



UNITED EASTERN
TECHNICAL & MANAGEMENT TRAINING

REFINERY & PETROCHEMICALS

www.uetmt.ae

Copyright © 2018 UETMT. All rights reserved



UNITED EASTERN
TECHNICAL & MANAGEMENT TRAINING

Best of the Best in Oil & Gas Talent Management



SQA Approved Centre
Scottish Qualifications Authority



REFINERY /PETROCHEMICALS PROGRAMS



COURSE CODE/NO	COURSE TITLE	COURSE DURATION
UETMT- REF- 100	Modern Refinery Technology	5 days
UETMT- REF- 101	Basic Refinery Operations	5 days
UETMT- REF- 102	Refinery Troubleshooting	5 days
UETMT- REF- 103	Advanced Refinery Operations	5 days
UETMT- REF- 104	Refinery Technology	5 days
UETMT- REF- 105	Production Planning and Scheduling in Petroleum Refineries	5 days
UETMT- REF- 106	Managing Shutdowns, Turnarounds and Outages	5 days
UETMT- REF- 107	Planned Shutdown Management	5 days
UETMT- REF- 108	Advanced Paraffin and Asphaltenes in Crude Oils	5 days
UETMT- REF- 109	Utilities and Environment Protection in Refineries	5 days
UETMT- REF- 110	International Oil Supply, Transportation, Refining & Trade	5 days
UETMT- REF- 111	Operations and Troubleshooting of Refinery Facilities	5 days
UETMT- REF- 112	Crude Oil de-salting Process	5 days
UETMT- REF- 113	Introduction to Crude Oil Refinery Processing	5 days
UETMT- REF- 114	Crude Oil Properties and Oil Treatment	5 days
UETMT- REF- 115	Crude Oil Testing & Equipment	5 days
UETMT- REF- 116	Crude Oil Production and Wellhead Process	5 days



COURSE CODE/NO	COURSE TITLE	COURSE DURATION
UETMT- REF- 117	Oil Refining: From Crude Oil to Petroleum Products	5 days
UETMT- REF- 118	Methods and Technique for Crude Oil Evaluation	5 days
UETMT- REF- 119	Crude Distillation Tower Operations	5 days
UETMT- REF- 120	Tower Internals	5 days
UETMT- REF- 121	Fundamentals of Catalyst in Oil & Gas Industry	5 days
UETMT- REF- 122	Fixed Bed Catalytic Reforming	5 days
UETMT- REF- 123	Catalytic Reforming Process (CRP)	5 days
UETMT- REF- 124	Catalytic Reforming (Modern Plat-forming Process with continuous Catalyst Regeneration, CCR)	5 days
UETMT- REF- 125	Fluid Catalytic Cracking Process Technology	5 days
UETMT- REF- 126	Refinery Cracking Technology	5 days
UETMT- REF- 127	Distillation	5 days
UETMT- REF- 128	Distillation Operation, Control and Troubleshooting	5 days
UETMT- REF- 129	OJT in Refinery Distillation & Oil Treatment Units	5 days
UETMT- REF- 130	Fired Heaters	5 days
UETMT- REF- 131	Fired Heater Operation, Design and Maintenance	5 days
UETMT- REF- 132	Process Heaters	5 days
UETMT- REF- 133	Heat Exchangers Design and Operation	5 days
UETMT- REF- 134	Heat Exchangers Operation, Design & Maintenance	5 days
UETMT- REF- 135	Heat Transfer Equipment Operation & Troubleshooting	5 days
UETMT- REF- 136	Basic Process Calculations	5 days
UETMT- REF- 137	Fundamentals of Process Calculations & Simulation by HYSYS	5 days
UETMT- REF- 138	Fundamentals of Process Design	5 days
UETMT- REF- 139	Fundamentals of Process Equipment (Selection, Sizing, Operation)	5 days
UETMT- REF- 140	Process Operations (For Technicians)	5 days
UETMT- REF- 141	Process Operation, Troubleshooting and Optimization	5 days





COURSE CODE/NO	COURSE TITLE	COURSE DURATION
UETMT- REF- 142	Process Troubleshooting & Problem Solving (Workshop)	5 days
UETMT- REF- 143	Process Plant Start-up, Commissioning & Troubleshooting	5 days
UETMT- REF- 144	Process Measurement & Control Technology	5 days
UETMT- REF- 145	Process Plant Start-up and Commissioning	5 days
UETMT- REF- 146	Process Plant Start up, Commissioning & Troubleshooting	10 days
UETMT- REF- 147	C5-C6 Isomerization Process Operations	5 days
UETMT- REF- 148	OJT on C5-C6 Isomerization Process	5 days
UETMT- REF- 149	Process Panel Operator Assessment (Software)	5 days
UETMT- REF- 150	Unicracking Process	5 days
UETMT- REF- 151	Delayed Coking Process Technology	5 days
UETMT- REF- 152	Utilities in Process Plants	5 days
UETMT- REF- 153	Merox Process & Technology	4 days
UETMT- REF- 154	Gas Dehydration Technology	5 days
UETMT- REF- 155	Gas Plant Troubleshooting & Special Problems	5 days
UETMT- REF- 156	Gas Processing, Treatment and Sulphur Recovery	5 days
UETMT- REF- 157	Gas Treating and Sulfur Recovery	5 days
UETMT- REF- 158	Sulfur Recovery Engineering	5 days
UETMT- REF- 159	Sulfur Plants and its Concerns	5 days
UETMT- REF- 160	Advanced-Gas Liquid Separation	5 days
UETMT- REF- 161	Refinery Gas Treating, Sour Water, Sulfur and Tail Gas	5 days
UETMT- REF- 162	Natural Gas Processing Technology	5 days
UETMT- REF- 163	Gasoline/Diesel Blending for Refiners and Traders	5 days
UETMT- REF- 164	Hydrotreating Technology	5 days
UETMT- REF- 165	Hydrocracking Process	5 days
UETMT- REF- 166	Isocracking Technology	5 days
UETMT- REF- 167	Hydrocarbon Production Operations	5 days





COURSE CODE/NO	COURSE TITLE	COURSE DURATION
UETMT- REF- 168	Tank & Tank Farms: Design, Operation, Instrumentation, Inspection & Maintenance	5 days
UETMT- REF- 169	Oil Movement, Storage & Troubleshooting in Modern Refineries, Marine Terminals & Oil Plants	5 days
UETMT- REF- 170	Oil Movement, Storage and Troubleshooting	5 days
UETMT- REF- 171	Advanced Facilities Operations	5 days
UETMT- REF- 172	Advanced Oil Treatment Technology	5 days
UETMT- REF- 173	Blending Operations	5 days
UETMT- REF- 174	Fundamentals of Chemical Engineering	5 days
UETMT- REF- 175	Chemical Treatment for Oil and Gas Field	5 days
UETMT- REF- 176	Chemical Engineering for Non-chemical Engineers	5 days
UETMT- REF- 177	Basic of Petrochemicals Industry	5 days
UETMT- REF- 178	Overview of Oil, Gas and Petrochemicals	5 days
UETMT- REF- 179	Refinery-Petrochemical Integration and Economics	5 days
UETMT- REF- 180	Understanding Success Factors in Petrochemicals Industry	5 days
UETMT- REF- 181	Fundamentals of the Fertilizers Business	2 days



MODERN REFINERY TECHNOLOGY

UETMT- REF- 100

Program Duration: 5 days

PROGRAM OVERVIEW

This Program will present an overview of “**Modern Refinery Technology**”, Integrated Crude Oil Refinery, its Feed stocks, Product Slate and the Processes used to convert Crude Oil and Intermediate Fractions into finished Products. Hydrocarbon Chemistry, Crude Oil Properties and Fuel Product Quality will be studied.

Each Refining Process will be presented, covering Operating Description and Conditions, Feedstock and Catalyst selection, Product Yields, and Process Parameters, Unit Performance and Product Yields.

This Program begins with a discussion of the Fundamentals of the Crude Oil Desalting Process including Crude Oil Quality Impact, the Operating variables, Key Equipment, and major Process Variables. Once the Fundamentals are established, Discussion moves into the Basic Types of different Typical Refinery Processes. Also, this Program examines various Types of Reactors, such as Vapor, Liquid phase, catalyst in continuous Reactor Operations, and Reactor Applications. Basic Technical Responsibilities for reactor Operations are also covered.

PROGRAM OBJECTIVES

- The objectives of this Program have been to treat all of the important topics of Refinery. Beginning with an introduction to Overview of Today’s Petroleum Industry, and Refinery Terminology. Topics introduce major Refinery Processes, basic Refinery Equipment, and some Operating Principles.
- Also, familiarization with the principles of some Conversion Processes and Reactor Applications, and Treating Processes for the Removal and Conversion of Sulfur and Sulfur Compounds contained in Refinery Products. Finally, some supporting Processes must be covered.

TARGET AUDIENCE

- The Program is designed for Personnel who would like to obtain Technical Information related to the Technology of Refinery Processes, including Refining Company Technical and Operating Personnel working in Process Engineering, Process Design, and Refinery Operations.
- The Program is also useful for different disciplines persons Technicians and Supervisors (Mechanical, Instrument, Electrical, ..Etc.).
- Experienced Operating Personnel and Engineers should find Beneficial Technical Information, Particularly if they have worked in only one area of the Refinery and have the need to gain an overview of the entire Refinery.
- Those in attendance will receive a comprehensive Manual covering Processing Units associated with “**Modern Refinery Technology**”.

TARGET COMPETENCIES

- Crude Oil Processing
- Residues Processing
- Chemistry and Principles of Hydro Processing
- Isomerization

PROGRAM CONTENT
Crude Oil and Its Processing:

- The Composition and Characteristics of Crude Oil
- Basic Processes
- The Processes Common to most Energy Refineries
- Processes not so Common to Energy Refineries

Conversion Processes:

- Origins and Characteristics of Conversion Units Feeds
- Different Types of Conversion: Principles, Performances:
- Thermal Cracking Processes
- Catalytic Cracking without Hydrogen
- Catalytic Cracking with Hydrogen


Refinery Processes:
(A) Crude Oil Processing:

- Crude Oil Desalting
- Atmospheric Distillation
- Vacuum Distillation

(B) Residues Processing:

- Visbreaking Process:
- Characteristics of the Feedstock
- Thermal Cracking Reactions
- Products of the Visbreaking Unit
- Analysis of the Working Conditions
- Operating Variables

(C) Hydrotreating Processing:

- Hydrotreating Catalysts
- Main Hydrotreating Reactions
- Process Variables

(D) Process For Gasoline:
(Distillate Yield and Quality)

- Catalytic Reforming Processes (Continuous Catalytic Reforming, CCR)
- Hydrotreating and Catalytic Reforming
- Reforming Catalyst
- Chemical Reactions
- Process Variables
- Octane & Octane Rating
- Typical Gasoline Pool

Chemistry and Principles of Hydro processing:

- Hydrotreating Reactions and Process Principles
- Chemistry of Sulfur Removal
- Chemistry of Nitrogen and Oxygen Removal
- Hydrotreating Catalysts
- Olefin and Aromatics Saturation
- Coke Formation and Catalyst Deactivation
- Mild Hydrocracking

Commercial Considerations in Hydro processing:

- Catalyst Presulfiding
- Catalyst Deactivation and Regeneration

Isomerization:

- Isomerization Catalysts
- Process Variables

(E) Refinery Supporting Processes:

- Hydrogen Production:
- Gas Processing Unit
- Acid Gas Removal
- Sulfur Recovery Processes

Refinery Products Properties and Specifications:

- Product Specifications and Test Methods
- Gas and Liquefied Petroleum Gas
- Gasoline and Naphtha
- Kerosene and Aviation Turbine Fuel
- Gas Oils Distillates
- Residual Fuel Oil

Refinery Utilities:

- On-Site Utilities & Off-Site Facilities

BASIC REFINERY OPERATIONS

UETMT- REF- 101

Program Duration: 5 days

PROGRAM OBJECTIVES:

The objectives of this program is to improve the Participants Understanding & Knowledge of Refinery Operations, and Blending Methods

TARGET AUDIENCE

All Refining Staff

TARGET COMPETENCIES

- Refinery Operations
- Fluid Storage and Flow Control
- Fluid heating and Cooling
- Plant Equipment Systems

PROGRAM CONTENT

- Overview of Plant Equipment Systems
- Fluid Storage and Flow Control
- Fluid heating and Cooling
- Furnace & Distillation Process Systems
- Reactor Process Systems
 - ✓ Operational Characteristics
 - ✓ Alkylation Unit
 - ✓ Cat Cracker

Refinery Instrumentation

- Process variables & Process Control Systems
- Measuring and Indicating Instruments

Refinery Operations

- Control Room Operations
- Off-site Operations
- Combined Operations

Main Operator Responsibilities

- Operator's Role (Controlling Production Processes, Operations Safety, Safety and Emergency Situations)
- General Control Room Activities

Blending Methods & Operations

- Distillates and Finished Products Produced by Blending
- Batch Blending & in-line Blending
- Typical Gasoline Blend Components
- Asphalt Blending and Residual Fuel Blending

REFINERY TROUBLESHOOTING

UETMT- REF- 102

Program Duration: 5 days

PROGRAM CONTENT:
1. ABOUT TROUBLESHOOTING

- What is Analytic Troubleshooting?
- What a Trouble Shooter Does

2. RECOGNIZING AND DESCRIBING PROBLEMS

- The Importance of Knowing the Should
- What to Do When You Spot Trouble
- Stating the Trouble
- Why We Specify the Trouble
- How We Specify the Trouble (IS)
- How We Specify the Trouble (IS NOT)

3. TESTING POSSIBLE CAUSES

- Getting Possible Causes from Experience
- Testing Possible Causes Against the Specification
- Selecting the Most Probable Cause

4. WAYS TO DEVELOP POSSIBLE CAUSES AND PROVE THE TRUE CAUSE

- Looking for Differences
- Areas of Sharp Contrast
- Why We Search for Changes
- The Great Ovens Mystery Continued
- Verifying the Cause

5. FIXING THE TROUBLE AND THINKING BEYOND THE FIX

- Types of Actions a Trouble Shooter Can Take
- Thinking Beyond the Fix

6. WHEN THERE IS MORE THAN ONE PROBLEM TO SOLVE

- How Multiple Problems Develop
- Separating Multiple Problems
- How We Set Priority
- Getting to a Cause Unknown Trouble Statement

7. WHEN PROBLEMS KEEP COMING BACK OR HAVE ALWAYS BEEN PRESENT

- Why We Have Recurring Problems and How We Can Get Rid of Them
- The Definition of a Start – Up Problem
- Tips to Solve Start – Up Problems
- Start – Up Problems That Really Aren't

8. PREVENTING PROBLEMS BEFORE THEY HAPPEN

- Thinking About Future Changes
- Steps in Potential Problem Analysis

ADVANCED REFINERY OPERATIONS

UETMT- REF- 103

Program Duration: 5 days

PROGRAM OBJECTIVES

Upon successful completion of this program, you'll be able to:

- Operate an oil refinery with safety as the prime consideration
- Monitor instrumentation and the operation of equipment
- Make adjustments to keep system process variables, such as flows, temperatures, and pressures, within acceptable ranges
- Detect problems and take corrective action to prevent the interruption of system operations
- Analyze operational trends and take corrective actions
- Use standard operating procedures to start and stop production equipment
- Maintain communication with other operators, maintenance, and management

TARGET COMPETENCIES

- Hydrocarbon Chemistry
- Introduction to Petroleum Refinery
- Dehydration and Desalting of Crude
- Refinery Process

PROGRAM CONTENT
Introduction: Composition of petroleum, laboratory tests, refinery feed stocks and products.

- General Definitions
- Hydrocarbon Chemistry
- Introduction to petroleum refinery
- Classification of Crude oil
- Characterization of crude oil ,Composition of crude
- Crude Oil - Properties, Assays, What's Different About Bitumen and Shale Oil
- Fuel Products – Gasoline, Jet, Fuel Oil and Diesel Specifications: Today and Tomorrow
- Physical properties
- Crude oil; analysis and distillation
- Introduction to refinery "feedstock/s" and refinery products

Evaluation of crude oil properties and Design of crude oil distillation column

- Dehydration and desalting of crude.
- Crude Assay ASTM TBP distillations evaluation of crude oil properties.
- API gravity various average boiling points and mid percent curves.
- Evaluation of properties of crude oil and its fractions.
- Design concept of crude oil distillation column design.

Refinery Process

- Atmospheric and Vacuum Distillation
- Fluid Catalytic Cracking, Including Role in Diesel and Propylene Markets
- Catalytic Reforming
- Aromatics Recovery for BTX Petrochemical Feedstock's

- Isomerization, Alkylation, and Polymer Gasoline
- Hydroprocessing – Hydrotreating and Hydrocracking Applications
- Hydrogen Production
- Hydrogen Sulfide Removal (Amine Treating) and Sulfur Recovery (Claus)
- Vacuum Resid Processes – Visbreaking, Solvent Deasphalting, Coking, Hydrocracking
- Pollution Control Overview – Waste Water, Stacks

Thermal and Catalytic Cracking

- Coking and Thermal process, Delayed coking.
- Catalytic cracking, cracking reactions, Zeolitecatalysts.
- Cracking Feed stocks and reactors, Effect of process variables.
- FCC Cracking, Catalyst coking and regeneration, Design concepts, New Designs for Fluidized-Bed Catalytic Cracking Units.

Catalytic Reforming

- Objective and application of catalytic reforming process reforming catalysts.
- Reformer feed reforming reactor design continuous and semi regenerative process.

Hydrotreating and Hydrocracking

- Objectives & Hydrocracking Reactions, Hydrocracking feed stocks, Modes of Hydrocracking, Effects of process variables.
- Hydro treating process and catalysts Resid hydro-processing, Effects of process variables, Reactor design concepts.

Isomerization, Alkylation and Polymerization

- Isomerization process, Reactions, Effects of process variables.
- Alkylation process, Feed stocks, reactions, products, catalysts and effect of process variables.
- Polymerization: Objectives, process, Reactions, catalysts and effect of process variables.

Lube Oil Manufacturing

- Lube oil processing: propane deasphalting Solvent extraction, dewaxing, Additives production from refinery feed stocks.
- Environmental issues and New Trends in petroleum refinery operations
- Ecological consideration in petroleum refinery, Waste water treatment, control of air pollution, New trends in refinery, Alternative energy sources, Biodiesel, Hydrogen energy from biomass

REFINERY TECHNOLOGY

UETMT- REF- 104

Program Duration: 5 days

ABOUT THE PROGRAM

This training session will present a detailed overview of Refining, from the Crude Oil feed to the finished products.

Major Refining Processes are presented and discussed, including Feedstocks, Feedstock Preparation, Operating Conditions, Catalysts, Yields, Product Properties, and Economics.

The program is oriented toward the practical Aspects of Refinery Operations as well as the Terminology and Economics of Refining.

TARGET AUDIENCE

- It is intended for Process Engineers, Technologists, Operating and Supervisory Personnel engaged in the refining activities who have a minimum of experience and who are required to understand and discuss issues related to their processes
- As well as engineering, this training session will also be suitable for business, sales, technical, and scientific personnel with limited or no broad refinery operating experience, along with Technical sales personnel; those involved in selling equipment or supplies to the refining industry and those involved with economic evaluations of refinery operations will benefit from this training session

TARGET COMPETENCIES

- Refinery Technology
- Petroleum Refinery Processes
- Refining Operations

PROGRAM OBJECTIVES

- Act as a primer into the industry of Petroleum Refining
- Familiarize industry professionals with all processes associated with the processing of petroleum into finished products
- Equip new engineers into the industry, with the basic tools for understanding the complex nature of Refining and its operations

TRAINING METHODOLOGY

Throughout the program active participation is encouraged and includes open discussions, case studies of the major processes, and team exercises of actual examples.

PROGRAM SUMMARY

In refineries, crude oils are converted into a number of finished products through a set of complicated and complex processes involving a large number of variables. Petroleum refining technology covers all aspects of training in this field, ranging from an extensive explanation of the chemistry of crude oil and the chemicals that constitute this very complex multi-compound solution, to a detailed discussion of the processes required to separate crude oil into individual compounds and products. It centers on current commercial technologies and licenses and includes numerous examples aimed at familiarizing the attendee with the subject.

