

COURSE OVERVIEW RE0574
Cost Management and Maintenance Management
(E-Learning Module)

Course Title

Cost Management and Maintenance Management (E-Learning Module)

Course Reference

RE0574

Course Format & Compatibility

SCORM 1.2. Compatible with IE11, MS-Edge, Google Chrome, Windows, Linux, Unix, Android, IOS, iPadOS, macOS, iPhone, iPad & HarmonyOS (Huawei)



Course Duration

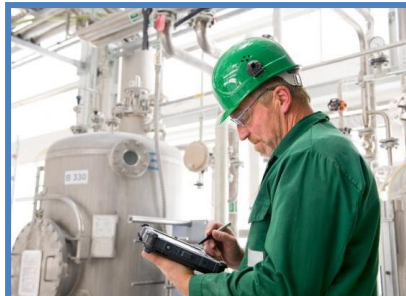
30 online contact hours
(3.0 CEUs/30 PDHs)



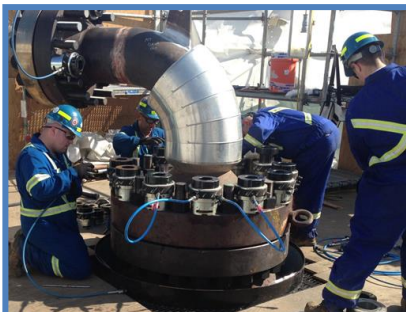
Course Description



This E-Learning course is designed to provide participants with a detailed and up-to-date overview of cost management and maintenance management. It covers the maintenance, reliability, maintenance cost facts, figures and maintenance policies development over time; the predictive maintenance, maintenance and reliability best practice and corrective maintenance; the preventive maintenance, cleaning, lubrication, adjusting, tightening, testing and calibration, scheduled replacement, short repairs, periodic inspection and rebuilding; and the factors that affect the efficiency of PM and classify maintenance policies.



Further, the course will also discuss the major parameters used for detection of machine faults; the vibration monitoring, infrared thermography monitoring and ultrasonic monitoring; the proactive maintenance, equipment failure process and causes; the p-f curve concept, equipment failure patterns, fundamental causes of failures and faulty design; the defects due to inadequate material selection, processing and manufacturing defects, assembly and installation errors and improper operation; the maintenance deficiencies, latent (organizational) deficiencies; the benefits of root cause failure analysis and the three levels of cause.



During this course, participants will learn the steps for root cause failure analysis, types of interviews and the 7-step process; the preventive maintenance optimization, life cycle cost analysis and pump life cycle cost calculation; the risk issues in maintenance budgeting; the cost engineering and management, cost estimating and the project life cycle, project cost management processes, maintenance cost control and variance management; the project management plan, total productive maintenance, overall equipment effectiveness, availability calculation, performance calculation and quality calculation; the principles of total productive maintenance, workforce management, employee life cycle and succession planning; establishing and maintaining learning environment; the maintenance planning and scheduling; the responsibilities of planner and scheduler; the benefit of planning; the continuous improvement and managing change; classifying and resolving problems effectively; the 7-step formula for problem solving; and the PDCA cycle.

Course Objectives

Upon the successful completion of this course, participants will be able to:-

- Apply and gain an in-depth knowledge on cost management and maintenance management
- Discuss maintenance and reliability, maintenance cost facts and figures and maintenance policies development over time
- Carryout predictive maintenance, maintenance and reliability best practice and corrective maintenance
- Apply preventive maintenance, cleaning, lubrication, adjusting, tightening, testing and calibration, scheduled replacement, short repairs, periodic inspection and rebuilding
- Identify the factors that affect the efficiency of PM and classify maintenance policies
- Recognize the major parameters used for detection of machine faults and employ vibration monitoring, infrared thermography monitoring and ultrasonic monitoring
- Apply proactive maintenance and determine equipment failure process and causes, the p-f curve concept, equipment failure patterns, fundamental causes of failures and faulty design
- Describe the defects due to inadequate material selection, processing and manufacturing defects, assembly and installation errors and improper operation
- Identify maintenance deficiencies, latent (organizational) deficiencies, the benefits of root cause failure analysis and the three levels of cause covering physical, human and latent causes
- List the steps for root cause failure analysis, types of interviews and the 7-step process
- Carryout preventive maintenance optimization, life cycle cost analysis and pump life cycle cost calculation
- Identify risk issues in maintenance budgeting, manage maintenance budget and build a long-range plan to optimize your budget

