COURSE OVERVIEW PE0267
Process Plant Performance & Efficiency
(E-Learning Module)

Course Title
Process Plant Performance & Efficiency (E-Learning Module)

Course Reference
PE0267

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 process plant performance and efficiency. It covers the progress charts (time versus depth), chemical product, process plant and its components; the refineries complexity factors, supply chain management, pareto principle or 80-20 rule, production and improving performance and performance monitoring; the operating procedures, optimization and managing performance; the benefits of performance measurement; the resources / budget justification, ownership and teamwork, communication and benchmarking; and the performance measures, metrics development process, leading and lagging indicators, data collection and quality.

Further, the course will also discuss the maintenance policies, predictive maintenance, comparison of maintenance strategies, proactive maintenance and reliability centered maintenance; the root cause analysis and its types; the total productive maintenance and maintenance best practices; the maintenance terms & definitions including reliability, availability and maintainability; and the functions of maintenance manager, supervisor and maintenance planner; the motivating strategies, disciplinary action and performance appraisal.

Moreover, the course will also cover the modern maintenance management, operator best operating practice, maintenance excellence and effective maintenance planning; the various types of schedule, the factors affecting scheduling and the principles of effective scheduling; the maintenance implementation strategies, modern maintenance management and best practices of lubrication storage and handling; the various ways to reduce inventory waste/costs and ensure that storage conditions are correct; and the system distribution diagrams, typical refinery offsite and utilities and refinery steam system.

During this course, participants will learn the boiler feed water treatment and the recommended PRV installation; the combustion air preheating, radiation, convection heat loss minimization and variable speed control for fans, blowers and pumps; the key performance indicators, fuel efficiency, model validation and back-casting; the enterprise resource planning, risk management methods and HAZOP study; the offsites operations optimization; the tank farm layout, tank mixing, storage facilities operation, batch blending and blending optimization; the inventory management, utilities management, boiler management, steam system and fuel gas system conventional control; and the total quality management, lean manufacturing, distillation optimization and MVPC optimization.

Course Objectives

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

- Apply and gain an in-depth knowledge on process plant performance and efficiency
- Discuss progress charts (time versus depth), chemical product, process plant and its components
- Identify refineries complexity factors and carryout supply chain management, the pareto principle or 80-20 rule, production and improving performance and performance monitoring
- Employ operating procedures, optimization and managing performance as well as discuss the benefits of performance measurement
- Apply resources / budget justification, ownership and teamwork, communication and benchmarking
- Identify performance measures, metrics development process, leading and lagging indicators, data collection and quality
- Classify maintenance policies and apply predictive maintenance, comparison of maintenance strategies, proactive maintenance and reliability centered maintenance
- Define root cause analysis and identify its types as well as implement total productive maintenance and maintenance best practices
- Explain maintenance terms & definitions including reliability, availability and maintainability
- Discuss the functions of maintenance manager, supervisor and maintenance planner as well as perform motivating strategies, disciplinary action and performance appraisal
- Carryout modern maintenance management, operator best operating practice, maintenance excellence and effective maintenance planning

- Recognize the various types of schedule, the factors affecting scheduling and the principles of effective scheduling
- Implement maintenance strategies, modern maintenance management and best practices of lubrication storage and handling
- Apply the various ways to reduce inventory waste/costs and ensure that storage conditions are correct
- Describe system distribution diagrams, typical refinery offsite and utilities and refinery steam system
- Perform boiler feed water treatment and the recommended PRV installation
- Recognize combustion air preheating, radiation and convection heat loss minimization and variable speed control for fans, blowers and pumps
- Discuss key performance indicators, fuel efficiency, model validation and back-casting
- Carryout enterprise resource planning, risk management & optimization, risk management methods and HAZOP study
- Optimize offsites operations and illustrate tank farm layout, tank mixing, storage facilities operation, batch blending and blending optimization
- Apply inventory management, utilities management, boiler management, steam system and fuel gas system conventional control
- Employ total quality management, lean manufacturing, distillation optimization and MVPC optimization

Who Should Attend

This course covers systematic techniques on process plant performance and efficiency

This course is intended for those concerned with the process plant performance and efficiency including planning staff, instrumentation & control staff, production & operation staff, process, electrical, mechanical and project engineers. Management can also appreciate the importance of the new tools available to achieve the plant objectives of today and meet the challenges of tomorrow.

