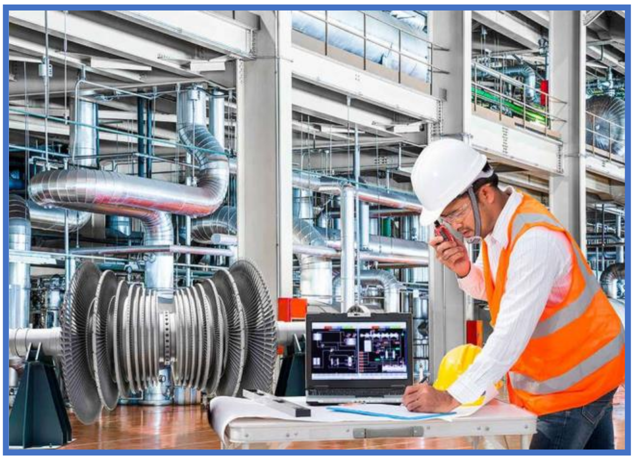
COURSE OVERVIEW PE0268
Process Plant Monitoring, Optimization & Energy Conservation Skills (E-Learning Module)

Course Title
Process Plant Monitoring, Optimization & Energy Conservation Skills (E-Learning Module)



Course Reference
PE0268

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 monitoring, optimization and energy conservation skills. It covers the components of the process plant; the performance monitoring and operating procedures; the catalyst and reactor, fundamentals of chemical reaction technology and the three most common types of reactors; the heat transfer methods; the various types of evaporators and distillation column trays performance constraints; and the distillation column trays efficiency, crude unit optimization, and absorption/desorption.

Further, the course will also discuss the types of cooling towers, efficiency of energy conversion, boiler components and the major N-product hazards; the wastewater purification and disposal, temperature measurement, pressure measurement and flow measurement; the level measurement, classification of control systems, PID control and feed forward control; and the hazard identification, protective measures to prevent an explosion, HAZOP study, guide words and meanings; and risk assessment plan.

Moreover, the course will also cover the pareto principle and refinery and process plant optimization trends; the various approach to optimization, simple and complex configurations, refinery configurations and coking & hydro-conversion; the hydrogen recovery, hydrogen manufacturing process, classification of conversion processes, hydrogen addition processes and hybrid processes; the aromatics plant configuration and olefins plant configuration; the ammonia and methanol synthesis; the reflux ratio, crude unit design, insulation thickness and heat exchanger networks; the process unit heat integration, simplified schematic of crude/vacuum unit integration and investment modelling; the graphic definitions of capacity creep, debottlenecking and expansion; the blending operations, feedstock selection, evaluation and ranking; and the inferential temperature control for distillation columns, feedback correction for feed composition changes, statistical process control and probability of failure.

During this course, participants will learn the root cause failure analysis; the basic procedure for FMEA or FMECA; the fault trees, probability and criticality analysis, basic logic diagram, basic reliability diagrams and risk evaluation methods; the criticality analysis, quantitative criticality analysis method and spare parts and materials inventory management; the turnaround management methodology, additional work approval process, critical path method and tank farm layout; the blending optimization, inventory management, utilities management, boiler management and steam and fuel gas system conventional control; the lean manufacturing, Six Sigma and Balanced, benchmarking, model validation and back-casting; the plant optimization versus supply chain optimization; and the process supply chain.

Course Objectives

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

- Apply and gain an in-depth knowledge on process plant monitoring, optimization and energy conservation skills
- Identify the components of the process plant and carryout production and improving performance, performance monitoring and operating procedures
- Discuss catalyst and reactor, fundamentals of chemical reaction technology and the three most common types of reactors
- Apply heat transfer methods and identify the various types of evaporators and distillation column trays performance constraints
- Determine distillation column trays efficiency, crude unit optimization, optimizing crude unit design and absorption/desorption
- Recognize the three types of crystal seed formation including the fundamentals of hydrodynamics, centrifugal pumps, pumps selection guidelines, pumps and pumping systems and compressors
- Identify the types of cooling towers, efficiency of energy conversion, boiler components and the major N-product hazards
- Illustrate wastewater purification and disposal, measurement and control technology, temperature measurement, pressure measurement and flow measurement

