
Maintenance Error Prevention Training Course: Human Factors, Investigation and Controls

22 – 26 February 2027
Geneva





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Programme Summary

Maintenance error prevention is the subject of this one-week training course for maintenance, reliability and safety managers, ending in an error prevention plan for one work area. Many serious plant events trace back to a maintenance task that was carried out incorrectly, and blaming the technician rarely stops a repeat. The programme moves from the science of human error, through diagnosis of work practice and investigation of events, to the design of controls, then applies them to one work area. Mars Training Centre UK delivers this maintenance error prevention programme for plant, utility and process operators.

The Business Case

Errors in maintenance work show up later as rework, unplanned stoppages and safety events, often far from the task that caused them. Leaders who can find the conditions behind an error, rather than only the person involved, remove causes that would otherwise repeat on every shift. Sound controls also protect technicians and strengthen reporting of near misses.

- Rework Volume: Falls as task conditions that invite error are corrected.
- Near-Miss Reporting: Rises as investigation focuses on conditions and not on blame.
- Safety-Critical Task Reliability: Improves as verification and handover safeguards are applied.

Principles and Evidence Base

- Reason's Swiss cheese model: It explains how layered defences fail together and shapes the barrier thinking in Sessions 1, 3 and 4.
- The Dirty Dozen human factors preconditions: They give a shared list of conditions such as fatigue, pressure and poor communication, used in the diagnosis of Session 2.
- MEDA, the Maintenance Error Decision Aid: It structures the event investigation method practised in Session 3.

Intended Participants

- Maintenance managers who own task procedures, supervision and handovers.
- Reliability leaders who analyse repeat failures with a human element.
- Safety and process safety leads who investigate events and review controls.
- Operations directors who depend on safe return of equipment to service.

The programme serves oil and gas, power generation, process manufacturing and transport maintenance operations, and suits mixed groups.



Learning Outcomes

1. Participants will be able to classify maintenance errors as slips, lapses, mistakes or violations.
2. Participants will be able to diagnose human factors conditions in procedures, handovers and workloads.
3. Participants will be able to construct an event timeline that identifies failed barriers.
4. Participants will be able to evaluate contributing factors using a structured investigation method.
5. Participants will be able to prioritise controls by their strength in preventing recurrence.
6. Participants will be able to justify an error prevention plan for one work area.

Programme Structure

Day 1: Maintenance Error Prevention Principles

Why do skilled people make errors in maintenance work, and what makes them likely?

- Swiss Cheese Model of Layered Defences
- Slip, Lapse, Mistake and Violation Classification
- Dirty Dozen Preconditions Checklist
- Human Performance Limits Briefing
- Error Taxonomy for Maintenance Tasks

Day 2: Diagnosing Error Conditions in Work Practice

Which conditions in procedures, shifts and workloads make an error more likely?

- Task Walk-Through Interview Guide
- Procedure Usability Review
- Shift Handover Log Review
- Fatigue and Workload Pattern Analysis
- Rework and Near-Miss Data Scan

Day 3: Investigating Maintenance Errors

How is an event investigated so that conditions, and not only people, are found?

- MEDA Investigation Process
- Contributing Factor Interview Protocol
- Event Timeline and Barrier Map
- Just Culture Decision Chart
- Investigation Report Template



Day 4: Designing Controls to Prevent Maintenance Errors

Which controls stop an error from reaching the equipment, and how strong is each?

- Error-Proofing Options for Tasks
- Procedure and Checklist Redesign
- Independent Verification Rules
- Handover and Permit Safeguards
- Control Strength Ranking Grid

Day 5: Applying Maintenance Error Prevention to One Work Area

Is the error prevention plan ready to put before the leadership team?

- Applying the Session 2 Diagnosis to the Chosen Area
- Re-Investigating a Past Event with the Session 3 Method
- Testing Session 4 Controls on a Live Procedure
- Rehearsing the Leadership Briefing
- Completing the Error Prevention Plan

Methodology

The programme uses case analysis built on anonymised maintenance events, procedures, handover logs and interview notes from several sectors. Participants work in small groups to classify errors, rebuild event timelines and test controls, with feedback from peers and the facilitator on each work product. Discussion stays on conditions and defences, not on blame.

- Suggested activity: Classifying the errors in a short maintenance event narrative.
- Suggested activity: Rebuilding a timeline and marking the barriers that failed.
- Suggested activity: Ranking three proposed controls for a repeat error by strength.

Capstone Output

Each participant completes an error prevention plan for one work area. It holds a condition diagnosis, a priority list of error-prone tasks, an investigation approach, a ranked set of controls with owners and a brief for the leadership team. The plan is used to agree changes to procedures, handovers and supervision.

Frequently Asked Questions

Is maintenance error prevention suitable for managers with no human factors background?

Yes. Maintenance error prevention starts from everyday work examples and assumes responsibility for maintenance tasks, procedures or event reviews, not prior human factors study.



Which models does maintenance error prevention rest on in this course?

Maintenance error prevention here rests on Reason's Swiss cheese model, the Dirty Dozen human factors preconditions and the MEDA investigation method.

How is the plan from maintenance error prevention used at work?

You use the error prevention plan to agree changes to procedures, handovers and supervision, and to brief your leadership team on the controls you propose.

How does maintenance error prevention differ from a root cause analysis programme?

Maintenance error prevention centres on human performance and the conditions that cause task errors, while a root cause analysis programme covers equipment failure mechanisms and wider causal analysis.