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: -

- 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.

- 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

- Progress Charts (Time versus Depth)
- Chemical Product
- Products
- Process Plant
- Components of the Process Plant
- Refineries Complexity Factors
- Supply Chain Management
- Cost, Size & Complexity Impact ROI
- How is the Pie Sliced?
- Items Contributing to the Optimum
- The Pareto Principle or 80-20 Rule
- The Pareto Principle in Action
- Components of the Process Plant
- Production and Improving Performance
- Performance Monitoring
- Operating procedures
- What Is Optimization?
- Optimization Characteristics
- Maxima and Minima
- What Can Optimization Achieve?
- How Big is the Pie?
- As Cost, Size & Capacity Increase the Pie Gets Bigger
- Quiz of section 01
- Managing Performance
- The Benefits of Performance Measurement
- Key Terms and Definitions
- Goals
- World-Class
- Accountability
- Resources / Budget Justification
- Ownership and Teamwork
- Communication — A Common Language

- Benchmarking
- Benchmarking - Definition
- Benchmarking – An Improvement Tool
- Benchmarking – Benefits
- Benchmarking Methodology
- Identifying Performance Measures
- Metric
- Metrics Development Process
- Leading and Lagging Indicators
- Lack of Standardized Definitions
- Data Collection and Quality
- Quiz of section 02
- Understanding Maintenance
- What is Maintenance?
- The Objective of Maintenance?
- Maintenance Objectives in the Plant
- How Maintenance Achieve Objectives
- Facts & Figures
- Maintenance Development Over Time
- Growing Maintenance Expectations
- Maintenance Policies
- Classification of Maintenance Policies
- Predictive Maintenance
- Comparison of Maintenance Strategies
- Proactive Maintenance
- Understanding Reliability
- Reliability Centered Maintenance
- Maintenance & Reliability – Importance
- Proactive vs. Preventive/Predictive
- Maintenance & Reliability Objectives
- Equipment Reliability – Responsibility?
- Top Management View of Maintenance
- Maintenance & Reliability – Facts & Figures
- What is Root Cause Analysis?
- Types of RCA

- FMEA/FMECA
- Total Productive Maintenance
- Maintenance Best Practices
- Maintenance Terms & Definitions
- MTBF (Mean Time Between Failure)
- MTTR (Mean Time To Repair)
- Reliability
- Availability
- Maintainability
- Quiz of section 03
- Works Execution Management
- Organization Structures
- Vocabulary
- Vertical Structure
- Matrix Structure
- One Man Show
- The Practical Result of Planning - Where Planning Fits into Maintenance
- Functions of Maintenance Manager
- What Maintenance Managers do?
- Reaching Organisational Goals by Managing Resources
- Management & Supervisor Functions
- Planning Activities
- Organising Activities
- Leading Activities
- Controlling Activities
- What Resources Are Available and Should be Managed by the Supervisor?
- Financial
- Human/People
- Physical
- Information
- Resources
- Management Roles
- Interpersonal
- Informational
- Decisional

- Management Skills
- Technical Skills
- Human Skills
- Conceptual Skills
- Managerial Activities Study
- Traditional Management
- Communication
- Human Resource Management
- Networking
- Allocation of Activities by Time
- Coping with “Temporariness”
- Declining Employee Loyalty
- Managers Dilemma
- Motivation, Employee Absenteeism
- Motivation
- Style of Management
- Motivating Strategies
- Disciplinary Action
- Procedure
- Performance Appraisal
- Steps in Appraisal
- Appraisal Force Distribution Method
- Message
- Human Resources
- Modern Maintenance Management
- The Evolving Role of Engineering
- Operator Best Operating Practice (BOP)
- Operator Maintenance
- Operator Monitoring and Measurement
- Roles & Responsibilities of Maintenance Planner
- Maintenance Planners Attributes
- Maintenance Excellence
- Levels of Planning
- Long Range
- Short Range

