QUEST
Professional Center

PROFESSIONAL TRAINING COURSE

Course No. 2057

Advanced Steam Turbine Operation, Maintenance & Overhaul Training Course

MAINTENANCE ENGINEERING
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION
5 Days

DELIVERY
Classroom

Course Overview

The Advanced Steam Turbine Operation, Maintenance & Overhaul Training Course provides an advanced, practical framework for professionals responsible for the reliable operation, maintenance, inspection, troubleshooting, and overhaul of steam turbine systems. The programme develops a deeper understanding of turbine operating principles, critical components, performance characteristics, failure mechanisms, maintenance strategies, and overhaul practices across industrial, power generation, oil and gas, petrochemical, and process facilities.

The course examines the complete steam turbine lifecycle, from startup, loading, normal operation, monitoring, and shutdown through preventive maintenance, condition assessment, fault diagnosis, major inspection, component refurbishment, reassembly, alignment, testing, and return to service. Particular attention is given to high-risk and high-value components such as rotors, blades, diaphragms, bearings, seals, valves, couplings, casings, and lubrication systems.

Participants will develop advanced capabilities in identifying abnormal operating conditions, interpreting turbine performance and condition-monitoring information, diagnosing vibration and mechanical problems, evaluating component deterioration, and determining appropriate maintenance and overhaul interventions. The programme also addresses common failure modes including rotor imbalance, misalignment, bearing damage, blade erosion, fouling, seal deterioration, thermal distortion, lubrication problems, and control-valve issues.

Through engineering case studies, troubleshooting scenarios, maintenance planning exercises, and an integrated overhaul workshop, the Advanced Steam Turbine Operation, Maintenance & Overhaul Training Course connects technical knowledge with practical asset-reliability objectives. Participants will learn how to improve maintenance decisions, reduce avoidable equipment degradation, strengthen operational reliability, and support safer and more controlled turbine maintenance and overhaul activities.

Objectives

- Analyze advanced steam turbine operating principles, performance characteristics, and critical operating parameters during the course.
- Evaluate the condition and operational behavior of major steam turbine components using structured engineering assessment techniques.

- Apply appropriate operating and monitoring practices for startup, loading, normal operation, shutdown, and abnormal conditions.
- Analyze vibration, temperature, pressure, speed, lubrication, and performance data to identify developing turbine problems.
- Diagnose common mechanical and operational failure mechanisms affecting steam turbines and associated auxiliary systems.
- Develop maintenance strategies based on equipment condition, criticality, failure mechanisms, and operational requirements.
- Assess the inspection and maintenance requirements of rotors, blades, bearings, seals, valves, casings, couplings, and related components.
- Apply systematic approaches to steam turbine overhaul planning, dismantling, inspection, repair, reassembly, alignment, and testing.
- Evaluate dimensional inspection findings and component condition to support technically sound repair and replacement decisions.
- Improve troubleshooting and root-cause analysis practices for recurring steam turbine reliability problems.
- Strengthen maintenance planning, quality control, documentation, and risk management throughout major turbine overhauls.
- Develop an integrated steam turbine reliability and overhaul improvement plan based on workplace equipment and operational priorities.

Who Should Attend

This course is designed for Steam Turbine Engineers, Rotating Equipment Engineers, Mechanical Engineers, Maintenance Engineers, Reliability Engineers, Plant Engineers, Operations Engineers, Mechanical Maintenance Supervisors, Rotating Equipment Specialists, Turbine Maintenance Specialists, Inspection Engineers, Condition Monitoring Specialists, and Technical Maintenance Professionals involved in steam turbine operation and asset reliability.

It is also suitable for Maintenance Managers, Engineering Managers, Reliability Managers, Operations Managers, Maintenance Planners, Shutdown and Turnaround Managers, Workshop Managers, Asset Integrity Professionals, and technical decision makers responsible for major rotating equipment. The programme is particularly relevant to professionals working with steam turbines in power plants, refineries, petrochemical facilities, oil and gas production assets, LNG facilities, utilities, manufacturing plants, and other continuous-process industrial environments.

Learning Outcomes

- Explain advanced steam turbine operating principles and the interaction between turbine components and auxiliary systems.
- Interpret key turbine operating parameters and recognize deviations that may indicate developing equipment problems.
- Assess turbine performance using operating data, efficiency indicators, pressure and temperature relationships, and relevant operating trends.
- Diagnose vibration, bearing, lubrication, sealing, alignment, and rotor-related problems using structured troubleshooting methods.
- Identify common deterioration mechanisms affecting turbine blades, rotors, casings, valves, bearings, seals, and couplings.
- Develop condition-based maintenance recommendations using inspection and condition-monitoring findings.
- Evaluate turbine component inspection results and determine appropriate maintenance, repair, or replacement actions.
- Prepare a structured steam turbine overhaul plan covering scope definition, resources, inspection activities, quality controls, and execution requirements.
- Apply sound practices for dismantling, component inspection, reassembly, shaft alignment, clearances, and post-maintenance verification.
- Investigate recurring turbine failures using root-cause analysis and develop corrective and preventive actions.
- Establish practical reliability improvement measures for steam turbine systems and their supporting auxiliaries.
- Produce an integrated steam turbine operation, maintenance, and overhaul action plan suitable for implementation within an industrial facility.

