JUPITER PRIME

Consulting • Training • Advisory

جوبيتر برايم للاستشارات والتدريب

COURSE BROCHURE

Rotating Equipment Reliability Engineering Training Course

15 – 26 August 2027
Muscat

jupiterprime.uk

info@jupiterprime.uk

Registered in the United Kingdom and Saudi Arabia

Rotating Equipment Reliability Engineering Training Course

Ref: 388_13779 **Date:** 15 – 26 August 2027 **Location:** Muscat **Fees:** 11700 GBP

Rotating Equipment Reliability Engineering is a 2-week advanced training course for reliability engineers, machinery leads and asset owners who quantify how pumps, compressors and turbines fail, using Weibull and RCM to choose preventive tasks, ending with a Critical Machine Reliability Improvement Plan. Machines that fail without warning still drive much of the lost output in refineries, petrochemical plants and water utilities. Jupiter Prime Training delivers this course for engineers who answer for machinery reliability.

Why Rotating Equipment Reliability Engineering Matters Now

Reliability engineering is being reshaped by affordable wireless sensors that stream vibration and temperature, by ageing rotating equipment operating beyond its original design life, and by owners who expect every maintenance task to be justified by failure evidence. Engineers who read failure data well avoid both over-maintenance and surprise breakdowns; those who do not keep repeating the same repairs. The course aligns with the SMRP Best Practices Metrics and Guidelines for reliability indicators, with EN 13306 for failure and fault vocabulary, and with ISO 55001 for linking equipment decisions to asset management objectives.

Who Gains Most from Rotating Equipment Reliability Engineering

- Engineers who analyse failure history and recommend task changes for pumps, compressors, fans and turbines
- Engineering leads who own preventive and predictive maintenance task libraries
- Condition monitoring specialists who interpret vibration, oil and thermal data
- Asset owners who decide on redesign, spares or replacement for bad-actor equipment
- Engineers who chair failure review meetings and track defect elimination actions

A reliability engineering group gains most when its engineers and a condition monitoring specialist attend together and agree one failure data standard.

Rotating Equipment Reliability Engineering Capabilities

Participants turn failure records, condition signals and failure mode logic into defensible task selections and measurable reliability gains on critical machines.

- Calculate Weibull shape and scale parameters from failure data — the choice between time-based and condition-based tasks
- Apply reliability-centred maintenance decision logic to failure modes — the asset owner approving the task list
- Design a condition monitoring route with suitable technologies — the monitoring specialist and production schedule
- Assess bad-actor equipment with Pareto and cost of unreliability — redesign or replacement decisions
- Build a defect elimination process with tracked actions — the failure review meeting chair
- Specify reliability indicators such as MTBF and availability — the monthly reliability report to management

Key Rotating Equipment Reliability Engineering Terms

- Weibull analysis — a statistical method that fits failure times to a distribution, revealing whether failures are early-life, random or wear-out.
- Failure mode — the specific manner in which an item fails, such as bearing spalling or seal leakage.
- Reliability-centred maintenance — a structured process for choosing the right task for each failure mode based on consequence and failure behaviour.
- Bad actor — an asset with repeated failures or disproportionate maintenance cost, ranked for priority attention.
- Precision maintenance — practices such as laser alignment, balancing and correct lubrication that remove common causes of machine failure.
- Inherent availability — the proportion of time an asset can operate, considering only failures and repair times.

Rotating Equipment Reliability Engineering Day by Day

Day 1: Reliability Engineering Foundations

- Reliability Function and Hazard Rate — Describing How Equipment Ages
- Six Failure Patterns — Why Age-Based Overhauls Often Fail
- EN 13306 Failure and Fault Vocabulary — Precise Reliability Discussions
- Cost of Unreliability Model — Valuing Lost Output and Repairs
- Pump, Compressor and Turbine Failure Mechanisms — Bearings, Seals and Rotors

Day 2: Failure Data and Records

- Failure Coding Structures — Problem, Cause and Remedy Codes
- Equipment Taxonomy for Data Collection — Consistent Boundaries and Hierarchy
- Failure History Cleansing — Removing Gaps and Misclassified Events
- Pareto of Failures and Downtime — Selecting Bad-Actor Equipment
- Machinery Data Sheets and Operating Envelopes — Context for Every Failure

Day 3: Weibull and Life Data Modelling

- Weibull Plotting and Parameter Estimation — Infant, Random or Wear-Out
- Suspended Data Handling — Including Units Still in Service
- Optimal Replacement Interval Calculation — Balancing Failure and Renewal Costs
- Mean Time Between Failures Interpretation — Avoiding Common Misuse
- Life Data Software Outputs — Reading Confidence Bounds Correctly

