

## DESIGN FOR RELIABILITY MAINTENANCE

*“Integrating Reliability into Engineering Design for Sustainable Performance and Lifecycle Cost Optimization”*

### Schedule

Date	Venue	Fees
16 - 20 Feb 2026	Kuala Lumpur, Malaysia	USD 3495 per delegate
03 - 07 May 2026	Doha, Qatar	USD 3495 per delegate
22 - 26 Jun 2026	London, UK	USD 3495 per delegate

► **Available delivery methods:** Face-to-Face & Online Training

### Introduction

Design for Reliability (DfR) is a proactive engineering approach that ensures asset reliability, maintainability, and performance are embedded into design and procurement decisions—rather than corrected later at higher cost. As industries push for greater uptime, safety, and lifecycle value, DfR becomes a key capability for maintenance, engineering, and reliability teams.

This intensive five-day training program equips professionals with practical methods to integrate reliability principles into the design phase. Participants will learn how to prevent failures, reduce lifecycle costs, and enhance maintainability through design analysis, modeling tools, and cross-functional collaboration.

### Objectives

By the end of this course, participants will be able to:

- Apply the principles of Design for Reliability (DfR) and maintainability engineering
- Conduct reliability modeling and risk analysis during design development
- Use tools such as FMEA, RCM, and Weibull analysis to guide decisions
- Collaborate across design, procurement, and maintenance teams to ensure asset reliability
- Reduce total cost of ownership by improving asset design quality and maintainability

## Why Attend

- Gain hands-on tools to integrate reliability into design specifications and standards
- Prevent common design-induced failures that lead to downtime and cost overruns
- Learn how to apply data-driven reliability predictions during early-stage design
- Enhance collaboration between engineering, maintenance, and operations
- Build a long-term strategy to support asset reliability and availability goals

## Target Audience

This program is designed for:

- Reliability and maintenance engineers
- Design and project engineers
- Engineering managers and asset managers
- Equipment manufacturers and OEM liaisons
- Procurement and technical specification professionals

## Individual Benefits

Key competencies that will be developed include:

- Reliability modeling, analysis, and prediction methods
- Maintainability-by-design and failure prevention strategies
- Use of reliability tools like FMEA, RBD, and Weibull analysis
- Lifecycle cost thinking and design trade-off evaluation
- Ability to lead reliability improvement initiatives from the design phase

## Organizational Benefits

Upon completing the training course, participants will demonstrate:

- Fewer design-related equipment failures and maintenance costs
- Stronger alignment between design and operational reliability goals
- Improved asset uptime, availability, and lifecycle ROI
- More effective capital project planning with reliability in focus
- Increased standardization and quality assurance in design processes

## Instructional Methodology

The course follows a blended learning approach combining theory with practice:

- Strategy Briefings - DfR principles, ISO standards, and best practices
- Case Studies - Failures caused by poor design and successful redesign outcomes
- Workshops - Group exercises using FMEA, RCM, and reliability modeling tools
- Peer Exchange - Cross-industry comparisons and project sharing
- Tools - Templates for design checklists, risk analysis matrices, and LCC evaluation

## MAWA EVENTS

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## Course Outline

### DETAILED 5-DAY COURSE OUTLINE

**Training Hours:** 7:30 AM – 3:30 PM **Daily Format:** 3–4 Learning Modules | Coffee breaks: 09:30 & 11:15 | Lunch Buffet: 01:00 – 02:00

#### Day 1: Foundations of Reliability in Engineering Design

- Module 1: Introduction to Design for Reliability (07:30 – 09:30) • Principles of DfR and its strategic importance • Overview of reliability engineering lifecycle • The cost of poor reliability in design decisions
- Module 2: Reliability Requirements and Metrics (09:45 – 11:15) • MTBF, availability, failure rates, and failure modes • Defining reliability targets for new designs • Establishing reliability specifications and KPIs
- Module 3: Reliability-Centered Design Thinking (11:30 – 01:00) • Avoiding failure modes through design choices • Collaboration across design, procurement, and O&M • Front-loading reliability into concept development
- Module 4: Workshop – Design Gap Analysis (02:00 – 03:30) • Participants assess reliability shortfalls in sample design cases

#### Day 2: Failure Mode Analysis and Preventive Design

- Module 1: Failure Modes and Effects Analysis (FMEA) (07:30 – 09:30) • FMEA process, scoring, and prioritization • Design FMEA vs. Process FMEA • Linking FMEA to design improvements
- Module 2: Fault Tree and Root Cause Analysis (09:45 – 11:15) • Fault tree development for critical systems • How FTA and RCA inform design redesign • Case example: electrical system fault logic
- Module 3: Maintenance Considerations in Design (11:30 – 01:00) • Maintainability engineering: ease of access, modularity, serviceability • Design for inspection, replacement, and repair • Human factors in design layout and work clearance
- Module 4: Workshop – Conduct a Design FMEA (02:00 – 03:30) • Participants run a FMEA on a selected system component

#### Day 3: Reliability Modeling and Data Analysis

- Module 1: Reliability Block Diagrams (RBD) (07:30 – 09:30) • Understanding series, parallel, and redundant system behavior • Modeling system availability and weak links • Case study in critical path analysis
- Module 2: Weibull and Life Data Analysis (09:45 – 11:15) • Failure distributions: exponential, lognormal, Weibull • Interpreting shape parameters and failure patterns • Using life data to predict future reliability
- Module 3: Accelerated Life Testing and Reliability Growth (11:30 – 01:00) • ALT techniques for product validation • Reliability growth models and design iterations • Planning reliability tests and burn-in
- Module 4: Workshop – RBD and Weibull Application (02:00 – 03:30) • Participants model system reliability using provided failure data

#### Day 4: Lifecycle Cost and Risk-Based Design Decisions

- Module 1: Lifecycle Cost (LCC) and Trade-Offs (07:30 – 09:30) • Balancing capital, operational, and maintenance costs • Evaluating TCO in design stage decisions • Reliability impact on LCC outcomes
- Module 2: Risk Analysis and Criticality Assessment (09:45 – 11:15) • Using risk matrices and criticality rankings • Prioritizing design effort and resources • Case examples from process industries
- Module 3: Designing for Predictive and Preventive Maintenance (11:30 – 01:00) • Embedding condition monitoring capability • Integration of sensors, smart design, and IIoT • Enabling autonomous reliability reporting
- Module 4: Workshop – LCC and Design Evaluation (02:00 – 03:30) • Teams assess two design options using reliability and LCC metrics

#### Day 5: Program Implementation and Integration

- Module 1: Building the Design for Reliability Process (07:30 – 09:30) • Integrating DfR into stage gates and project workflows • Governance and stakeholder roles • Continuous improvement in design feedback
- Module 2: DfR in Capital Projects and OEM Relations (09:45 – 11:15) • Contracting and procurement implications • OEM data and reliability validation • Ensuring design compliance during commissioning
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- Module 3: Program Review and Success Factors (11:30 – 01:00) • Common DfR challenges and how to overcome them • Monitoring effectiveness of DfR initiatives • Organizational culture to support reliability
- Module 4: Final Workshop – 90-Day Implementation Roadmap (02:00 – 03:30) • Participants build a tailored DfR action plan • Presentation, feedback, and course wrap-up

### Certification

Participants will receive a Certificate of Completion in Design for Reliability Maintenance, confirming their ability to integrate reliability principles into design, specification, and project decisions for improved lifecycle performance.

### Why Choose MAWA Events

- **Global Expertise:** More than 17 years of experience in professional training and consulting.
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