- Annual Budget
- Day to Day
- Work Order
- Planner's Attributes
- Principles of Effective Maintenance Planning
- Failures of Planning
- Maintenance Planner Does NOT
- Schedule
- Types of Schedule
- Factors Affecting Scheduling
- Principles of Effective Scheduling
- Scheduling Team (Planner/Maintenance/Production)
- Reliability Engineer
- The Importance of Teams
- Good Teams
- Global Virtual Teams
- Meeting
- Tips for Effective Group Meeting
- Maintenance Implementation Strategies
- Implementation Strategies
- Incorrect Strategies
- The Implications of Management Style
- Communication
- Modern Maintenance Management
- The Maintenance Organization
- Vocabulary
- Quiz of section 04
- Materials, Repair, Operations Store Management
- Course Perspective & Approach
- Manager's View of MRO storerooms
- Typical Look of MRO Stores
- Typical Look of MRO Storeroom
- MRO to be
- RMO to
- Lubrication Storage and Handling – Best Practice

- Lubrication Storage and Handling
- How do we go from pictures A to B
- Organization Chart of MRO's
- Organization Chart of MRO Storeroom
- Storekeeper Attributes
- Procurement
- Cutting Inventory Costs
- Ways to Reduce Inventory Waste/Costs
- Supplier Partnering
- Co-operation Between Plants
- Apply World Class Manufacturing (WCM) Principles
- Stock Control
- Stock Depreciation
- Ensure that storage conditions are correct
- Stock Availability and Ease of Retrieval
- Work Planning
- New Plant, Modifications and Redundant Plant Procedures
- Supplier Partnering Programme (SPP)
- The SPP "win-win" alliance
- Definitions
- Lead Time
- Economic Order Quantity (EOQ)
- Open or Closed Storeroom?
- Physical Storage
- Housekeeping
- Receiving, Inspection and Shipping
- Servicing of Stored Items
- Racks and Bins
- Satellite Storage
- Free-Issue Stores
- Vendor-Managed Storage
- Quiz of section 05
- Energy Supply
- System Distribution Diagrams
- Typical Refinery Offsite and Utilities

- REFINERY STEAM SYSTEM
- Steam
- Definition of Terms
- Dry Steam & Its Fraction
- Heat Recovery Steam Generation
- Boiler Equipment
- Heat Transfer Fundamentals to Boilers
- How are Boilers Classified
- Water Tube Boiler
- Boiler Feed Water treatment
- PRV's Types
- Safety valves
- Relieve Valves
- Rupture Discs
- Pilot Operated Pressure Relief Valves
- Safety Valves - Field Example
- Spring Force
- Recommended PRV Installation
- Basic Principles Associated with Steam Traps
- Common Return Lines
- Steam Flow Quality & Condensate
- Steam Traps Types
- Boiler & Fired heater Heat Exchange Efficiency
- Boiler Efficiency
- Boiler Efficiency: Direct Method
- Advantages of Direct Method
- Disadvantages
- Improve Plant By Increasing Efficiency
- Where to Save Fuel
- Typical Air Pre-Heating System
- Types of Combustion
- Stack Temperature/ Efficiency
- Energy Efficiency Opportunities
- Stack Temperature Control
- Feed Water Preheating Economizers

- Combustion Air Preheating
- Stack Temp. Checklist
- Minimize Incomplete Combustion
- Optimum Oxygen Percentage
- Radiation and Convection Heat Loss Minimization
- Automatic Blow Down Control
- Scaling and Soot Loss Reduction
- Reduced Boiler Steam Pressure
- Variable Speed Control for Fans, Blowers and Pumps
- Control Boiler Loading
- Proper Boiler Scheduling
- Cooling Water
- Direct-Contact Exchangers
- Types of Wet-cooling Towers
- Background
- Mechanical Draft Cooling Towers
- Condensers
- Effect of Condenser Fouling on Turbine Heat Rate
- Electrical Energy
- Refrigeration
- Compressed Air
- Quiz of section 06
- Benchmarking & Best Practices
- Performance Measures & Profitability
- Key Performance Indicators
- Relative Energy Intensity Index – Example
- Relative Maintenance Index US $/EDC
- Key Performance Indicators Refinery Example
- Fuel Efficiency
- Reliability
- Best Practices
- Model Validation
- Back-Casting
- Model Validation & Back-Casting
- Other Considerations