PROGRAM CONTENT:
DAY 1 - Refinery Technology

- Introduction
- Crude Oil Origins & Characteristics
- Crude oil Assay and properties
- Crude oil products
- Product specifications
- Gasoline
- Kerosene/ Jet Fuel
- Fuel Oil/ Diesel Fuels
- Petrochemical Feedstocks
- Refineries Complexity
- Overall refinery flow: Interrelationship of processes

DAY 2 - Petroleum Refinery Processes

- Crude Processing
- Desalting
- Atmospheric distillation
- Vacuum distillation
- Heavy Oils Processing – Coking and Thermal Processes
- Delayed Coking
- Fluid Coking
- Flexicoking
- Visbreaking
- Case study – example

DAY 3 - Process for Motor Fuel Production

- Fluid catalytic cracking
- Hydrocracking
- Cat Cracking
- Isomerization
- Alkylation
- Hydrotreating
- Catalytic Reforming
- Case study – example

DAY 4 - Supporting Operations

- Blending for Product Specifications
- Hydrogen production
- Refinery Gas Plants
- Acid Gas Treating
- Sulfur Recovery Plants
- Case study – example

DAY 5 - Refinery Economics

- Residue Reduction
- Asphalt and Residual Fuel
- Cost Estimation
- Economic Evaluation
- Case Studies
- Group Discussions

PRODUCTION PLANNING AND SCHEDULING IN PETROLEUM REFINERIES

UETMT- REF- 105

Program Duration: 5 days

ABOUT THE PROGRAM

This program is specifically designed to identify and resolve issues of production planning and scheduling in petroleum refineries that are most commonly encountered by refinery personnel working in this area. Issues of operations scheduling for petroleum refining are discussed in depth. It will also be enhanced with planning and scheduling examples and will provide relevant background information of the subject.

TARGET AUDIENCE

Process Engineers and Technologists engaged in Planning and Scheduling Activities who have a minimum of experience and who are required to understand and discuss issues related to their Industry

TARGET COMPETENCIES

- Planning and Scheduling in Oil Refineries
- Refinery Configuration:
- Hydro Skimming Refinery
- Refineries with Secondary Conversion Process
- Integrated Refineries

PROGRAM OBJECTIVES

- Gain an appreciation of Modern Planning and Scheduling tools that will be useful for Planning of Crude and Product Deliveries in their facilities
- Assist in improved operations, optimization, upgrading and modification of existing facilities
- Will result in improved profitability and help in continuous modernization of facilities

INSTRUCTIONAL METHODOLOGY

Throughout the program active participation is encouraged and includes open Discussions, Questionnaires and team exercises of actual examples.

PROGRAM SUMMARY

In Refineries, Crude Oils are converted into a number of finished products through a set of complicated and complex processes involving a large number of variables. In addition crude arrivals and product dispatches are ultimately linked with the refinery operability and profitability. It is proposed to cover the rational of planning and scheduling methods and their basis along with the other relevant background information.

PROGRAM CONTENT
APPLICATION OF PLANNING AND SCHEDULING

- Overview of Planning and Scheduling in Oil Refineries
- Refinery Configuration:
- Hydro Skimming Refinery
- Refineries with Secondary Conversion Process
- Integrated Refineries
- Existing & New Refineries
- Choice of Crude

- Crude Oil Scheduling
- Choice of Processes
- Capacity Utilization of Crudes
- Severity of Process Operations
- Cut-points Optimization
- Facing Upset Situations
- Tankage Requirement

IMPROVING PRODUCT MOVEMENTS AND RELEASING TANKAGES

- Basic Information Required
- Crude Assay
- Intermediate Feed Characteristics
- Yields and Properties
- Different Process Units:
- Utilities

PRODUCT BLENDING RULES

- Product Specifications
- New Trends in Fuel Production
- Environmental Issues
- Crude Cost
- Product Netback

FORMULATION OF PROBLEM

- Refinery Flow-sheets
- Simplified Material Balance
- General Formulation
- Demand Equations
- Product Inventory Control
- Product Quality Control
- Fixed Composition Blend
- Capacity Control/ Constraints
- Availability of Feedstock/ Control

APPLICATION TO A REFINERY WORKSHEET

- Petroleum Product Movement and Product Exchange
- Marginal Depot Supply and movements
- Commonly Used Methods & Recent Developments
- Mathematical Approach to Solution
- Linear Programming
- Graphic Method
- Vendors Software



MANAGING SHUTDOWNS, TURNAROUNDS AND OUTAGES

UETMT- REF- 106

Program Duration: 5 days

INTRODUCTION:

- Planning and managing shutdowns, turnarounds and outages in the process plant environment is a complex and demanding function. If turnarounds are not properly planned, managed and controlled, companies run the risks of serious budget overruns, costly schedule delays and negative impacts on customers.
- This program has been developed to specifically respond to the need to help owners and contractors meet their turnaround goals. In the development of this training program, a combination of extensive hands-on experience in turnaround planning and execution, input from turnaround teams, and emerging industry trends were blended together to establish best practice turnaround management approaches.
- This program is designed to establish a thorough understanding of the fundamentals of effective turnaround management. Numerous examples and case studies based on completed turnarounds are used to emphasize major strategic planning and management issues essential to successful turnarounds.
- The program emphasizes that company staff from different departments, contractors and vendors must combine their knowledge, resources and energies, and work as a unified team to successfully achieve company goals and turnaround objectives.

WHO SHOULD ATTEND?

- This program is designed to be beneficial for both the owner's and contractor's staff, who are involved in the planning, co-ordination and execution of plant shutdowns and turnarounds
- The program is especially valuable for turnaround managers and coordinators, planning/scheduling and cost control staff, construction superintendents and supervisors, operations coordinators, project engineers and contract administrators. Participation from inspection, materials, safety and maintenance engineering is also encouraged

PROGRAM OBJECTIVES

- To enhance the company's turnaround management capabilities, and to ensure a team approach in the planning and execution of plant shutdowns and turnarounds
- Provide a comprehensive understanding of effective turnaround management techniques and implementation
- Create awareness of strategic planning methods and an integrated organizational approach in the execution of successful turnarounds
- Incorporate latest developments in turnaround planning and management techniques and emerging industry trends
- Make the turnaround planning and execution process efficient, professionally rewarding and with the minimum stress and conflict

TARGET COMPETENCIES

- Turnaround Management Techniques and Implementation
- Strategic Planning Methods
- Turnaround Planning and Emerging Industry Trends

PROGRAM SUMMARY

- Organizations who expose participants to the training and development experience provided by this program will be contributing to building a core of knowledgeable and skilled staff who will be able to add value through their contributions to more effective preparation, planning, scheduling, execution and control of shutdowns and turnarounds.
- They will be able to contribute in leadership or operational roles, both with knowledge and skills to ensure shutdowns and turnarounds are effectively planned, scheduled and executed and leverage these techniques to improve productivity and cost effectiveness.

PROGRAM CONTENT
DAY 1 - INTRODUCTION TO SHUTDOWNS AND TURNAROUNDS

- Overview and Introduction
- Shutdown Planning Strategy
- Shutdown/TA Problems and issues.
- Management Planning

DAY 2 - SHUTDOWN/TURNAROUND PREPARATION

- Plant shutdown and preparation for maintenance
- Work Scope Development and Work Breakdown Structures
- Case Study work
- Organization and Roles

DAY 3 - SHUTDOWNS/TURNAROUND PLANNING TECHNIQUES

- Developing Shutdown and Turnaround Plans
- The Critical Path Planning Method
- "Short Cut" Planning Methods
- Scheduling Multiple Projects

DAY 4 - COSTS, CONTROL AND CONTRACTORS

- Developing shutdown budgets
- Progress, cost control and productivity tracking
- Materials planning and control
- Contractor Management

DAY 5 - SAFETY, QUALITY AND RISK MANAGEMENT

- Safety, Quality and Environmental Management
- Risk Management
- Integrating Risk Management into the shutdown Plan
- Conclusion



PLANNED SHUTDOWN MANAGEMENT

UETMT- REF- 107

Program Duration: 5 days

PROGRAM DESCRIPTION

- This course has been designed to improve the following competences
- improving start-up response and equipment reliability
- planned shutdown preparation
- process plant shutdown and start up precautions
- Shutdown and shutdown hazards management
- Shutdown Management Parameters
- Shutdown Organization Members
- Know how to reduce shutdown costs, downtime, rework, and safety incidents
- Master Shutdown Plane
- Understand all the facets involved in a successful shutdown.
- This will be achieved through the following Outcomes

TARGET COMPETENCIES

- Shutdown Planning
- shutdown & Turnaround Organization
- Shutdown and Startup Preparation

PRE REQUEST

- Oil and gas Process overview
- Process safety and hazards analysis
- Process and logic control fundamentals

TRAINEES EVALUATION

A passing grade in this course is determined by successful completion of final assignment, practical applications, and testing operation

DELIVERY METHOD

Classroom, videos

PROGRAM CONTENT
Module 1 – Introduction to Shutdown Planning

- Understand what is meant by planned shutdown
- Understand the rule and goal of planned shutdown
- Examples of shutdown activities and turnaround works

Module 2 – shutdown & Turnaround Organization

- Understand the shutdown organization team configuration and rule
- Recognize the Turnaround Leadership & Committee
- Recognize Shutdown Planning/Preparation Team

Module 3 – Shutdown and Startup preparation

- Understand Shutdown and Startup Logic
- Recognize A Critical Path Network
- Recognize how safely Shutting Down the Plant
- Recognize how safely startup the Plant

Module 4 - SD Scope of Work WBS

- Differentiated between operation and projects
- Recognize What is Project Management
- Understand Shutdown Work Scope
- What is a Work Breakdown Structure (WBS)

Module 5 – SD Planning Work Estimation

- Recognize Five key phases
- Understand Planning for the Shutdown Events
- Understand shutdown Work Estimating & Types of Estimates

Module 6 – Documentation SD Critical Path Method

- Understand Maintenance Project Work
- Recognize Project Planning Tools
- Understand The Critical Path Method
- Project Plan Outline

Module 7 – SD Execution and Control

- Know the basic of The Shutdown Control Process
- Control of Daily Activities
- PMS and MMS Role in Shutdown Management

Module 8 -SD Quantitative Risk Assessment

- Know the basic of Qualitative Risk Assessment
- Shutdown Specific Risks
- Risk Assessment Methodology

Module 9- SD Health and Safety Management

- Turnaround Safety Issues
- factors that create hazards
- Permit to Work Strategy for Shutdown/Startup

Module 10- SD Contractor Quality Management

- Use of Contractors in Turnarounds
- Contractor Management
- Issues to consider when allocating work to contractors

ADVANCED PARAFFIN AND ASPHALTENES IN CRUDE OILS

UETMT- REF- 108

Program Duration: 5 days

PROGRAM OBJECTIVES

- Paraffin crystallization and Asphaltene flocculation Phenomena
- Asphaltene flocculation curves and paraffin crystallization curves
- Asphaltene Deposition Envelopes P-T- ADE
- Near Infrared Spectroscopy (NIR) technology applied to Paraffin/Asphaltene phenomena
- Modern Asphaltene stability method/ laboratory procedure
- Selection and optimization of chemical injection by using diagrams of stabilization power method.
- New formation treatment method to control asphaltene deposition based on stability method
- Asphaltene and Paraffin case histories (Problem -Solutions)
- Design and specification and quality control of Permanent magnets/Electromagnetic devices applied to oil industry.
- New Microbial technology to control paraffin and Asphaltene: Theory, field design, quality control and history cases.
- Chemical method for in-situ heat generation and Nitrogen displacement for well and pipeline paraffin control systems.

TARGET COMPETENCIES

- Paraffin Crystallization
- Asphaltene Flocculation
- Near Infrared Spectroscopy (NIR) technology

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Production staff

PROGRAM CONTENT

- Paraffin crystallization and Asphaltene flocculation Phenomena
- Asphaltene flocculation curves and paraffin crystallization curves
- Asphaltene Deposition Envelopes P-T- ADE
- Near Infrared Spectroscopy (NIR) technology applied to Paraffin/Asphaltene phenomena
- Spectrum/ Electromagnetic theory applied to paraffin/asphaltene phenomena
- Laboratory procedure to obtain P-T-Compositional-Paraffin/Asphaltene
- Crystallization/flocculation diagrams generated with NIR Spectroscopy technology
- Absorbance behavior vs time in Asphaltene crudes
- Modern Asphaltene stability method/ laboratory procedure

- UV method to determine asphaltene stability (field application)
- Experimental equipment (UV) for atmospheric experiments
- Experimental equipment for elevated pressure & elevated temperatures
- Effect of diluent and carbon dioxide asphaltene on flocculation in heavy oil solutions
- Diagrams of stabilization power of chemicals
- Selection and optimization of chemical injection by using diagrams of stabilization power method.
- Boscan/Panuco crudes phenomena /research results and field application
- New formation treatment method to control asphaltene deposition based on stability method
- NIR curve interpretation and differentiation with P-T-ADE envelopes
- Uses of NIR paraffin/asphaltene crystallization/flocculation curves to diagnose paraffin and asphaltene problems to establish strategies for reservoir exploitation
- Asphaltene and Paraffin case histories (Problem -Solutions)
- Monophasic sampling technology for live-reservoir sampling collection
- Magnetic and Electromagnetic principle and theory
- Theory of Applied Magnetic/Electromagnetic fields on electric species in fluids
- Design and specification and quality control of Permanent magnets/Electromagnetic devices applied to oil industry.
- New Microbial technology to control paraffin and Asphaltene: Theory, field design, quality control and history cases.
- Chemical method for in-situ heat generation and Nitrogen displacement for well and pipeline paraffin control systems.
- Brief review Thermodynamic models to predict paraffin deposition
- Brief review Thermodynamic-Molecular and Thermodynamic-Colloidal models to predict asphaltene deposition.



UTILITIES AND ENVIRONMENT PROTECTION IN REFINERIES

UETMT- REF- 109

Program Duration: 5 days

INTRODUCTION

The success of every company depends of each employee's understanding of the key business components. Employee training and development will unlock the companies' profitability and reliability. When people, processes and technology work together as a team developing practical solutions, companies can maximize profitability and assets in a sustainable manner. Training and development is an investment in future success – give yourself and your employees the keys to success

PROGRAM OBJECTIVES

This course presents a detailed overview of petroleum refinery processes, wastes, Management of Refinery Waste, Pollution Prevention Options and treatment technology and final disposal methods

TARGET COMPETENCIES

- Petroleum Refinery Processes
- Naphtha, Gasoline, and Solvents
- Kerosene and Diesel Fuel
- Fuel Oil
- Lubricating Oil
- Refinery Wastes

WHO SHOULD ATTEND?

New process engineers, process supervisor, and new technicians in relation to the important features of storage and loading facilities

PROGRAM CONTENT
Day 1

- Introduction
- Petroleum Composition
- Elemental Composition
- Chemical Composition
- Composition by Volatility
- Composition by Fractionation

Properties

- Density and Specific Gravity
- Elemental (Ultimate) Analysis

Refinery Products and By-Products

- Liquefied Petroleum Gas
- Naphtha, Gasoline, and Solvents
- Kerosene and Diesel Fuel
- Fuel Oil
- Lubricating Oil
- White Oil, Insulating Oil, and Insecticides
- Grease
- Wax
- Asphalt
- Coke

Day 2

- Hydrocarbon Waste
- A. Oily waste
- B. Sludge
- Refinery Wastes
- Process Wastes
- Desalting
- Distillation
- Visbreaking and Coking
- Fluid Catalytic Cracking

- Hydrocracking and Hydrotreating
- Alkylation and Polymerization
- Catalytic Reforming
- Isomerization
- Deasphalting and Dewaxing

Day 3

- Residual Oil Storage Tank Sludge
- Physical Chemical Properties
- Residual Hydrocarbon Waste Composition
- Entry into the Environment
- Storage and Handling of Petroleum Products
- Release into the Environment

Toxicity

- Lower-Boiling Constituents
- Higher-Boiling Constituents
- Total Petroleum Hydrocarbons
- Wastewater

Day 4

- Management of Refinery Waste
- Pollution Prevention
- Refinery Wastes and Treatment
- Air Emissions
- Wastewater and Treatment
- Other Waste and Treatment
- Pollution Prevention Options
- Recycling
- Treatment Options
- Adoption of Pollution Reduction Options

Day 5

- Refinery Outlook
- Hazardous Waste Regulations
- Regulatory Background
- Requirements
- Disposal methods



INTERNATIONAL OIL SUPPLY, TRANSPORTATION, REFINING & TRADE

UETMT- REF- 110

Program Duration: 5 days

INTRODUCTION

- The business of oil and gas is multifaceted, technically complex, highly capital intensive and often confronted with potential risks and uncertainties. Today's oil companies' are dealing with ever increasing levels of complexity and competition. The innovative technologies in the recovery of oil are also changing the landscape of petroleum industry. Managing international supplies, refining and trading of oil require several cross-functional skills. To maximize effectiveness, managers and professionals must continually expand their business knowledge, improve their skills, and learn the latest trends in the market. In this program you will study the following business practices and skills to enhance the business insight:
- Fundamentals of international oil supply, economics and transportation
- The supply relationship with upstream
- The value of crude oil based on product market prices
- Primary logistics – tanker freight costs and chartering
- The structure of a refinery, its basic operations, and its economics
- Refining interface with petrochemicals, retail and distribution
- Key points on product quality and specifications
- The fundamental economic drivers of international oil supply, transportation, refining, and trade.
- Supply logistics – major international pipelines, shipping routes, and choke points

WHO SHOULD ATTEND?

- New entrants to the oil industry, and integrated sections such as supply, trading and logistics
- Managers and analysts changing disciplines into downstream
- Professional personnel such as legal, banking, insurance, finance – both inside and outside oil companies dealing with oil supply, refining, trading and transportation.
- Corporate planning professionals
- Upstream professionals such as geologists, geophysicists, petroleum and production engineers to have better understanding of downstream business where revenue is generated.
- Refinery professionals, supply planners & scheduling professionals
- Government regulators
- Auditing personnel
- Compliance officers
- Joint Venture officers
- Negotiators and contracting professionals
- Energy industry journalists and reporters

PROGRAM OBJECTIVES

- Gain broad perspective of global oil business, supply, transportation, refining & trading
- Boost your fundamental analysis of oil business: quality, blending & valuation of oil for trade, freight and netback calculation & refinery margins calculations, vessel chartering, pipelines & terminals, etc.
- Master the Total barrel economics
- Understand oil market futures, hedging and futures, and the price management considerations
- Learn the technical, commercial, legal, and basic environmental aspects of oil business
- Confidently discuss the technical terms, concepts and buzzwords with your peers and clients

TARGET COMPETENCIES

- Upstream Oil Industry
- Fundamentals of Oil & Gas Geology and Petroleum Engineering
- Fundamentals of Oil Economics
- Crude Oil Transportation

PROGRAM SUMMARY

This 5-Day accelerated program provides a wider management perspective of global oil business and highlights the success factors in each of its essential components. It follows the natural order of business, starting with its supply and transportation that fuels the global economy, followed by the critical refining, distribution and trading operations.

It also provides hand-on business cases to evaluate crude oil value, netback and refinery margin calculations, price management, transportation costs, sales contracts, total barrel economics, product quality, economic value of pipeline, etc. It simplifies through visual aids and simulation the complexity of several complex operations, such as, drilling, completion, refining, and transportation and is designed to suite the wide background of delegates.

It will also effectively deals with the core issues, practices and essential concepts of successfully running the international oil supply, transportation, refining and trading business.

PROGRAM CONTENT:
DAY 1 - GLOBAL OIL SUPPLY

- Introduction to Program
- Introduction to Upstream Oil Industry
- Fundamentals of Oil & Gas Geology and Petroleum Engineering
- Essence of International Oil Supply – Global Reserves, Production & Trade
- Fundamentals of Oil Economics

DAY 2 - OIL MARKET EVOLUTION, TRANSPORTATION AND PRICING

- Fundamentals of Crude Oil Transportation – Tankers and Chartering
- Basic Principles in Pricing and Overview of Markets
- Refined Products Quality
- Crude Oil Markets
- Refined Products Market

DAY 3 - CRUDE SALES, REFINING AND DISTRIBUTION

- Essential Elements in Crude Oil Sales Contracts
- Basic Refining II – Conventional Refinery Upgrading
- Basic Refining III – Sulfur Reduction
- Contracts – Elements of Risk
- Basic Refinery IV – Economics & Environmental Aspects
- Primary Logistics – Pipelines and Storages

DAY 4 - PROFITABILITY: OIL TRADING AND RETAILING

- Introductory Concepts in Oil Trading
- Interface with retailers
- Downstream Supply Chain management
- Total Barrel Economics
- Oil Markets – Futures
- Price Exposure

DAY 5 - RISK & PRICE MANAGEMENT

- Hedging – Risk Management
- Pricing Management
- Derivatives
- Supplementary Data
 - ✓ Crude Oil Exploration and Production fundamentals
 - ✓ Glossary & Abbreviations in Oil & Gas Downstream
 - ✓ Oil & Gas Regulatory Agencies
 - ✓ Health, Safety, and Environmental Agencies

OPERATIONS AND TROUBLESHOOTING OF REFINERY FACILITIES

UETMT- REF- 111

Program Duration: 5 days

PROGRAM OVERVIEW

The **Operations & Troubleshooting of Refinery Facilities Program** is a highly participative program which presents guide, develop and facilitate learning using a variety of methods, including Case Studies, Skills Practice, Individual and Group Discussions.

The program begins with an overview of Refinery Operations, including Process Objectives, Equipment Behavior, Interaction of the Process & Equipment, and Troubleshooting Techniques.

This approach demonstrates the Complexity of actual Plant Operations and How to Simplify and Identify Solvable Problems? Once the Fundamentals are established, the session moves into the topics of the art and science of Plant Troubleshooting, Analysis, and Problem Solving.