- Apply cost engineering and management, cost estimating and the project life cycle, project cost management processes, maintenance cost control and variance management
- Implement project management plan, total productive maintenance, overall equipment effectiveness, availability calculation, performance calculation and quality calculation
- Discuss the principles of total productive maintenance and perform workforce management, employee life cycle and succession planning
- Establish and maintain learning environment, apply maintenance planning and scheduling as well as discuss the responsibilities of planner and scheduler
- Calculate the benefit of planning, choose a planner, apply continuous improvement and manage change
- Classify and resolve problems effectively, apply the 7-step formula for problem solving and describe the PDCA cycle

Who Should Attend

This course covers systematic techniques on cost management and maintenance management for maintenance managers, maintenance engineers, maintenance supervisors, maintenance foremen, asset managers, housing services supervisors, property managers, maintenance & engineering consultants, project managers and those who are involved in maintenance and operations (M&O) in consultant, contractor or operating companies.

Training Methodology

This Trainee-centered course includes the following training methodologies:-

- Talking presentation Slides (ppt with audio)
- Simulation & Animation
- Exercises
- Videos
- Case Studies
- Gamification (learning through games)
- Quizzes, Pre-test & Post-test


Every section/module of the course ends up with a Quiz which must be passed by the trainee in order to move to the next section/module. A Post-test at the end of the course must be passed in order to get the online accredited certificate.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course.

Certificate Accreditations


Certificates are accredited by the following international accreditation organizations: -

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USA International Association for Continuing Education and Training (IACET)

Haward Technology is an Authorized Training Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 1-2013 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 1-2013 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Association for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council for Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Fee

As per proposal

Course Contents

- Understanding Maintenance & Reliability
- What Maintenance Is?
- Understanding Reliability
- Maintenance Cost Facts & Figures
- Maintenance Policies Development Over Time
- Maintenance Development Over Time
- Growing Maintenance Expectations
- Maintenance Policies
- Predictive Maintenance (PDM)
- Maintenance & Reliability Best Practice
- Definition
- Features
- What are the Best Practices?
- Corrective Maintenance (CM)
- Basic Philosophy
- When Can CM Be Reasonably Effective?
- In General, The Following Rules Apply
- Advantages
- Disadvantages
- What are the Likely Consequences of Operating Largely With CM?
- Preventive Maintenance (PM)
- What Is Preventive Maintenance (PM)?
- Cleaning
- Lubrication
- Adjusting and Tightening
- Testing and Calibration
- Scheduled Replacement
- Short Repairs
- Periodic Inspection
- Rebuild

- When Does Preventive Maintenance Make Sense?
- Ratio of PM to CM
- Suitable Applications
- Unsuitable Applications
- Advantages
- Disadvantages
- The Factors that Affect the Efficiency of PM
- Predictive Maintenance (PDM)
- Classification of Maintenance Policies
- ISO Definition
- Basic Philosophy
- Advantages
- Disadvantages
- Major Parameters Used for Detection of Machine Faults
- Vibration Monitoring
- What Is Machine Vibration?
- Infrared Thermography Monitoring
- What Is Thermography?
- Thermography - Introduction
- Thermography - Uses
- Thermography Uses in Mechanical Components
- Thermography Uses in Electrical Components
- Thermography - Benefits
- Thermography – Mechanical Defects Detection
- See the Heat, See the Problem
- Bearing Problems
- Pump Bearing in Need of Maintenance
- Belt Drive
- Loose or Tight Belt Heats Up Abnormally
- Overheating Belt/Sheave
- Combustion Engines
- Ship Diesel Engine Running Improperly
- Thermography – Electrical Defects Detection

- See the Heat, See the Problem
- Transformer Low Oil
- Motor Internal Winding Problem
- Coupling Misalignment
- Electric Motor Bearing
- Overheated Motor Bearing. Over 80 °C on Bearing Housing
- Valves
- Leakage Detection
- Steam Systems
- Steam Trap Blow-By Easily Detected
- Fluid/Steam Systems
- Tank Levels
- Thermography
- Advantages
- Limitations
- Cost
- Ultrasonic Monitoring
- What Is Ultrasound?
- Ultrasonic Monitoring
- Applications
- Measuring
- Leak Detection
- Steam Traps
- Valve Leak Detection
- Bearing Lubrication
- Bearing Faults
- Ultrasonic – Pump Cavitation
- Ultrasonic – Electrical Inspection
- Ultrasonic Monitoring - Setting a Baseline
- Comparative
- Historical
- Ultrasonic Monitoring - Advantages
- Ultrasonic Monitoring - Cost

