MERCURY

Criticality Analysis of Equipment Failure Training

5 – 9 April 2027
London (UK)



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Introduction

Industrial organizations depend on reliable equipment to maintain production continuity, operational safety, and long-term profitability. The Criticality Analysis of Equipment Failure course provides an understanding of how equipment importance is evaluated according to operational, safety, environmental, and financial consequences. Participants learn systematic approaches for identifying high-risk assets and establishing maintenance priorities that maximize reliability and minimize unexpected failures.

The Criticality Analysis of Equipment Failure training course explains proven methodologies for assessing the criticality of equipment failures, evaluating asset reliability, and analyzing failure consequences to support effective decision-making across industrial facilities. Participants will examine techniques for ranking equipment, assessing operational risks, and selecting maintenance strategies that align with organizational objectives.

The Criticality Analysis of Equipment Failure program explores modern asset management practices, critical equipment identification processes, and reliability-centered approaches that strengthen maintenance planning and resource optimization. Realistic industrial examples demonstrate how criticality evaluations improve maintenance effectiveness while reducing downtime, lifecycle costs, and operational uncertainty. Participants will perform criticality analyses that enhance equipment performance, improve asset reliability, and support sustainable operational excellence.

Targeted Groups

This Criticality Analysis of Equipment Failure training targets professionals seeking knowledge and skills:

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- Maintenance engineers managing industrial assets.
- Reliability engineers improv equipment availability.
- Asset managers are responsible for lifecycle optimization.
- Operations managers oversee production continuity.
- Plant managers supervise critical equipment performance.
- Mechanical engineers support maintenance operations.
- Electrical engineers maintain production systems.
- Instrumentation and control engineers.
- Maintenance planners and schedulers.
- CMMS administrators and maintenance analysts.
- Inspection and integrity engineers.
- Risk management specialists.
- Process engineers working with production assets.
- Project engineers implement reliability improvements.
- Shutdown and turnaround coordinators.
- Maintenance supervisors lead technical teams.
- Technical consultants specializing in asset management.
- Facility managers are responsible for operational reliability.
- Engineering professionals seeking advanced maintenance knowledge.

Course Objectives

Participants will achieve the following objectives by completing the Criticality Analysis of Equipment Failure course:

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- Understand the principles of equipment failure criticality assessment.
- Explain the importance of asset criticality within industrial operations.
- Recognize factors influencing equipment reliability and operational performance.
- Apply structured asset criticality analysis methodology.
- Identify critical equipment using systematic evaluation techniques.
- Differentiate between the importance of equipment and the severity of failure.
- Perform failure mode and criticality ranking for industrial assets.
- Evaluate operational, financial, environmental, and safety consequences.
- Conduct a failure impact analysis in maintenance planning.
- Develop criticality matrix models for evaluating equipment failures.
- Interpret qualitative and quantitative maintenance information.
- Utilize maintenance history to improve criticality decisions.
- Assess equipment breakdown risk using structured methodologies.
- Prioritize maintenance activities based on criticality results.
- Support reliability-centered maintenance criticality implementation.
- Align maintenance planning with operational objectives.
- Improve asset reliability through evidence-based decision-making.
- Strengthen maintenance budgeting using equipment prioritization.
- Interpret risk-based maintenance strategies effectively.
- Document assessment findings using standardized reporting practices.
- Validate equipment rankings through multidisciplinary collaboration.
- Integrate asset management criticality frameworks into maintenance systems.
- Evaluate industrial equipment failure analysis techniques.
- Improve maintenance efficiency through continuous criticality review.

Targeted Competencies

Participants will gain the following competencies during the Criticality Analysis of Equipment Failure program:

- Assess the equipment's operational importance objectively.
- Perform equipment failure criticality assessment confidently.
- Identify critical production assets systematically.
- Conduct a structured failure consequence analysis.
- Develop equipment criticality ranking systems.
- Apply asset reliability criticality evaluation methods.
- Utilize risk-based criticality analysis maintenance principles.
- Build criticality matrices accurately.
- Analyze maintenance risks effectively.
- Interpret equipment performance indicators.
- Prioritize maintenance activities strategically.
- Evaluate industrial equipment failure analysis techniques.
- Support reliability-centered maintenance initiatives.
- Improve maintenance documentation quality.
- Communicate technical assessment findings professionally.
- Strengthen asset management decision-making.
- Promote continuous improvement within maintenance organizations.