Case Studies presented in this program are developed from actual field case histories; will cover major Units and Equipments found in Refineries, specifically Atmospheric Unit, Vacuum Tower and Vacuum Systems, Fluidized Catalytic Cracking FCC Unit, Alkylation's Unit, Amine Systems, Sulfur Recovery Units, and Centrifugal Pumps, Process Fired Heaters. In addition to some Auxiliary Equipment which covers Vapor-Liquid Separation, Field Measurement, Alarms and Trips.

INSTRUCTIONAL METHODOLOGY

The program concludes with chance to discuss a Case Study for Problems brought by Attendees. The participants will receive a comprehensive manual with CD covering the Operations and Troubleshooting associated with major Refinery Facilities.

PROGRAM OBJECTIVES

By the end of this program, participants will be able to:

- Participants will have the opportunity to obtain a broad working knowledge of Troubleshooting Principles and Practice,
- Participants will gain insight into both Traditional and Advanced Techniques, and to interact with others workers in Refinery Plants.
- Participants will also have the chance to know the topics ranging from Refinery Operations and Fundamentals through Monitoring and Troubleshoot Problems of Commercial Operating Units.

TARGET AUDIENCE

The program is designed for Personnel involved in Refinery Troubleshooting, Process Engineering, Plant Operations, and Technical Services. Process Engineers from Operating, Design and Construction Companies, as well as others provide Services to the Petroleum and Petrochemical Industries.

TARGET COMPETENCIES

- Troubleshooting Concepts and Techniques
- Petroleum Refinery Operations
- Atmospheric Distillation
- Vacuum Distillation

PROGRAM CONTENT
Universal Troubleshooting Process
Objective and Approach:

- Importance of Troubleshoot
- **Current Trends in Petroleum Refining Industry:**
- Configuration Flow schemes from period 1950 to beyond year 2000

Troubleshooting Concepts and Techniques:

- Typical Problems
- Interaction of Process and Equipment
- Troubleshooting Techniques

Refining Operations
Introduction to Petroleum Refinery Operations:

- Types of Refineries, Feedstocks, Fuel Products (Energy Refineries), and Refinery Operations
- Processes Common to most Energy Refineries
- Processes not so Common to Energy Refineries:
 - (Alkylation, and Isomerization Processes)
- Oxygenated Gasoline: (Ether Compounds- Methyl Tertiary Butyl Ether, MTBE)
- None-Energy Producing Refineries

Variables Affecting Processes and Equipment Efficiency:
(Operating, System, and Design Variables)

- Atmospheric Distillation
- Vacuum Distillation
- Operation Difficulties:
 - Tower Overloading
 - Tower Underloading
 - Ineffective Control of Tower Operation
 - Abnormal Operation
 - Typical Problems of Distillation (Poor Column Performance)
 - Other Typical Operating Problems: (Flooding, Foaming, and Efficiency)

TROUBLESHOOTING PROCESS OPERATIONS
Specific Processes:

- Crude Distillation Unit
- Amine Systems
- Sulfur Recovery Units
- Alkylation Unit
- Fluid Catalytic Units, FCC

Process Equipment:

- Vacuum Tower
- Centrifugal Pump
- Process Fired Heaters

Practical Problems:

- Vapor-Liquid Separation

Process Engineer's Job:

- How to Make Field Measurements

NEXT GENERATION PROCESSES AND PRODUCTS IMPROVEMENT
Building Operational Excellence:

- Process Monitoring and Control:
 - Material Balance
 - Heat Balance
 - Pressure Balance
 - Process Control Instrumentation
- Effective Troubleshooting
- Debottlenecking and Optimization

Future Trends in Refineries Technologies and Operations:
Refinery Processes

- Hydrogen Production
- New Liquid Fuels for Fuel Cell Vehicle

CRUDE OIL DE-SALTING PROCESS

UETMT- REF- 112

Program Duration: 5 days

PROGRAM OBJECTIVES

Upon Completion of this course, the trainees must be able to understand & Identify the following:

- Emulsion Formation Principles
- Emulsion Stability
- Emulsion Dehydration Equipments
- The Effects of Salt Contamination
- Desalting Systems Schemes
- Electric Field on Desalting Vessels (Grid) and the Effect of this Grid for Processing
- Emulsion Treating Theory
- Nature and Formation of Emulsions
- Emulsions Stability
- Droplet Size in Emulsions
- Emulsion Breaking
- Gravity Setting
- Chemical Reaction
- Scale Habited
- Heating Reaction
- Separator Design
- Principles of Separation
- Sampling and Quality Control

TARGET COMPETENCIES

- Crude Oil Properties
- Introduction to Desalting
- Crude Oil Impurities: Water, Salt and Solids

WHO SHOULD ATTEND?

- Operation Supervisors
- Senior Plant Supervisors
- Operations Engineers
- Process Support Engineers
- Design Engineers
- Process and Production Staff
- Projects and Constructions Engineers
- Maintenance Personnel
- Maintenance Supervisors

PROGRAM CONTENT
Day 1
Introduction

- Crude Oil Properties, Contaminations and Characteristics
- Introduction to Separation Process and Separator Performance
- Introduction to Crude Oil Emulsion
- Emulsion Classification
- Emulsion Formation and Stability
- Emulsion Breakdown and Oil Dehydration Equipments
- Crude Oil Desalting Process & Equipment

Impact of Crude Oil Quality on Desalter Performance

- Introduction to Desalting
- Crude Oil Impurities: Water, Salt and Solids
- Impact of Organic Acids, Asphaltenes
- Desalting Heavy and Opportunity Crudes
- Tankage Dehydration

Day 2:
Fundamentals of Electrical Desalting

- Wash Water Addition
- Rate and Wash Water Quality
- Mixing/Contact
 - + Mix Valves
 - + Static Mixer
- Coalescence
 - + Stoke's Law and Electrical Voltage
- Performance Control Variables
- Dehydration Efficiency vs. Salt Removal Efficiency

Types of Desalting Systems

- Single-Stage Dehydrator
- Single-Stage Desalter
- Two-Stage Desalter
- Three-Stage Desalter
- Typical Operating Conditions and Performance

Day 3
Desalter Components

- Process Vessel
- Distribution System
- Electrodes and Transactors
- Mud Wash
- Level Control Devices

Desalter Design Considerations

- Vessel Size
- Number of Stages
- Transactor Size and Power Consumption
- Crude Properties

Day 4
Factors that Affect Desalter Operation and Performance

- Crude Oil Feed Rate and Quality
- Temperature/Viscosity/Density Relationships
- Electrical Field Intensity
- Wash Water Rate, Quality and Flow Configuration
- Emulsion Formation (Pumps, Exchangers, Valves, Mixers)
- Control of Water Level and Emulsion Layers
- Demulsifier Technology and Addition Rate
- Mud Washing and Brine Recycle

Day 5
Types of Desalting Applications

- Heavy Crude Desalting
- FCC Feed Desalting
- Distillate Treating

Desalter Troubleshooting

- Oily Effluent
- Poor Dehydration and/or Desalting
- Workshop

Economics Impact

- Electrostatic Desalter Operation, Performance and Troubleshooting

Sampling and Quality Control

INTRODUCTION TO CRUDE OIL REFINERY PROCESSING

UETMT- REF- 113

Program Duration: 5 days

ABOUT THE PROGRAM

- This program will present an overview of the Modern & Integrated Crude Oil Refinery, its Feedstocks, Product Slate and the Processes used to convert Crude Oil and Intermediate Fractions into finished Products. Hydrocarbon Chemistry, Crude Oil Properties and Fuel Product Quality will be studied.
- Each Refining Process will be presented, covering Operating Description and conditions, feedstock and catalyst selection, product yields, and Process Parameters, Unit Performance and Product Yields.

PROGRAM OBJECTIVES

- The objectives of this program have been to treat all of the important topics of Refinery. Beginning with an Introduction to overview of today's Petroleum Industry and Refinery Terminology. Topics introduce major Refinery Processes, basic Refinery Equipment, and some Operating Principles.
- Also, familiarization with the principles of some conversion processes and reactor applications, and treating processes for the removal and conversion of sulfur and sulfur compounds contained in refinery products. Finally, some supporting processes must cover.

TARGET AUDIENCE

- This "Introductory Program" has been designed to train new and limited experience technicians, new graduate and limited experience engineers or chemists who are involved in the Refining Operations.
- Experienced Operating Personnel and Engineers should find beneficial technical information, particularly if they have worked in only one area of the refinery and have the need to gain an overview of the entire refinery.

TARGET COMPETENCIES

- Crude Oil and Its Properties
- Crude Oil Processing

PROGRAM CONTENT
CRUDE OIL AND ITS PROPERTIES:

- PHYSICAL AND CHEMICAL PROPERTIES
- CRUDE ASSAY
- EFFECT ON REFINING OPERATIONS

PRODUCT SLATE:

- GASOLINE, KEROSENE/ JET FUEL, FUEL OILS/ DIESEL FUELS,
- FUEL OILS

CRUDE OIL PROCESSING:

- DESALTING
- ATMOSPHERIC DISTILLATION
- VACUUM DISTILLATION

PROCESSES FOR GASOLINE:

- REFORMING
- ALKYLATION
- ISOMERIZATION
- POLYMERIZATION

PROCESSES FOR MIDDLE DISTILLATE YIELD:

- CATALYTIC CRACKING
- HYDROTREATING
- HYDROCRACKING

MISCELLANEOUS PROCESSES:

- GAS PROCESSING UNIT
- ACID GAS REMOVAL UNIT
- HYDROGEN PRODUCTION
- SULPHUR RECOVERY UNIT

RESIDUE PROCESSING:

- VISBREAKING
- COKING
- DEASPHALTING
- HYDROCRACKING

CRUDE OIL PROPERTIES AND OIL TREATMENT

UETMT- REF- 114

Program Duration: 5 days

PROGRAM OBJECTIVES

Understand the fundamentals of separation in vessels by Gravity.

- Operate and Troubleshoot Separator Problems.
- Identify Emulsions, Emulsifying Agents, and Demulsifiers.
- How to operate and troubleshoot Heater-Treaters
- Understand the Basic Pump Hydraulics.
- Identify Storage Tank Types and components.
- Know Tank Maintenance Procedures.
- Identify Hazardous Conditions and apply Safety Procedures.
- Know the required measurements for oil the storage tanks (Gravity, Temperature, Volume, Salt Content, Water and Sediment)

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors, in Oil Production Facilities and Oil Refineries
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors, in Oil Production Facilities and Oil Refineries
- Operations Engineers in Oil Production Facilities and Oil Refineries
- Process Support Engineers, in Oil Production Facilities and Oil Refineries
- Design Engineers

PROGRAM CONTENT

- Fundamentals of separation in vessels
- Operation and Troubleshooting.
- Crude Oil Emulsions
- Sizing of Heater-Treaters
- Electrostatic Heater Treater and Operation.
- Basic Pump Hydraulics.
- Storage Tank Design
- Hazardous Conditions, Safety Procedures and Measurements.



CRUDE OIL TESTING & EQUIPMENT

UETMT- REF- 115

Program Duration: 5 days

ABOUT THE PROGRAM

Crude oil is the single largest traded commodity in the world. Proper sampling, analysis, and reporting of data according to established standards is of paramount importance, especially with the volatility in price, and the market proliferation of synthetic, high TAN, and extra heavy crude oils. Whether crude oil is refined in the near-term or stored for an extended period, it is fundamentally important that recognized procedures and standards be used in sampling and analysis. This is true from the time crude oil is produced, through transportation and interim storage, until it is ultimately refined. Analytical data must be accurate and reliable as they are the basis for decisions on whether a given crude oil can be effectively processed and yield the desired product slate. These data are also used by engineering personnel in planning refinery or production upgrades

PROGRAM OBJECTIVES

- Prepare routine standard chemical solutions, conduct sample analysis as per ASTM/IP/internal test methods, interpret the results, and take action on abnormal values
- Maintain & operate lab equipment, perform calibration as per procedures and troubleshoot minor equipment problems. (Those not requiring OEM/supplier resolution)

TARGET COMPETENCIES

- Crude Oil Composition
- Crude Oils and Fraction Properties
- ASTM Crude Oil Proficiency Testing Program

TRAINING METHODOLOGY

- A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions, and motivate everybody find the right answers.
- The delegates will also be encouraged to raise their own questions and to share in the development of the right answers using their own analysis and experiences.
- 60 % Lectures
- 20% Group Work& Practical Exercises
- 20% Videos& General Discussions

WHO SHOULD ATTEND

- Production Chemist
- Operation and production operators
- Operation engineers
- Lab Technician II
- Lab Technician I

PROGRAM CONTENT

- Crude Oil History; Supply and Trading Patterns
- Definitions and Terms
- The Complexities of Crude Oil Composition and crude oil characteristics
- Crude Oils and Fraction Properties



- Basics of Crude Oil Processing Evaluation
- Typical oilfield processing
- Production fluid treatment objectives
- Production fluid separation
- Emulsion
- Sampling Protocols
- Sampling Containers and Sample Integrity
- Composition and Classification
- Crude Oil Quality (Case Studies)
- ASTM Crude Oil Proficiency Testing Program
- American Society for Testing and Materials (ASTM's) industrial chemical standards and it's quality towards safe production and utilization.
- Institute of Petroleum (IP) in the oil and gas industry
- Comprehensive Analyses (Full Assay)
- Crude oil standard operation testing (Scope ,Application and Summary of Method)
- factors influences lab test result and uncertainties
- Awareness of the steps and time to produce a laboratory result
- Normal- Physical properties of each test the lubricant are within acceptable limits, and no signs of excessive contamination or wear are present.
- Monitor- Specific acceptable ranges of the test results
- Abnormal- physical properties, contamination, and/or component wear.
- Interpretation of chemical names and formulae
- Calculation of molecular and formula masses
- Concentration calculations (molar, molal, mass, mole fraction, density) 13-01 LS 1-4
- Procedures for inspection
- Preventive and corrective maintenance and adequate planning, management and implementation
- Discrepancy from the indicated levels, adjustments compared to the device functions and specifications of the manufacturer in their maintenance or service manual.
- Accuracy compared to known standards.
- Resources needed for maintenance.
- Group discussion on the chemicals used
- Discussions and Assessments will be carried out

CRUDE OIL PRODUCTION AND WELLHEAD PROCESS

UETMT- REF- 116

Program Duration: 5 days

PROGRAM INTRODUCTION

- Many oil production processes present a significant challenge to oil and water treating equipment design and operations. The nature of crude oil emulsions changes continuously as the producing field depletes and conditions change with time. This creates the need to consider future performance when designing treatment systems and requires an understanding of scale and up scaling. The program explores all the theories and technology required in crude oil and water treatment, starting with the emulsion theory formation, stabilization and the mechanism and technology to destabilize and separate water from oil.
- After the oil has been dehydrated some oil will still not meet contract specifications due to the amount of salt present in the crude oil. For this reason the program also discusses desalting technologies and processes needed to achieve the required oil specifications.
- Due to environmental regulations and water injection specifications, produced water must also be processed. The program also provides a summary of the technologies, processes, and operational conditions needed to achieve the specifications for the produced water.

WHO SHOULD ATTEND?

This program is aimed at technical personnel at grade level within exploration, production, refining and service companies such as:

- Surface Facilities Operation Engineers
- Flow Assurance Engineers
- Production Engineering Staff
- Production chemists
- Operations Personnel

PROGRAM OBJECTIVES

- The aim of this program is to establish an understanding of the processes, technology, equipment, techniques and HSE relating to the Crude Oil and Water Treatment Facilities associated with the production and operation of crude oil at the processing locations. After attending the program the participants will:
- Have an understanding of the facilities required for crude oil and produced water treating and processing
- Understand the principles for the separation of oil, gas and water
- Be aware of the Oil treatment basics regarding dehydration and desalting of crude oil
- Be familiar with the produced water technologies employed in the oil industry

TARGET COMPETENCIES

- Crude Oil Treatment Facilities
- Well Fluids Separation
- Crude Oil Desalting

TRAINING METHODOLOGY

“Crude Oil Production and Wellhead Process” is a hands on, stimulating learning experience. The program will be highly interactive, with opportunities to advance your opinions and ideas. Participation is encouraged in a supportive environment. To ensure the concepts introduced during the program are understood, they will be reinforced through a mix of learning methods, including lecture style presentation, and open discussion.

PROGRAM SUMMARY

- This program describes the processes and technologies frequently provided for the treatment of the oil and water phases of well stream fluids. This includes the following operations:
- Separation
- Desalting
- Produced Water Treatment

PROGRAM CONTENT
DAY 1 - CRUDE OIL TREATMENT FACILITIES
Introduction

- Typical Oilfield Processing
- Operating Centre Concept
- Production Fluid Treatment Objectives

The Wells

- Well Function
- Well Operation
 - ✓ Basic Notions
 - ✓ Producer Well Operations
 - ✓ Injection Well Operations
 - ✓ Operating Parameters

DAY 2 - SEPARATION AND TREATMENT
Well Fluids Separation

- The Function of Separation
- Basic Principles
- The Separation Process
- Operating Control
- Troubleshooting

DAY 3 - CRUDE OIL DESALTING

- Main Problems of Salty Crude Oil
- Oil Desalting Principles
- Desalters: Equipment and Technology
- Operation and Design Considerations

DAY 4 - WATER TREATMENT

- Properties of Produced Water
- Environmental Regulation
- Primary Treatment – Decantation
- Secondary Treatment – Breaking Emulsions
- Tertiary Treatment
 - ✓ Flotation
 - ✓ Coalescence
 - ✓ Coagulation and Flocculation

DAY 5 - DRAINS AND FLARES
Drains

- The Function of Drains
- Different types of Drains
- How Drains Work

Flares

- The Function of Flares
- How Flares Work
- Types of Flares
- Operation of Flare Systems
- Suspended Oil and Solid Removal
- Chemical Used In Water Treatment



OIL REFINING: FROM CRUDE OIL TO PETROLEUM PRODUCTS

UETMT- REF- 117

Program Duration: 5 days

PROGRAM OBJECTIVES

To improve understanding and awareness of Crude Oil fractionation, catalytic and Hydrotreating Processes

TARGET AUDIENCE

All Refining Personnel

TARGET COMPETENCIES

- Crude Oil Fractionation
- Hydrotreating Processes
- Conversion by Means of Catalytic Cracking

PROGRAM CONTENT
Petroleum Products

- Energy and non-energy products and their main uses.
- Principal components of petroleum products; general hydrocarbon classification and main impurities.
- Quality requirements imposed on petroleum products.
- New trends in market structure and product characteristics.

Refining Processes

- Crude Oil Fractionation
- Origin, overall Characteristics and Classification of Crude Oils
- Yields and Properties of Straight-run Cuts Obtained by Distillation
- Industrial Units: Topping, Vacuum Distillation, Light-ends Fractionation; Various Process Schemes, Operating Conditions, Energy Consumption
- Catalytic Reforming and Summarization
- Basics of Processes, Types of Catalysts, Product Yields
- Industrial Units : Process Schemes, Operating Conditions, Equipment Involved, Energy Consumption
- Hydrotreating Processes
- Main Features of Impurities Removal by Catalytic Hydrogen Treatment
- Main Refining Applications
- Conversion Units
- Characteristics and Origin of Feeds to be Cracked
- Conversion by means of Thermal Cracking: Visbreaker, Various Cokers
- Conversion by means of Catalytic Cracking
- Recent developments in Catalytic Cracking of Heavy Residues
- Base Lube Oil Manufacturing

METHODS AND TECHNIQUE FOR CRUDE OIL EVALUATION

UETMT- REF- 118

Program Duration: 5 days

PROGRAM CONTENT
Chemistry and Physics of Petroleum

- Introduction
- Constituent of crude oils
- Hydrocarbons
- Non- hydrocarbons
- Sulphur compound
- Nitrogen compound
- Oxygen compound
- Metals
- Cracking
- Reforming
- Hydrocracking
- Alkylation


Crude Oil Classification and Hydrocarbon Type Analysis

- Characterization of Petroleum Fractions
- Structural Group Analysis Methods

Evaluation of Crude Oil

- The Processing Scheme of Crude Oil
- Physical Properties
 - Specific Gravity
 - Boiling Point
 - Melting Point
 - Viscosity
 - Solubility Characteristics
- Chemical Properties
- Thermal Reactions
- Oxidation Reactions
- Technical Properties

Applied example for a Crude Oil Evaluation
Classification of Product Specification

- Marketing Specification
- Supply Specification
- Refinery Operating Specification
- FISC Specification

Quality Assessment

- Introduction
- Stability Tests
- Corrosion Tests
- Flammability Tests
- Volatility Tests
- Viscosity Tests
- Liquefaction Tests
- Solidification Tests
- Calculations
- Miscellaneous Tests
 - Conradson Carbon
 - Demulsification Number
 - Foaming Characteristics
 - Doctor Tests
 - Water Reaction
- Chemical Test Methods
 - Acidity and Alkalinity
 - Ash, Sediment, and Water
- Determination of Inorganic Constituents and Contaminants
- Determination of inorganic Constituents by Chemical Means
- Properties, Specifications and Tests Methods for Gas and Liquefied Petroleum Gas
- Properties, Specifications and Tests Methods for Gasoline, Kerosene and Aviation Turbine Fuel
- Properties, Specifications and Tests Methods for Distillate and Residual Fuel Oil
- Properties, Specifications and Tests Methods for Lubricating Oil, and Asphaltic Bitumen

CRUDE DISTILLATION TOWER OPERATIONS

UETMT- REF- 119

Program Duration: 5 days

PROGRAM OVERVIEW

This program introduces the Crude Oil Distillation Process. Basic Equipment, Components, and Operating Principles are covered, and Operator Responsibilities and Typical Problems are also included.

