
Production Equipment Reliability: Pumps, Compressors, Valves and Exchangers Training Course

18 – 22 July 2027
Muscat





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Programme Summary

Production equipment reliability is the focus of this five-day training course for maintenance, reliability and operations leaders at managerial level, ending in an equipment reliability and maintenance plan for a production facility. Pumps, compressors, valves and heat exchangers decide whether a plant meets its output target, yet failures are often handled one repair at a time. The programme moves from failure logic and criticality, through diagnosis of each equipment family, to maintenance strategy and application on a chosen plant. Mars Training Centre UK delivers this programme in production equipment reliability.

The Business Case

Unplanned equipment stoppages interrupt production, strain maintenance budgets and create hazards during emergency repair. Leaders who classify failures, read condition evidence and plan work by criticality can reduce repeat breakdowns, hold spares where they matter and schedule shutdowns around real equipment condition rather than habit.

- Unplanned Downtime: Falls as recurring failure causes are diagnosed and removed rather than repaired again.
- Maintenance Cost per Unit of Output: Improves as tasks are selected by criticality and condition evidence.
- Repeat Failure Rate: Declines as failure data are recorded in a consistent structure and reviewed.

Principles and Evidence Base

- ISO 14224: Its taxonomy and failure data structure shape the failure coding and criticality ranking in Sessions 1 and 4.
- API Standard 610: Its centrifugal pump requirements frame the operating and diagnostic review in Session 2.
- API Standard 670: Its machinery protection principles guide the review of trips and monitoring in Session 2.
- ISO 55001: Its asset management system requirements structure the maintenance planning and review cycle in Session 4.

Intended Participants

- Leaders accountable for availability of pumps, compressors and other production equipment.
- Managers who direct maintenance planning, shutdowns and spares for a production facility.
- Reliability and asset leaders who must justify maintenance strategy to operations management.
- Operations managers who challenge repair decisions.



The programme serves oil and gas operators, petrochemical and power producers, and engineering service companies.

Learning Outcomes

1. Participants will be able to classify equipment failures and rank equipment by criticality using a common structure.
2. Participants will be able to diagnose pump and compressor faults from operating and condition data.
3. Participants will be able to evaluate valve and heat exchanger degradation against performance and inspection evidence.
4. Participants will be able to construct a maintenance strategy that matches task type to failure behaviour.
5. Participants will be able to prioritise repairs, spares and shutdown scope by risk and value.
6. Participants will be able to justify an equipment reliability and maintenance plan to asset and operations management.

Programme Structure

Day 1: Production Equipment Reliability and Failure Logic

How do production equipment fail, and which items matter most?

- Equipment Boundary and Failure Mode Taxonomy From ISO 14224
- Failure Mechanisms in Wear, Fatigue, Corrosion and Fouling
- Criticality Ranking Matrix
- Bathtub Curve and Failure Rate Reading
- Failure Event Coding and Data Quality Review

Day 2: Pump and Compressor Operation and Diagnostics

What do operating data reveal about pump and compressor health?

- Pump Curve and Operating Point Analysis
- Mechanical Seal and Bearing Failure Patterns
- Compressor Surge, Capacity and Efficiency Checks
- Machinery Protection and Trip Review From API Standard 670
- Vibration and Temperature Trend Interpretation

Day 3: Valve and Heat Exchanger Diagnostics

How is degradation found in valves and exchangers before it stops production?



- Control Valve Stroke and Positioner Diagnostics
- Pressure Relief Valve Test and Repair Intervals
- Exchanger Fouling Factor and Duty Trends
- Tube Leak and Corrosion Inspection Findings
- Actuator and Isolation Valve Leak Detection

Day 4: Maintenance Strategy and Planning

Which maintenance task suits each failure behaviour, and how is it scheduled?

- Task Selection by Failure Pattern
- Condition Monitoring Technique Selection
- Spare Parts Criticality and Stock Levels
- Shutdown Scope Challenge Process
- Asset Management Review Cycle From ISO 55001

Day 5: Applying Production Equipment Reliability to a Plant

Which actions deliver the most reliability for the least cost, and is the plan ready for approval?

- Applying Day 1 Criticality Ranking to Plant Equipment
- Testing Day 2 Diagnostic Findings Against Case Data
- Matching Day 3 Degradation Evidence to Repair Priorities
- Applying Day 4 Task Selection to the Highest-Ranked Items
- Completing the Equipment Reliability and Maintenance Plan

Methodology

The programme is built around case analysis and data review. Participants examine anonymised failure histories, trend plots and inspection reports from facilities in different sectors, decide what failed and why, and defend their maintenance decisions in group review.

- Suggested activity: Diagnosing a repeat seal failure from operating and maintenance records.
- Suggested activity: Ranking twenty items of plant equipment by criticality.
- Suggested activity: Presenting a shutdown scope challenge to a simulated asset review board.

Capstone Output

Each participant completes an equipment reliability and maintenance plan for one production facility, real or case-based. It holds a criticality ranking, a failure mode summary, diagnostic findings for selected equipment, a task and spares strategy and a prioritised action list. It is used to brief asset management and to set the scope of the next maintenance cycle.



Frequently Asked Questions

Is this production equipment reliability course suitable for managers without an engineering degree?

Yes. It is set at managerial level for leaders who oversee maintenance and operations, and assumes plant experience rather than design calculations.

Which standards does production equipment reliability training rest on?

It rests on ISO 14224 for failure data, API Standard 610 for pumps, API Standard 670 for machinery protection and ISO 55001 for asset management. Each is applied to case data.

How is the production equipment reliability plan used at work?

The equipment reliability and maintenance plan briefs asset management, ranks equipment and repairs by risk, sets spares policy and defines the scope of the next maintenance cycle.