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Studying Scenarios

In this Criticality Analysis of Equipment Failure training, participants develop skills through the following scenarios:

- Ranking production equipment following repeated failures.
- Evaluating critical pumps within refinery operations.
- Prioritizing rotating equipment for preventive maintenance.
- Comparing maintenance strategies using criticality matrices.
- Assessing operational risk during plant shutdown planning.
- Performing failure consequence analysis for compressors.
- Identifying hidden failure risks in utility systems.
- Evaluating spare parts priorities using equipment rankings.
- Reviewing maintenance budgets according to asset importance.
- Developing risk-based maintenance improvement plans.
- Improving equipment reliability through criticality reviews.

Course Content

Unit 1: Foundations of Criticality Analysis of Equipment Failure

- Define equipment criticality within industrial asset management.
- Explain the purpose of Criticality Analysis of Equipment Failure.
- Differentiate reliability, availability, maintainability, and risk.
- Understand equipment lifecycle management concepts.
- Identify production-critical assets.
- Examine principles of operational risk and equipment failure analysis.
- Explore the relationship between equipment reliability and business performance.
- Understand maintenance objectives across industrial sectors.
- Review common causes of industrial equipment failures.
- Examine equipment degradation mechanisms.
- Analyze historical equipment performance information.

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Unit 2: Equipment Failure Criticality Assessment Methodology

- Understand asset criticality analysis methodology.
- Identify equipment functions and operational boundaries.
- Collect maintenance history records.
- Gather operational performance data.
- Analyze equipment failure frequencies.
- Evaluate production consequences.
- Assess environmental consequences.
- Evaluate health and safety impacts.
- Analyze the financial consequences of failures.
- Perform equipment breakdown risk assessment.
- Apply structured critical equipment identification processes.

Unit 3: Failure Analysis and Criticality Ranking Techniques

- Understand Failure Modes and Effects Analysis FMEA.
- Apply Failure Mode and Effects Analysis FMEA and Criticality Ranking techniques.
- Perform Fault Tree Analysis FTA.
- Develop failure consequence analysis equipment models.
- Construct a criticality matrix for equipment failure.
- Compare likelihood versus consequence approaches.
- Evaluate probability-based assessment models.
- Rank equipment according to business impact.
- Analyze industrial equipment failure analysis techniques.
- Compare qualitative and quantitative assessment methods.
- Interpret criticality scoring results.

Unit 4: Performing Asset Reliability Criticality Evaluation

- Prepare equipment registers for assessment.
- Define assessment boundaries.
- Establish equipment hierarchy structures.
- Review equipment operating conditions.
- Conduct multidisciplinary evaluation workshops.
- Apply asset reliability criticality evaluation methods.
- Compare assessment outcomes across departments.
- Validate equipment classifications.
- Review maintenance effectiveness indicators.
- Document scoring assumptions.
- Prepare professional criticality reports.

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Unit 5: Maintenance Prioritization Based on Criticality

- Understand maintenance prioritization based on criticality.
- Develop maintenance strategies for critical assets.
- Apply preventive maintenance according to equipment importance.
- Integrate predictive maintenance for high-risk equipment.
- Optimize corrective maintenance planning.
- Apply reliability-centered maintenance criticality concepts.
- Improve spare parts prioritization.
- Align maintenance budgets with equipment importance.
- Support asset management criticality framework implementation.
- Establish continuous review processes.
- Improve long-term maintenance performance using criticality analysis.
- Strengthen organizational reliability culture.

Final Insights & Key Takeaways

Effective Criticality Analysis of Equipment Failure enables organizations to identify high-risk assets, allocate maintenance resources efficiently, and reduce operational uncertainty. A structured equipment failure criticality assessment supports better maintenance prioritization, improved asset reliability, and more informed risk-based decisions across industrial facilities. Applying proven methodologies for failure mode evaluation, consequence analysis, and criticality ranking enhances equipment availability while lowering lifecycle costs and minimizing unplanned downtime. Organizations that integrate criticality analysis into their asset management strategies establish stronger reliability programs, improve operational resilience, and achieve sustainable long-term performance.