHVEER MAHARAJ

Ashveer Maharaj has been currently practicing engineering for over 21 years with respect to design, fabrication, repair and fitness for service of pressurised equipment and systems for the petrochemical industry. He has extensive knowledge with respect to a variety of Codes and Standards like ASME, API, European Codes PD-5500, AD Merkblatter & EN13445.

He specialises in performing advanced Finite element Analysis (FEA) and Level 3 Fitness for Service assessments with applications both local and international ranging from South Africa, Asia, USA and Canada. Other than his years of experience he has received extensive international training from reputable institutions which include American Society for Mechanical Engineers (ASME) and their affiliates like Becht. He is extremely skilled in performing stress analysis which includes linear and non-linear evaluations, buckling and dynamic responses, creep, fatigue, and fracture mechanics evaluations.

Ashveer has provided numerous life extension solutions to critical equipment like Coker Drums, Platformer During his working career he has acquired extensive experience with respect to a variety of FEA related tools like Abaqus, ANSYS, MSc and SolidWorks Simulation and has assisted in developing and publishing user related FFS procedures and specifications which are used to this date. Ashveer constantly receives updates with expected Code changes with background to rules with his current affiliations with numerous ASME Code committee members based in Canada and the USA.

API 579-1 ASME FFS-: FITNESS-FOR-SERVICE
5 Days: 5 CPD Points

LIVE VIRTUAL CLASSROOM

2KG Training Live Virtual Courses offer participants the same instructors, training systems, course materials, personal support, and face-to-face engagement with instructors and other participants that they would expect to find in a conventional classroom.

The API 579 Fitness For Service Live Virtual Course brings participants together in a virtual classroom, where they receive training from an expert via a live video link. Participants are interconnected via audio and video, enabling them to interact both with the instructor and with their classmates. Learners can speak to their instructor at any time to ask questions, request assistance, and instructors can provide hands-on support.

OPERATE, REPAIR OR REPLACE!!! WHAT DO WE DO?

Fitness For Service (FFS) in accordance with API 579-1 / ASME FFS-1 is a multi-disciplinary engineering assessment to help make informed and safe decisions to either operate, repair, or replace equipment or piping systems that contain a specific flaw or are subjected to a specific damage mechanism. Recommendations assist with assessing the equipment remaining life and inspection strategies for continued life in service.

THE BENEFITS ARE:

- Improved SAFTEY!
- Reduce Risk
- Reduce cost for maintenance and inspection!
- Reduce downtime of equipment availability for operation
- Be PROACTIVE!
- Extend equipment life, optimise inspection strategies, understand potential for future damage, make informed decision, develop repair and replacement strategies, and determine future inspection intervals.

WHO SHOULD ATTEND

This course is aimed at inspectors and engineers engaged in inspection activities and maintenance of plant facilities. Participants should have a basic knowledge of design codes, stress analysis and material behavior.

The course will help participants apply the FFS standard in their daily work solutions. The course will address the interaction of non-destructive examinations, metallurgy and stress analysis. The assessment methods are applicable to in-service pressure vessels, piping and tanks.

API 579-1 ASME FFS-1
FITNESS-FOR-SERVICE Cont.

2KG TRAINING

COURSE OBJECTIVE

- Evaluate integrity and monitor pressure vessels, piping and tanks for continued operation
- How to apply inspection techniques and recommendations to perform FFS assessments
- Gain a practical understanding of applying the techniques incorporated in API 5791-1/ASME FFS-1

DESCRIPTION

Fitness for service (FFS) assessments is an essential part of mechanical integrity engineering for operating facilities and service providers to such industries. ASME FFS-1 / API-579 provides assessment recommendations for various forms of in-service degradation. The procedures may be applied to pressure vessels, piping and storage tanks and is considered recognized and generally accepted good engineering practice.
When equipment repair is not a practical option, fitness for service assessments in accordance with this standard allows operators to continue production, safely, although original construction code limits rules may not be met or apply.

COURSE OUTLINE

Day 1
Part 1: Introduction to FFS

- Local Regulations & Post Construction Codes & Standards
- Definition
- Multidisciplinary nature
- Cost Benefit
- What can go wrong without it?
- Historical Background
- API 579-1/ASME FFS-1 Scope
- Responsibilities and Qualifications
- Applicable Codes and Standards including referenced
- Standard Contents and what's next?

Day 1
Part 3: Brittle Fracture

- Description of Brittle Fracture
- Part 3 Overview
- When is Part 3 appropriate as well as application and limitations
- Critical Exposure Temperature (CET)
- Minimum Allowable Temperature (MAT)
- Level 1 Assessment
- Level 2 Assessment
- Example Problem
- Level 1 & 2 Assessment

Day 2
Part 5: Local Metal Loss

- Overview
- Applicability and Limitations
- Inspection Data
- Multiple LTA's, corrosion near welds and groove like flaws
- Level 1 Assessment
- Example Problem
- Level 2 Assessment
- Comparison with Level 1 Problem
- Groove Assessment
- Supplemental Loads
- LTA Rules Background and validation
- Different Methods & Safety Margins
- Comparison with other codes and standards

Day 3
Part 7: Hydrogen Damage

- Definitions
- Damage due to HIC, SOHIC, Blisters vs laminations
- Applicability and Limitations
- HIC Assessment
- Level 1 Example Problem
- Level 2
- Blister
- SOHIC
- High temperature Hydrogen Attack (HTHA)

Day 1
Part 2: FFS procedure

- Types of Damage and Damage Classes
- Each Part Methodology
- Data Requirements
- Inspection techniques
- Assessment Techniques & Acceptance Criteria
- Remaining Strength Factor
- Remaining Life Assessment Scenarios
- In-service Monitoring
- Annexes
- What's new or updated