PROGRAM OBJECTIVES

By the end of this program, participants will be able to

- Describe the general purpose of Crude Distillation and the Purposes of the two major steps in Crude Distillation
- Identify Equipment typically used in Crude Distillation
- List and describe the basic steps of Desalting and explain How Crude is Heated both before and after Desalting
- Describe the Operation of a Typical Desalter and identify Process variables and Factors that affect Desalter Operation
- Describe the Operation of a flash drum and a Prefractionator, an Atmospheric Distillation tower and its Associated Equipment, and a Vacuum Distillation Tower and its Associated Equipment.
- Describe Process variables that are important to the operation of a charge Heater, an Atmospheric tower, and a Vacuum Tower
- Define these Terms: Cut Point, Initial Boiling Point, Final Boiling Point, Boiling Point Percentage, and Target Temperature Range.
- Describe How Adjustments can be made to Maintain Process Specifications.
- Describe these Abnormal Conditions and explain how they can be detected and Corrected: Flooding, Dry Trays, and Upset Trays.

TARGET AUDIENCE

- Crude Distillation
- Heating and Desalting
- Process Variables

PROGRAM CONTENT
Introduction to Crude Distillation (Purpose/ Phases / Heating & Desalting Equipment)

- Purpose of Crude Distillation
- Major Steps in the Crude Distillation Process
- Heating and Desalting Equipment
- Distillation Equipment

Heating and Desalting

- Steps of Desalting
- Preheating and Desalting Operations
- Process variables and Factors
- Heating Desalted Crude

Crude Distillation

- Pre-separation Equipment Operation
- Atmospheric Tower Operation
 - Vapor Flow
 - Liquid Flow
- Equipment associated with Atmospheric Towers
- Vacuum Tower Operation

Process Variables (Pressure, Temperature, Stripping Steam Flow, Level)

- Charge Heater Process Variables Atmospheric tower Process Variables
 - ✓ Pressure
 - ✓ Temperature
 - ✓ Stripping stream flow
 - ✓ Level
- Vacuum Tower Process Variables

Maintaining Process Specifications

- Fractions and Boiling Points
- Adjusting Processes to Maintain Specs
 - ✓ Maintaining Specs - Example 1
 - ✓ Maintaining Specs - Example 2
 - ✓ Maintaining Specs - Example 3

Abnormal Conditions

- Flooding
- Dry Trays
- Upset Trays
- **Double-Ended Composition Control**
- Interaction Between Loops
- Measures of Interaction
- Application of Interaction Analysis to Fractionators
- Use of Materials and Energy Balance Concepts

Complex Towers

- Single Side Draws
- Intermediate Reboilers
- Intermediate Reflux
- Multiple side draws

TOWER INTERNALS

UETMT- REF- 120

Program Duration: 5 days

PROGRAM OBJECTIVES

- To give participants a better understanding of the working and use of the trays and packing installed in many columns for distillation, absorption, stripping, washing,
- On completion of the course, the participants should know:
- The different types of internals, their advantages and disadvantages
- The main criteria for choice according to their respective operating field
- The basic features for designing
- The operating range of installed equipment and how to troubleshoot it.

TARGET COMPETENCIES

- Technology and Functioning of Trays
- Technology and Functioning of Packed Beds
- Comparison and Troubleshooting of Trays And Packings

WHO SHOULD ATTEND?

- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Process and Production staff,
- Projects and Constructions Engineers
- Utility engineer and operation staff

PROGRAM CONTENT
Technology and Functioning of Trays

- Basics of mass transfer between liquid and vapor: importance of the interface area, viscosity and relative volatility.
- Definition of some working parameters: efficiency, capacity, flexibility, pressure drop, ...
- Different types of trays: with or without down comers.
- Different types of contacting system for the active area: bubble caps, fixed or mobile valves.
- Hydraulic working and pressure drops.
- Troubles as flooding, weeping, fouling, ...
- Main parameters to take into account in the design of internals.
- Specific features for multi-pass trays.
- Equipment for transition zones as flash zone, changing of pass number, ...
- Aim of high performance trays and functioning. Advantages and fields of use.
- New technology trays and implementation in the next future.
- Example:
- Simulation of a tray design; representation of trays in operation (video)

TECHNOLOGY AND FUNCTIONING OF PACKED BEDS

- Random packing, structured packing, grids.
- Technology of a packed bed in operation.
- Operating range and pressure drop.
- Recent evolution of packing.
- Liquid or vapor distributors, collectors and redistributors.
- Impact on the working and performances of packed beds.
- **Example:**
- Representation of packing in operation (video); implementation of packing and
- Evaluation of performances

COMPARISON AND TROUBLESHOOTING OF TRAYS AND PACKINGS

- Advantages and disadvantages of trays and packed beds, costs.
- Respective technical performances: capacity, pressure drops, flexibility, implementation.
- Detection of the troubles on the field and analysis of the data.
- Potential solutions and efficiency.
- Example:
- Revamping an existing column
- Case study of troubled equipment, diagnostic and remedy.

FUNDAMENTALS OF CATALYST IN OIL & GAS INDUSTRY

UETMT- REF- 121

Program Duration: 5 days

PROGRAM OBJECTIVES

This course covers a general overview of the Catalytic Processes in a Refinery and how each integrates with the high value products, with a special emphasis on hydrocracker, and Catalytic Reformers. A history of each Catalytic Process will be reviewed including; process description, process variables, reaction chemistry, catalyst development and evaluation Systems

PROGRAM OBJECTIVES

- Overview of the Catalytic Processes in a Refinery, with a special emphasis on hydrocrackers, Hydrotreater and Catalytic Reformers.
- Catalyst Evaluation Techniques.
- An understanding of Reactor and Catalyst interaction.
- The operation, control and trouble shooting of a reactors and associated equipment
- An overview of reactors, practical solutions as well as theory
- An understanding of essential reaction concepts
- techniques for commissioning, start up and shutdown of reactor operations

TARGET COMPETENCIES

- Catalytic Process
- Hydrodesulphurization
- Hydrogenation
- Dehydrogenation
- Isomerization

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Ideal for veterans and those with years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject

PROGRAM CONTENT

- Refinery Overview and the role of Catalytic Process in the Refinery
- Alkylolation
- Hydrodesulphurization
- Hydrogenation
- Dehydrogenation
- Isomerization
- Hydrocracking and De-Alkylolation
- Reforming
 1. Catalytic structure, function and history in each of the processes
 2. Process Variables
 3. Common Problems observed
 4. Reaction Chemistry
 5. Current Advancements in Catalyst
 6. Catalyst Evaluation Techniques

FIXED BED CATALYTIC REFORMING

UETMT- REF- 122

Program Duration: 5 days

PROGRAM DESCRIPTION

This program covers the operation, maintenance, and troubleshooting of the Fixed-Bed Catalytic Reforming unit, with emphasis on optimizing catalyst performance and maximizing catalyst cycle life. This is a discussion-based session, designed to encourage interaction and information sharing among participants. It includes lecture, teamwork, and problem-solving activities to provide experience in troubleshooting typical problems encountered in the field.

TARGET AUDIENCE

This program is designed for process engineers and operations personnel who work with the Fixed-Bed Catalytic Reforming unit or supervise those who do.

TARGET COMPETENCIES

- Fixed-Bed Catalytic Process Flow
- Process Variables
- Catalyst Chemistry
- Catalyst Poisons

PROGRAM OBJECTIVES

- Participants will be able to:
- Identify the Process Flow of the Fixed-Bed Catalytic Reforming Unit
- Describe the effects of key Process Variables
- Explain Catalyst Chemistry and How it affects Performance
- Identify Catalyst Poisons
- Understand the Procedures for Catalyst Regeneration
- Monitor Process Performance
- Troubleshoot Typical Operating Problems

PROGRAM CONTENT

- Process Flow and Control
- Effects of Process Variables
- Process and Catalyst Chemistry
- Catalyst Poisons
- Water/Chloride Balance
- Catalyst Regeneration
- Operating Procedures
- Process Monitoring
- Troubleshooting

CATALYTIC REFORMING PROCESS (CRP)

UETMT- REF- 123

Program Duration: 5 days

PROGRAM OBJECTIVES

Upon completion of this course, participant will be to gain:

- Identify process flow of the CCR Plat forming unit
- Describe the implications of process variable changes and their effect on performance and catalyst deactivation
- Explain the catalyst chemistry and its effect on performance
- Identify catalyst poisons
- Compare and contrast procedures for catalyst regeneration
- Understand operating procedures and put them into practice
- Monitor process operations
- Troubleshoot typical operating problems
- Overview of the Catalytic Processes in a Refinery, with a special emphasis on Hydrotreaters Systems

TARGET COMPETENCIES

- Chemical Reactions and Thermodynamics
- Catalytic Reforming Catalyst

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Ideal for veterans and those with years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject

PROGRAM CONTENT
Day 1
Basic Principles
Introduction

- The Problem of Antiknock Quality
- Octane Number
- Composition Effect on Octane Number
- Thermal Reforming
- Feed Treatment by Hydrogen

The Catalytic Reforming Process

- Introduction
- Feed to Catalytic Reforming
- Product from Catalytic Reforming
- The Typical Yield
- Reformate Composition
- Reformate Specification
- Catalytic Reforming Techniques

Day 2
Process Chemical Reactions and Thermodynamics

- Introduction
- Process Reactions
- Relative Reaction Rate
- Heats of Reaction

Catalytic Reforming Catalyst

- Introduction
- Classification of Catalyst
- Main Types of Catalyst
- General Catalyst Characterization and Properties
- Catalyst Deactivation
- Catalyst Regeneration
- Catalyst Regeneration Steps

Day 3

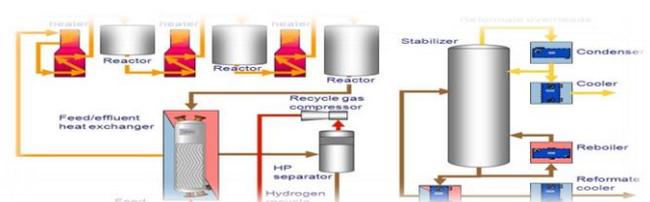
- Discussion of Process Variables
- Reactor pressure
- Temperature
- Feed quality
- Hydrogen to hydrocarbon ratio
- Space velocity
- Catalyst protection, aging and poison

Day 4

- NORMAL START-UP AND SHUT-DOWN
- Normal Start-Up after Prolonged Shutdown
- Discussion
- Detailed procedure – catalytic reforming
- Normal Start-Up after Short Shutdown

Day 5

- Process troubleshooting & EMERGENCY
- Loss of Recycle Compressor
- Loss of Feed
- Explosion, Fire, Line Rupture, or Serious Leak –
- Instrument Air Failure
- Power Failure
- Steam Failure
- Cooling Water Failure
- Heater Failure
- Fuel Gas / Fuel Oil Failure



CATALYTIC REFORMING (MODERN PLAT-FORMING PROCESS WITH CONTINUOUS CATALYST REGENERATION, CCR)

UETMT- REF- 124

Program Duration: 5 days

INTRODUCTION

This Program will present a review of “Catalytic Reforming and Modern CCR Unit”. Beginning with an Introduction to Crude Oil and its Processing, i.e. Processes common to most Energy Refineries.

This Program describes Fundamentals of the meaning of Octane Pool, Octane Improvement of Virgin Naphtha. Once the Fundamentals are established, discussion moves into the industrial Catalytic Reforming Processes, Process Schemes, and Operating Conditions, Types of Catalyst, Product Yields. Also, this Program examines various types of CCR Technologies and Regeneration Loops. Basic Troubleshooting for Catalytic Reforming are also covered.

PROGRAM OBJECTIVES

- The Objectives of this program have been to give a Broader Technical Understanding of the Process of Catalytic Reforming and also to present How the Operation can be optimized. Beginning with an Introduction to overview of today’s Crude Oil and its Processing.
- Also, Familiarization with the principles of the influence of the Operating Parameters on the Performances of Catalytic Reforming Process through a thorough of the behavior of the Catalyst and the Respective Chemical Reactions. Better Explanation of the purpose and implementation of the main steps of the continuous Catalyst Regeneration for Catalytic Reforming. Regarding Production of Aromatics, i.e. Separation of Components of the Benzene-Toluene-Xylene, called currently BTX Fraction is stressed also.
- Finally, a better view of the potential origins of troubles and their respective remedies

TARGET COMPETENCIES

- Catalytic Reforming Process
- Separation Processes
- Conversion Processes Categories
- Refinery Octane Pool

WHO SHOULD ATTEND?

- The program is designed for Personnel who would like to obtain Technical Information related to the Technology of Catalytic Reforming Processes, including company Technical and Operating Personnel working in Process Engineering, Process Design, and Operations.
- The Technical Content of the Program also makes it suitable for the staff of Refineries, Research Centers, Oil Companies and Engineering Firms concerned by the different aspects of the Operation of these Processes.
- Experienced Operating Personnel and Engineers should find beneficial Technical Information, particularly if they have worked in only one area of the Refinery and have the need to gain an overview of the entire Refinery.
- Those in attendance will receive a comprehensive manual covering Processing Units associated with “Catalytic Reforming and Modern CCR Unit”.

PROGRAM CONTENT
1. Introduction to Refining:
Crude Oil and its Processing
Separation Processes:

- Primary Distillation (Atmospheric Pressure)
- Secondary Distillation (Vacuum Distillation)
- Other Separation Processes: (Absorption, Extraction, Crystallization, and Adsorption)

Conversion Processes Categories:

- Processes for the Improvement of Properties:
 - By Molecular Rearrangement: (Catalytic Reforming, and Isomerization)
 - By Using Co-Reactants: (Alkylation, Ether Synthesis, and Oligomerization)
- Conversion Processes:
 - Thermal Processes: (Visbreaking, Coking, Catalytic Cracking, Steam Reforming, and Hydroconversion)
 - Finishing Processes: (Hydrotreatment/ Hydrogenation, and Sweetening)
 - Environmental Protection Processes:(Acid Gas Processing, i.e. Sulfur Recovery, Stack Gas Processing, and Waste Water Treatment

2. Refinery Octane Pool:

- Quality Specification of Gasolines related to Engine Operation and Environment Protection; Reformulated Gasoline
- Octane Number Definitions and Standard Tests: MON, RON
- Relation between the Structure of Hydrocarbon Molecules and their Octane Numbers
- Octane Improving Processes, Integration within the Refining Schemes

3. Industrial Catalysts:

- The Place of Catalytic Processes in Refining
- Classifying Catalysts: (Active Elements "Promoters", and Main Types of Refining Catalysts)
- Catalyst Characteristics and Properties
- Preparing the Catalyst
- Catalyst Regeneration

4. Catalytic Reforming Processes:

- Feedstock Origins and its Characteristics, Product Properties
- Process Parameters of Catalytic Reforming Units (Regenerative)
- Fundamentals of Catalytic Reforming Chemistry and related Catalysts:
 - Catalyst Poisons and Catalyst Life
 - Catalyst Regeneration

5. CCR Technologies and Regeneration Process:

- Atmospheric Pressure Technology
- Catalyst Circulation
- Special Features for CCR Catalyst
- Catalyst Regeneration

6. Troubleshooting for Catalytic Reforming:

- RON Decrease: Causes, Diagnostic and Remedies
- Moisture in the Feed, Sulfur Peak, Chlorine Peak
- Recycle or Separation Problems
- Reactors Temperature Run-Off
- Specific Troubles of CCR Units (Catalyst Circulation, Regeneration Loops Chilling System, Nitrogen Lift Pollution)
- CCR Operation with Catalyst Regeneration Problems

FLUID CATALYTIC CRACKING PROCESS TECHNOLOGY

UETMT- REF- 125

Program Duration: 5 days

PROGRAM INTRODUCTION

The fluid catalytic cracking process is a very complex and demanding one. This program, "Fluid Catalytic Cracking Process Technology," has been developed by Refining Process Services to provide an in-depth yet practical review of current FCC technology. The speakers will cover topics ranging from the basic process principles through items of current interest such as diesel fuel maximization and methods of meeting fuel specifications. The interactions between process variables such as feedstock quality, reaction conditions, and environmental constraints will be discussed. A thorough understanding of these principles is required to optimize the performance of the fluid catalytic cracking unit.

TARGET COMPETENCIES

- FCC Fundamentals
- FCC Chemistry and Heat Balance
- Process Equipment Overview

WHO SHOULD ATTEND

If you are new to the FCC unit and need to know how to optimize the operation of the unit. You will start at the beginning by discussing how the FCC unit fits into the overall refinery processing scheme, how it may process various feed-stocks, how product selectivity can be controlled and FCC catalyst fluidization basics. Participants will discuss process flow, process control, equipment, catalyst management, and how to properly execute a heat balance of the unit. The course emphasizes the technology aspects of the FCC unit and implements important process calculations that can be used to properly monitor FCC performance, including cyclone velocities, superficial velocities, distributor pressure drops and more. The course also incorporates a proprietary FCC Simulator to explore the key operating procedures and process variable effects associated with a commercial FCC unit. Through lecture, team work and exercises, participants will gain the fundamental principles required to understand common FCC Unit issues.

PROGRAM CONTENT
1. FCC Fundamentals

- FCC Flow Scheme
- Pressure Balance
- Process Fundamentals

2. FCC Chemistry and Heat Balance

- Basic Cracking Reactions
- Heat Balance
- How to Get Accurate Test Run Data

3. FCC Variable Effects

- Operating Variable Interactions
- Feedstock Effects in FCC
- Methods of Increasing LCO Yields
- NOx / SOx Emissions and Reduction

4. Process Equipment Overview

- FCCU Configurations
- Resid Cracking Processes
- Hardware Modifications
- Riser/Reactor/Fractionator Design Principles
- Recovery Side Operating Guidelines
- Reactor/Regenerator Troubleshooting
- Cyclone Operation
- Air Blower Operation

5. Cracking of Heavy Feedstocks and Resids

- Characterization of Heavy Feeds and Resids
- Effect of Heavy Oil Cracking on Product Yield and Product Quality
- Effect of Carbon and Metals
- Metals Passivation in FCC

6. Fluidization Fundamentals for FCC

- Basics of FCC Fluidization
- Flow in Standpipes

7. FCC Catalyst Technology

- Zeolite Cracking Catalysts
- Catalyst Composition and Selectivity Effects

8. FCC Catalyst Evaluation

- Analytical Characterization
- Performance Testing
- Impact of Properties on FCCU Operation

9. Advances in FCC Technology

- New Feed Nozzle Designs
- Advanced Riser Termination Devices
- Improved Stripper Technologies

REFINERY CRACKING TECHNOLOGY

UETMT- REF- 126

Program Duration: 5 days

PROGRAM OVERVIEW

This Program is an intensive in-depth program. It covers “**Refinery Cracking Technology**”. The Program concludes with chance to discuss a Case Study brought by attendees. The Program is adapted to shorter durations.

The purpose of this Program is to focus first on “Differences between the various Refinery Cracking Processes” from Operation Points of view, and then acquiring the Basics to start operating those Heavy Cuts Cracking Processing Units. Emphasis is on monitoring and Controlling Critical Process variables and Reacting to changes in Plant Operating Conditions.

A Broader Understanding of Catalysts, their Preparation the Problems involved in their Utilization, Industrial Performance Control, and Investigation of the Regeneration Principal. Typical current update on developments in Commercial Heavy Cuts Cracking Processes is also covered.

PROGRAM OBJECTIVES

During this program, a description of Fluid Catalytic Cracking FCC Technology will be presented. The Technologies discussed will include the Characteristics of the feeds, impact on the Process, Characteristics of the Products. Also included in this Program are main Operating Variables: Changes of catalyst Circulation, Cracking Temperature, Feed Temperature, Feed Flow Rate, Stripping Steam Ratio, Feed Chemical Properties, and Reactor Pressure.

TARGET AUDIENCE

- The Program is designed for Personnel who would like to obtain Technical Information related to the Technology of “**Refinery Cracking Processes**”, including Operational Personnel, Supervisors and Engineers who are involved in the Operation of this type of Units. The Technical Content of the Program also makes it suitable for other Refinery Sections concerned by the different Aspects of the Operation of these Processes.
- Attendance will receive a comprehensive Manual covering Processing Units associated with Refinery Cracking Processes Technology.

