Chemical Plant Asset Integrity and Reliability Training Course



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4100 € (Per Person)

Ref: #ACE1074_296201

Course Introduction / Overview:

In the high-stakes environment of the chemical processing industry, the integrity and reliability of physical assets are not just operational goals; they are fundamental pillars of safety, environmental stewardship, and profitability. This comprehensive training course is meticulously designed to equip chemical engineers and technical professionals with the essential knowledge and tools for establishing and managing a world-class Asset Integrity Management (AIM) system. The curriculum delves deep into the core principles that prevent catastrophic failures, optimize maintenance expenditure, and ensure regulatory compliance. We will explore the foundational concepts championed by experts like John Moubray in his seminal work, "Reliability-Centered Maintenance," to understand how to shift from a reactive to a proactive maintenance culture. Participants will learn to identify and mitigate risks, implement data-driven reliability strategies, and manage the entire asset lifecycle effectively. BIG BEN Training Center has developed this program to bridge the gap between theoretical engineering principles and their practical application on the plant floor, ensuring that every participant leaves with actionable skills to enhance asset performance and operational excellence within their organization.

Target Audience / This training course is suitable for:

- Chemical Engineers.
- Process Engineers.
- Reliability Engineers.
- Maintenance Managers and Supervisors.
- Inspection Engineers and Specialists.
- Plant and Operations Managers.
- Project Engineers.
- Technical Safety and HSE Professionals.
- Asset Integrity Managers.

Target Sectors and Industries:

- Chemical and Petrochemical Manufacturing.
- Oil and Gas Processing.
- Pharmaceuticals and Biotechnology.
- Specialty Chemicals Production.
- Plastics and Polymers Industry.
- Fertilizer and Agrochemical Plants.
- Power Generation and Utilities.
- Governmental regulatory bodies and environmental agencies.

Target Organizations Departments:

- Engineering and Design.
- Maintenance and Reliability.
- Plant Operations and Production.
- Health, Safety, and Environment (HSE).
- Inspection and Non-Destructive Testing (NDT).
- Project Management and Execution.
- Quality Assurance and Control.
- Procurement and Supply Chain.

Course Offerings:

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

- Develop a robust framework for an Asset Integrity Management (AIM) system.
- Apply Risk-Based Inspection (RBI) principles to optimize inspection schedules and resources.
- Implement Reliability Centered Maintenance (RCM) analysis to define effective maintenance strategies.
- Identify and analyze common damage mechanisms in chemical process equipment.
- Conduct effective Root Cause Analysis (RCA) for equipment failures.
- Utilize Failure Modes and Effects Analysis (FMEA) to proactively identify potential risks.
- Evaluate asset lifecycle costing to make informed maintenance and replacement decisions.
- Integrate Process Safety Management (PSM) with mechanical integrity programs.
- Understand the application of key industry standards such as API 510, 570, and 653.
- Leverage data for predictive maintenance and improved asset performance management.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to foster a dynamic and engaging learning environment that maximizes knowledge retention and practical application. This course moves beyond traditional lectures, employing a blended approach that combines expert-led instruction with interactive learning modules. Participants will engage in detailed case studies drawn from real-world incidents and successes within the chemical industry, allowing them to analyze complex problems and develop viable solutions. Collaborative group workshops and problem-solving sessions will encourage teamwork and the exchange of diverse perspectives. The curriculum incorporates practical exercises on core techniques like FMEA and RCA, ensuring participants can apply these tools immediately in their work environments. Open discussions and Q&A sessions are integral to each module, providing ample opportunity for participants to clarify concepts and relate them to their specific operational challenges. Our experienced instructors facilitate a supportive atmosphere where feedback is continuous and constructive, ensuring every participant achieves the course objectives and returns to their organization with enhanced capabilities.

Course Agenda (Course Units):

Unit One: Foundations of Asset Integrity and Reliability

- Introduction to Asset Integrity Management (AIM).
- The business case for reliability and integrity in the chemical industry.
- Understanding the link between AIM and Process Safety Management (PSM).
- Key performance indicators (KPIs) for asset performance.
- Roles and responsibilities in an AIM framework.
- Introduction to relevant codes, standards, and regulations (API, ASME).
- The asset lifecycle from design to decommissioning.

Unit Two: Risk-Based Methodologies and Maintenance Strategies

- Principles of Risk-Based Inspection (RBI) per API 580/581.
- Developing a risk matrix and assessing probability and consequence of failure.
- Introduction to Reliability Centered Maintenance (RCM) analysis.
- Defining equipment functions, functional failures, and failure modes.
- Selecting appropriate maintenance tasks (preventive, predictive, detective).
- Comparing proactive, reactive, and predictive maintenance philosophies.
- Optimizing maintenance plans and task intervals.

Unit Three: Damage Mechanisms and Inspection Techniques

- Common degradation and damage mechanisms in chemical plants.
- Corrosion, erosion, fatigue, and creep analysis.
- Fundamentals of materials selection for chemical service.
- Overview of Non-Destructive Testing (NDT) methods.
- Visual Testing (VT), Ultrasonic Testing (UT), and Radiographic Testing (RT).
- Advanced inspection techniques for specific threats.
- Developing effective inspection plans and reports.

Unit Four: Failure Analysis and Predictive Analytics

- Systematic Root Cause Analysis (RCA) methodologies.
- Techniques such as the 5 Whys and Fishbone (Ishikawa) diagrams.
- Conducting a Failure Modes and Effects Analysis (FMEA/FMECA).
- Calculating Risk Priority Numbers (RPN).
- Introduction to predictive maintenance (PdM) technologies.
- Vibration analysis, thermography, and oil analysis.
- Using operational data for reliability improvement.

Unit Five: Management Systems and Continuous Improvement

- Implementing an AIM system based on ISO 55000 standards.
- Managing maintenance work processes and planning and scheduling.
- Asset lifecycle costing and long-term capital planning.
- Fitness-for-Service (FFS) assessments (API 579).
- Managing turnarounds and shutdowns for integrity tasks.
- The role of human factors in reliability and integrity.
- Future trends: Digitalization, IIoT, and data-driven asset management.

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 the principles of asset integrity management be adapted to address the emerging challenges of green hydrogen production and carbon capture facilities?

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

This course distinguishes itself by offering a holistic and pragmatic perspective specifically tailored for the chemical engineering context. While many programs focus narrowly on either reliability theory or inspection standards, this training course integrates these critical elements into a unified management framework. We move beyond simply teaching the "what" of standards like API and ISO 55000 to explore the "how" and "why" of their practical implementation in a high-hazard process environment. The curriculum is uniquely structured to bridge the gap between engineering design, operational reality, and maintenance execution, a common point of failure in many asset management programs. Rather than focusing on specific software tools, our emphasis is on developing the critical thinking and analytical skills required to select and implement the right methodologies—be it RBI, RCM, or RCA—for any given situation. By using case studies directly relevant to chemical processing, the course ensures that the learning is not abstract but immediately applicable, empowering participants to drive tangible improvements in safety, reliability, and profitability.