- Proactive Maintenance
- Equipment Failure Process & Causes
- What is a Failure?
- What is a Failure Mode (FM)?
- What is a Failure Mechanisms?
- The P-F Curve Concept
- Functional Failure
- Potential Failure
- How Failures Appear?
- Equipment Failure Patterns
- First Generation
- Second Generation
- “Wear In” (Infant Mortality) Failures
- “Normal Life” Failures
- “Wear Out” Failures
- Fundamental Causes of Failures
- Faulty Design
- Defects Due to Inadequate Material Selection
- Processing and Manufacturing Defects
- Assembly and Installation Errors
- Improper Operation
- Maintenance Deficiencies
- Latent (Organizational) Deficiencies
- Root Cause Failure Analysis “RCFA”
- The Benefits
- The Three Levels of Cause (Physical, Human and Latent Causes)
- General Principles of RCFA
- Steps for Root Cause Failure Analysis
- Reporting an Incident or Problem
- Scoping
- Appoint the RCA Team
- Defining the Problem
- Collection of Data

- Parts
- Paper
- Position
- People
- Types of Interviews
- Interviewing Techniques
- Interview Questions
- Process Equipment Questions
- Employee Interaction
- Documentation
- Paradigms
- Data Analysis
- Analyze the 7-Step Process
- Data Analysis – Brainstorming
- Data Analysis – 5 Whys
- Developing Corrective Action Recommendations
- Evaluating Potential Corrective Actions
- Reporting
- Verify Corrective Actions
- RCFA Software
- Preventive Maintenance Optimization (PMO)
- PMO – Introduction
- Lack of Effective Preventive Maintenance can Cause
- Effective Preventive and Predictive Maintenance Insures
- What is Wrong with the Typical PM Program?
- PMO is Achieved By
- PMO – Process
- STEP 1- Task Compilation (Collection)
- Step 2 - Failure Mode Analysis
- Step 3 - Rationalization and Failure Mode Review
- Step 4 – Functional Analysis
- Step 5 - Consequence Evaluation
- Step 6 - Maintenance Policy Determination

- Step 7 - Grouping and Review
- Step 8 - Approval and Implementation
- Step 9 - Living Program
- The Results of a Typical PMO
- Life Cycle Cost Analysis
- Why Use LCCA?
- Initial (Acquisition) Costs
- Future (Sustaining) Cost
- LCC Analysis for Pumping System
- CIC - Initial Investment Costs
- CIN - Installation and Commissioning (Start-Up) Costs Installation and Commissioning Costs
- CE - Energy Costs
- CO- Operation Costs
- Cm- Maintenance and Repair Costs
- Life Cycle Cost Analysis – Case Study
- Pumping System with a Problem Control Valve
- Pump Life Cycle Cost Calculation
- The Maintenance Budget
- Identifying Risk Issues in Maintenance Budgeting
- Maintenance Budget Preparation & Control
- The Operating Budget
- Annual Budgeting
- Manpower
- Materials
- Parts
- Consumables
- Tools and Technical Resources
- External Assistance
- Managing the Maintenance Budget
- Budget Development – Creating the Foundation
- Where to Start
- Following Business Processes
- Review – Collect Data and Review Results – Bad Actors

- Create Improvement
- Focus on Leading Indicators
- Typical Performance Measures
- Build a Long-Range Plan to Optimize Your Budget
- Cost Engineering & Management
- Cost Estimating and the Project Life Cycle
- Project Cost Management Processes
- Maintenance Cost Control
- Cost Baseline
- Variance Management
- Cost Estimates
- Organization Process Assets
- Project Management Plan
- Project Management Plan Purpose
- Total Productive Maintenance (TPM)
- Total Productive Maintenance – History
- Overall Equipment Effectiveness (OEE)
- Availability Calculation
- Performance Calculation
- Quality Calculation
- Total Effective Equipment Performance
- Total Productive Maintenance - Principles
- 5S Philosophy
- 5S Philosophy – Sort (Seiri)
- 5S Philosophy – Set in Order (Seiton)
- 5S Philosophy – Shine (Seiso)
- 5S Philosophy – Standardize (Seiketsu)
- 5S Philosophy – Sustain (Shitsuke)
- 5S Philosophy – Benefits
- PILLAR 1: Autonomous Maintenance (JISHU HOZEN)
- Benefits
- PILLAR 2: Focused Improvement (KAIZEN)
- PILLAR 3: Planned Maintenance

