



Chemical, Mechanical Engineering



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Course: Risk Based Strategies for Inspection & Maintenance (RBI & RBM)

Code	City	hotel	Start	End	price	Hours
540	Hamburg (Germany)	Hotel Meeting Room	2024-04-08	2024-04-12	5450 €	25

INTRODUCTION

Risk Based Inspection (RBI) methodology enables the assessment of the likelihood and potential consequences of pressure equipment failures. RBI provides companies the opportunity to prioritize their equipment for inspection; optimize inspection methods, frequencies and resources; develop specific equipment inspection plans; and enable the implementation of Reliability Centered Maintenance. This results in improved safety, lower failure risks, fewer forced shutdowns, and reduced operational costs.

- **The risk-based approach needs:**
 - To be multi-disciplined
 - To be realistically applicable to plant integrity
 - Design with future scenarios in mind
 - Consideration of all potential degradation mechanisms
 - Understanding of the risks involved
 - Awareness of Fitness for Service assessment techniques

OBJECTIVES

- To provide clear understanding of the key aspects of Risk Based Inspection, its advantages and limitations
- To provide a clear understanding of how it is linked to reliability-centered maintenance
- Understand how fitness-for-service assessment affects the Risk
- To show you how to develop a successful RBI program at your facility
- Provide you with the practical and effective methods you need to perform practical likelihood and consequence analysis
- Show you how to develop optimum Inspection intervals for individual equipment based on the assessment of the active degradation mechanisms

ORGANISATIONAL IMPACT

- Identification and assessment of active degradation mechanisms
- Implementation of a Risk Based Inspection program would result in significant measurable improvements improved plant integrity
- Fewer failures



- Optimization of inspection and maintenance plans and resources
- Reduction in operating costs

PERSONAL IMPACT

- Delegates will acquire the knowledge necessary to apply the risk-based methodology
- Delegates will acquire the skills necessary to apply the risk-based methodology
- Enhance competence in RBI
- Enhance performance level
- Contribute additional value to the organization

WHO SHOULD ATTEND?

- Operations Engineers
- Maintenance Engineers
- Engineering Managers and Supervisors
- Technical Staff with responsibilities for inspection, maintenance, assessment and mitigation of plant equipment degradation, and who want to use RBI effectively in their plants

outline

- Significance of Inspection in Plant Integrity and Maintenance Costs
 - The Real Function of Inspection
 - Inspection Key Performance Indicators
- Common Inspection Strategies and Their Limitations
- Risk-Based Decision-Making Fundamentals and Tools
 - Risk Assessment - Probability of failure, consequences of failure
 - Risk Management - Avoidance, Mitigation
 - Risk Communication
- Understanding and Managing Risk
 - Principles Risk Assessment
 - Risk Assessment Elements
 - Qualitative, Semi-quantitative, and Quantitative Assessment
- Workshop 1- Illustrative Example of Risk Assessment
- Risk Based Inspection (RBI)
 - Definitions
 - Evolution
 - Key Elements of RBI
 - Reasons for implementing RBI
 - Benefits and Limitations of using RBI
 - RBI as a part of plant integrity management
 - Economic Benefits



- API Risk-Based Inspection Methodology
 - API RP 580
 - API BRD 581 - Various levels of RBI Analyses
- Impact of RBI on Related API Codes, Standards, and Recommended Practices
 - API 510, 570 and 650
 - API 579 Fitness-For-Purpose
- API Risk Based Inspection Software
- Workshop 2 - Q&A on API RBI Methodology
- Overview of API 571 - Recognition of Conditions Causing Deterioration of Failure
- Overview of over 60 damage mechanisms found in refineries
- Detailed discussion of some common damage mechanisms: Internal and external corrosion, brittle fracture, fatigue, SCC, HIC, internal and external corrosion
- Identification of Deterioration Mechanisms & Failure Modes
 - Active damage mechanisms in critical plant equipment
 - Inactive or “unlikely” mechanisms
 - Identification for assessment
 - Impact of simultaneous mechanisms
- Selection of Suitable Materials for Specific Deterioration Mechanisms
- Integrated Asset Management
 - Linking Risk Assessment, RBI, and RCM
 - Managing Risk Using RBI
- Workshop 3 - Case studies involving a number of equipment damage and failures, and learnings
- Development of Inspection Plan (Based on RBI Risk Ranking)
 - Inspection Planning Guidance
 - Need for Some Speculative / Exploratory Inspection
 - RBI Implementation
 - Essentials for Establishing a Successful RBI Program
 - The RBI Team - Recommended Structure and Mandate
 - Developing Equipment and Piping Systems / Circuits Inventory
 - Inspection History, Interpretation
 - Equipment Criticality Rating
 - Equipment Data Base
 - Shared Database by RBI and RCM
 - Importance of Data Quality
 - Computerized Maintenance Management Systems
 - Workshop 4 - Case Study: Risk-based categorization of equipment and failure modes
 - Inspection Interval Optimization Based on Assessed Risk
 - Evaluation of Inspection Results
 - Data Quality
 - Corrosion Rate Calculations
 - Remaining Life Calculations
 - Fitness-For-Service Assessments
 - Estimation of Consequences of Failures



- Workshop 5 - Case Study - Assessment of defects in critical equipment



The Scandinavian Academy employs modern methods in training and skills development, enhancing the efficiency of human resource development. We follow these practices:

- **Theoretical Lectures:**
 - We deliver knowledge through advanced presentations such as PowerPoint and visual materials, including videos and short films.
- **Scientific Assessment:**
 - We evaluate trainees skills before and after the course to ensure their progress.
- **Brainstorming and Interaction:**
 - We encourage active participation through brainstorming sessions and applying concepts through role play.
- **Practical Cases:**
 - We provide practical cases that align with the scientific content and the participants specific needs.
- **Examinations:**
 - Tests are conducted at the end of the program to assess knowledge retention.
- **Educational Materials:**
 - We provide both printed and digital scientific and practical materials to participants.
- **Attendance and Final Result Reports:**
 - We prepare detailed attendance reports for participants and offer a comprehensive program evaluation.
- **Professionals and Experts:**
 - The programs scientific content is prepared by the best professors and trainers in various fields.
- **Professional Completion Certificate:**
 - Participants receive a professional completion certificate issued by the Scandinavian Academy for Training and Development in the Kingdom of Sweden, with the option for international authentication.
- **Program Timings:**
 - Training programs are held from 10:00 AM to 2:00 PM and include buffet sessions for light meals during lectures.