FITNESS FOR SERVICE MNE003

COURSE DESCRIPTION

Fitness-for-service assessment is a multi-disciplinary engineering approach that is used to determine if equipment is fit to continue operation for some desired future period. The equipment may contain flaws, have sustained damage, or have aged so that it cannot be evaluated by use of the original construction codes. API 579-1/ASME FFS-1 is a comprehensive consensus industry recommended practice that can be used to analyze, evaluate, and monitor equipment for continued operation. The main types of equipment covered by this standard are pressure vessels, piping, and tanks. This course is timely, emphasizing the practical application of a recently updated standard.

Completing this course will help participants understand and apply the API/ASME fitness-for-service standard in their daily work. The material presented in the course shows how the disciplines of stress analysis, materials engineering, and nondestructive inspection interact and apply to fitness-for-service assessment. The assessment methods apply to pressure vessels, piping, and tanks that are in-service.

COURSE GOAL

To enhance the participants' knowledge, skills and abilities necessary to understand and apply the API/ASME fitness-for-service standard in their daily work.

COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Analyze, evaluate, and monitor pressure vessels, piping, and tanks for continued operation.
- Explain how to apply background information on fitness-for-service assessment.
- Identify the main parts of the API/ASME standard, as well as the annexes.
- Explain the practical application of the techniques incorporated in API 579-1/ASME FFS-1.

WHO SHOULD ATTEND

Engineers and engineering management engaged in the operation, design, analysis, and maintenance of plant facilities.

COURSE DURATION

5 Working Days

COURSE OUTLINES

1. Scope of API 579-1/ASME FFS-1:
    - Responsibilities of owner-user.
    - Responsibilities of Inspector.
    - Responsibilities of Engineer.
2. General Assessment Method
    - Data requirements:
    - What is required.
    - Who is responsible.
    - How is data obtained and organized.
    - Remaining strength factor.
    - Need for in-service monitoring (inspection frequency).
    - Remaining Life Determination.
3. Brittle Fracture Resistance:
    - Governing thickness concept (as per ASME VIII).
    - Stress ratio.
    - Hydrostatic testing.
    - Thin wall considerations.
4. Metal Loss Evaluation:
    - Point thickness methodology.
    - Grid thickness methodology.
    - Supplemental loading.
    - ASME B31.1 and B31.3 flexibility analysis.
    - Pitting evaluation.
5. HIC and SOHIC Evaluation:
    - Blisters and hydrogen induced cracking.
6. Evaluating Geometric Irregularities.
    - Bending and section axial forces.
    - Weld misalignment.
    - Out of round.
    - Internal and external pressure.

- Bulges and dents.
- Gouges.
- Combinations of distress.
- Fatigue analysis.

7. **Evaluation of Cracks and Crack-like Flaws:**
   - Primary, secondary, and residual stress.
   - Non-fracture mechanics method.
   - Fracture mechanics method.
8. **Creep Damage Assessment.**
9. **Heat and Fire Damage Evaluation.**
10. **Lamination Evaluation.**