Advanced Risk-Based Inspection and Maintenance Planning Training Course

21 - 25 Dec 2026

Boston

7500 € (Per Person)

Ref: #OG5841_100104

Course Introduction / Overview:

This comprehensive training course provides a deep dive into the principles and practices of Risk-Based Inspection (RBI) and its critical integration with maintenance planning. In today's asset-intensive industries, moving from traditional, time-based inspection schedules to a sophisticated, risk-informed approach is essential for optimizing safety, reliability, and cost-effectiveness. This program is designed to equip participants with the skills to develop, implement, and manage a robust RBI program in line with international standards such as API 580 and API 581. We will explore the foundational concepts of risk analysis, including the detailed assessment of Probability of Failure (PoF) and Consequence of Failure (CoF). As emphasized by industry experts like John Reynolds, a successful RBI program is not merely an inspection tool but a cornerstone of a holistic asset integrity management strategy. The curriculum, inspired by seminal works like "Risk-Based Management: A Reliability-Centered Approach," will guide attendees through identifying damage mechanisms, selecting appropriate inspection techniques, and translating risk assessment results into actionable maintenance plans. BIG BEN Training Center delivers this course to empower professionals to make data-driven decisions that enhance plant integrity and operational excellence.

Target Audience / This training course is suitable for:

- Inspection Engineers and Supervisors.
- Maintenance Planners and Engineers.
- Reliability and Asset Integrity Professionals.
- Process Safety and Risk Management Personnel.
- Operations and Plant Managers.
- Corrosion and Materials Engineers.
- Project Engineers involved in plant modifications.
- Regulatory and compliance officers.

Target Sectors and Industries:

- Oil and Gas (Upstream, Midstream, and Downstream).
- Petrochemical and Chemical Processing Plants.
- Power Generation (Fossil, Nuclear, and Renewable).
- Pharmaceutical Manufacturing.
- Mining and Mineral Processing.
- Pulp and Paper Manufacturing.
- Governmental bodies and regulatory agencies.
- Marine and Offshore industries.

Target Organizations Departments:

- Maintenance and Reliability.
- Inspection and Non-Destructive Testing (NDT).
- Engineering and Technical Services.
- Asset Integrity Management.
- Health, Safety, and Environment (HSE).
- Operations and Production.
- Process Safety Management (PSM).
- Capital Projects and Turnaround Planning.

Course Offerings:

By the end of this course, the participants will have able to:

- Develop a comprehensive framework for implementing a Risk-Based Inspection program.
- Conduct qualitative, semi-quantitative, and quantitative risk assessments for fixed equipment.
- Identify and analyze potential damage mechanisms affecting asset integrity.
- Determine Probability of Failure (PoF) and Consequence of Failure (CoF) accurately.
- Create optimized inspection plans based on calculated risk levels.
- Integrate RBI outputs with maintenance planning and reliability centered maintenance (RCM) strategies.
- Utilize inspection data to update risk models and drive continuous improvement.
- Justify inspection and maintenance decisions to management using risk-based principles.
- Ensure compliance with industry standards like API 580 and API 581.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to be highly interactive, practical, and engaging, ensuring participants can apply the learned concepts directly to their work environments. Our approach moves beyond traditional lectures to foster a deep, experiential understanding of Risk-Based Inspection and maintenance planning. The course will feature a blend of expert-led presentations, real-world case studies from various industries, and hands-on workshops where participants will practice conducting risk assessments using sample data. Collaborative group exercises will encourage peer-to-peer learning and problem-solving, allowing attendees to simulate the development of an RBI plan from start to finish. Interactive sessions, Q&A panels, and open discussions are integrated throughout the five days to address specific challenges and questions from the participants. Our experienced instructors provide continuous feedback and guidance, creating a supportive learning environment that bridges the gap between theoretical knowledge and practical, on-the-job application. This dynamic and immersive methodology ensures that every participant leaves with both the competence and the confidence to implement effective RBI strategies within their organization.

Course Agenda (Course Units):

Unit One: Fundamentals of Risk-Based Inspection (RBI)

- Introduction to Asset Integrity Management (AIM).
- Evolution from time-based to risk-based inspection methodologies.
- Core principles and objectives of RBI.
- Overview of key industry standards (API 580, API 581).
- The business case for RBI: safety, reliability, and cost benefits.
- Defining the scope and boundaries of an RBI program.
- Roles and responsibilities of the RBI team.

Unit Two: The Risk Assessment Process

- Understanding the concept of risk as Probability x Consequence.
- Qualitative, semi-quantitative, and quantitative RBI approaches.
- Detailed analysis of Probability of Failure (PoF).
- Identifying and evaluating active and potential damage mechanisms.
- Assessing the effectiveness of past inspections.
- Detailed analysis of Consequence of Failure (CoF).
- Evaluating safety, environmental, and business consequences.

Unit Three: Data Requirements and Damage Mechanisms

- Critical importance of accurate data for RBI analysis.
- Essential data collection: design, construction, and operational data.
- Understanding common damage mechanisms in process industries.
- Corrosion, cracking, fatigue, and metallurgical degradation.
- Introduction to Integrity Operating Windows (IOWs).
- Linking damage mechanisms to material selection and process conditions.
- Utilizing process and inspection data to validate damage rates.

Unit Four: Developing Inspection and Maintenance Plans

- Translating risk assessment results into actionable plans.
- Using the risk matrix to prioritize inspection activities.
- Determining appropriate inspection methods and NDT techniques.
- Setting inspection intervals and due dates based on risk.
- Developing risk-based mitigation and maintenance strategies.
- Integrating RBI with Reliability Centered Maintenance (RCM).
- Optimizing turnaround and shutdown work scopes using RBI data.

Unit Five: RBI Implementation, Management, and Sustainability

- Steps for implementing a successful RBI program.
- The role of RBI software and data management systems.
- Monitoring RBI program performance with Key Performance Indicators (KPIs).
- Living RBI: The process of re-assessment and continuous improvement.
- Management of change (MOC) and its impact on the RBI program.
- Auditing the RBI process for effectiveness and compliance.
- Future trends in RBI: Integrating AI and digital twin technologies.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

How can organizations effectively balance the quantitative precision of a data-intensive RBI program with the practical, qualitative insights of experienced field personnel to create a truly holistic asset integrity strategy?

What unique qualities does this course offer compared to other courses?

This training course distinguishes itself by focusing on the seamless integration of Risk-Based Inspection with strategic maintenance planning, a synergy often overlooked in more siloed programs. While many courses cover the theoretical aspects of API 580 and 581, our curriculum emphasizes the practical "how-to" of translating complex risk data into optimized, actionable maintenance tasks. We move beyond simply calculating risk to exploring how those risk profiles should fundamentally reshape an organization's entire approach to asset care, from routine maintenance to major turnaround events. The course content is enriched with cross-industry case studies that illustrate both successes and failures in RBI implementation, providing invaluable lessons in avoiding common pitfalls. Furthermore, we dedicate significant time to the human and organizational factors essential for a sustainable RBI culture, addressing change management and the importance of securing buy-in from all stakeholders. The program is not just about learning a methodology; it is about mastering a philosophy of proactive, risk-informed asset management that delivers tangible improvements in safety, reliability, and financial performance.