TARGET COMPETENCIES

- Thermal Cracking
- Fractionating Tower
- Catalytic Hydrocracking

PROGRAM CONTENT
Crude Oil and its Processing:

- The Composition and Characteristics of Crude Oil
- Basic Processes
- The Processes Common to most Energy Refineries
- Processes not so Common to Energy Refineries

Conversion Processes:

- Origins and Characteristics of Conversion Units Feeds
- Different Types of Conversion: Principles, Performances:
- Thermal Cracking Processes
- Catalytic Cracking without Hydrogen
- Catalytic Cracking with Hydrogen

Cracking Process:

- Nature of Cracking Process
- Cracking Reactions
- Necessity for Cracking
- Straight-Run Gasoline and Cracked Gasoline
- Effect of Process Variables on Cracking Reaction

Cracking Equipment:

- Furnaces (Heaters): Convection Coils, Radiant Coils, Single and Double Convection Coil Furnaces, and Transfer Line
- Reaction Chambers
- Heat Exchangers
- Bubble Towers
- Pumps, and Materials used in Pump Construction
- Instruments: Flow Controller, Temperature Controller, Level Controller, and Pressure Controller

Thermal Cracking:
Liquid-Phase Cracking:

- Main Steps in Liquid-Phase Cracking
- Variations in Liquid-Phase Cracking Systems
- Factors that Decide Cracking Process Used
- Well-Known Thermal Cracking Processes (Visbreaking Processes)

Vapor-Phase Cracking:

- Development of Vapor-Phase Cracking
- Time-Temperature Factor
- System of Vapor-Phase Cracking

Catalytic Cracking:

- Function of Catalyst
- Types of Catalysts
- Fixed-Bed Process
- Moving-Bed Process
- Fluid Process (FCC)
- Catalytic Cracking Units:
- Preparing Feedstock for Fluid Catalytic Unit:
- Handling Liquid Feed
- Removal of Metal Poisons
- Preparing Feedstock for Fluid Catalytic Unit Handling both Liquid and Vapor Feed
- Reactor of Fluid-Process Catalytic Cracking Unit
- Flow Diagram of Fluid-Process:

Catalyst Section

- Method of Recirculating Catalyst
- Catalyst Regenerator
- Afterburning
- Cyclone Separators
- Air Heater
- Slide Valves
- Air Blower
- Maintaining Fluid Flow of Catalyst

Fractionation Section
Fractionating Tower Overhead:

- Light Cycle Oil
- Heavy Cycle Oil
- Recycle Reflux

Fractionator Bottoms
Gas Concentration Section
Process for Stabilizing Gasoline:

- Low-Pressure and High-Pressure Absorbers
- De-Ethanizer
- Debutanizer
- Depentanizer

Commercial Catalytic Cracking

- Feed Selection and Pretreatment
- Process History, Types of Units
- Characteristic Equipment
- Operation Aspects
- Catalyst Demetallation

Catalytic Hydrocracking:

Hydrocracking Reactions
 Feed Preparation
 The Hydrocracking Process
 Hydrocracking Catalyst
 Process Variables
 Hydrocracking Yields
 Modes of Hydrocracker Operation

DISTILLATION

UETMT- REF- 127

Program Duration: 5 days

PROGRAM DESCRIPTION

Distillation is still the most widely used means of separating chemical species in the petroleum and chemical industries and is the first unit operation in an oil refinery. This program covers the key areas of assessing the design of the internals through to their eventual installation but with the emphasis placed on aspects seldom taught. It is not a Chemical Engineering 'refresher' program, but rather seeks to cover topics from a practical viewpoint that can be obtained only by hard won experience.

Various aspects relating to the initial design of column internals are covered. Current internals are reviewed including critical design aspects of trays, packings and ancillary equipment. The occurrence and avoidance of pyrophoric fires in columns, and the in-situ inspection requirements of all internals, are included. The philosophy and approach to troubleshooting is discussed leading on to a review of numerous first hand troubleshooting examples, each demonstrating a significant problem area. The program is designed to open the mind to the wider issues of column internals and to the maintenance of the design performance over the cycle life of the unit.

PROGRAM OUTLINE

- Development of Fractionation
- Column types
- Simulation packages
- Column Internals
- Critical Design Aspects
- Control
- Inspection
- Column Cleaning and Pyrophoric Fires
- Troubleshooting Case Studies

PROGRAM OBJECTIVES

This program covers the key areas of assessing the design of the internals through to their eventual installation and covers the topics from a practical viewpoint such as can be obtained only by hands-on involvement. Experience has shown that relatively small mal-practices, either in the design or installation, can have serious economic consequences far beyond that which could be anticipated. Experience has also shown that whilst procedures may well be in place to ensure efficient verification of the installation of internals, personnel often do not have the appropriate knowledge with which to perform the job they are required to undertake. The program will address these issues and should enable engineers to make a positive and definable economic contribution to their company profits with a minimum of delay. Upon completion of this program, participants will have gained a good understanding of the key elements associated with column hydraulics and the design of modern internals, installation of all types of internals, operation and troubleshooting of distillation columns and will also include simulation and phase equilibrium, root cause analysis, pyrophoric fires, installation disciplines and the structured approach to troubleshooting.

TARGET AUDIENCE

The program will be highly valuable to all engineers involved in the operation and design of Distillation facilities. Additionally, the program will be useful to any technical personnel wishing to gain an insight into the practical aspects of Distillation. Those who are experienced in other fields and seek a review of the fundamentals of Distillation will also find this program most beneficial.

TARGET COMPETENCIES

- Development of Fractionation
- Column types
- Simulation packages
- Column Internals
- Critical Design Aspects

PROGRAM CONTENT
Introduction

- Feeds, General requirements, Stage efficiency, Design envelopes, Accuracy and consequences

Specific Distillation

- Crude oil, Residue, Other columns

Column Internals

- Critical aspects (trays), Critical aspects (packings), Critical aspects (other internals), Review of current trays and packings

Pyrophoric Fires

- Occurrence, Avoidance, Column cleaning

Control
Inspection

- What to look for:
- Up to delivery
- Before start up (trays)
- Before start up (packed)
- Before start up (other)

Troubleshooting Philosophy, Case histories


DISTILLATION OPERATION, CONTROL AND TROUBLESHOOTING

UETMT- REF- 128

Program Duration: 5 days

PROGRAM OBJECTIVES

Upon completion of this course, participant will be to gain:

- The operation, control and trouble shooting of a distillation columns and it's associated equipment,
- An overview of distillation, practical solutions as well as theory
- An understating of essential distillation concepts,
- Valuable practical insights for trouble free design and field proven techniques for commissioning, start up and shutdown of distillation operation.
- The fundamental knowledge of distillation control.
- To tailor your approach to specific design, analysis and troubleshooting problems.

TARGET COMPETENCIES

- Characteristics of Crude Oil
- Refinery Flow Sheet
- Distillation Columns

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- deal for veterans and those with years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject

PROGRAM CONTENT

Day 1

Characteristics of Crude Oil

- Sources of Crude
- Composition of Crude
- Description of Crude Oil Fractions
- Definition of Physical and Chemical Processes
- Crude Oil Testing
- Crude Assays

Day 2

Introduction to the Refinery Flow Sheet

- Refinery Flow Sheet
- Gasoline Processing Options
- Bottoms Heavy Oil Processing Options
- Alkylolation
- Hydrotreating
- Gas Sweeting

• Day 3

General Column Design

- The components of a distillation system, more than just a tower – it is a
- system of different components
- History of distillation

Different types of distillation columns

- Differences among batch, flash, and multistage distillation process
- Relative advantages of tray and packed columns
- Steps in the process design

Day 4

Tray Column Design

- The major design differences between tray types
 1. Baffle Trays
 2. Bubble Cap Trays
 3. Sieve Deck Trays
 4. Valve Trays
- Different types of distillation columns
- Differences among batch, flash, and multistage distillation process
- Relative advantages of tray and packed columns
- Steps in the process design
- Crude Oil Distillation
- Description of the Distillation Process
- Cut Points of the Various Fractions
- Crude Tower Design
- Vacuum Tower Design

Day 5

- Troubleshooting
- Introduction
- Evaluate operation of a packed column
- Evaluate operation of a tray column
- Use tools to diagnosis problems
- Crude Oil Trouble Shooting Case Studies
- Distillation
- Typical Problems
- Flooding and Its Detection
- Pressure Surveys
- Entrainment and Product Quality



OJT IN REFINERY DISTILLATION & OIL TREATMENT UNITS

UETMT- REF- 129

Program Duration: 5 days

PROGRAM OBJECTIVES

Upon completion of this course, participant will be to gain:

- An overview of distillation, practical solutions as well as theory (software and practically)
- The operation, control and trouble shooting of a distillation columns and its associated equipment (software and practically)
- An understating of essential distillation concepts(software and practically)
- Valuable practical insights for trouble free design and field proven techniques for commissioning, start up and shutdown of distillation operation.
- The fundamental knowledge of distillation control (software)
- Understanding the theory, principles, operation and troubleshooting of desalting facility (software and practically)
- Understanding oil treatment facilities normal operation, equipments (software)
- Understanding emulsion and how to treat (software and practically)
- To tailor your approach to specific design, analysis and troubleshooting problems (software)

TARGET COMPETENCIES

- Characteristics of Crude Oil
- Refinery Flow Sheet
- process flow diagram
- Compressors & Pumps classification

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Ideal for veterans and those with years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject

PROGRAM CONTENT
Day 1

- Introduction
- Characteristics of Crude Oil
- Introduction to the Refinery Flow Sheet
- General Column operation
- The major design differences between tray type
- Different types of distillation columns
- Crude Oil Distillation
- Understanding the theory, principles, operation and troubleshooting of desalting facility (software and practically)
- Troubleshooting

Day 2 (Process Software)

- Overview for process (software) or simulator and through it,
- Process normal startup
- How is the monitoring of process in normal operation?
- Recognize for controlling loops
- Recognize how to deal with various equipments (heater, pumps, reactor, and compressor and towers)
- Recognize how to deal with various troubleshooting
- How to simulate the process conditions
- Process shutdown
- Understanding oil treatment facilities normal operation, equipments (software)
- Understanding emulsion and how to treat (software and practically)

Day 3 (Practical)

- process field overview
- On site process flow diagram
- Compressors & Pumps classification
- Compressors & Pumps field check points
- Compressors & Pumps performance monitoring
- Compressors & Pumps start up & troubleshooting
- Compressors & Pumps changeover procedures and safety precautions

Day 4 (Practical)

- Process Heat transfer equipments
- Process Fired Heater overview
- Process Fired Heater startup procedures
- Process Fired Heater shutdown procedures
- Process Fired Heater troubleshooting
- Process Heat exchanger overview (shell and tube, plate & frame)
- Process Heat exchangers turn-on line procedures
- Process Heat changer troubleshooting and maintenance

Day 5 (Practical)

- Process separators overview
- Process sampling
- Process towers
- Process control valves
- Process interlock
- Safely equipments isolation
- Maintenance equipments handover

FIRED HEATERS

UETMT- REF- 130

Program Duration: 5 days

PROGRAM DESCRIPTION

Fired heaters are found on almost every process unit in a petroleum refinery and play a vital role in achieving optimum process results. Fired heaters must operate efficiently and reliably in order for the refinery to run maximum throughput while producing the desired product slate. In many cases the capacity of the fired heater may limit unit charge rate so that de-bottlenecking a heater or improving a heater's efficiency may have an extremely high payout. This program contains an in-depth discussion of all aspects of fired heater design and operation, including heat transfer principles, combustion fundamentals, factors affecting fired heater efficiencies, burner design and operating parameters as well as stacks and draft control. Refractory applications and heat losses are also covered as are NOx reduction technologies and air preheating systems. A significant portion of the program is devoted to the most effective ways of revamping existing heaters and troubleshooting heater problems.

TARGET AUDIENCE

This program was developed for those who are concerned with the design, operation and technical support of fired heaters in petroleum refineries. It is ideal for refinery process and design engineers, unit operators and supervisors, operations engineers and maintenance personnel. The program is also well suited for personnel from consulting companies, engineering firms and suppliers of products and services for fired heaters.

TARGET COMPETENCIES

- Refinery Fired Heaters
- Combustion Fundamentals
- Heat Transfer

PROGRAM CONTENT
1. INTRODUCTION TO REFINERY FIRED HEATERS

- Fired Heater Uses in Refineries
- Types of Fired Heaters
- Fired Heater Design Principles

2. COMBUSTION AND EFFICIENCY

- Types of Fuels Used
- Combustion Fundamentals
- Effects of Fuel Type on Efficiency
- Fouling Rates
- Heater Run Length
- Required Cleaning Techniques

3. HEAT TRANSFER PRINCIPLES

- Heat Transfer Coefficients
- Effects of Flow Velocities
- Vaporization Effects
- Effects of Fuel Composition

4. BURNERS

- Burner Designs
- Effects of Efficiencies
- Burner Modifications / Revamps

5. STACKS AND DRAFT CONTROL

- Economizer Design and Operation
- Optimizing O2 Levels in the Stack

6. REFRACTORY APPLICATIONS AND HEAT LOSSES

- Types of Refractory Used
- Refractory Application Techniques
- Energy Efficiency and Heat Losses
- Waste Heat Recovery

7. NOx EMISSION REDUCTION

- Factors Affecting NOx Production
- Low NOx Burners
- Effects of O2 Concentrations
- Other NOx Control Techniques

8. AIR PREHEATING SYSTEMS

- System Designs and Costs
- Advantages of Air Preheating

9. FIRED HEATER REVAMPS

- Capacity Expansion
- Improvement of Run Lengths
- Upgrading Reliability

10. TROUBLESHOOTING FIRED HEATERS

- Troubleshooting Techniques
- Common Problems and Solutions



FIRED HEATER OPERATION, DESIGN AND MAINTENANCE

UETMT- REF- 131

Program Duration: 5 days

INTRODUCTION

The success of every company depends of each employee's understanding of the key business components. Employee training and development will unlock the companies' profitability and reliability. When people, processes and technology work together as a team developing practical solutions, companies can maximize profitability and assets in a sustainable manner. Training and development is an investment in future success – give yourself and your employees the keys to success

PROGRAM OBJECTIVES

This course provides the theoretical knowledge and practical skills required to improve the operation, profitability, and safety of a plant's fired heaters. Classroom lectures cover furnace design, process considerations, and field evaluation of fired heaters. Topics such as troubleshooting common heater problems, burner operation, and turnaround items, emissions, instrumentation,

TARGET COMPETENCIES

- Petroleum Chemistry
- Heat Transfer
- Fired Heater
- Burners

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,

PROGRAM CONTENT
Day 1

- Fundamentals of Petroleum Chemistry
- Description of a Hydrocarbon Molecule
- Types of Hydrocarbon Molecules
- Chemistry of Combustion

Day 2

- Principles of Heat Transfer in Fired Heater
- Introduction to Fired Heater
- General Types
- Fire Box
- Convection
- Stack
- Burners

Day 3

- Fired Heater Engineering
- Fluid Flow
- Heat Transfer
- Fuels and Design Guidelines

Day 4

- Performance Monitoring
- Fired Heater Operation

Day 5

- Troubleshooting

PROCESS HEATERS

UETMT- REF- 132

Program Duration: 5 days

PROGRAM OBJECTIVES

The participants will learn the fundamental functions, Operation and Process requirements of Process Heaters

TARGET COMPETENCIES

- Process Function of Heater
- Heat Transfer Basics
- Radiant Heat Balance

WHO SHOULD ATTEND?

Process Engineers, Operation Supervisors and Central Control Room Operators

PROGRAM OUTLINES

- Introduction
- Process Function of Heater
- Heat Transfer Basics
- Codes and Standards
- Radiant Heat Balance
- Convection Heat Balance
- Flame Temperature
- Burners
- Heater Instrumentation
- Start up and Shutdowns Procedure
- Troubleshooting
- Inspection and Turnaround

PROGRAM CONTENT

- Heater Classification
- Function of Heater
- Fuel and Combustion Data
- Design Consideration
 - ✓ Modes and Basics of Heat Transfer
 - ✓ Heater Description
 - ✓ Efficiency
- Definitions
- Effect on Design
- Measurements of the thermal efficiency

Tubes

- Tube Spacing
- Tube Diameter and Length
- Tube Passes
- Return Tube Header

Design Procedure

- Radiant Section Design
- Convection Section Design
- Pressure Drop calculation
- Stack Design

Burners

- Burner types
- Gases and Oil Burner Guide

Codes and Standards

- API Standard 560
- API Recommended Practice 530

Start up and Shut Down Procedures

- General Consideration
- Troubleshooting

Inspection and Turnarounds
Generalized method Predicts Fired Heater Performance Attachment

- Sample Calculation

HEAT EXCHANGERS DESIGN AND OPERATION

UETMT- REF- 133

Program Duration: 5 days

PROGRAM DESCRIPTION

The program is formulated with objectives of understanding the Heat transfer equipment, typical features of Shell and Tube Heat Exchangers, design methods and design thumb rules, familiarization with ASME and TEMA codes, Operation, Control and Troubleshooting aspects.

The program starts with the fundamentals of a practical exchanger design including overall process design, Sizing of Shell and Tube Heat Exchangers, pressure drop, considerations for fluid allocation (shell side/tube side), no. of passes. Baffle spacing etc.

The program further deals with how to optimize for both mechanical and thermal design requirements. The program will cover several case studies for clarifying the design methodology and solving real life problems in Heat exchanger Operation, Control and Troubleshooting. The program deals with Failure of heat exchangers: operating conditions, sources of failures start-up issues, Malfunctioning – typical causes and remedial measures and learn how to troubleshoot, diagnose, and correct operating problems

TARGET AUDIENCE

The program is recommended for process engineers and design engineers (chemical/mechanical), engaged in design and/or specification of Heat Exchangers. The program would help the participants in to widen and/or gain better insight into design and operations of Heat Exchangers. Attendees could look forward to gaining further insight into operational and control aspects of heat transfer equipment. New engineers wishing to gain experience in heat transfer and heat exchanger design, fabrication, and operations will find the program very useful. Practicing engineers and other professionals who are involved in heat exchanger operation, testing, design or manufacturing should consider taking this program.

TARGET COMPETENCIES

- Heat Transfer Theory
- Heat Exchangers

PROGRAM CONTENT
Basic Heat Transfer Theory

- Conduction, Convection, Radiative Heat Transfer
- Applications of heat exchangers
- Heat Transfer in heat exchangers
- Overall Heat Transfer Coefficient U
- Counter flow Versus Parallel Flow Heat Exchangers
- Impact of Flow Rate Changes on Heat Exchanger Heat Transfer Rate
- Impact of Inlet Flow Temperature Changes on Heat Exchanger Heat Transfer Rate

Classification & Selection of Heat Exchangers

- Classification According to Construction
- Classification According to Transfer Process
- Classification According to Surface Compactness
- Classification According to Flow Arrangement
- Classification According to Pass Arrangements
- Classification According to Phase of Fluids

- Classification According to Heat-Transfer Mechanisms
- Selection of Heat Exchangers
- Selection Criteria

Heat Exchanger Thermal Design

- Fundamentals of Heat Exchanger Design Methodes
- Procedures Design Specifications
- Design Procedure
- Heat Exchanger Pressure-Drop Analysis
- Performance Failures

Shell and Tube Heat Exchangers Desig

- Construction Details for Shell and Tube Exchanger
- Tubes, Tube Arrangement, Baffles, Tubesheet, Tube Bundle, Shell Pass Arrangements for Flow Through Tubes
- Fluid Properties and Allocation

- Classification of Shell and Tube Heat Exchangers
- TEMA Classification of Heat Exchangers
- Shell and Tube Heat Exchanger Selection
- Design Considerations for a Shell and Tube Heat Exchanger
- Thermal Design Procedure
- Typical control schemes
- API Standard 660

Air Cooled Heat Exchangers Design

- Fields of application of air-cooled heat exchangers
- Air-Cooled Heat Exchangers
- Air versus Water Cooling
- Tube Bundle Construction
- Tube Bundle Fin Geometry
- American Petroleum Institute Standard 661

Operating Problems and Practical Solutions

- Common problems with heat exchangers
- Effects of Fouling on the Thermo-hydraulic Performance of Heat Exchangers
- Costs of Heat Exchanger Fouling
- Parameters That Influence Fouling Resistances
- Case Studies

HEAT EXCHANGERS OPERATION, DESIGN & MAINTENANCE

UETMT- REF- 134

Program Duration: 5 days

PROGRAM OBJECTIVES

The Heat Exchanger Training Course covers a large range of Exchanger types like Shell & Tube Exchanger (includes TEMA type classification), Air Cooled Exchanger, Plate & Frame (Plate Exchanger), Spiral Exchanger, etc. Detailed Coverage provided on Heat Exchanger Operation & Maintenance of popular TEMA. The primary focus on Heat Exchanger Graphic / Heat Exchanger Animation in the CBT helps in very clearly understanding Heat Exchanger designing, Operating Principle / Heat Exchanger Working Principle & Heat Exchanger Maintenance Procedures like Testing and aids in Heat Exchanger Repair.