- Asset Utilization
- Limitations of the Planning Process
- Plant Optimization versus Supply Chain Optimization
- Manufacturing Process Supply Chain
- Supply Chain Management
- Supply Chain Optimization
- Supply Chain Optimization – Schematic
- Refinery & Process Plant Optimization Trends
- Optimization Trends
- The Overall Goal
- Crude Unit Optimization Case Study
- Crude Unit Expansion – Background
- Crude/Vacuum Unit Original Design
- Crude/Vacuum Unit Revamp Before
- CDU Revamp Philosophy
- Crude/Vacuum Unit Revamp After
- CDU Loadings at Original Design
- CDU Loadings by Adding a Pumparound Increases Capacity by 15%
- Potential Revamp Capacity Increase = 85%
- Actual Revamp Adds 40% Capacity
- VDU Revamp Philosophy
- Flashed Crude Composite Curves
- MVPC Optimization
- CDU/VDU Yields Before & After
- Benefits – Margin & Capture
- Quiz of section 07
- Management & Information Systems
- Enterprise Resource Planning (ERP)
- Risk Management & Optimization
- Risk Management Methods
- Hazop Study
- Hazop Objectives
- Consequences to be Considered
- Hazop Guide Words
- Hazop Team Review Process

- Successful Hazop Criteria
- Hedging
- Optimizing Offsites Operations
- Tank Farm Layout
- Layout Scheme
- Finished Product Tanks
- Total Tankage Volume
- Optimum Storage Volume
- Tank Mixing
- Tank Blending with Fixed Angle Mixer
- Sludge Build-up in Tank with Fixed Angle Mixer
- No Sludge Build-up in Tank with Variable Angle Mixer
- Storage Facilities Operation
- Batch Blending
- Time consuming
- In-Line Blending
- Blending Optimization
- Inventory Management
- Utilities Management
- Boiler Management
- Steam System Conventional Control
- Steam System Control
- Steam System Advanced Control
- Fuel Gas System Conventional Control
- Continuous Improvement
- It Started With Deming
- Total Quality Management (TQM)
- Deming Cycle
- Kaizen
- Lean Manufacturing
- Just in Time
- Six Sigma
- Statistical Six Sigma Definition
- Six Sigma Versus Two Sigma
- Reducing Quality Give Away
- Further Reduction in Quality Give Away

- The Balanced Scorecard
- The Learning and Growth Perspective
- The Business Process Perspective
- The Customer Perspective
- The Financial Perspective
- Comments on Continuous Improvement
- Some Inconsistencies & Contradictions
- Improvement Slows Down
- Quiz of section 08
- Refinery & Process Plant Optimization Trends
- Optimization Trends
- The Overall Goal: Decrease or Increase?
- Optimize Distillation
- Introduction - Distillation Definition
- Crude Unit Optimization Case Study
- Crude Unit Expansion – Background
- Original Design
- Crude/Vacuum Unit Revamp – Before
- Crude Distillation U. Revamp Philosophy
- Crude/Vacuum Unit Revamp – After
- MVPC Optimization
- CDU/VDU Yields Before & After
- Quiz of section 09
- Continuous Improvement
- Advanced Petrochemical CO.
- Continuous Improvement
- Total Quality Management
- Deming Cycle For TQM
- Continuous Improvement Techn.
- Lean Manufacturing
- Just in Time
- Statistical Six Sigma Definition
- Some Inconsistencies & Contradictions
- Improvement Slows Down
- Continuous Improvement
- Quiz of section 10