

Course No. 2033

Steam Turbine Maintenance, Reliability & Troubleshooting Training Course

MAINTENANCE ENGINEERING
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Steam Turbine Maintenance, Reliability & Troubleshooting Training Course provides a comprehensive and practical framework for maintaining, inspecting, troubleshooting, and improving the reliability of steam turbine systems used in power generation, refineries, petrochemical plants, and other process industries. The programme focuses on the technical factors that influence turbine performance, availability, efficiency, and operational reliability.

Participants will examine the construction and operating principles of steam turbines, including rotors, blades, diaphragms, bearings, seals, steam valves, governors, lubrication systems, turning gear systems, condensers, and auxiliary systems. The course connects turbine design and operating conditions with maintenance requirements and common degradation mechanisms.

A major emphasis is placed on identifying and diagnosing turbine problems such as vibration, rotor imbalance, shaft misalignment, bearing failures, steam leakage, blade damage, erosion, corrosion, lubrication problems, overspeed conditions, thermal distortion, and performance deterioration. Participants will learn how to use operating data, vibration measurements, inspection findings, maintenance history, and performance trends to identify probable causes and determine appropriate corrective actions.

The programme also addresses preventive and predictive maintenance, condition monitoring, turbine overhauls, inspection planning, reliability improvement, failure analysis, spare parts, maintenance planning, and performance management. Practical case studies and troubleshooting exercises enable participants to apply systematic techniques to real-world steam turbine maintenance and reliability challenges.

Objectives

- By the end of this training course, participants will be able to:
- Analyze the operating principles and major components of steam turbine systems.
- Evaluate steam turbine operating conditions and performance requirements.
- Assess the condition and reliability of critical turbine components.
- Identify common mechanical, thermal, hydraulic, and operational turbine failures.
- Analyze turbine vibration and other condition monitoring indicators.

- Evaluate bearing, rotor, blade, seal, and valve operating conditions.
- Diagnose shaft misalignment, imbalance, resonance, and rotor-related problems.
- Assess lubrication system performance and oil-related risks.
- Evaluate steam path degradation, erosion, corrosion, and deposits.
- Apply systematic troubleshooting techniques to turbine performance problems.
- Develop preventive and predictive maintenance strategies for steam turbines.
- Optimize inspection, overhaul, and maintenance activities.
- Apply root cause failure analysis to recurring turbine problems.
- Develop corrective and preventive actions for critical turbine failures.
- Establish reliability and performance indicators for steam turbine systems.
- Develop an integrated steam turbine maintenance and reliability improvement strategy.

Who Should Attend

This course is designed for senior rotating equipment engineers, mechanical engineers, maintenance engineers, reliability engineers, steam turbine specialists, and maintenance managers responsible for turbine operation, maintenance, reliability, and performance.

It is also suitable for condition monitoring specialists, vibration analysts, inspection engineers, maintenance planners, operations engineers, lubrication specialists, mechanical supervisors, technicians, and technical professionals involved in steam turbine maintenance and troubleshooting.

The programme is particularly relevant to professionals working in power generation, oil and gas, refineries, petrochemicals, chemical processing, energy, utilities, manufacturing, and other industrial facilities where steam turbines are critical to production and energy systems.

Learning Outcomes

- Upon completion of the course, participants will be able to:
- Explain the construction, operating principles, and functions of major steam turbine components.
- Evaluate turbine operating data and identify abnormal performance conditions.
- Assess the condition of rotors, blades, bearings, seals, valves, and auxiliary systems.

- Interpret vibration measurements and identify common turbine fault patterns.
- Diagnose imbalance, misalignment, looseness, resonance, and rotor-related problems.
- Identify causes of bearing degradation, overheating, and abnormal vibration.
- Evaluate lubrication system condition and oil-related equipment risks.
- Identify steam path problems affecting turbine efficiency and reliability.
- Assess erosion, corrosion, deposits, blade damage, and thermal deterioration.
- Analyze turbine operating and maintenance history to support troubleshooting.
- Apply structured techniques for diagnosing complex turbine failures.
- Develop preventive, predictive, and condition-based maintenance programmes.
- Plan turbine inspections, shutdowns, overhauls, and major maintenance activities.
- Conduct root cause analysis for recurring turbine failures.
- Develop corrective actions that improve turbine availability and reliability.
- Prepare a comprehensive maintenance and reliability improvement plan for steam turbine systems.

Course Outline

DAY 01

Steam Turbine Fundamentals, Construction and Maintenance Requirements

- Steam turbine operating principles
- Turbine configurations and applications
- Main turbine components and auxiliary systems
- Rotors, blades, diaphragms, bearings, and seals
- Steam valves, governors, and control systems
- Lubrication and hydraulic systems
- Turning gear and auxiliary equipment
- Steam conditions and their impact on turbine performance
- Turbine operating parameters and performance requirements

DAY 01 — CONTINUED

PRACTICAL APPLICATION

Assessing the maintenance requirements of a steam turbine system

DAY 02

Steam Turbine Reliability and Condition Monitoring

- Steam turbine reliability principles
- Equipment criticality and failure modes
- Vibration monitoring and turbine condition assessment
- Rotor dynamics and vibration behavior
- Bearing temperature and condition monitoring
- Lubrication and oil condition monitoring
- Shaft position and differential expansion monitoring
- Steam pressure, temperature, flow, and performance trends
- Early warning indicators and abnormal operating conditions

PRACTICAL APPLICATION

Evaluating turbine condition using operating and monitoring data

DAY 03

Steam Turbine Troubleshooting and Failure Diagnosis

- Systematic turbine troubleshooting methodology
- High and abnormal vibration diagnosis
- Rotor imbalance and shaft misalignment
- Bearing failures and lubrication problems
- Blade damage and steam path deterioration
- Erosion, corrosion, deposits, and fouling
- Steam seal leakage and sealing problems
- Thermal expansion, distortion, and clearance issues

DAY 03 — CONTINUED

- Valve and governor-related problems

PRACTICAL APPLICATION

Diagnosing a complex steam turbine failure using technical evidence

DAY 04

Maintenance, Inspection and Overhaul Management

- Preventive and predictive turbine maintenance
- Inspection planning and maintenance intervals
- Turbine shutdown and overhaul planning
- Rotor, blade, bearing, and seal inspection
- Non-destructive inspection considerations
- Component repair and replacement decisions
- Alignment and balancing requirements
- Lubrication system maintenance
- Quality control during major turbine maintenance

PRACTICAL APPLICATION

Developing a steam turbine overhaul and maintenance plan

DAY 05

Reliability Improvement, Failure Prevention and Performance Management

- Root cause failure analysis for steam turbines
- Recurring failure elimination
- Turbine performance and efficiency monitoring
- Reliability and maintenance performance indicators
- Availability, downtime, and maintenance cost analysis
- Spare parts and critical component management

DAY 05 — CONTINUED

- Corrective and preventive action programmes
- Reliability improvement and lifecycle management
- Continuous improvement and maintenance optimization
- Final Integrated Workshop: Developing a comprehensive Steam Turbine Maintenance, Reliability & Troubleshooting Strategy for a critical turbine system

Register or Request More Information

Course page: <https://quest-training.com/courses/steam-turbine-maintenance-reliability-troubleshooting-training-course>

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