TARGET COMPETENCIES

- Heat Transfer
- Heat Exchangers
- Shell and Tube Exchangers

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,

PROGRAM CONTENT
Day 1

- Fundamentals of Heat Transfer
- Types of Heat Exchangers
- Shell and Tube Exchangers

Day 2

- Double pipe Exchangers
- Air – Cooled Exchangers
- Heat Exchanger Operation

Day 3

- Heat Exchanger Problems
- Heat exchanger design

Day 4

- Mechanical

Day 5

- Mechanical

HEAT TRANSFER EQUIPMENT OPERATION & TROUBLESHOOTING

UETMT- REF- 135

Program Duration: 5 days

PROGRAM OBJECTIVES

- Understand the principles of Heat Transfer.
- Know the function of Heat Transfer Equipment.
- Identify the different types of Heat Exchangers.
- Know the components of Air – Cooled Exchangers.
- Know testing procedures of Heat Exchanger for leaks.
- Identify the Heat Exchanger problems and how to troubleshoot.
- Startup, Shutdown and Troubleshoot the Furnace

TARGET COMPETENCIES

- Types of Heat Exchangers
- Shell and Tube Exchangers
- Double pipe Exchangers
- Air – Cooled Exchangers
- Plate Heat Exchangers

WHO SHOULD ATTEND?

- Who are involved in the operations function and who are responsible for leading and directing people to achieve and improve productivity levels?
- Those faced with the challenge of actually using the various techniques of Troubleshooting and Problem Solving to reduce downtime and waste and improve run efficiencies will benefit
- It is of equal importance to Production, Maintenance Engineering and Process Engineering personnel
- These includes :
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Process and Production staff,
- Projects and Constructions Engineers
- Utility engineer and operation staff

PROGRAM CONTENT

- Principles of Heat Transfer & Heat Transfer in Heat Exchangers
- Types of Heat Exchangers
- Shell and Tube Exchangers
- Double pipe Exchangers
- Air – Cooled Exchangers
- Plate Heat Exchangers
- Heat Exchanger Operations
- Heat Exchanger Problems
- Fired Heater Designs, Performance Monitoring, Operation, and Troubleshooting.

BASIC PROCESS CALCULATIONS

UETMT- REF- 136

Program Duration: 5 days

PROGRAM OBJECTIVES

- This course covers the fundamentals of the essential hand calculation in the oil and gas field,
- The course represented as a basic for the advanced calculation course by simulation.
- It is designed to give the audience a good overall understanding and practical hand calculation for the subject mention below

TARGET COMPETENCIES

- Centrifugal Pump Calculation
- Debutanizer Calculation.
- Heat Exchanger Design Calculation.
- Heater Design Calculation

WHO SHOULD ATTEND?

- Who are involved in the operations function and who are responsible for leading and directing people to achieve and improve productivity levels?
- Those faced with the challenge of actually using the various techniques of Troubleshooting and Problem Solving to reduce downtime and waste and improve run efficiencies will benefit
- It is of equal importance to Production, Maintenance Engineering and Process Engineering personnel
- These includes :
- Operation Supervisors
- 1st Line Maintenance personnel
- Maintenance Supervisors
- Senior Plant Supervisors
- Operations Engineers
- Process Support Engineers
- Design Engineers
- Process and Production staff
- Projects and Constructions Engineers
- Utility engineer and operation staff

PROGRAM CONTENT

- Chose crude oil sample composition and Calculate the mol%, vol%, total density, Specific gravity, and molecular weight of the crude oil.
- Calculate the pressure losses in piping within laminar or turbulence flow.
- Selected and calculate the best operating speed for the centrifugal pump.
- Debutanizer calculation.
- Heat exchanger Design calculation.
- Heater Design calculation.
- Compressor sizing.
- Calculate the Bubble point, dew point, flash calculation.
- Calculate the tower feed inlet, top and, bottom operating pressure and temperature.
- Calculate the actual number of trays required in the tower.
- Calculate the Mass and Heat balance.
- Calculate heater and heat exchanger Efficiency.

FUNDAMENTALS OF PROCESS CALCULATIONS & SIMULATION BY HYSYS

UETMT- REF- 137

Program Duration: 5 days

PROGRAM OBJECTIVES

This course covers the Fundamentals of the essential hand Calculation in the Oil and Gas Field, the course represented as a Basic for the Advanced Calculation course by Simulation. It is designed to give the students a good overall understanding and practical hand calculation for the subject mention below.

TARGET COMPETENCIES

- Calculate the Mass and Heat Balance
- Calculate Heater and Heat Exchanger Efficiency
- Distillation Towers and Vacuum Towers Calculations
-

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding Operation, Design, and Economics of Processing Plants
- 1st Line Operations Personnel
- Operation Supervisors
- 1st Line Maintenance Personnel
- Maintenance Supervisors
- Senior Plant Supervisors
- Operations Engineers
- Process Support Engineers
- Design Engineers

PROGRAM CONTENT

- Chose Crude Oil sample Composition and Calculate the mol%, vol%, total Density, Specific Gravity, and Molecular weight of the Crude Oil
- Calculate the Pressure Losses in Piping within Laminar or Turbulence Flow
- Selected and Calculate the best Operating speed for the Centrifugal Pump
- Debutanizer Calculation
- Heat Exchanger Design Calculation
- Heater Design Calculation
- Compressor Sizing
- Calculate the Bubble Point, Dew Point, Flash Calculation
- Calculate the Tower Feed inlet, top and bottom Operating Pressure and Temperature
- Calculate the actual number of trays required in the tower
- Calculate the Mass and Heat Balance
- Calculate Heater and Heat Exchanger Efficiency
- Distillation Towers and Vacuum Towers Calculations
- Natural Gas Processing Simulations and Calculations
- Dynamic Simulations for Processes and Equipments
- Dynamic Simulations and Control Tuning
- Refinery Simulation by HYSYS

FUNDAMENTALS OF PROCESS DESIGN

UETMT- REF- 138

Program Duration: 5 days

PROGRAM OVERVIEW

- This program delivers practical insights into the principles of process design. It features a review of chemical engineering unit operations, discussion of design and performance characteristics of commonly-used equipment, and case studies that deliver a broad perspective of the subject as well as an understanding of industrial engineering practices. Program content includes shortcut techniques, practical approaches to engineering problem solving, "rules-of-thumb", and guidelines that can be put into practice when participants return to their jobs.
- Teamwork is encouraged through collaboration on exercises, sharing work experiences, and leveraging skills and knowledge.
- Optionally, the UniSim® process simulator can be incorporated to give students hands-on experience modeling refinery processes. Students use the simulator to apply the principles of thermodynamics, distillation, and column design learned during the lecture portion of the class.

WHO SHOULD ATTEND?

- This program is designed for:
- Chemical engineers with less than two years of experience in the hydrocarbon processing industries
- Engineers transferring from allied industries (e.g., chemicals, power, and other industries that employ continuous processing techniques)
- Engineers returning to the workplace who need a refresher on process design principles
- The program will be of particular benefit to those engineers who are responsible for rating the performance of existing equipment and systems at new processing conditions, conducting revamps, determining and specifying equipment, and auditing the work of third party design engineers.
- Students should have a level of competency commensurate with an undergraduate degree in chemical engineering.

PROGRAM OBJECTIVES

- Program participants will be able to:
- Set up and solve heat and material balances
- Systematically assess hydraulic circuits
- Demonstrate competency in line sizing
- Evaluate the effectiveness of existing equipment under new processing conditions
- Generate requirements and equipment data sheets for new equipment
- Critique third party designs

TARGET COMPETENCIES

- Column Sizing
- Pumps And Compressors
- Heat Exchangers

PROGRAM CONTENT:

- Applied thermodynamics and process modeling
- Multi-component fractionation – process principles and parametric analysis techniques
- Column sizing
- Line sizing/hydraulics
- Pumps and compressors
- Heat exchangers (shell and tube, air coolers)
- Fired heaters
- Relieving systems

FUNDAMENTALS OF PROCESS EQUIPMENTS (SELECTION, SIZING, OPERATION)

UETMT- REF- 139

Program Duration: 5 days

PROGRAM OBJECTIVES
Upon completion of this course, participant will be to gain:

- Identify principle Process Equipment Fundamentals
- Identify the tower configuration and how trays work, design
- Reboiler types and how they works
- How instruments work (level, pressure, flow and temperature)
- Heat exchangers operation and design
- Pumps and compressors fundamental
- Fired heater
- Understand operating procedures and put them into practice
- Troubleshoot typical operating problems

TARGET COMPETENCIES

- Process Equipment Fundamentals
- Trays Performance & Design

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Ideal for veterans and those with years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject

PROGRAM CONTENT
Day 1

- Process Equipment Fundamentals
- How trays work
- Trays performance & design

Day 2

- Reboiler types
- Instruments (pressure, level, flow and temperature)
- Heat exchangers and air coolers

Day 3

- Fired heater operation, troubleshooting

Day 4

- Pumps o operation, troubleshooting
- Separator Sizing, Operation and Troubleshooting

Day 5

- Compressors Operation and Troubleshooting

PROCESS OPERATIONS (FOR TECHNICIANS)

UETMT- REF- 140

Program Duration: 5 days

PROCESS OPERATION, TROUBLESHOOTING AND OPTIMIZATION

UETMT- REF- 141

Program Duration: 5 days

PROGRAM OBJECTIVES

- Operate an oil refinery with safety as the prime consideration.
- Monitor instrumentation and the operation of equipment.
- Detect potential and actual problems and take corrective action to prevent the interruption of system operations.
- Analyze operational trends and take corrective actions.
- Use standard operating procedures to start/stop production equipment

TARGET AUDIENCE

- Operations personnel
- Operation Supervisors
- Maintenance personnel
- Maintenance Supervisors
- Senior Plant Supervisors
- Operations Engineers
- Process Support Engineers
- Design Engineers
- Process and Production staff
- Projects and Constructions Engineers

TARGET COMPETENCIES

- Introduction to Petroleum Refining
- Industrial Valves
- Compressed Air
- Basic Process Instrumentation and Control

PROGRAM CONTENT

- Introduction to Petroleum Refining
- Industrial Valves, Compressed Air
- How to Read Process Drawings
- Basic Process Instrumentation and Control
- Pump, Fundamentals
- Compressors
- Heat Exchangers
- Basic Safety
- Process plant startup / shutdown
- Troubleshooting

PROGRAM DESCRIPTION

This program has been developed to provide an in-depth, yet practical review of the art and science of Plant Troubleshooting. Since day-to-day Operation Problem Solving and Optimizing are critical to the Profitability of Plant Operations, Troubleshooting is a prime responsibility of Refinery and Plant Engineers. The importance of Troubleshooting has grown as Plants push to operate at higher and higher throughput levels.

The program's content is both comprehensive and wide-ranging. The sessions begin with a discussion of the Fundamentals, including Process Objectives, Equipment Behavior, Interaction of the Process and Equipment, and Troubleshooting Techniques. A Case Study approach covers some selected Process and Equipment found in Refineries and Petrochemical Plants, specifically Distillation Process, Pumps, Water Coolers, Fired Heaters, Vacuum Systems. All Case Studies are developed from "Actual Refinery Case Studies". Once the Fundamentals are established the session moves into the topics of Troubleshooting Techniques, Analysis, and Problem Solving.

PROGRAM OBJECTIVES

Program's Participants will have the opportunity to obtain a broad working knowledge of Troubleshooting Principles and Practice, to gain insight into both Traditional and Advanced Techniques, and to interact with others working in Plants. Also, this program has been to give a broader Technical Understanding of the approach demonstrates the Complexity of actual Plant Operations and How to simplify and identify solvable Problems. Finally, better view of the potential origins of troubles and their respective remedies.

PROGRAM CONTENT:

- Refinery Overview
- Preparation for Initial Start-Up
- Process Units Start-Up
- Process Units Normal Shutdown
- Emergency Shutdowns
- Process Units and Refinery Equipment Troubleshooting & Optimization
- Case Studies



PROCESS TROUBLESHOOTING & PROBLEM SOLVING (WORKSHOP)

UETMT- REF- 142

Program Duration: 5 days

ABOUT THE PROGRAM

This program has been developed to provide an in-depth, yet practical review of the art and science of Plant Troubleshooting. Since day-to-day Operation Problem Solving and Optimizing are critical to the Profitability of Plant Operations, Troubleshooting is a prime responsibility of Refinery and Plant Engineers. The importance of Troubleshooting has grown as Plants push to operate at higher and higher throughput levels.

The program's content is both comprehensive and wide-ranging. The sessions begin with a discussion of the Fundamentals, including Process Objectives, Equipment Behavior, Interaction of the Process and Equipment, and Troubleshooting Techniques. A Case Study approach covers some selected Process and Equipment found in Refineries and Petrochemical Plants, specifically Distillation Process, Pumps, Water Coolers, Fired Heaters, Vacuum Systems. **All Case Studies are developed from "Actual Refinery Case Studies"**. Once the Fundamentals are established the session moves into the topics of Troubleshooting Techniques, Analysis, and Problem Solving.

PROGRAM OBJECTIVES

Program's Participants will have the opportunity to obtain a broad working knowledge of Troubleshooting Principles and Practice, to gain insight into both Traditional and Advanced Techniques, and to interact with others working in Plants. Also, this program has been to give a broader Technical Understanding of the approach demonstrates the Complexity of actual Plant Operations and How to simplify and identify solvable Problems. Finally, a better view of the potential origins of troubles and their respective remedies

TARGET AUDIENCE

The program is designed for Personnel who would like to obtain Technical Information related to the "Process Troubleshooting & Problem Solving". The program is ideal for Personnel involved in Refinery Troubleshooting, Process Engineering, Plant Operations, and Technical Services. Process Engineers from Operating, Design and Construction Companies, as well as others providing services to the Petroleum and Petrochemical Industries, should also find this program beneficial. Those in attendance will receive a comprehensive and up-to-date manual covering "Process Troubleshooting & Problem Solving".

TARGET COMPETENCIES

- Troubleshooting Concepts and Techniques
- General Plant Equipment
- Process Problems

PROGRAM CONTENT

Day 1

1. Troubleshooting:

- Objectives and Approach
- Importance of Troubleshooting
- Troubleshooting isn't easy
- Process Troubleshooting, Optimization, and Debottlenecking

2. Troubleshooting Concepts and Techniques:

- Typical Problems
- Interaction of Process and Equipment
- The Skills of Troubleshooters
- Troubleshooting Techniques
- Troubleshooting Tools

3. Building the Operation and Maintenance Group's Excellence:

- Unit Monitoring and Control: (Material Balance, Heat Balance, Pressure Balance, and Process Control Instrumentation)
- Effective Troubleshooting

4. Planning a Performance Test:

- Objectives of Performance Test
- Preparation for Performance Test
- The Day Before the Performance Test
- Correlating the Data

Day 2

5. General Plant Equipment Problems:

- Rotating Equipment
- Pressure Vessels
- Heat Exchangers
- Direct Fired Heaters
- Piping
- Tankage

6. The Plant Employees Problem: (People Issues):

- Dealing with shift Operators
- Try for Involvement
- Opening Valves
- Reporting to Refinery Management
- Working with Operating Superintendents

7. Process Problems:

- Basic Understanding of Troubleshooting
- Understanding the Types of Problems That Could Occur
- First steps to be taken in the event of a problem occurring
- Unusual Noises & Vibrations, Rotating Equipment, Cavitating Pumps
- Oversized Pumps, Harmonic Vibrations, Thumping Furnaces,
- Hydrocarbon Leaks, Water Hammer etc
- Crude Distillation- Atmospheric & Vacuum
- Distillation Columns
- Stripping Columns
- Tray Fouling
- Reflux Changes
- Common Reflux Problems
- Reflux Rates
- Operating Parameters
- Flooding
- Foaming
- Identifying Causes

Day 3

8. Saving Energy at Reduced Feed Rates:

- Pumps and Compressors
- Fractionation Columns
- Heat Exchangers
- Furnaces

9. Statistics Ways of Utilizing Process Data:

- Average, Range, Variance, and Standard Deviation
- Histograms and Normal Distributions

10. Problem Solving and Decision Making:

- The 80-20 Relationship (Pareto's Law)
- Going Through the Data
- Problem-Solving Technique
- Seven Causes
- Decision-Making Technique
- **Selection Case Studies**

Day 4

11. Mechanical Analytical Problem-Solving Technique:

- Sizing Up The Problem
- Failures Caused by Excessive Loads
- Failures Caused by Wear
- Failures Caused by Thermal Loads
- Miscellaneous Failures: (Leaking Flange Gasket)
- Selection Case Studies

Day 5

12. Overview of Process and Equipment Reliability Principles:

- Reliability Definitions
- The Motivation for Improving Reliability
- Reliability as an art and Science
- Reliability Engineering versus Maintenance Engineering
- Reliability Policy
- Process Reliability Tools
- Life Cycle Costs



PROCESS PLANT START-UP, COMMISSIONING & TROUBLESHOOTING

UETMT- REF- 143

Program Duration: 5 days

PROGRAM OBJECTIVES

Upon Completion of this course, the trainees must be able to understand & Identify the following:

- Plant Commissioning Requirement & Responsibilities
- Troubleshooting & Risk Potential Sources
- Understand Start-up Terminology
- Understand How to Evaluate a Project
- Determine Requirement for Start-up Success
- Understand Plant Personnel Involvement
- Be Familiar with Problem Sources from Project Inception to Completion
- Understand How to minimize Problems and Consequences during Commissioning and Start-up
- Plan for Starting-up
- Predict Start-up Cost
- Minimize Equipment Problems
- Work as a start-up Leadership
- Understand why Construction Inspection, who perform Construction Inspection and How to Perform Construction Inspection
- Understand Construction Completion as the beginning of Start-up
- Understand Commissioning as the Heart of Start-up
- Perform the Initial Start-up Activities
- Understand the Start- up Troubleshooting Techniques
- Implement Changes
- Plan for Shutdown and Decommissioning
- Troubleshooting of Heat Transfer Equipment, Mass Transfer Equipment in Process Plant
- Fluid Movement Equipment in Process Plant and Convergence Process Plant
- Developing Troubleshooting Solving Skills
- Practical use of Tools and Technique
- Troubleshooting Case Studies (*Personal Experience*)
- To give participants better and deep understanding of practical Control Loops Problems.
- To provide participants with the most accurate Diagnostic methods to identify and to solve their difficult Control Loops Problems

TARGET COMPETENCIES

- Process Plant Start-up
- Construction Inspection
- Construction Completion

WHO SHOULD ATTEND?

- People who are making day to day Decisions regarding Operation, Design, and Economics of Processing Plants;
 - 1st Line Operations Personnel
 - 1st Line Maintenance Personnel
 - Senior Plant Supervisors
 - Operation Supervisors
 - Maintenance Supervisors
 - DCS Process Engineers
 - Operations Engineers
 - Design Engineers
 - DCS Operators
 - Process Support Engineers
- Ideal for Veterans and those with years of experience who want to review or broaden their understanding in Processing Plant Operations. Other Professionals who desire a better understanding of subject

PROGRAM CONTENT
Day 1
Process Plant Start-up Approach

- Economics Approach (Assessment & Evaluation ...etc.)
- Start-Up Problems
- Discussion: Potential Problems Associated with the Project and Its Start-Up
 - Start-Up Planning
 - Start-Up Cost Prediction
 - Minimizing Equipment Problems

Day 2
Management

- Start-Up Safety and Environmental Issues
- Start-Up Management
- Start-Up Manpower
- Start-Up Leadership
- Discussion

In The Field

- Construction Inspection
- Construction Completion—the Beginning of Start-Up
- Commissioning—The Heart of Start-Up
- Start-Up Operations: Performing the Initial Start-Up Activities
- Discussion: Troubleshooting or Commissioning, Example Situation.

Day 3
Start- Up Troubleshooting

- Technical Issues
- Solutions:
- Implementing Changes

Start- Up and Process Simulation (Hands-On Demonstration)
Day 4
Shutdown and Decommissioning

- Normal Shutdown
- Decommissioning and Demolition

Problem Solving Techniques/Applications
Plant Monitoring, Control and Process Analysis
Day 5
Case Studies and Data Analysis
Hazards, Accidents (Lessons Learned & General Information)
Safety Measures
Plant Equipments Troubleshooting

- Heat Exchangers Equipments Operation, Troubleshooting
- Fired Heaters equipments Operation, Troubleshooting
- Troubleshooting of Mass Transfer equipment in Process Plant
- Separation by difference in Density
- Separation by difference in Boiling Point (*Fractionation*)
- Separation by difference in Concentration (*Absorption*)
- Troubleshooting of Fluid Movement Equipment in Process Plant
- Liquid Transportation (*Pumps*)
- Gas Transportation (*Compressors*)

PROCESS MEASUREMENT & CONTROL TECHNOLOGY

UETMT- REF- 144

Program Duration: 5 days

PROGRAM OBJECTIVES

Participants will be trained in process measurement and instrumentation used in petroleum refineries, process dynamics, control loops design, controller tuning and system performance stability.

PROGRAM OUTLINES

- Measurement and Instrumentation principles.
- Open and closed loop dynamics.
- Measuring elements and transmitters.
- Signal Transmission (electronic, pneumatic and digital)
- Control valves and actuators.
- Online analytical and soft analytical.
- Feedback control and selection of control modes.
- Feed forward, cascade, and ratio control.
- Advanced Process.
- Measurement process control, optimal and fuzzy control.

