



# ME052: Risk Based Strategies for Inspection & Maintenance (RBI & RBM)

## Training Description:

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 course will discuss:

- 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

## Training Objectives:

### By the end of the training, participants will be able to:

- ✓ Provide a clear understanding of how it is linked to reliability-centered maintenance
- ✓ Understand how fitness-for-service assessment affects the Risk
- ✓ Show how to develop a successful RBI program at your facility
- ✓ Provide with the practical and effective methods you need to perform practical likelihood and consequence analysis
- ✓ Show how to develop optimum Inspection intervals for individual equipment based on the assessment of the active degradation mechanisms
- ✓ Acquire the knowledge necessary to apply the risk-based methodology
- ✓ Acquire the skills necessary to apply the risk-based methodology
- ✓ Enhance competence in RBI
- ✓ Enhance performance level
- ✓ Contribute additional value to the organization

## Training Designed for:

This course is intended for all 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.

## Training Requirement:

**“Hand’s on practical sessions, equipment and software will be applied during the course if required and as per the client’s request.”**

**Contents can be adapted to your specific wishes. It is therefore possible to focus on specific modules of the training course as per client’s learning needs and objectives. Further, it should be forwarded to us a month prior to the course dates.**

## Training Program:

### DAY ONE:

- ❖ PRE-TEST
- ❖ Course Objectives and Overview
- ❖ 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
- ❖ Illustrative Example of Risk Assessment

### DAY TWO:

- ❖ 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
- ❖ Q&A on API RBI Methodology

### DAY THREE:

- ❖ 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, including
- 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
- ❖ Case Studies Involving a Number of Equipment Damage and Failures, and Learnings

#### DAY FOUR:

- ❖ 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 data base by RBI and RCM
  - Importance of Data Quality
  - Computerized Maintenance Management Systems
- ❖ Case Study: Risk-Based Categorization of Equipment and Failure Modes

#### DAY FIVE:

- ❖ 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
- ❖ Course Conclusion
- ❖ POST-ASSESSMENT and EVALUATION

### Training Methodology:

This interactive training course includes the following training methodologies as a percentage of the total tuition hours:

- 30% Lectures, Concepts, Role Play
- 70% Workshops & Work Presentations, Techniques, Based on Case Studies & Practical Exercises, Gamification, Software & General Discussions
- Pre and Post Test

## Training Certificate(s):

CMCT Internationally recognized certificate(s) will be issued to each participant who completed the course.

## Training Fees:

**TBA as per the course location** - This rate includes participant's manual, hand-outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Note: The 5% VAT (Value Added Tax), will be effective starting 01<sup>st</sup> of January 2018 as per the new regulation from the UAE Government. The VAT applies for all quotation both for local and abroad.

## Training Timings:

### Daily Timings:

07:45 - 08:00	Morning Coffee / Tea
08:00 - 10:00	First Session
10:00 - 10:20	Recess (Coffee/Tea/Snacks)
10:20 - 12:20	Second Session
12:20 - 13:00	Recess (Prayer Break & Lunch)
13:00 - 14:00	Last Session

### For training registrations or in-house enquiries, please contact:

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