- Apply level measurement, classification of control systems, PID control and feed forward control
- Carryout hazard identification, plant safety, protective measures to prevent an explosion and HAZOP study
- Define HAZOP guide words and meanings, illustrate HAZOP flow diagram and apply risk assessment plan
- Discuss the pareto principle, enterprise economics or financial returns and refinery and process plant optimization trends
- Optimize design and determine project methodology and the concept of the universal process
- Employ various approach to optimization, simple and complex configurations, refinery configurations and coking & hydro-conversion
- Illustrate other deep conversion processes, hydrogen recovery, hydrogen manufacturing process, classification of conversion processes, hydrogen addition processes and hybrid processes
- Carryout aromatics plant configuration and olefins plant configuration
- Describe ammonia and methanol synthesis and review the results of configuration optimization
- Optimize equipment & unit design, reflux ratio, crude unit design, utilities, insulation thickness and heat exchanger networks
- Recognize pinch technology composite curves, pinch technology rules, pinch limits and heavy crude composite curves
- Illustrate process unit heat integration, simplified schematic of crude/vacuum unit integration and investment modelling
- Explain the graphic definitions of capacity creep, debottlenecking and expansion
- Apply blending operations, feedstock selection, feasibility and optimality, delta-base modelling and feedstock and crude evaluation & ranking
- Illustrate process models, spreadsheet material balance models, optimizing process operations and process unit optimization parameters
- Identify the benefits of improved control, maximize the profit of a plant and apply multivariable process control and model predictive control
- Explain inferential temperature control for distillation columns, feedback correction for feed composition changes, statistical process control and probability of failure
- Employ root cause failure analysis, preserve failure data, order the analysis, analyze the data and communicate findings and recommendations
- Implement the basic procedure for FMEA or FMECA and the basic steps for performing an FMEA/FMECA analysis

- Apply fault trees, probability and criticality analysis, basic logic diagram, fault tree and basic reliability diagrams and risk evaluation methods
- Perform criticality analysis, quantitative criticality analysis method and spare parts and materials inventory management
- Determine turnaround management methodology, additional work approval process, the critical path method, risk management & optimization and tank farm layout
- Employ blending optimization, inventory management, utilities management, boiler management and steam and fuel gas system conventional control
- Discuss lean manufacturing, Six Sigma and Balanced Scorecard as well as perform benchmarking & best practices, performance measures & profitability, model validation and back-casting
- Differentiate plant optimization versus supply chain optimization and manufacture process supply chain

Who Should Attend

This course covers systematic techniques on process plant monitoring, optimization and energy conservation skills for planning staff, instrumentation & control staff, production & operation staff, process engineers, mechanical engineers 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

- Introduction
- Components of the Process Plant
- Production and Improving Performance
- Performance Monitoring
- Operating procedures
- The Catalyst and the Reactor
- Catalyst Performance
- Selectivity
- Activity
- Lifetime
- Reasons for deactivation of catalyst
- Mechanical Strength
- Production Cost
- Kinetics of a Heterogeneous Catalyst Reaction
- Film diffusion
- Pore diffusion
- Reactor Design
- Fundamentals of Chemical Reaction Technology
- The types of reactors
- The three most common types of reactors
- Product Processing
- Heat Transfer
- Heat Transfer & its Application
- Temperature and Heat
- Units of Heat
- Heat Transfer Methods
- Conduction
- Convection
- Radiation
- Thermal Conductivity (K)

- Evaporation
- Various types of evaporators
- Condensation
- Distillation
- Distillation Column Trays Performance Constraints
- Foaming
- Entertainment
- Flooding
- Downcomer Flooding
- Coning
- Weeping/Dumping
- Fractionation Tray Stability
- Distillation Column Trays Efficiency
- Crude Unit Optimization
- Optimizing Crude Unit Design
- Absorption/Desorption
- Important selection criteria for absorption liquid
- Common problems in Amine absorber systems
- Possible means to solve these problems
- Removal of heat stable salts has the following advantages
- Extraction
- Required conditions for the extract phase
- Mass transfer between the two phases is the result of three steps
- Crystallization
- Three types of crystal seed formation
- Adsorption
- Drying
- Membrane Separations
- Filtration
- Various filters types for batch processes
- Various filters types for continuous processes
- Other means of filtration (not involving fluid dynamics)
- Pipelines, Pumps & Compressors

