
RAM Analysis and Equipment Risk Assessment Training Course

28 February – 4 March 2027
Kuala Lumpur





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Ref: 137_15126 **Date:** 28 February – 4 March 2027 **Location:** Kuala Lumpur **Fees:** 4000 GBP

Programme Summary

RAM analysis and equipment risk assessment is a five-day training course for senior technical leaders at advanced level, culminating in a reliability and risk decision case for a critical production system. Many plants set availability targets, sparring levels and maintenance intervals on judgement alone. The approach moves from failure data and reliability modelling through structured risk techniques to decisions that leadership can defend. Mars Training Centre UK delivers this programme in reliability, availability and maintainability analysis for oil, gas, power and process plants.

The Business Case

Every design choice, spare part and inspection interval carries a reliability consequence, yet few organisations can show how a proposed change alters production availability or the likelihood of a major failure. Leaders who quantify those effects direct capital and maintenance effort to the systems that matter.

- Production Availability: Rises as configuration, redundancy and repair strategies are tested before they are approved.
- Equipment Risk Exposure: Falls as high-consequence failure modes are identified, ranked and controlled.
- Maintenance and Spares Cost: Is directed to critical equipment rather than spread evenly across the asset base.

Principles and Evidence Base

- ISO 20815: Its production assurance process frames how availability targets are set in Session 1.
- ISO 14224: Its reliability data taxonomy underpins the failure data work in Session 2.
- IEC 60812 and IEC 61025: These standards for FMECA and fault tree analysis structure Session 3.
- IEC 61078: Its reliability block diagram method supports availability modelling in Session 4.

Intended Participants

- Leaders who set reliability and availability targets for production systems and new facilities.
- Managers who approve maintenance strategies, sparring policies and equipment upgrades.
- Engineering heads who review design options at concept and front-end engineering stages.
- Technical safety leads who decide how equipment failure risks are assessed and controlled.

The programme serves upstream oil and gas, refining, petrochemicals and power generation.



Learning Outcomes

1. Participants will be able to evaluate a production system against an availability target.
2. Participants will be able to construct failure distributions from field data using Weibull life data analysis.
3. Participants will be able to diagnose dominant failure modes and their causes using FMECA and fault tree analysis.
4. Participants will be able to construct a reliability block diagram and estimate system availability by simulation.
5. Participants will be able to prioritise equipment risks using risk matrices, event trees and bow-tie analysis.
6. Participants will be able to justify a design or maintenance decision with quantified reliability and risk evidence.

Programme Structure

Day 1: RAM Analysis and Production Assurance Foundations

What does a RAM study need to answer for the business?

- Reliability, Availability and Maintainability Definitions and Measures
- ISO 20815 Production Assurance Process and Life Cycle Stages
- Availability Targets, Production Efficiency and Loss Categories
- MTBF, MTTR and the Bathtub Curve in Practice
- Scoping a RAM Study and Its Decision Questions

Day 2: Equipment Failure Data and Life Analysis

How are failure rates and life patterns drawn from real data?

- ISO 14224 Equipment Taxonomy and Failure Data Fields
- OREDA Generic Failure Rates and Their Limits
- Weibull Life Data Analysis and Shape Parameter Interpretation
- Censored Data, Small Samples and Confidence Bounds
- Bad Actor Identification from Maintenance Records

Day 3: Failure Logic and Criticality Analysis

Which failure modes drive equipment risk, and why do they occur?

- FMEA and FMECA to IEC 60812
- Criticality Ranking and Risk Priority Approaches
- Fault Tree Construction and Minimal Cut Sets to IEC 61025
- Common Cause Failures and Dependency Effects
- Equipment Criticality Assessment for Rotating and Static Assets



Day 4: System Availability Modelling and Risk Ranking

How do configuration choices change availability and risk?

- Reliability Block Diagrams to IEC 61078
- Monte Carlo Simulation of Production Availability
- Redundancy, Sparing and Repair Strategy Comparison
- Event Tree Analysis for Escalation Scenarios
- Bow-Tie Analysis and Corporate Risk Matrices

Day 5: Applying RAM Analysis to Plant Decisions

Which option should leadership approve, and on what evidence?

- Sensitivity Testing of the Day 4 Availability Model
- Combining Day 3 Criticality Results with Cost of Unavailability
- Presenting Reliability Evidence to Investment Committees
- Tracking Availability Performance Against Targets
- Reliability and Risk Decision Case Completion

Methodology

The programme is built around a data workshop: participants work with failure records and system layouts from oil and gas, power and process cases, building simple spreadsheet models. Each session moves from a short method briefing to group analysis, then tests results against the questions a leadership team would ask.

- Suggested activity: Fitting a Weibull distribution to pump failure records and choosing a replacement policy.
- Suggested activity: Building a fault tree for loss of export from a gas compression train.
- Suggested activity: Comparing compressor configurations on availability and cost.

Capstone Output

Each participant completes a reliability and risk decision case for a critical system from their own organisation or a case plant. It contains the system model, data assumptions, ranked failure modes, availability estimate, risk ranking and a recommended option.

Frequently Asked Questions

Is RAM analysis training suitable for managers who do not run reliability software?

Yes. It is set at advanced level for leaders who commission and review RAM studies, and assumes plant experience and basic statistics; models are built in spreadsheets.



Which standards does RAM analysis and equipment risk assessment rest on?

It rests on ISO 20815 for production assurance, ISO 14224 for reliability data, IEC 60812 for FMEA and FMECA, IEC 61025 for fault tree analysis and IEC 61078 for reliability block diagrams.

How is the RAM analysis decision case used at work?

You can use it to support a design review, a sparing decision or a maintenance budget request.

How does RAM analysis and equipment risk assessment differ from maintenance planning programmes?

It quantifies failure behaviour, availability and equipment risk to support decisions, rather than organising and scheduling maintenance work.