Day 4: Failure Modes and Effects

- Functional Block Diagram — Defining Boundaries Before Failure Analysis
- FMEA Worksheet Construction — Modes, Effects and Local Causes
- Severity, Occurrence and Detection Ranking — Prioritising Failure Modes
- Hidden Failure Identification — Protective Devices and Standby Units
- Mechanical Seal and Coupling FMEA — Common Rotating Equipment Weak Points

Day 5: Reliability-Centred Maintenance Decisions

- RCM Decision Diagram — Consequence-Led Task Selection
- Failure-Finding Interval Calculation — Testing Hidden Protective Functions
- On-Condition Versus Scheduled Restoration Tasks — Evidence-Based Choices
- Redesign as a Default Action — When No Task Is Effective
- RCM Task Package Approval — Asset Owner Sign-Off and Records

Day 6: Condition Monitoring Technologies

- Vibration Spectrum Analysis — Imbalance, Misalignment and Bearing Defects
- Lubricant and Wear Debris Analysis — Contamination and Component Wear
- Infrared Thermography — Electrical Connections and Mechanical Heating
- Airborne Ultrasound — Leaks, Bearing Lubrication and Electrical Discharge
- Online Sensors and Alarm Limits — Continuous Monitoring of Critical Machines

Day 7: Precision Maintenance and Defect Elimination

- Laser Shaft Alignment Tolerances — Extending Bearing and Seal Life
- Dynamic Balancing Practice — Reducing Vibration at Source
- Lubrication Regime Design — Right Oil, Quantity and Interval
- Defect Elimination Workflow — Logging, Prioritising and Closing Defects
- Failure Review Board — Structured Learning From Each Breakdown

Day 8: System Reliability and Availability

- Reliability Block Diagrams — Series, Parallel and Standby Configurations
- Availability Modelling — Combining Failure Rates and Repair Times
- Redundancy and Spare Unit Decisions — Value Versus Investment
- Critical Spares Optimisation — Stock Levels From Failure Probability
- Compressor Train and Spare Pump Strategies — Standby Switching Rules

Day 9: Reliability Indicators and Reporting

- SMRP Best Practices Metrics and Guidelines — Reliability Metric Definitions
- MTBF, MTTR and Availability Dashboards — Trend Reporting by Asset Class
- Predictive Task Effectiveness Measures — Catches Versus Missed Failures
- ISO 55001 Line of Sight — Linking Equipment Decisions to Objectives
- Reliability Business Case — Presenting Gains to Plant Leadership

Day 10: Practising the Critical Machine Reliability Improvement Plan

- Bad-Actor Selection From Failure Pareto — Choosing the Target Asset
- Weibull and FMEA Results Applied — Defining Failure Mode Priorities
- RCM and Condition Monitoring Tasks Applied — Building the Task List
- Availability and Indicator Targets Applied — Measuring Improvement
- Critical Machine Reliability Improvement Plan Completion — Actions, Owners and Milestones

Applying Rotating Equipment Reliability Engineering After the Course

- Run a Weibull analysis on the failure history of one bad-actor pump or compressor and adjust its task intervals accordingly.
- Set up a monthly failure review board that logs defects, assigns owners and reports closure rates.

Rotating Equipment Reliability Engineering Questions FAQ

What is rotating equipment reliability engineering and why does it matter now?

Rotating equipment reliability engineering applies failure data, failure mode logic and condition signals to choose the right task for each pump, compressor or turbine. It matters now because ageing rotating equipment and cheaper sensors make evidence-based task selection both necessary and achievable in refineries and power stations.

Which roles gain most from rotating equipment reliability engineering?

Reliability engineers, maintenance engineering leads and asset owners gain most. They analyse failures, own task libraries and decide on redesign or replacement, so quantitative methods such as Weibull analysis and RCM change their recommendations directly.

How does rotating equipment reliability engineering training differ from a maintenance management course?

It is a machinery engineering course rather than a departmental leadership one. A maintenance management course addresses budgets, policies and work control; here engineers model failure data, apply RCM logic, select monitoring technologies and calculate availability for specific critical machines.

What do you bring back from rotating equipment reliability engineering training?

You bring back a reliability improvement agenda for one critical machine. It contains failure mode priorities, a revised task list with monitoring routes, availability targets and defect elimination actions ready for approval by the asset owner.

Rotating Equipment Reliability Engineering: The Way Forward

The Critical Machine Reliability Improvement Plan gives the asset owner a failure-evidence basis for every task on one bad-actor machine. Its first decision is which failure modes receive condition monitoring rather than scheduled overhaul. Reliability engineers and monitoring specialists use it daily. After the first quarter, revisit the Weibull results with new failure data to confirm the intervals.