- Benefits
- Six Steps in Planned Maintenance
- PILLAR 4: Quality Maintenance
- Definition
- Objective
- Quality Rate
- Policy
- PILLAR 5: Education and Training
- Objectives
- Benefits
- PILLAR 6: Safety, Health and Environment
- Benefits
- PILLAR 7: Office TPM
- Steps for TPM Implementation
- Step 1: Announce Top Management's Decision to Introduce TPM
- Step 2: Introductory Education Campaign
- Step 3: TPM Promotion
- Step 4: Establish Basic TPM Policies and Goals
- Step 5: Preparation and Formulation of a Master Plan
- Program Development Master Plan
- Step 6: TPM Kick-Off
- Step 7: Develop an Equipment Management Program
- Typical Membership of a Team
- Tools
- Step 8: Develop a Planned Maintenance Program
- Step 9: Develop an Autonomous Maintenance Program
- A Chart for Autonomous Maintenance
- Step 10: Increase Skills of Production and Maintenance Personnel
- Training Skill Development Matrix
- Step 11: Develop Early Equipment Management Program
- Step 12: Perfect TPM Implementation and Raise TPM Levels
- Direct Benefits of TPM
- Indirect Benefits of TPM

- Difficulties Faced in TPM Implementation
- The Cost of Implementing TPM
- Workforce Management
- Introduction
- Employee Life Cycle
- Hire
- Inspire
- Admire
- Retire
- New Hire Selection Process/Procedures
- Performance Review
- Determining Training Needs
- Skills Development Training
- Designing Organization Structure for Better Integration of M&R Functions
- Succession Planning
- Establish and Maintain Learning Environment
- Introduction to Maintenance Planning & Scheduling (MPS)
- MPS - Introduction
- What is Wrench Time?
- MPS - Objectives
- MPS – Defined
- Planning/Scheduling
- Planning Vs. Scheduling
- Planning
- The Planner Responsibilities
- Typical Planning Duties
- 1. Plans and Coordinates Maintenance Activities
- 2. Acting as a Liaison Between Departments
- 3. Ensures that the CMMS Software Data Files are Complete and Current
- 4. Develop and Maintain Planner Reference Systems (Library)
- 5. Assist with Stores and Purchasing Functions
- 6. Identifies Recommendations and or Areas for Improvements
- Planner's Time

- Scheduling
- The Scheduler Responsibilities
- Typical Scheduling Duties
- MPS - Benefits
- Calculating the Benefit of Planning
- How to Choose a Planner?
- Good Craft Skills
- Good Communication Skills
- Data Skills
- Self-Motivated
- Should Planning Be Separate from Scheduling?
- How Many Planners?
- Where Planning/Scheduling Fits into Good Maintenance Practices?
- MPS – The Process
- Continuous Improvement
- Objectives
- Managing Change
- Innovation & Improvement
- Kaizen is not a Synonym for Improvement
- Comparing Kaizen and Innovation
- 6 Points to Consider
- Why is it Necessary to Measure?
- What is Measured?
- Where to Measure?
- The Best Measures are Made at the Situation
- Try to Measure and Record Events as Soon after the Event as Possible
- The People Who Operate and Repair Equipment are the Ones with the Greatest Experience
- Adopt the Slogan “Speak with Facts”. Do Not Make Decisions Based on Experience and Intuition Alone
- Breakdowns
- What is a Breakdown?
- Breakdown Classification
- Cause

- Suddenness
- Extent
- Period of Occurrence
- Safety
- Way of Occurring
- Consequences
- Type of Repair
- MTBF Mean Time Between Failures
- MTTR Mean Time to Repair
- Overall Equipment Effectiveness
- Problem Classification
- How Do You Resolve Problems?
- How Should You Resolve Problems?
- Problem Classification
- Problem Type A: Known Cause and Known Countermeasure
- Problem Type B: Known Cause and Unknown Countermeasure
- Problem Type C: Unknown Cause and Known Countermeasure
- Problem Type D: Unknown Cause and Unknown Countermeasure
- 7 Step Formula for Problem Solving
- Plan, Do, Check, Act. The PDCA Cycle