PROGRAM DESCRIPTION

This course is designed to provide the trainee with high skills to easily and effectively specify the best components of control loops, as the hardware of control elements (sensors, transmitters, controllers, control valves, .etc) will be studied, besides control algorithms and theories which will give the attendants the ability to comprehend the overall process control criteria . Comparison between different measurement and control techniques stressing on the advantages and best usage of control systems will give the participants wide knowledge and update their information in the field of process control.

WHO SHOULD ATTEND?

As The Process Measurement and Control Technology Course gives the information required to enhance plant people ability to achieve better control in petroleum refineries ,oil and gas companies and petrochemicals, hence this short intensive course is fundamental for under development engineers, instrument technicians, process operators and laboratory personnel concerned with process.

PROGRAM OBJECTIVES

At the end of this course the participants will be able to:

- Understand measurement and control terminology.
- Follow measurement and control integration loops.
- Implement and design instrumentation and control systems for different process variables (pressure, temperature, flow,...etc)
- Troubleshoot and specify problems with measurement systems.
- Understand modern control techniques.
- Design and specify control loop parameters.

TARGET COMPETENCIES

- Measurement And Instrumentation Principles
- Pressure Measurement
- Temperature Measurement
- Flow Measurement

PROGRAM CONTENT
MEASUREMENT AND INSTRUMENTATION PRINCIPLES

- Process Measurements Terminology
- Measuring Systems and Configuration
- Units and system of units
- Control valves, Actuators, Positioners and sensors
- Pressure, level, temperature and flow transmitters

PRESSURE MEASUREMENT

- Principles of pressure measurement
- Units of pressure
- Pressure Transducers
- Manometers

- Bourdon Tubes
- Bellows
- Diaphragms
- Installation considerations.

LEVEL MEASUREMENT

- Principles of level measurement
- Hydrostatic pressure for level measurement
- Ultra-sonic level measuring techniques.
- Level control loop (block diagram)
- Installation considerations

TEMPERATURE MEASUREMENT

- Principles of temperature measurement
- Temperature transducers
- Thermocouples
- Resistance Thermometers and Thermostats
- Semiconductor Temperature Transducers
- Temperature control loop (block diagram)
- Installation considerations

FLOW MEASUREMENT

- Principles of flow measurement
- Flow Transducers
- Orifice ,Venturi and Nozzle
- Rotameters
- Magnetic Flowmeters
- Turbine Meters
- Vortex Meters
- Installation considerations

CONTROL VALVES AND ACTUATORS

- Types of control valves
- Valve Positioners for Pneumatic Actuators
- Valve inherent Characteristics
- Valve installed Characteristics
- Control valve selection

MODERN CONTROL TECHNIQUES

- Digital control systems
- Distributed Control Systems
- Programmable Logic Controllers
- Advanced Process Control (APC)
- Smart transmitters
- Signal Transmission

CONTROL ALGORITHMS

- Proportional, Integral , Derivative (PID)
- PID with feed forward (PIDFF)
- PID with external reset-feedback (PIDERFB)
- Ratio control (RATIOCTL)
- Ramp and Soak (RAMPSOAK)
- Auto Manual (AUTOMAN)
- Incremental Summer (INCRSUM)
- Override selector (ORSEL)

CONTROL SYSTEMS PERFORMANCE

- Open and Closed loop dynamics
- Steady State Accuracy
- Analytical techniques

PROCESS PLANT START-UP AND COMMISSIONING

UETMT- REF- 145

Program Duration: 5 days

INTRODUCTION

- Start Up and Commissioning of new plant and equipment presents both a major technical and management challenge. An organization's personnel must familiarize themselves with new equipment, processes and technologies; develop the relevant operating and safety procedures.
- This program addresses in an integrated manner the key activities involved in the safe, effective and timely commissioning and start-up of a new plant or facility. In this program you will learn:
- About the key stages of the commissioning process
- How to balance the technical and management challenges of commissioning
- How to deal with machinery and equipment specific commissioning issues
- How to Manage Risks and Solve Problems during commissioning

WHO SHOULD ATTEND?

- This program addresses the needs of a diverse audience with an interest in Plant Start-up and Commission, including:
- Those who have oversight responsibility for Plant Start-up and Commissioning
- Operations and Maintenance Professionals with direct line responsibility as well as staff support responsibility for delivering on effective Plant Start-up and Commissioning
- Plant Start-up and Commissioning Professionals and Engineers
- Technical personnel involved in supporting Plant Start-up and Commissioning activities
- Supervisors and Engineers, both operations and maintenance who are involved or likely to be involved in Plant Start-up and Commissioning situations

PROGRAM OBJECTIVES

- About the key stages of the commissioning process
- To develop and overall commissioning and plant start-up strategy
- To deal with machinery and equipment specific commissioning issues
- How to manage issues dealing with the commissioning of Electrical, Instrumentation and Utilities Systems
- To develop a overall commissioning management plan, resource plan and budget
- Troubleshooting and Problem Solving strategies which can be applied during commissioning
- How to manage risks associated with commissioning

TARGET COMPETENCIES

- Process Plant Start Up and Commissioning
- Commissioning Strategy
- Mechanical Completion & Integrity Checking
- Pre-commissioning and Operational Testing

TRAINING METHODOLOGY

- Process Plant Start-up and Commissioning is a hands-on, stimulating learning experience. The program will be highly interactive, with opportunities to advance your opinions and ideas. Participation is encouraged in a supportive environment.
- To ensure the concepts introduced during the program are understood, they will be reinforced through a mix of learning methods, including lecture style presentation, open discussion, case studies, simulations and group work.

PROGRAM SUMMARY

The need for Plant Start Up and Commissioning is ongoing in any business that is growing, as new plant is added to expand capacity and to replace obsolete technology. This program aims to develop employees through exposure to the training and development experience provided by this program, to build a “cadre” of knowledgeable and skilled staff who will be able to add value through their contributions to any situations involving plant start-up and commissioning. They will be able to contribute in leadership or operational roles, both with knowledge and skills to ensure such projects are effectively and efficiently managed in a manner consistent with recognized best practices. A spin off benefit will be their ability to coach and impart learning to their peers and subordinates to the mutual benefit of individuals and organization.

PROGRAM CONTENT
DAY 1 - INTRODUCTION AND PREPARATION

- Introduction to Process Plant Start Up and Commissioning
- Organization and Roles
- Supplementary Topics
- Cost Estimation
- Spare Parts Planning

DAY 2 - COMMISSIONING STRATEGY

- Commissioning Strategy
- Mechanical Completion & Integrity Checking
- Pre-commissioning and Operational Testing
- Start-up/Initial Operation, Testing and Acceptance

DAY 3 - PROCESS PLANT AND MACHINERY SPECIFIC ISSUES

- Process Plant and Machinery Commissioning
- Instrumentation and Control Systems
- Preparing and Isolating Process Plant

DAY 4 - MANAGEMENT, PLANNING AND CONTROL

- The Start Up and Commissioning Planning and Control
- A Short-cut Approaches to Planning
- Progress Monitoring and Control
- Earned Value Analysis

DAY 5 - MANAGING RISKS DURING COMMISSIONING

- Troubleshooting and Problem Solving
- Risk Management
- Managing Safety and Quality
- Conclusion

PROCESS PLANT START UP, COMMISSIONING & TROUBLESHOOTING

UETMT- REF- 146

Program Duration: 10 days

INTRODUCTION

- There is an alarming trend in industry to discount the potential contribution of the Technical/Operations function to productivity improvement, product quality and gains in market share. Principles taught in this training session will help you to understand the true nature and different techniques of problem solving and problem prevention in the operational/process environment.
- Both modules are delivered by leading experts who provide innovative and interesting training sessions. Participants will have access to the latest research in Maintenance Management which forms the basis of the program.
- Excellent Troubleshooting skills are considered a core competency for 'Best-in-Class' industrial companies. If your company's goals include minimizing downtime then this workshop is a must because it delivers rapid, safe Troubleshooting.

WHO SHOULD ATTEND?

- This program is directed at those Supervisors who are involved in the operations function and who are responsible for leading and directing people to achieve and improve productivity levels
- Those faced with the challenge of actually using the various techniques of Troubleshooting and Problem Solving to reduce downtime and waste and improve run efficiencies will benefit
- The program elements are of equal importance to Production, Maintenance Engineering and Process Engineering personnel

PROGRAM OBJECTIVES

- How to become a 'Top Gun' Troubleshooter by acquiring new skills
- To develop a structured approach to Troubleshooting and Problem Solving which uses a common terminology and shared understanding
- To point the way to Continuous Improvement in the way you run your processes and make incremental efficiency gains
- To understand the difference between having a techniques manual on the bookshelf – and actually making it work
- To identify the "motivated" people who should be the champions of Troubleshooting and Problem Solving – and who should just follow
- To understand work practices which "allow" success in Troubleshooting and Problem Solving through reducing the variability of your process

TARGET COMPETENCIES

- Process Plant and Machinery
- Planning and Control Management
- Managing Risks during Commissioning

TRAINING METHODOLOGY

The program will be conducted in a facilitative style with a combination of lecture and practical exercises in the use of techniques, case studies and a high level of lively debate and sharing of ideas. Delegates will be encouraged to introduce problems of their own for discussion and analysis. Copies of all lecture materials, case studies and workbooks will be provided.

PROGRAM CONTENT
DAY 1 - Introduction and Preparation

- Introduction to Process Plant Start Up and Commissioning
- Organization and Roles
- Supplementary Topics
- Cost Estimation
- Spare Parts Planning

DAY 2 - Commissioning Strategy

- Commissioning Strategy
- Mechanical Completion & Integrity Checking
- Pre-commissioning and Operational Testing
- Start-up/Initial Operation, Testing and Acceptance

DAY 3 - Process Plant and Machinery Specific Issues

- Process Plant and Machinery Commissioning
- Instrumentation and Control Systems
- Preparing and Isolating Process Plant

DAY 4 - Management, Planning and Control

- The Start Up and Commissioning Planning and Control
- A Short-cut Approaches to Planning
- Progress Monitoring and Control
- Earned Value Analysis

DAY 5 - Managing Risks during Commissioning

- Troubleshooting and Problem Solving
- Risk Management
- Managing Safety and Quality
- Conclusion

DAY 6 - Concepts

- The nature of process problems affecting performance
- Performance defined in terms of generic variables: Speed, Quality and Cost
- Effort inputs in context - Asset based or Business Process based
- Structured approach - The Operations Process redefined
- Configuration; Operation; and Optimization
- Maturity Indexing: Planning, Control, Congruence, Empowerment
- 6 Big Losses, 7 Wastes

DAY 7 - Tools and Techniques - Practical Experience

- Interactive and Dynamic variable relationships analysis
- Techniques introduction
- Tools introduction
- Problem Analysis
- Practical Use of Tools and Techniques
- Case Studies
- Tools & Techniques - selecting the right one

DAY 8 - People Issues

- Working practices - empowerment or impairment?
- Group dynamics
- Individual motivators
- Developing Troubleshooting and Problem Solving skills
- Managing change

DAY 9 - Operator, Maintainer, Designer Interface

- Cross functional and Team working
- Introduction to the Theory of Inventive Problem Solving
- Auditing your process to a dynamic standard
- Effect of Maintenance/Operations strategy
- Development of Standards and Key Performance Indicators
- Life Cycle Costing, Design for Operation, Design for Maintenance

DAY 10 - Open Forum

- Revisit Concepts, Tools and Techniques
- Your Problems - Case Studies
- Your Action Plan
- Wrap up

C5-C6 ISOMERIZATION PROCESS OPERATIONS

UETMT- REF- 147

Program Duration:5 days

PROGRAM OBJECTIVES

Upon completion of this course, participant will be to gain:

- In-depth knowledge of the C5-C6 ISOMERIZATION Process and particularly the client's unit
- A general understanding of the significance of the unit within the refinery scheme
- A broad technical understanding of the catalyst and the chemical reactions involved in the process
- A solid knowledge of the Process Flow Diagram and equipment
- A thorough knowledge of operating conditions and their impact on performance
- A good overview of the start-up and shutdown activities
- A sound knowledge of the main troubleshooting actions

TARGET COMPETENCIES

- C5-C6 ISOMERIZATION Process
- Catalyst Chemical Reactions
- Operating Conditions

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Board men. Suitably qualified or experienced outside
- Operators may attend to enhance their process knowledge.
- Ideal for veterans and those with years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject

PROGRAM CONTENT
Day 1
1. Introduction

- Supply/demand situation
- Market trends
- Environmental regulation
- Focus on the unit in its Context

2. Process Objectives

- General information
- Feed characteristics
- Unit duty
- Products' specifications
- Material Balance

Day 2
3. Process Description

- Process Flow Diagrams
- Piping & Instrumentation Diagrams
- Main equipment (Drawings, pictures and functions)

4. Dryers Mechanism and Regeneration

- Dryers objectives
- Adsorption theory
- Dryers regeneration
- Operating variables

Day 3
Main Start up Activities

- Hydrogen pressurization
- Oil circulation, column start-up
- Drying out of the reaction section
- Acidizing and final drying
- Catalyst loading
- Pressurization
- First isomerization reactor line-up
- Second reactor line-up
- Lining-out at design capacity

Normal Operation and Operating parameters

- Operating parameters
- Performance follow-up (yield, etc)
- Analysis

Day 4
9. Unit Shut-down/Restart

- Planned shut-down
- Restart

10. Emergency Shutdown

- Emergency shutdown
- Unscheduled shutdown
- Safety Interlocks

Day 5
11. Troubleshooting

- Typical causes and resolution of product quality incidents
- Operational disturbances

12. Catalyst Special Procedures

- Sulfur stripping
- Unloading

OJT ON C5-C6 ISOMERIZATION PROCESS

UETMT- REF- 148

Program Duration: 5 days

PROGRAM OBJECTIVES

Upon completion of this course, participant will be to gain:

- In-depth knowledge of the C5-C6 ISOMERIZATION process and particularly the client's unit
- By the end of the course, the participants will have:
 - Understanding isomerization process technology (PENEX)
 - Understanding process chemistry, process variables (software)
 - Understanding PENEX reactors lead lag operation , switch over, loading and unloading
 - Understanding gas and liquid driers operation regeneration technology and interlock (software & practically)
 - Identify process flow of the process unit (software & practically)
 - Describe the implications of process variable changes and their effect (software)
 - Isomerization catalyst poisons and CO high content solutions
 - Understand operating procedures and put them into practice (software & practically)
 - Daily Monitor isomerization process operations and abnormality (software)
 - Troubleshoot typical operating problems and how our response (software)
 - A good overview of the start-up and shutdown activities (software & practically)
 - Practically on site reviewing and monitoring for starting up, shutdown, troubleshooting and recognizing for process equipments

TARGET COMPETENCIES

- C5-C6 ISOMERIZATION Process
- Isomerization Process Technology (PENEX)
- Process Chemistry
- Process Variables (Software)

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Board men. Suitably qualified or experienced outside
- Operators may attend to enhance their process knowledge.
- Ideal for veterans and those with years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject

PROGRAM CONTENT
Day 1 (Process presentation overview)

- Introduction
- Process Objectives
- Process Description
- Dryers Mechanism and Regeneration
- Main Start up Activities
- Normal Operation and Operating parameters
- Unit Shut-down/Restart
- Emergency Shutdown

Day 2 (Process Software)

- Overview for process (software) or simulator and through it ,
- Process normal startup
- How is the monitoring of process in normal operation?
- Recognize for working of controlling loops
- Recognize how to deal with various equipments (heater, pumps, reactor, and compressor and towers)
- Recognize how to deal with various troubleshooting
- How to simulate the process conditions
- Process shutdown

Day 3 (Practical)

- Process field overview
- On site process flow diagram
- Compressors & Pumps classification
- Compressors & Pumps field check points
- Compressors & Pumps performance monitoring
- Compressors & Pumps start up & troubleshooting
- Compressors & Pumps changeover procedures and safety precautions

Day 4 (Practical)

- Process gas and liquid driers operation and equipments
- Process gas and liquid driers regeneration sequences
- Process Heat exchanger overview (shell and tube, plate frame)
- Process Heat exchangers turn-on line procedures
- Process Heat changer troubleshooting and maintenance

Day 5 (Practical)

- Process separators overview
- Process reactors put in service and normal operation
- Process reactors shutdown ,loading and unloading
- Process sampling
- Process towers
- Process control valves
- Process interlock
- Safely equipments isolation
- Maintenance equipments handover

PROCESS PANEL OPERATOR ASSESSMENT (SOFTWARE)

UETMT- REF- 149

Program Duration: 5 days

PROGRAM OBJECTIVES

- Upon successful completion of this lab, you will understand the operation of oil and gas process and how changes in operating parameters effect the composition and flow rate of products as follows;
- Explain the effect feed flow on product composition
- Explain the effect of changing reflux flow on product composition, flow and overhead temperature.
- Explain the effect of changes in bottoms temperature on product composition and flow.
- Perform a successful start up and shut down of a distillation column simulation.

TARGET COMPETENCIES

- Laboratory Preparation
- Laboratory Procedure
- Theory of Distillation Column Operation

WHO SHOULD ATTEND

- Engineers working as DCS panel operators
- Panel operators
- Qualified field operators required to be prepared as panel operators
- Operation Supervisors
- 1st Line Maintenance personnel
- Maintenance Supervisors
- Senior Plant Supervisors
- Operations Engineers
- Process Support Engineers
- Design Engineers
- Process and Production staff
- Projects and Constructions Engineers

PROGRAM CONTENT

- Laboratory Preparation
- Laboratory Procedure
- Theory of Distillation Column Operation
- Process Description
- Normal process operating conditions
- Process equipment
- Process instrumentation
- Part A: Characteristics of Distillation Processes
- Part B: Start Up Procedure for the Distillation Process
- Step 1: Starting up the Simtronics simulations software
- Step 2: Process Familiarization
- Step 3: Composition control
- DSS Process Log
- Pre-Lab Assignment

UNICRACKINGTM PROCESS

UETMT- REF- 150

Program Duration: 5 days

PROGRAM OVERVIEW

- This program covers the fundamentals of the UOP Sulfolane Process, including optimization and troubleshooting. It also addresses the unit's operation in an aromatics complex. The program will be of particular interest to engineers and operations personnel whose unit is an older model and who need a refresher on current best practices, operations, and design considerations. Evolution of the technology and the reasons for the improvements are a significant portion of the class.

WHO SHOULD ATTEND

- This program is designed for process engineers and operations personnel who work with a UOP Sulfolane unit or supervise those who do.
- Attendance is limited to UOP license holders.

PROGRAM OBJECTIVES

Upon program completion, participants will be able to:

- Explain key aspects of the technology
- Illustrate process flow
- Describe equipment design and the impact on process flow
- Explain process variables
- Perform process calculations
- Discuss operating procedures
- Perform troubleshooting and process optimization tasks
- Direct the operations of the plant with a solid understanding of optimal operating procedures
- Understand how proper solvent conditioning can prolong the life of the plant

TARGET COMPETENCIES

- Process Theory
- Process Flow And Equipment
- Process Variables
- Process Calculations

PROGRAM CONTENT

- Process theory
- Process flow and equipment
- Process variables
- Process calculations
- Operating procedures
- Troubleshooting
- Optimization
- Solvent conditioning
- Corrosion
- Laboratory support

DELAYED COKING PROCESS TECHNOLOGY

UETMT- REF- 151

Program Duration: 5 days

PROGRAM INTRODUCTION

In order to increase the value of refinery products derived from the bottom of the crude oil barrel, many refiners are introducing delayed coking into their processing configuration. This program has been developed by Refining Process Services to provide an in-depth discussion of the process fundamentals and mechanical systems associated with the operation of a delayed coking unit. The information presented ranges from a description of heavy oil chemistry through a discussion of the current trends driving delayed coker revamps and re-configuration of refinery heavy oil processing schemes.

