Creating and Implementing Effective Inspection Plans for Pressure Equipment and High Energy Piping Systems using ASME PCC-3

A Practical, Case Study-based Training Program
Led by:

John L. Arnold, PE

7.5 Hours • .75 CEUs • 7.5 PDHs

About this MasterClass (MC137)

ASME Post Construction Code PCC-3, *Inspection Planning Using Risk-Based Methods*, contains guidance on preparing and implementing a risk-based inspection plan. Inspection planning is a systematic process that begins with the identification of facilities or equipment or components and culminates in a technically rigorous plan that identifies for each item an inspection scope and schedule. This one-day MasterClass provides an in-depth review of PCC-3 that can guide the creation and implementation of an effective inspection plan of any scope. Practical examples will be used throughout the course to demonstrate the philosophy of PCC-3.

For more information and to register, visit
http://go.asme.org/mc137

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ASME MasterClass Series

The ASME MasterClass Series focuses on applications and case studies of a particular topic. Each MasterClass is led by an ASME Master, an expert in his professional discipline, who brings a wealth of knowledge and practical examples to the forum. Participants are expected to have prior knowledge of the topic area to gain the most from this interactive environment.

Sessions are focused on real world examples and case studies, with active class discussion and analysis.

About this MasterClass

This one-day MasterClass provides an overview of the methodology and philosophy of ASME PCC-3, *Inspection Planning Using Risk-Based Methods*, and includes guidance on the development of an effective and technically rigorous inspection plan for boilers, pressure vessels, heat exchangers, piping and piping components, pipelines, and storage vessels.

Examples of practical applications for the steps involved in creating a risk-based inspection plan are discussed to demonstrate the philosophy of the guideline. Detailed scenarios are used to illustrate how the various stages of an analysis are applied, and their respective limitations. An overview of determining the probability of failure and consequence of failure and the selection of level of risk analysis are included in the discussion.

Upon completion, attendees will be able to

- Explain the use of Risk for engineering applications
- Define a comprehensive list of equipment to be covered in an Inspection Program
- Identify plausible failure mechanisms and associated consequence scenarios
- Calculate Probability of Failure, Consequence of Failure, and Risk
- Select proper inspection technologies
- Create inspection schedules
- Develop mitigation strategies

Who Should Attend

This course is intended for plant engineers, maintenance engineers, and inspectors involved in the inspection and maintenance of piping, pressure vessels, and other critical plant equipment engineers in the refining, petrochemical, and power generation industries.

About this ASME Master

John L. Arnold, PE is an internationally recognized expert in the assessment of boilers, pressure equipment, and high-energy piping. He is the founder of Niantic Bay Engineering, LLC, and works in the area of pressure vessel and piping evaluation and analysis, fitness for service, and asset management. He routinely applies engineering principles to the in-service inspection of critical plant equipment to support long-term asset management. This includes remaining life assessments using nondestructive examinations, metallurgical evaluations, and engineering methods including fracture mechanics, creep, fatigue, and creep-fatigue analysis.

Mr. Arnold has collaborated extensively with ASME BPV Code Sections I, VIII Divisions 1 and 2, IX, and the ASME Post Construction Committees. He has been a member of the Post Construction Subcommittee on Inspection Planning since 1997. He is a member of the Committee on Power Boilers (BPV I) and is the Chairman of the Subgroup on Fabrication and Examination for BPV I. He is a past Chair of the ASME Power's Steam Generator and Auxiliaries Committee, and he has authored and coauthored several papers on this subject including the evaluation of boiler tubing, headers, pressure vessels, high-energy piping, and the influence of new materials on life management.

Mr. Arnold earned his Bachelors of Science degree in Mechanical Engineering from the University of Lowell in Lowell, Massachusetts, and his Masters of Science degree in Metallurgy from the University of Connecticut. He is a registered Professional Engineer in seven states including Connecticut, California, and Tennessee. He has received numerous awards for his contributions to both ASME Codes and Standards and with the Power and Pressure Vessels and Piping Divisions.

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AGENDA

The contents are presented in four sessions, tentatively organized as shown. The one-day schedule allows for ample discussion and interaction with attendees. The instructor reserves the right to modify the content to address the audience's needs and preferences.

8:00am – 10:00am

1. Background and Development of ASME PCC-3, Inspection Planning Using Risk-Based Methods
    a. Overview of PCC-3
    b. Discussion of Risk
    c. Probability of Failure
    d. Consequence of Failure
    e. Key References

2. Introduction to Risk-Based Inspection
    a. Inspection Optimization
    b. Levels of Analysis

3. Planning the Risk Analysis
    a. Identifying Objectives
    b. Initial Screening
    c. Selecting the Risk Analysis Level
    d. Estimating Time and Resources

4. Data and Information Collection
    a. Typical Data Needs
    b. Data Quality

10:30am to Noon

1. Damage Mechanisms and Failure Modes
    a. Identifying Damage Mechanisms
    b. Determining the Failure Mode

2. Determining Probability of Failure
    a. Units of Measure
    b. Baseline Probability
    c. Effects of In-Service Damage
    d. Determining Failure Modes
    e. Calculating Damage Progression Rate

3. Determining Consequence of Failure
    a. Units of Measure
    b. Types of Consequences
    c. Analysis of the Consequence of Failure

1:00pm to 3:00pm

1. Risk Determination, Analysis, and Management
    a. Addressing Failure Modes with Multiple Consequence Scenarios
    b. Risk Calculation
    c. Risk Communication
    d. Establishing Acceptable Risk Thresholds

2. Risk Management with Inspection Activities
    a. Identifying Opportunities for Risk Reduction
    b. Establishing an Inspection Strategy
    c. Using Inspection to Manage Risk

3. Other Risk Mitigation Activities

3:15pm to 5:00pm

1. Re-Analysis
    a. When to Conduct a Re-Analysis

2. Documentation and Record Keeping

3. Case Study 1 – Equipment Assessment; Multi-Vessel Process

4. Case Study 2 – Component Assessment; High Energy Piping System

End of Class