Day 1
Part 4: General Metal Loss

- Overview
- Component Types
- Applicability and Limitations
- Inspection Data
- Level 1 Assessment
- Example Problem
- Level 2 Assessment
- Example Problem
- Remaining Life
- Remediation and Inservice Monitoring

Day 2
Part 6: Pitting Corrosion

- How to find them?
- Applicability and Limitations
- Level 1 Assessment
- Example Problem
- Level 2 Assessment
- Overview and compute RSF
- Localised and widespread Pitting and Pitting combined with LTA

Day 3
Part 8: Weld Misalignment and Shell Distortions

- Definitions and description
- Weld centre line and angular offset & Weld Peaking
- Global Out-of-Roundness
- Measurement Techniques
- Applicability and Limitations
- Level 1 Assessment
- Pressure Vessel Fabrication Tolerances
- Piping Tolerances
- Tank Tolerances
- Example Problem – Out of Roundness
- Level 2 Assessment

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Day 3

Part 9: Crack Like Flaws

- Overview of Assessment
- Flaw Dimensions, Multiple Flaws and Flaw interaction
- Applicability and Limitations
- Level 1 Assessment
- Screening Curves & Example Problem
- Introduction to Fracture Mechanics
- Types of cracking and failure mechanisms
- Fracture Toughness vs Stress Intensity Factor
- Limitations of Elastic Fracture Mechanics
- Failure Assessment Diagram (FAD) with application to Codes and Standards
- Stress Classification
- Toughness Ratio
- Reference Stress & Load Ratio
- FAD Input Summary
- Level 2 Assessment
- Leak Before Break
- Crack remediation
- Fatigue Crack Growth
- Annexes

Day 4

Part 11: Fire Damage

- Assessment Overview
- Applicability and Limitations
- Data Requirements
- Heat exposure Zones
- Zone 1, II, III, IV & V
- Assessing Fire Damage
- Level 1 Assessment
- Example
- Level 2 Assessment
- Annexes

Day 4

Part 13: Laminations

- Overview of Assessment
- Laminations Hydrogen Service
- Lamination Dimensions and Spacing
- Level 1 Assessment
- Example Problem
- Level 2 Assessment

Day 5

Part 14: Fatigue – Continued

- Stress Strain Curves and Fatigue Strength Reduction Factors (FSRF)
- Level 2 Assessment
- Elastic Method A
- Elastic Plastic Method B
- Structural Stress Method C
- Ratcheting Assessment Elastic
- Ratcheting Assessment Elastic Plastic Method
- Remaining Life
- Remediation
- Weld Quality Improvement
- In-service Monitoring
- Annexes

Day 3

Part 10: Creep

- Creep Failure
- Why do a Creep Assessment?
- Creep Assessment Levels
- Level 1 Assessment
- Screening Curves & Example Problem
- Level 2 Assessment
- Omega Creep Model
- Creep Damage & Time to Rupture Example Problem
- Creep Fatigue Interaction, Creep Crack Growth and Creep Buckling
- Level 3 Assessment
- Inservice Monitoring
- Annexes

Day 4

Part 12: Dents & Gouges

- Definitions & Dimensions
- Applicability and Limitations
- Level 1
- Dent Assessment
- Gouge Assessment
- Level 2 Assessment
- Level 1 Assessment
- Example
- Level 2 Assessment

Day 4

Part 14: Fatigue

- What is Fatigue
- Applicability and Limitations
- Level 1 Assessment
- Method A
- Method B
- Method C
- Method D

Day 5

Level 3 Applications

- Brittle Fracture & Fracture Mechanics Approach to Establish Minimum Pressurization
- Temperature Envelopes
- General Metal Loss VS Local Metal Loss Elastic Plastic Stress Analysis
- Bulge Assessments
- Linear vs. Non-Linear Buckling
- Creep Assessment Isochronous Stress Strain Curve
- Low and High Cycle Fatigue Assessments - Elastic vs Structural Stress Method
- Fatigue comparison with European Codes
- **General Discussion and Questions**

Registration Form

Number of days: 5 **CPD Points:** 5

How to register for the course:

1. Complete this registration form and fax it to Phindi Chauke: Tel: 011 325 0686 Fax: 011 325 0488 Email: phindi@2kg.co.za
2. Acknowledgement will be emailed to you.
3. Final confirmation and details will be faxed or emailed to you approximately 7 days before the commencement of the seminar.

Cancellation Policy:

By signing and returning the registration form, the authorizing signatory on behalf of the stated company is subject to the following terms and conditions.

- All cancellations must be received in writing
- Any cancellations received less than 3 working days before the date of the event, the full fee will be payable and no refunds or credit notes will be given.
- If a registered delegate does not cancel and fails to attend the Workshop, this will be treated as a cancellation and no refund or credit note will be issued.

Delegate information:

Title: _____ Surname: _____ Name:_____

Full Company name: _____ Job Title: _____

Postal Address (to which invoice must be sent):_____

_____

Code: _____ VAT number: _____

Tel: ( ) _____ fax: ( )

_____

Cell: _____ Email: _____

Contact/ Accounts information:

Title: _____ Surname: _____ Name_____

Tel: ( ) _____ fax: ( ) _____

Cell: _____ Email: _____

Please tick the course that you would like to attend:

Conventional Classroom

☐ 10–14 November 2025, (5 Days)
Johannesburg
R21 500.00 (excl VAT)

Live Virtual Classroom

☐ Date to be advised, (5 Days)
Venue to be confirmed
R17 200.00 (excl VAT)

I have read and agreed to all the conditions of registration as stipulated in this brochure.

_____ _____
Signature Date

For more info and to register contact Phindi Chauke on tel: 011 325 0686 or cell: 071 125 6188 and email: phindi@2kg.co.za or visit www.2kg.co.za