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COURSE BROCHURE

Turbomachinery Performance, Overhaul and Reliability Engineering Training Course

22 – 26 November 2026
Cairo

Turbomachinery Performance, Overhaul and Reliability Engineering Training Course

Ref: 1408_52606 **Date:** 22 – 26 November 2026 **Location:** Cairo **Fees:** 4000 GBP

Turbomachinery Performance, Overhaul and Reliability Engineering is a 1-week training course for rotating equipment engineers responsible for compressor and steam turbine trains, producing a Train Overhaul and Reliability Strategy for one critical machine. Rising energy costs, longer intervals between shutdowns and pressure to defer capital replacement make every efficiency point and every avoided failure count. Jupiter Prime Training offers Turbomachinery Performance, Overhaul and Reliability Engineering.

Why Turbomachinery Performance, Overhaul and Reliability Matters Now

Three forces shape the subject. Energy and fuel costs reward engineers who can show where polytropic efficiency is being lost to fouling, wear or poor operating points. Owners now stretch run lengths between major turnarounds, so overhaul scope must be decided from condition evidence rather than calendar habit. Finance teams also ask for life-cycle cost cases before approving rerates or replacement rotors. A site that links performance data to overhaul and reliability choices spends less on unplanned outages; one that does not overhauls too often or too late. The course draws on ISO 55001 Asset Management and the terminology of EN 13306 Maintenance Terminology.

Who Gains Most from Turbomachinery Performance, Overhaul and Reliability

- Engineers who monitor efficiency, head and power of compressor and turbine trains
- Engineers who define overhaul scope, spares and turnaround work packs
- Engineers who run failure investigation and reliability modelling for machinery
- Engineers who set maintenance strategy and condition monitoring intervals
- Engineers who prepare rerate, upgrade and life-extension cases

A machinery engineering group from one site gains most when several members attend, because performance, overhaul and reliability decisions on a train are usually split between them.

Turbomachinery Performance, Overhaul and Reliability Capabilities

Participants connect thermodynamic performance, failure history and overhaul findings into decisions owners can fund.

- Calculate polytropic head and efficiency from field data — performance engineers tracking degradation
- Assess compressor operating points against performance maps and surge margins — process and control engineers
- Weigh calendar-based against condition-based overhaul intervals — turnaround planners
- Build Weibull and mean-time-between-failure models from machinery history — reliability leads
- Specify overhaul inspection, clearance and balancing acceptance criteria — repair shop and contractor teams
- Communicate life-cycle cost cases for rerates and replacement rotors — asset owners and finance

Key Turbomachinery Performance, Overhaul and Reliability Terms

- Polytropic efficiency — the ratio of useful compression work to actual work, used to track compressor stage condition over time.
- Performance map — a chart of head or pressure ratio against flow at several speeds, showing surge and stonewall limits.
- Stage efficiency loss — a drop in turbine output per unit steam caused by deposits, erosion or seal wear.
- Weibull analysis — a statistical method fitting failure times to reveal whether failures are early-life, random or wear-out.
- Reliability-centred maintenance — a structured method selecting maintenance tasks from functions, failure modes and consequences.
- Life-cycle cost — the total cost of owning a machine across purchase, energy, maintenance, outages and disposal.

Turbomachinery Performance, Overhaul and Reliability Day by Day

Day 1: Thermodynamic Performance of the Train

- Polytropic and Isentropic Head Calculations — Field Efficiency Baselines
- Compressor Performance Maps and Fan Laws — Speed and Rerate Choices
- Surge Margin and Anti-Surge Line Settings — Recycle Energy Penalties
- Steam Turbine Stage Efficiency and Steam Rate — Fouling Detection
- Degradation Trending in Gas Compression and Power Generation — Wash Decisions

Day 2: Failure Modes and Reliability Analysis

- Machinery Failure Mode and Effects Analysis — Ranking Train Risks
- Weibull Plotting of Seal and Bearing Failures — Interval Selection
- Mean Time Between Failures and Availability Models — Spares Holdings
- Root Cause Analysis of Rotor and Blade Damage — Corrective Design Changes
- Reliability Block Diagrams for Spared and Unspared Trains — Redundancy

Day 3: Maintenance Strategy for Train Machinery

- Reliability-Centred Maintenance Task Selection — Preventive Versus Predictive
- Vibration and Oil Analysis Regimes — Monitoring Intervals and Alarm Levels
- Performance-Based Maintenance Triggers — When Efficiency Loss Justifies Intervention
- Condition-Based Overhaul Interval Setting — Run-Length Extension Cases
- ISO 55001 Asset Plans for Rotating Equipment — Linking Strategy to Value

Day 4: Overhaul Practice and Acceptance

- Overhaul Scope Definition from Condition Evidence — Turnaround Work Packs
- Rotor Inspection, Runout and Balancing — Acceptance Criteria
- Internal Clearances, Diaphragms and Labyrinths — Restoring Efficiency
- Blade Repair, Coating and Replacement Options — Cost and Risk
- Post-Overhaul Performance Testing — Confirming Restored Head and Steam Rate

Day 5: Practising the Train Overhaul and Reliability Strategy

- Performance Baseline for a Chosen Train — Applying Head and Efficiency Methods
- Failure History Model for the Train — Applying Weibull Results
- Life-Cycle Cost Comparison of Overhaul Options — Owner Approval Case
- Monitoring and Trigger Matrix — Linking Condition to Intervention
- Completing the Train Overhaul and Reliability Strategy — Intervals, Scope and Owners

Applying Turbomachinery Performance, Overhaul and Reliability After the Course

- Calculate current polytropic efficiency for one critical compressor and compare it with its original performance map.
- Run a Weibull fit on recorded seal and bearing failures and propose a revised overhaul interval.

Turbomachinery Performance, Overhaul and Reliability Questions FAQ

What is turbomachinery performance, overhaul and reliability engineering, and why does it matter now?

It is the discipline of linking compressor and turbine efficiency, failure data and overhaul choices. It matters now because energy costs and longer turnaround intervals make every lost efficiency point and unplanned outage expensive.

Which roles gain most from turbomachinery performance, overhaul and reliability engineering?

Rotating equipment engineers gain most. You decide overhaul scope, maintenance intervals and upgrade cases, so you need performance and reliability evidence to justify them.

How does turbomachinery performance, overhaul and reliability engineering differ from a technician operating checks course?

The focus is engineering decisions, not field rounds. A technician course covers routine readings and first-line fault finding; here you calculate efficiency, model failure history and set overhaul strategy.

What do you bring back from turbomachinery performance, overhaul and reliability engineering?

You bring back a strategy for one critical train, with a performance baseline, failure model, overhaul intervals and a life-cycle cost case ready for owner review.

Turbomachinery Performance, Overhaul and Reliability: The Way Forward

The Train Overhaul and Reliability Strategy brings efficiency trends, failure models and overhaul scope into one document. Its first use is deciding whether the next turnaround needs a full opening or a targeted inspection. Machinery engineers, turnaround planners and asset owners use it. After the first overhaul, revisit whether the predicted efficiency recovery matched the post-overhaul test.