Risk-Based Inspection (RBI) in Chemical Engineering Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Risk-Based Inspection (RBI) is a data-driven, integrity management strategy widely adopted in the oil & gas, petrochemical, and chemical processing industries to optimize inspection planning based on risk assessment, probability of failure, and consequence analysis. This advanced approach integrates corrosion science, mechanical integrity, process safety management (PSM), and asset reliability engineering to prioritize inspection resources where they matter most. With increasing emphasis on plant safety, operational excellence, and cost optimization, RBI has become a cornerstone of modern asset integrity management systems (AIMS).

This training course provides a comprehensive understanding of API 580/581 RBI methodology, advanced corrosion degradation modeling, failure mode analysis, and quantitative risk assessment techniques. Participants will gain hands-on exposure to inspection planning optimization, risk matrices, remaining life assessment, and digital RBI software tools. Risk-Based Inspection (RBI) in Chemical Engineering Training Course is designed to align with global standards in process safety, industrial risk management, and predictive maintenance strategies, enabling engineers to reduce unplanned downtime, improve safety compliance, and enhance asset lifecycle performance.

Programme Curriculum

Risk-Based Inspection (RBI) in Chemical Engineering Training Course

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Course Duration

5 days

Course Objectives

1. Understand fundamentals of Risk-Based Inspection (RBI) methodology
2. Apply API 580 and API 581 standards in industrial environments
3. Perform probability of failure (PoF) analysis
4. Conduct consequence of failure (CoF) assessment
5. Develop risk matrices for chemical process equipment
6. Identify and evaluate corrosion mechanisms and degradation models
7. Design optimized inspection planning strategies
8. Implement asset integrity management frameworks
9. Use quantitative risk assessment (QRA) techniques
10. Perform remaining life and fitness-for-service evaluation
11. Integrate RBI with process safety management (PSM) systems
12. Utilize RBI software tools and digital inspection platforms
13. Improve cost-effective maintenance and turnaround planning

Target Audience

1. Chemical Engineers in process industries
2. Mechanical and Maintenance Engineers
3. Inspection and Corrosion Engineers
4. Plant Reliability Engineers
5. Safety and Risk Management Professionals
6. Refinery and Petrochemical Operations Staff
7. Asset Integrity Managers
8. Graduate Engineers in industrial safety and reliability fields

Course Modules

Module 1: RBI Fundamentals & Industry Standards

- Introduction to RBI concepts and lifecycle
- API 580 & API 581 framework overview
- Risk definitions in chemical plants
- RBI vs traditional time-based inspection
- Regulatory compliance requirements

- **Case Study:** RBI implementation in a refinery crude distillation unit

Module 2: Corrosion Science & Damage Mechanisms

- Types of corrosion in chemical plants
- Stress corrosion cracking and erosion models
- Material degradation behavior
- Environmental impact factors
- Corrosion loop identification
- **Case Study:** Heat exchanger tube failure due to chloride corrosion

Module 3: Probability of Failure (PoF) Modeling

- Failure frequency analysis
- Statistical reliability models
- Equipment condition assessment
- Degradation rate estimation
- Failure data interpretation
- **Case Study:** Pressure vessel failure probability in ammonia plant

Module 4: Consequence of Failure (CoF) Analysis

- Safety, environmental, and financial impacts
- Toxic release and fire modeling
- Explosion risk assessment
- Business interruption analysis
- Risk ranking techniques
- **Case Study:** Gas leak consequence modeling in LNG facility

Module 5: Risk Assessment & Ranking

- Risk matrix development
- Semi-quantitative vs quantitative RBI
- Risk categorization methods
- Criticality ranking of assets
- Decision-making frameworks
- **Case Study:** Risk ranking of storage tanks in petrochemical terminal

Module 6: Inspection Planning Optimization

- Inspection interval optimization
- Non-destructive testing (NDT) selection
- Inspection scope prioritization
- Resource allocation techniques
- Turnaround inspection planning
- **Case Study:** Optimized inspection plan for refinery piping network

Module 7: Asset Integrity & Fitness-for-Service

- Remaining life assessment methods
- API 579 Fitness-for-Service application
- Integrity operating windows

- Repair vs replace decisions
- Life extension strategies
- **Case Study:** Fitness-for-service evaluation of aging pressure vessel

Module 8: Digital RBI & Smart Inspection Systems

- RBI software tools and automation
- Digital twin integration
- Predictive maintenance analytics
- IoT-based inspection systems
- AI in risk prediction
- **Case Study:** Digital RBI deployment in smart chemical plant

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

Ready to enroll or request a customized program? Book online or contact us:

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