- Fundamentals of Hydrodynamics
- Steady State Flow
- Energy Relationships
- Pumps and Pumping Systems
- Equivalent Piping Length
- Recommended Velocity
- Centrifugal Pumps
- Centrifugal Pumps/Vanes
- Centrifugal Pumps – Information for Purchasing
- Pumps Selection Guidelines
- Centrifugal Pumps - Pump Curves
- Centrifugal Pumps - BHP, Head
- Centrifugal Pumps - Capacity, Head, Power
- Centrifugal Pumps - Typical Operating Problems
- Centrifugal Pumps – Cavitation
- Centrifugal Pumps - Avoiding Cavitation
- Pumps and Pumping Systems
- Compressors
- Compression Process
- Compressors & Gas Compression
- Compressors Process Operating
- Centrifugal Compressor
- Performance Curves Terminology
- What is Surge?
- Compressor Problem Solving Approaches
- Polytropic Head & Surging
- Polytropic Process
- Energy Supply
- Steam and Condensate System
- Electrical Energy
- Cooling Water
- Types of cooling towers
- Refrigeration

- Compressed Air
- Energy Efficiency
- Efficiency of Energy Conversion
- Illustration
- Efficiency of Some Common Devices
- Vehicle Efficiency – Gasoline Engine
- Heat Engine
- Carnot Efficiency
- Illustration
- Inference
- Schematic Diagram of a Power Plant
- Boiler Components
- Overall Efficiency
- System Efficiency
- Efficiency of a Light Bulb
- System Efficiency of an Automobile
- Efficiency of a Space Heater
- Heat Mover
- Heat Pump Heating Cycle
- Heat Pump Cooling Cycle
- Coefficient of Performance (C.O.P)
- Example
- Solution
- Consequences
- More C.O.P's
- Product Supply and Storage
- Waste Disposal
- Off-Gas Collection System and Flares
- Major N-Product Hazards
- NO_x
- Proposed Flue Gas Treatment
- Non-Catalytic Process (SNCR)
- Selective Non-Catalytic Reduction (SNCR)

- Selective Catalytic Reduction (SCR)
- Carbon Dioxide
- Industrial Hazards
- Use Filters, Cyclone Scrubbers & Electrostatic Precipitators
- Also Flue Gas Water Scrubbers (Desulfurizer)
- Wastewater Purification and Disposal
- Physical treatment
- Solid-liquid separation
- Chemical treatment
- Biological treatment
- Solid Waste Disposal
- Measurement and Control Technology
- Metrology
- Temperature Measurement
- Pressure Measurement
- Three types of elastic element pressure-measuring devices
- Flow Measurement
- Rotameter flow measuring device
- Two techniques based on the fluid properties
- Level Measurement
- Five Categories
- Visual devices
- Float-actuated devices
- Displacer devices
- Head devices
- Miscellaneous methods
- Control Technology
- Classification of Control Systems
- PID Control
- Limitations of Conventional PID Controllers
- Proportional Control (- P)
- Proportional Control Example
- PID Control - How Proportional Control Works

- Proportional Control & Offset
- PID-Reset Action or Integral Control – I
- Impact of Reset Action
- Derivative Action – D
- Derivative Action or Rate Control
- Other Control Action Features
- Fundamentals: PID Controller
- Limitations of Conventional PID Controllers
- Types of Feed-back Controllers-FB
- Simple Feedback Control
- Feed Forward Control
- Feedforward + Feedback Control Action
- Cascade Control
- Other FB-FF Example
- Plant Safety
- Health, Safety & Environment at Personnel Level
- Definitions
- The Plant Safety & Philosophy
- The Plant & Process Safety
- The Philosophy of Safety
- Hazard Identification
- Plant Safety
- Three elements determine the risk of an explosion
- Protective measures to prevent an explosion
- Other Unsafe Conditions on the Job
- HAZOP Study
- Consequences to be Considered
- HAZOP Guide Words
- HAZOP Guide Words and Meanings
- When Timing Matters
- HAZOP Flow Diagram
- Successful HAZOP Criteria
- What to do When HAZARD is Identified?

- A Method for Foreseeing Deviations- HAZOP
- Risk-Based Applicability
- Risk Assessment Plan
- 1. Identify Risks Throughout The Project
- 2. Develop Risk Assessment Criteria
- 3. Tabulate The Risks – Extend To A Risk Management Plan
- 4. Prepare Standby Plans Or Alternatives
- Optimization Fundamentals
- What is Optimization?
- Optimization Characteristics
- Common Misconceptions
- Maxima and Minima
- What can Optimization Achieve?
- How Big is the Pie?
- As Cost, Size & Capacity Increase the Pie Gets Bigger
- 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
- The Pareto Principle in Action
- Operational Economics
- Investment Economics
- DCFRR or IRR (also sometimes called ROI)
- NPV Analysis
- Enterprise Economics or Financial Returns
- ROCE
- Optimizing Operational Economics
- Optimizing Investment Economics
- Refinery & Process Plant Optimization Trends
- Optimization Trends
- The Overall Goal: Decrease or Increase?
- Optimise Distillation

