



Maintenance Decision Analysis: Weibull, AHP & FMEA Methods



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Maintenance Decision Analysis: Weibull, AHP & FMEA Methods is a five-day course on choosing maintenance actions with numbers rather than habit. It suits maintenance, reliability and planning staff who already handle failure records and work orders. You apply Weibull analysis, the Analytic Hierarchy Process and FMEA to your own equipment and leave with a Maintenance Decision Workbook. Mercury Training Center runs this one-week, method-focused course.

About This Course

Maintenance budgets are often spent by whoever argues loudest: intervals are copied from manuals, shutdown scopes grow and repeat failures stay. To follow the course you should already work with failure history, a CMMS or maintenance plans. You practice each method on worked data sets, then on records you bring from your site.

Who It Is For

- People who set maintenance strategies and intervals for plant equipment
- People who analyze failures and recommend reliability improvements
- People who plan and schedule work, spares and shutdowns
- People who run or report from CMMS and planning systems
- People who approve maintenance budgets and must defend their choices

This course is not for readers who want a broad, two-week tour of decision analysis and performance measurement, who are better served by a longer operations decision course, or for statisticians seeking theory, who are better served by an academic reliability course.

Competencies You Will Build

- Failure data interpretation: reads a Weibull plot and says whether failures are early, random or wear-out.
- Multi-criteria ranking: builds an AHP hierarchy and defends the weights to colleagues.
- Failure risk scoring: leads an FMEA session and agrees risk priorities with the team.
- System reliability modeling: estimates how series, parallel and redundant layouts change availability.
- Planning data use: pulls CMMS, MRP and ERP information into one decision.
- Policy selection: matches each asset to run-to-failure, time-based or condition-based care.

What You Will Be Able to Do

By the end of the course you will be able to:

- From a set of failure times, fit a Weibull distribution and propose a replacement interval.
- Given several competing maintenance proposals, rank them with AHP and a benefit/cost check.
- Using an FMEA worksheet, score failure modes and decide which actions come first.
- From a process flow sketch, model system reliability and test the value of a standby unit.
- Given a bill of materials and master production schedule, plan spares for a maintenance window.
- Using CMMS history reports, adjust intervention timing for a group of assets.

Course Content

Day 1: Decision Foundations and Failure Data

- Scope of Decisions in Operations and Maintenance
- Decision-Making Stages From Framing to Review
- Learning From Worst Practice: How Bad Maintenance Decisions Happen
- Guidelines for Sound Decision Analysis
- Reliability Basics and Weibull Analysis of Failure Records

Day 2: Multi-Criteria Choices With AHP

- AHP Hierarchy Building for Maintenance Policy Choices
- Pairwise Comparison Matrices and Consistency Checks
- Benefit/Cost Analysis of Competing Interventions
- Resource Allocation Across a Portfolio of Maintenance Work
- Sensitivity of AHP Rankings to Changes in Weights

Day 3: FMEA and System Reliability

- FMEA Worksheets for Critical Equipment
- Risk Priority Number Scoring and Its Limits
- Criticality Matrix for Ranking Assets Before a Shutdown
- Fault Tree Analysis of a Repeat Trip
- Series, Parallel and Redundant System Reliability Models

Day 4: Planning Systems and CMMS Data

- ERP Development and Its Role in Maintenance Planning
- MRP Logic: Bill of Materials and Master Production Schedule
- CMMS Data Quality and Reports That Support Decisions
- Policy Selection: Run-to-Failure, Time-Based or Condition-Based
- Features of Next-Generation Maintenance Systems

Day 5: Decision Practice on Plant Cases

- Exercise: Weibull Fit and Replacement Interval for a Pump Fleet
- Exercise: AHP Policy Choice Under Limited Resources
- Exercise: FMEA and Criticality Ranking Before a Shutdown
- Exercise: Turning CMMS Reports Into Intervention Timing
- Completing Your Maintenance Decision Workbook

Case Studies and Exercises

The following are suggested activities.

- Case study: An oil and gas processing site has budget for only part of its proposed overhauls; you rank them with AHP and decide which wait.
- Case study: A water utility's pumping station suffers repeat seal failures; you fit failure data and decide on a new interval.
- Exercise: A power plant prepares a shutdown; you produce an FMEA and criticality ranking for its auxiliary systems.
- Exercise: A manufacturing line plans spares from its master production schedule; you produce a spares list for the next maintenance window.

What You Take Back

The Maintenance Decision Workbook is a set of worked templates you complete across the five days with your own equipment data. In your first month back, use it to review intervals on your worst actors and to rank the next batch of maintenance requests before budget approval.

- A Weibull analysis sheet with interval recommendations
- An AHP ranking model for maintenance proposals
- An FMEA and criticality register for critical assets
- A policy selection guide linked to CMMS reports

Quick Answers FAQ

What should I know before a maintenance decision analysis course on Weibull, AHP and FMEA?

You should already work with failure records, work orders or maintenance plans and be comfortable with spreadsheets. No statistics background is required; Weibull and AHP are built step by step from worked examples.

How does a one-week maintenance decision analysis course differ from a two-week operations decision course?

The one-week course concentrates on applied methods: Weibull, AHP, FMEA, system reliability and CMMS data. A two-week course adds wider topics such as decision trees, performance measurement, OEE and quality function deployment.

When should Weibull analysis be used for maintenance intervals?

Weibull analysis fits when you have enough failure times for one failure mode. The shape parameter shows whether failures are early, random or wear-out, and only wear-out failures justify fixed replacement intervals.

What do I take back from a maintenance decision analysis course?

You take back the Maintenance Decision Workbook, built on your own equipment data. It holds a Weibull sheet, an AHP ranking model, an FMEA and criticality register and a policy selection guide.

For Your Manager

After the course, the team member will be able to set maintenance intervals from failure data, rank competing requests with AHP, lead FMEA reviews and use CMMS and planning data in policy choices. They return with a Maintenance Decision Workbook built on site equipment, first used to review intervals and rank requests for the next budget round.