



Maintenance & Reliability Best Practices

CMRP Exam Preparation

Course Overview

Over recent years many good practices in maintenance have been developed that have contributed to improved performance. This course is designed for maintenance and reliability professionals wishing to broaden their knowledge in the field of maintenance and reliability.

Scope

The scope of the course is to introduce participants to the 5 pillars of maintenance as defined by the Society for Maintenance and Reliability Professionals and prepare participants for the Certified Maintenance and Reliability Professional (CMRP) Exam.

Course objectives

At the end of this training course, attendees will be able to:

- Evaluate existing maintenance programs.
- Implement principles and strategies to manage maintenance effectively.
- Set targets related to Reliability to improve plant performance.
- Understand the true cost of downtime.
- Get acquainted with proactive maintenance methods.
- Reduce maintenance costs through efficient work management practices.
- Pass the CMRP exam.

Who should attend:

The course is designed for Maintenance and Reliability Engineers, Production and Operations Engineers, Managers, Apprentice Engineers and Supervisors

Training Methodology: This is an interactive training course and the content will be covered by using lectures, workshops and work presentations, case studies and practical exercises and videos.

Course instructor: George Loizou

George is a Mechanical Engineer with more than 38 years of experience mainly in the Oil and Gas Industry. George holds an MSc Degree from The Pennsylvania State University. He is a member of SMRP and a Certified Maintenance and Reliability Professional (CMRP). He is also member of the Cyprus Scientific and Technical Chamber, associated member of the Institution of Mechanical Engineers of UK and certified trainer by the Human Resource Development Authority of Cyprus (HRDA). George worked as Head of Mechanical Maintenance at the Cyprus Petroleum Refinery Ltd, Engineering Manager and Terminal Manager at Cyprus Petroleum Storage Company Ltd. He has a wide experience as a trainer, as since 2005 he has been delivering courses and seminars internationally.

Duration: 5 Days

Course Venue: TBA



DAY 1

1. Course Overview.

Participant introduction.

2. The Society of Maintenance and Reliability Professionals.

3. Short quiz (Kahoot).

4. Principles of Maintenance

- Maintenance – Historical Perspective.
- Basic terms (maintenance, Reliability, MTBF, MTTR).
- Understanding Failures.
- Types of Maintenance.
- Asset Management - ISO55000.

5. Introduction to Best Practices

- What is a best practice.
- Metrics.

6. Pillar 1 - Business Management

- Create Strategic Direction and Plan for M&R Operation: Vision, Mission, Values, Policy and Strategy, Strategic planning, Setting goals, Assessing the present situation, Action Plans.
- Administer Strategic Plan: Building the business case, Planning and budgeting Resources, Risk Management.
- Measure performance: Leading & lagging indicators, Scorecards, Dashboards.
- Organizational Changes: Communicating programs and change to stakeholders, Change Management, Change Models.
- Communication with Stakeholders: Communication methods, Stakeholder matrix, RACI chart.
- Short quiz (Kahoot).

DAY 2

7. Pillar 2 - Manufacturing Process Reliability

- Operating procedures: Block diagrams, PFDs, P&IDs, SIPOC Diagram, Standard work instructions, Standard operating procedures.
- Process Improvement Techniques: Manufacturing Effectiveness Techniques, Statistical Process Control, The 5S program, Manufacturing Teams, 6σ, Lean manufacturing, Value Stream Mapping, Root Cause Analysis.
- Management of Change: Manage effects of change to process & equipment, Plant changes, Identification of HSE issues,

Process Hazard Analysis, What if, HAZOP, Pre-Startup safety reviews, Job Hazard Analysis.

- Maintain the process: Process and industry standards and specifications, Maintain the process, HSE policy, Safety Inspections and audits, KPIs, Idle time, uptime, Availability, Overall Equipment Effectiveness, Total Effective Equipment Performance.
- Short quiz (Kahoot).

DAY 3

8. Pillar 3 - Equipment Reliability

- Determine Equipment Reliability Expectations: Review Business Goals, Asset Criticality, Pareto Analysis, Weibull Analysis, Reliability Growth, Series Systems/Redundant Systems.
- Evaluate Equipment Reliability and Identify Improvement Opportunities: Identify improvement opportunities, Root Cause Failure Analysis, Fault Tree Analysis, Fishbone diagram, FMEA, FRACAS.
- Establish A Strategic Plan to Assure Reliability of Existing Equipment: Establish a Maintenance Strategy, RCM, TPM, RBI, SIS, Condition Based Maintenance, Hydraulic Oil Cleanliness, Activity Based Budgeting.
- Establish A Strategic Plan to Assure Reliability of New Equipment: Specifications for new equipment, Life Cycle Analysis.
- Justify the Costs of Selected Plans for Implementation: Cost-justify tactics selected for implementation.
- Implement Selected Plans to Assure Equipment Reliability: Good engineering practices in maintenance, Upgrading machinery, Repair Standards.
- Review Reliability of Equipment And Adjust Reliability Strategy: Review performance and adjust maintenance strategy, KPIs.
- Short quiz (Kahoot).

DAY 4

9. Pillar 4 - Organization and Leadership

- Determine Organizational Requirements: Identify Goals &



Constraints, Determine organizational requirements, KPIs.

- Analyzing Organizational Capability: Job descriptions, Competency Model, Skills Matrix, Human errors.
- Develop the Organization Structure: M & R Organization structure, Organizational Theories (Maslow's Hierarchy of needs, Herzberg's Theory, MacGregor's Theory of X and Y, Theory Z, McClelland Theory of Needs).
- Develop Personnel: Develop the maintenance and reliability staff, Team Formation.
- Lead and Manage People: Organizational Culture, Leadership, Autocratic, Laissez-Faire, Democratic, Servant, Transformational, Coaching.

10. Pillar 5 - Work Management

- Identify, validate and approve work intake: Work identification, Sources of work, Work requests/orders, Work order system, Decision to Accept or Reject a Work Request.
- Prioritize Work: RIME Index for work priorities.
- Plan work: Roles and responsibilities, Work planning, WBS, Job plans.

- Execute Work: Issuing work to operators, Contractors, Wrench time, Backlog management.

DAY 5

- Document Work: Documented Procedures, Equipment history, failure identification, ISO 14224:2023.
- Analyze Work and follow up: Analyzing Equipment History.
- Measure work management performance: KPIs.
- Plan and execute projects: Capital Project Planning, Effective Turnaround/Shutdown Planning.
- Use information technologies effectively: CMMS, Project Management Software, Predictive Maintenance Software.
- Manage resources and materials: Inventory Control, Inventory Classification, Economic order quantity.
- Short quiz (Kahoot).

11. Practice questions/Questions and Answers

12. Course assessment

13. Presentation of Certificates

- Schedule Work: Work scheduling, Priority Over Plan, Weekly scheduling, Daily scheduling, the annual plan.