Course Outline

DAY 01

Advanced Steam Turbine Operation, Performance & Control

- Advanced steam turbine operating principles and thermodynamic fundamentals
- Turbine configurations, stages, casings, rotors, blades, diaphragms, and critical components

DAY 01 — CONTINUED

- Steam admission, expansion, extraction, and exhaust systems
- Startup, loading, normal operation, shutdown, and operating limits
- Turbine control systems, governing systems, trip systems, and protection functions
- Operating parameters including speed, pressure, temperature, vibration, and bearing conditions
- Turbine performance monitoring and identification of operating deviations
- Steam quality, deposits, erosion, corrosion, and their effect on turbine performance

PRACTICAL APPLICATION

Analysis of turbine operating data to identify performance deviations and potential reliability concerns

DAY 02

Advanced Steam Turbine Maintenance, Condition Monitoring & Troubleshooting

- Preventive, predictive, condition-based, and reliability-centered maintenance approaches
- Criticality assessment of steam turbine components and auxiliary systems
- Vibration monitoring and interpretation for rotating equipment
- Bearing condition, lubrication systems, oil quality, and lubrication-related failures
- Mechanical seals, gland sealing systems, clearances, and leakage management
- Rotor dynamics, imbalance, misalignment, shaft runout, and mechanical looseness
- Blade deterioration, erosion, deposits, cracking, and component damage
- Control valves, actuators, governing systems, and operational malfunctions
- Structured troubleshooting and root-cause failure analysis

PRACTICAL APPLICATION

Diagnosing a simulated steam turbine failure using operating, vibration, temperature, and maintenance data

DAY 03

Steam Turbine Inspection, Overhaul Planning & Component Assessment

- Steam turbine inspection philosophy and maintenance intervals
- Major inspection and overhaul scope development
- Pre-overhaul planning, work packages, resources, tools, and technical documentation
- Safe turbine shutdown, isolation, preparation, and dismantling principles
- Rotor, blade, diaphragm, casing, bearing, seal, and valve inspection
- Dimensional measurements, clearances, runout, alignment, and tolerance assessment
- Non-destructive examination principles for critical turbine components
- Evaluation of erosion, corrosion, cracking, wear, distortion, and thermal damage
- Repair, refurbishment, replacement, and engineering disposition decisions

> **PRACTICAL APPLICATION**
>
> Developing an inspection and overhaul scope based on turbine condition and component assessment findings

DAY 04

Advanced Overhaul Execution, Alignment & Reliability Restoration

- Overhaul execution strategy and work sequencing
- Component removal, identification, preservation, inspection, and quality control
- Rotor inspection, balancing considerations, and dimensional verification
- Bearing inspection, repair requirements, and installation practices
- Seal inspection, replacement, clearances, and leakage control
- Casing inspection, joint condition, distortion assessment, and corrective actions
- Shaft alignment, coupling inspection, and alignment verification
- Reassembly controls, torque management, clearances, and dimensional checks
- Pre-commissioning inspections, testing, startup readiness, and return-to-service requirements

DAY 04 — CONTINUED

PRACTICAL APPLICATION

Developing a controlled overhaul execution plan including inspection hold points, alignment activities, quality checks, and commissioning requirements

DAY 05

Steam Turbine Reliability Improvement, Failure Prevention & Overhaul Excellence

- Post-overhaul testing, performance verification, and operational acceptance
- Analysis of recurring turbine failures and reliability improvement opportunities
- Root-cause analysis of major steam turbine failures
- Reliability-centered maintenance strategies for critical turbine assets
- Condition monitoring strategies and early-warning indicators
- Maintenance performance indicators and turbine reliability measures
- Spare parts strategy and critical component management
- Maintenance documentation, technical reporting, lessons learned, and knowledge retention
- Risk management and continuous improvement for turbine operation and maintenance

FINAL WORKSHOP

Development of an integrated Advanced Steam Turbine Operation, Maintenance & Overhaul Plan covering operating controls, condition monitoring, maintenance strategy, inspection scope, overhaul execution, alignment and testing, failure prevention, reliability improvement, and post-overhaul performance management

Register or Request More Information

Course page: https://quest-training.com/courses/advanced-steam-turbine-operation-maintenance-overhaul-training-course
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