- Optimise Reactors
- 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
- Vacuum Dist. U. Revamp Philosophy
- MVPC Optimization
- CDU/VDU Yields Before & After
- Optimizing the Design
- Project Methodology
- Concept of the Universal Process
- The Universal Process
- Approach to Optimization
- Simple & Complex Configurations
- Refinery Configurations
- Topping Refinery
- Schematic of Topping Refinery
- Hydroskimming Refinery
- Schematic of Hydroskimming Refinery
- Cracking Refinery
- Two types of cracking configuration in general use
- Schematic of Cat Cracking Refinery
- Schematic of Hydrocracking Refinery
- Full Conversion
- Coking & Hydro-Conversion
- Schematic of Coking Refinery
- Schematic of Resid Hydrocracking Refinery
- Full Conversion
- Coking & Hydro-Conversion
- Schematic of Coking Refinery
- Other Deep Conversion Processes

- Hydrogen Manufacture
- Hydrogen Recovery
- Hydrogen Manufacturing Process
- Classification of Conversion Processes
- Hydrogen Addition processes
- Hybrid Processes
- Specialty Products
- Asphalt
- Lubes
- Solvents
- Traditional Base Oil Production
- State of the Art Lube Plant
- Aromatics Plant Configuration
- Olefins Plant Configuration
- Integrated Refining – Petrochemical Complex
- Basic Hydrogen Manufacture
- Ammonia Synthesis
- Methanol Synthesis
- Maximizing NPV
- Results of Configuration Optimization
- Optimizing Equipment & Unit Design
- Optimum Reflux Ratio
- Optimizing Crude Unit Design
- Crude Unit Design
- Crude Column Loadings
- CDU Column Loadings No PA's
- The Impact of Pumparounds
- CDU Column Loadings One PA
- Adding More Pumparounds
- CDU Column Loadings Two PA's
- Optimizing Utilities
- Optimizing Insulation Thickness
- Basic Crude Preheat Train Layout

- Crude Preheat Train Layout with 2PA's First Trial (Not Optimized)
- Crude Preheat Train Layout with 2PA's Second Trial
- Crude Preheat Train Layout with 2PA's Optimum Pre-heat Temp Heavy Crude
- Crude Preheat Train Layout with PA's Optimum Pre-heat Temp Light Crude
- Optimizing Heat Exchanger Networks
- Optimizing the Design
- What is Pinch Technology?
- Composite Curves
- Pinch Technology Composite Curves
- Pinch Technology Concept
- Finding the Pinch
- Pinch Technology Rules
- Pinch Limits
- Heavy Crude Composite Curves
- Hot & Cold Utilities
- Grand Composite Curve Crude Oil
- Benefits of Pinch Technology
- Process Unit Heat Integration
- Simplified Schematic of Crude/Vacuum Unit Integration
- Investment Modelling
- Integer or Mixed Integer Programming (IP or MIP)
- Example of Integer Programming
- Choosing Between Crude Units
- Capacity Creep & Plant Debottlenecking
- Design Flexibility
- Capacity Creep, Debottlenecking & Expansion
- Graphic Definitions of Capacity Creep, Debottlenecking & Expansion
- Are Capacity Creep, Debottlenecking & Expansion the Same?
- What Makes Capacity Increases Possible?
- Some Capacity Increase or Debottlenecking Examples
- More Capacity Increase or Debottlenecking Examples
- Debottlenecking Furnaces
- Capacity Increase Philosophy

- Optimizing Operations Planning
- Production Plans – General
- Unit Operating Goals
- Blending Operations
- Feedstock Selection
- Feasibility & Optimality
- Feasibility
- Optimality
- Production Plans – Objectives
- Maximum Profit
- Minimum Cost
- Optimal Product Mix
- Joint Ventures (JV's)
- Linear and Non-Linear Models
- Feasibility
- Model Types
- Blending
- Single Plant
- Time Period
- Multi-Plant and Distribution
- Extreme Operating Mode LP
- The Real World is Non-Linear
- The Pooling Problem
- Swing Cuts
- Delta-Base Modeling
- Convexity Constraints
- Feedstock Evaluation & Ranking
- Crude Evaluation & Ranking
- Crude Break Even Values – Example
- Crude Price Differentials – Example
- Optimizing Unit Performance
- Process Models
- Modeling Tools

- Process Models – Fixed Yield
- Process Models – Modes & Simulation
- Spreadsheet Material Balance Models
- Example Excel Refinery Model
- Marginal Economics
- Exceeding 100% Capacity
- Linear Incremental Yields Run to Recover Incremental VOC
- Real Incremental Yields
- Planning versus Scheduling
- Schedule Optimization
- Example Blending Model Uses an NLP Recursively
- Schedule Feasibility
- Example of Monte Carlo Probability Analysis
- Optimizing Process Operations
- Process Unit Optimization Parameters
- Crude Unit Cut Points – LSR
- Crude Unit Cut Points – HSR to Kerosene
- Crude Unit Cut Points – Diesel to HVGO
- Crude Flash Curves
- Crude Flash Curves – Diagram
- Reformer Severity
- Graphical Optimization of Reformer RON
- FCCU Conversion
- Some Other Key Parameters
- Process Controls
- Benefits of Improved Control
- Example of Improved Constraint Control
- Maximizing the Profit of a Plant
- Control with Wide Variation
- Control with Narrow Variation
- Multivariable Process Control
- Model Predictive Control
- Multi-Pass Furnace Controls

- Computed Manipulated Variable Control
- Computed Reboiler Duty Control
- Internal Reflux Control
- Inferential Control
- Inferential Temperature Control for Distillation Columns
- Feedback Correction for Feed Composition Changes
- Neural Networks
- Neural Networks – History
- Neural Networks – Advantages
- Neural Networks vs Conventional Computers
- How Neural Networks Function
- Neural Network – Schematic
- Neural Network – Description
- Soft Sensors Based on Neural Networks
- Fuzzy Logic Controls
- Conventional Controller Logic
- Fuzzy Controller Logic
- Dynamic versus Steady State
- MBPC Optimization
- Statistical Process Control
- Control Charts
- Cusum
- Shewart vs Cusum
- Moving Average
- Shewart vs Moving Average
- CuSum Control Charts
- Optimizing Reliability
- Reliability Centred Maintenance (RCM)
- Application of RCM
- Failure Rates
- Weibull Distribution Function
- Reliability
- Probability of Failure

- Characteristics of Weibull Slope β
- Reliability vs Runlength
- Different Weibull Slopes
- Reliability vs Runlength – Log Plot
- Root Cause Failure Analysis
- Preserve Failure Data
- Order the Analysis
- Analyze the Data
- Communicate Findings and Recommendations
- Cause Tree Example
- FMEA and FMECA
- Basic Procedure for FMEA or FMECA
- The basic steps for performing an FMEA/FMECA analysis
- Fault Trees, Probability & Criticality Analysis
- Basic Logic Diagram
- Fault Tree and Basic Reliability Diagrams
- Fault Tree Example
- Risk Evaluation Methods
- Criticality Analysis
- Quantitative Criticality Analysis Method
- Spare Parts and Materials Inventory Management
- Reorder Point System (ROP)
- Periodic Reorder System
- Reorder Quantity
- Parts & Materials Usage
- Example Calculation
- Moderate Penalty Costs
- High Penalty Costs
- Low Penalty Costs
- Very Low Penalty Costs
- Turnaround Management Methodology
- Controlling Additional Costs
- Additional Work Approval Process

- The Critical Path Method
- The Network Diagram
- The Critical Path
- Possible Paths & Durations
- Management & Information Systems
- Management Information System (MIS)
- Enterprise Resource Planning (ERP)
- Risk Management & Optimization
- Optimization & Risk Management
- 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
- Tank Farm Layout
- Finished Product Tanks
- Total Tankage Volume
- Optimum Storage Volume
- Tank Farm Layout
- Finished Product Tanks
- Total Tankage Volume
- Optimum Storage Volume
- Blending Optimization
- Inventory Management
- Utilities Management
- Boiler Management
- Steam System Conventional Control

- Steam System Control
- Steam System Advanced Control
- Fuel Gas System Conventional Control
- Fuel System Control
- Fuel Gas System Advanced Control
- Continuous Improvement
- It Started With Deming
- Total Quality Management (TQM)
- Deming Cycle
- Continuous Improvement
- Kaizen
- Lean Manufacturing
- Just in Time
- Six Sigma
- 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
- Continuous Improvement
- Benchmarking & Best Practices
- Performance Measures & Profitability
- Key Performance Indicators
- Bench Mark Analysis
- Complexity Factors
- Bench Mark Analysis – Petrochemical Plants
- Relative Energy Intensity Index – Example
- Relative Maintenance Index US $/EDC
- Bench Mark Margin & Margin Capture
- Key Performance Indicators Refinery Example

- 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