TARGET COMPETENCIES

- Heavy Oil Chemistry
- Coker Feed Systems
- Coker Preheat Furnace

PROGRAM CONTENT
1. Process Background

- History
- Typical Flow Plan Yields
- Comparison with Fluid Coking

2. Heavy Oil Chemistry

- Composition of Heavy Oils
- Thermal Cracking Reactions
- Compatibility

3. Coker Feed Systems

- Crude/Coker Interactions
- Tankage Considerations
- Non-Conventional Feeds
- Coker Preheat Options

4. Coker Preheat Furnace

- Past Design / Current Design Strategies
- Effect of Geometry on Run Length
- Effect of Feed Properties on Run Length
- Effect of Contaminants on Run Length
- Effect of Operating Conditions on Run Length
- Decoking Options

5. Coker Drum Operations

- Mechanical Details
- Dynamic Coking Model
- Foam Formation / Use of Anti-Foam
- Overhead Line Quenching Options
- Pressure Relief Systems

6. Coker Process Variable Effect

- Key Operating Variables
- Key Feedstock Parameters
- Effect on Product Yields
- Effect on Product Qualities
- Upgrading/Processing Options for Coker Products

7. Petroleum Coke Quality Issues

- Types of Petroleum Coke
- Dispositions for Petroleum Coke
- Current Market Trends
- Feedstock Effect on Coke Quality
- Operating Variable Effects
- Coke Calcining Operations

8. Decoking Operations

- Sequence of Events
- Blowdown Systems
- Automatic Deheading Devices
- Details of Coke Cutting System
- Options for Green Coke Handling
- Coke Dewatering/Cutting Water Systems
- Heatup Condensate Processing Options

9. Fractionator and Gas Plant Operations

- Gas Oil Wash Zone Options
- Heat Removal Options
- Naphtha End Point Control During Switches
- Lean Oil/Sponge Oil Options

10. Commercial Considerations for Delayed Coking

- Troubleshooting of Delayed Cokers
- Optimization of Delayed Coking Systems
- Debottlenecking Options
- Unit Monitoring and Test Runs
- Process Economics

11. Trends in Delayed Coking

- Cogeneration
- Low Pressure/Ultra-Low Recycle Coking
- Strategies for Improved Furnace Run Length
- Strategies for Shortening Decoking Cycle
- Refinery Sludge and Slop Oil Disposition

UTILITIES IN PROCESS PLANTS

UETMT- REF- 152

Program Duration: 5 days

PROGRAM OBJECTIVES

Utilities systems are vital services to the operation of process plants. This course provides a comprehensive introduction to the utilities in the process industry. The course will present a thorough understanding of the different utilities systems, air systems, nitrogen production, water systems, fuel systems and heating systems. The course addresses the most common technology in each system including an overview of the major equipment specific to each system and the options offered by recent technological advances. The course covers the available technologies with the proposed design improvement through various case studies.

TARGET COMPETENCIES

- Air Compressors
- Air Systems
- Air Supply Systems
- Air Dryers in Process Plants

WHO SHOULD ATTEND?

- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Process and Production staff,
- Projects and Constructions Engineers
- Utility Engineers
- Utility Operation staff

PROGRAM CONTENT

- Apply skills and knowledge on utilities in process plants
- Discuss air compressors and air systems and list the typical air supply systems and air dryers in process plants
- List the various types of nitrogen, inert gas generation, cryogenic nitrogen generation and nitrogen/inert gas requirements
- Explain pressure-swing adsorption nitrogen generation
- Discuss the properties of water chemistry, potable and industrial water treatment, thermal distillation and waste water treatment
- Carryout fire water systems, fuel gas systems and flare systems

MEROX PROCESS & TECHNOLOGY

UETMT- REF- 153

Program Duration: 4 days

PROGRAM OBJECTIVES

Upon completion of this course, participant will be to gain:

- Overview of MEROX Processes
- MEROX Reactions and Process Principles
- Chemistry and Kinetics of Sulfur Removal
- Describe the implications of process variable changes and their effect on performance
- Explain the catalyst chemistry and its effect on performance
- Monitor process operations
- Troubleshoot typical operating problems

TARGET COMPETENCIES

- Sweetening and Extraction Process
- Process Equipment
- Normal Start-Up after Prolonged Shutdown

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,

Ideal for veterans and those with years of experience who want to review or broaden their understanding in Processing Plant Operations. Other professionals who desire a better understanding of subject

PROGRAM CONTENT
Day 1
Discussion of Process

- General
- Sweetening and extraction process
- Theory of process
- Reactions
- Process principles

Process Flow and Control

- General description of flow

Day 2
OPERATING CONDITIONS AND CONTROL

- Discussion of Process Variables
- Catalyst
- Heat
- Contact
- Alkalinity
- Oxygen

Day 3
NORMAL START-UP AND SHUT-DOWN

- Process equipment
- Normal Start-Up after Prolonged Shutdown
- Normal Start-Up after Short Shutdown

Day 4

- Normal Operations for both sweetening and extraction process
- Troubleshooting
- Emergency procedures

GAS DEHYDRATION TECHNOLOGY

UETMT- REF- 154

Program Duration: 5 days

PROGRAM OBJECTIVES

- Understanding Principles of Gas Dehydration
- Understanding Hydrate Formation.
- Factors Promoting Hydrate Formation
- Procedures and Resources for Determining Hydrate-Formation
- Temperature Control Methods and Equipment Used To Inhibit Hydrate Formation in a Natural Gas Stream
- Methanol Injection Rate Required Inhibiting Hydrate Formation in a Natural Gas Stream
- Glycol Dehydration System Components
- Optimizing and Troubleshooting Dehydrator Operations
- Solid Desiccant Dehydration
- Optimizing Adsorption-Type Dehydrators

TARGET COMPETENCIES

- Principles of Gas Dehydration
- Water Content of Gases
- Hydrate Formation.

WHO SHOULD ATTEND

Junior Engineers, Senior Operators, and Operators who are working in Oil Production Facilities and Oil Refineries.

PROGRAM CONTENT

- Understanding Principles of Gas Dehydration
- Water Content of Gases
- Understanding Hydrate Formation.
- Factors Promoting Hydrate Formation
- Procedures and Resources for Determining Hydrate-Formation
- Temperatures of Sweet and Sour Gas Streams
- Temperature Control Methods and Equipment Used To Inhibit Hydrate Formation in a Natural Gas Stream
- Methanol Injection Rate Required Inhibiting Hydrate Formation in a Natural Gas Stream
- Glycol Dehydration
- Describing the Glycol Dehydration Process
- Glycol Dehydration System Components
- Process/Design Variables
- Optimizing and Troubleshooting Dehydrator Operations
- Solid Desiccant Dehydration
- Adsorption Calculations
- Process Flow and the function of the major components of Solid
- Desiccant Dehydrator and Function of Major Components of Solid Desiccant Dehydrators

GAS PLANT TROUBLESHOOTING & SPECIAL PROBLEMS

UETMT- REF- 155

Program Duration: 5 days

PROGRAM OBJECTIVES

- Overview of gas processing industry
- Meaning of absorption technology
- Glycol dehydration operation and troubleshooting
- Gas sweetening operation and troubleshooting
- Adsorption principles and troubleshooting
- Solid bed dehydration and troubleshooting
- Refrigeration systems and troubleshooting
- Cryogenic gas processing and troubleshooting

TARGET COMPETENCIES

- Gas Processing Industry
- Water-Hydrocarbon
- Absorption Technology
- Glycol Dehydration Operation and Troubleshooting

WHO SHOULD ATTEND

Junior engineers, senior operators, and operators who are working in oil production facilities and oil refineries.

PROGRAM CONTENT

- Overview of gas processing industry
- Understanding phase behavior
- Water-hydrocarbon behavior
- Meaning of absorption technology
- Glycol dehydration operation and troubleshooting
- Gas sweetening operation and troubleshooting
- Adsorption principles and troubleshooting
- Solid bed dehydration and troubleshooting
- Refrigeration systems and troubleshooting
- Valve expansion: plants
- Cryogenic gas processing and troubleshooting
- Equipment troubleshooting
- Reciprocating compressors, reciprocating engines
- Loss in centrifugal compressor capacity
- Gas turbine driven
- Plant pipeline hydrate ,corrosion problems
- Problem set

GAS PROCESSING, TREATMENT AND SULPHUR RECOVERY

UETMT- REF- 156

Program Duration: 5 days

INTRODUCTION

The removal of acidic components (primarily H₂S and CO₂) from hydrocarbon streams can be broadly categorized as those depending on chemical reaction, absorption, or adsorption. Processes employing each of these techniques are described.

Acid gas streams that contain H₂S, may be flared, incinerated, or converted to elemental sulphur in a Sulphur Recovery Unit. Various Sulphur Recovery Processes (primarily The Modified Claus Process) are discussed.

WHO SHOULD ATTEND?

- The program is specifically designed to be of substantial benefit to graduate engineers with less than 3 years experience as technologists, mechanical engineers, inspection engineers and maintenance and project engineers
- It is designed for both technical and non-technical personnel as well as operational staff at supervisory level employed in refineries, petrochemical, and oil and gas process industries
- It will serve as an introduction to gas technology for those who are unfamiliar with the subject and will also assist those who need the ability to progress to a detailed knowledge of the gas processing technologies

PROGRAM OBJECTIVES

- Have an understanding of sweetening and Sulphur Recovery technologies
- Gain and explanation of the key features of gas treating
- Understand the thermodynamics of gas processing
- Identify the main process steps
- Monitor / evaluate and troubleshoot treating operations
- Perform process engineering calculation

TARGET COMPETENCIES

- Gas Sweetening
- Alkanolamine Processes
- Liquid Hydrocarbon Sweetening

TRAINING METHODOLOGY

Active participation is encouraged during the program and includes the use of team exercises, questionnaires, and open discussions of actual real life examples.

PROGRAM SUMMARY

This program covers the various aspects of gas process treatments and sulphur recovery. Discussions on the chemistry of acid and sour gas sweetening as well as the processes of sulphur recovery will take place. It will also concentrate on the various processes of removal and recovery of sulphur compounds and the participants will be encouraged to interact through open discussions and group exercises.

PROGRAM CONTENT
DAY 1 - Gas Sweetening

- General Considerations and Safety
- Types of Contaminants
- Process Selection and Classification
- Chemistry of Gas Sweetening
- Operating Problems
- Selective Sweetening Systems

DAY 2 - Alkanolamine Processes

- Process Flow and General Design Criteria / Guidelines
 - ✓ MEA
 - ✓ DEA
 - ✓ MDEA
 - ✓ DGA

- ✓ DIPA
- ✓ Formulated Solvents
- ✓ Sterically Hindered Amines
- Caustic Wash
- Case Studies

DAY 3 - Treating Processes

- Physical Solvent Processes
 - ✓ Selexol
 - ✓ Purisol Process
 - ✓ Fluor Solvent
 - ✓ Rectisol Process
 - ✓ Morphosorb
- Combination (Chemical and Physical) Processes
 - ✓ Sulfinol
 - ✓ Hi-Pure
- Alkaline Salt Processes Chemistry
- Batch Processes
 - ✓ Iron Sponge
 - ✓ ChemSweet
 - ✓ Sulpha-Check / Sulpha-Treat
 - ✓ Zinc Oxide – PURESPEC
 - ✓ Molecular Sieve
- Iron Chelate processes
 - ✓ LO-CAT Process
 - ✓ SulFerox Process
- Membrane Separation

DAY 4 - Liquid Hydrocarbon Sweetening

- Regenerated Caustic
- Peco Solid Copper Chloride
- Batch Caustic Wash
- Solid Potassium Hydroxide
- Molecular Sieve
- Liquid/Liquid Processes
- Gas and Hydrocarbon Liquid Sweetening....(continued)
- Case Studies

DAY 5 - Sulphur Recovery

- Claus Process Considerations and Modifications
 - ✓ Tail Gas Handling
- Incineration
- Clean-up
- SO₂ Recovery Process
- H₂S Recovery Process
- Direct Oxidation Process
- Liquid Redox
- The EUROCLAUS Concept
- SCOT
- Sulphur Storage and Handling
- Claus Process Calculations and Exercises
- Program review and evaluation

GAS TREATING AND SULFUR RECOVERY

UETMT- REF- 157

Program Duration: 5 days

PROGRAM DESCRIPTION

This program emphasizes process selection, practical operating issues, technical fundamentals, and integration of the sweetening facilities into the overall scheme of gas processing. Sulfur recovery and tail gas processes are also covered including standard Claus configurations, SuperClaus®, EuroClaus®, SCOT® etc. Special design and operation topics such as trace sulfur compound handling and optimization of H₂S:CO₂ ratio is covered.

PROGRAM OBJECTIVES

Upon completion of this program, participants will have gained a broad understanding on:

- Evaluation and selection of processes to remove acid gases (H₂S, CO₂, COS, CS₂, mercaptans, etc) from gas and LPG's
- The advantages and disadvantages of available gas treating technology and processes
- How to estimate solvent circulation rates, energy requirements and equipment sizes
- Recognizing and evaluating solutions to common problems
- Sulfur recovery technologies, including an overview of the Claus Sulfur process
- How to select the proper sulfur recovery process given differing process conditions
- Providing participants with technical information on the operations and safety aspects of all units associated with sulfur recovery processes, and also to present how the operation can be optimized.
- Knowing the chemistry, the technologies and environmental issues associated with the removal of hydrogen sulfide from refinery gas streams
- Knowing the main processes (amine units and Claus units) used in the conversion of the H₂S into elemental sulfur.

TARGET AUDIENCE

Production and processing personnel involved with gas treating and sulfur recovery requiring an understanding of the principles of these process operations. This program is also for facilities engineers, process engineers, operations personnel, field supervisors and others who select, design, install, evaluate or operate gas sweetening and sulfur recovery facilities.

TARGET COMPETENCIES

- Process Flow Scheme
- Process Control
- Tail Gas Clean-Up Processes

PROGRAM CONTENT:
Amines Units

- Chemical reaction between amines and H₂S.
- Process flow scheme: absorption, regeneration, filtration, equipment review.
- Process control: pressures, temperatures, amine solution optimization, steam flow rate to regenerator optimization.

- Regeneration quality: objectives, follow-up methods, and performances impacts.
- Troubleshooting: amine solution degradation, foaming, corrosion, washing quality follow-up.
- Application: amine solution flow rate determination (typical unit), and amine analysis: what you can learn from your analysis (routine and detailed).

Sulfur Recovery Units
Chemical reaction.

- **Process flow scheme:** thermal stage, catalytic stage, sulfur recovery, tail gas incineration, Operating parameters, Sulfur yields.

Process Control:

- H₂S/SO₂ ratio control, air flow rate optimization, tail gas analyzer, temperatures at the converters.

Troubleshooting:

- Hydrocarbons presence, sulfur behavior as per temperature, H₂S degassing from sulfur product, safety, Shutdowns.

New technologies:

- oxygen enrichment, sour water stripper gas as feed.

Tail Gas Clean-Up Processes
Process flow schemes:

- CLAUSPOL, SCOT and SULFREEN.
- Influence of the H₂S/SO₂ ratio control.
- Sulfur yields.

Sour Water Treating

- Sour water characteristics. Ammonia content.
- Principle, main equipment, operating parameters, quality follow-up.

Program workshop and summary

SULFUR RECOVERY ENGINEERING

UETMT- REF- 158

Program Duration: 5 days

INTRODUCTION

As part of our on-going effort to offer timely, Technical Programs for Refining Professionals and Refining Process Services is offering this program on Amine Treating and Sulfur Recovery Engineering. This in-depth program, presented by an experienced, Industry Professional, should prove invaluable to those working in this challenging area.

ABOUT THE PROGRAM

This program is an intensive in-depth program. It covers Technology, Troubleshooting Problems, and Design basics for Sulfur Recovery. The program concludes with chance to discuss a Case Study for Problems brought by attendees. The program is adapted to shorter durations.

The purpose of this program is to focus first on "Amine Treating and Sulfur Recovery" and then on Safe and Efficient Sulfur Plant Operation. Emphasis is on Monitoring and Controlling Critical Process variables and Reacting to changes in Plant Operating Conditions. Typical Operating Problems are also covered.

PROGRAM OBJECTIVES

During this Program, a description of Sulfur Recovery Technology will be presented. The Technologies discussed will include the Processes such as Amine Treating, Sour Water Treating, Claus Units, and Tail Gas Treating. Also included in this program are topics ranging from Process Chemistry and Fundamentals through Monitoring and Troubleshooting Problems of Commercial Operating Units.

TARGET AUDIENCE

The program is designed for Personnel who would like to obtain Technical Information related to the Technology of Sulfur Recovery, including Refining Company Technical and Operating Personnel working in Process Engineering, Process Design, and Sulfur Recovery Operations.

Those attendees will receive a comprehensive Manual covering Processing Units associated with Sulfur Recovery.

TARGET COMPETENCIES

- Sulfur Recovery
- Fundamentals of Amine Chemistry

PROGRAM CONTENT
1. Overview of Sulfur Recovery:

- Sources of Refinery H₂S
- Properties of Hydrogen Sulfide

2. Review of Amine Treating Units:

- Fundamentals of Amine Chemistry
- Description of Common Amines

3. Review of Sour Water Treating
4. Review of Claus Units:

- Fundamental Sulfur Plant Chemistry
- Controlling the Process Front End
- Mechanical Description of the Plant
- Process Monitoring and Operation Guideline

5. Sulfur Plant Incinerators:

- Thermal Incinerators
- Catalytic Incinerators

6. Review of Tail Gas Treating Processes
7. Sulfur Plant Problems and Troubleshoot Problems:

- Pressure Drop
- Plugged Seal Legs
- Disintegrated Catalyst
- Carbon Deposits
- Boiler Leaks
- Inadequate Conversion of H₂S to Liquid Sulfur

8. Maximizing Sulfur Plant Capacity
SULFUR PLANTS AND ITS CONCERNS

UETMT- REF- 159

Program Duration: 5 days

ABOUT THE PROGRAM

The participants will understand the Basic Function of Sulfur Plant to identify Frequent Problems and develop the skills and knowledge of Operating Staff on Troubleshooting.

TARGET AUDIENCE

Operation and Process Engineers, Supervisors and Central Control room Operators.

TARGET COMPETENCIES

- Sulfured Plants Refinery
- Analyzer in Sulfur Recovery
- Amine Treating Unit

PROGRAM CONTENT

- Importance of Sulfured Plants Refinery
- Basic Function Catalyst and its Functions
- Role of Analyzer in Sulfur Recovery
- Corrosion and Remedies
- Frequent Blockage and Solidification of Sulfur
- Importance of Air ratio and its Control
- Emission of Hazardous Gases through Sulfur Pits and Seal Pots
- Role of Sulfured Plants
- Amine Treating Unit
- Sulfur Recovery Technology Overview
- Sulfur Recovery Claus Technology & its Importance in Refinery
- Catalyst and Catalyst Operation
- Analytic Procedure
- Process Description
- Equipment Details
- Process Chemistry
- Main Operating Variables & Control
- Main Unit Operations
- Pre-commissioning & Commissioning
- Initial and Normal Start up
- Planned and Emergency Shut down
- Burner Management System (BMS)
- Safety Management
- Tail Gas Treating Processes
- Sulfur Solidification Unit
- Air Ratio Control
- Emission of Hazardous gases through Stack, Sulfur Pit & Seal Pots
- Case Study

ADVANCED-GAS LIQUID SEPARATION

UETMT- REF- 160

Program Duration: 5 days

PROGRAM OBJECTIVES

Upon completion of this course, participant will be to gain:

- Identify principle and theory of separation
- Identify the separator configuration
- Explain separator internal and sizing
- Stage separation and phases of separation
- Understand operating procedures and put them into practice
- Troubleshoot typical operating problems

TARGET COMPETENCIES

- Separation Process
- Separation Operation and Troubleshooting

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Ideal for veterans and those with years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject

PROGRAM CONTENT
Day 1
Introduction

- **Separation Process**
- **Principles of Separation**
 - ✓ Gravity Separation
 - ✓ Separation System Problems
 - ✓ Factors Affecting Separation

Day 2
Phases Separation

- Primary Separation
- Secondary Separation
- Mist Extraction
- Liquid Accumulation
- Oil and Water Separation

Stage Separation
Day 3
Separator Configuration

- Horizontal Separators
- Vertical Separators
- Spherical Separators

Separator Internals

- Inlet Configuration
- Intermediate Configuration
- Outlet Configuration

Day 4
Separator Sizing (Design)

- Definitions
- Sizing Knock Out Drum
- Sizing Liquid Accumulators
- Sizing Vapor Liquid Separators

Day 5
Separation Operation and Troubleshooting

- Separator Control
- Troubleshooting

Operating Problems

- Foamy Crudes
- Paraffin
- Sand
- Emulsion
- Slugging

REFINERY GAS TREATING, SOUR WATER, SULFUR AND TAIL GAS

UETMT- REF- 161

Program Duration: 5 days

ABOUT THE PROGRAM

This program is an intensive in-depth program. It covers Technology, Troubleshooting, and Design issues for Oil Refineries. Emphasis is on details throughout. The program concludes with a (workshop session) for Problems brought by attendees. It is also available either in public open-enrollment versions or as a customized in-house program for Technical or Operating Staff. This program parallels our well established "Gas Treating and Sulfur Recovery" Program.

TARGET AUDIENCE

Refinery and Unit Operating Personnel, Engineers with Process Responsibility, Refinery Technical Staff

TARGET COMPETENCIES

- Gas Treating with Amines
- Liquid Product Treating
- Sour Water Stripping
- Sulfur Recovery

PROGRAM OBJECTIVES

By the end of this program, participants will be able to;

- Evaluate and select Acid Gas Removal Processes (H₂S, CO₂ etc)
- Understand Claus Sulfur Recovery Processes, different Configurations, Oxygen Enrichment
- Use SuperClaus® EuroClaus® PROCLaus® etc
- Principles of Gas Sweetening, Sulfur Recovery, Tail Gas Clean-up
- Estimate Solvent Circulation Rates, Energy Needs, Solvent Loadings and Equipment Sizes
- Describe the available Technology and Processes
- Understand the basics of Sour Water Stripping, Ammonia etc
- Understand Common Operating Problems and Develop Solutions

PROGRAM CONTENT

- Sources of Sulfur in the Refinery
- Introduction to Sulfur Compounds
- Gas Treating with Amines
- Liquid Product Treating
- Sour Water Stripping
- Sulfur Recovery
- Sulfur Sales & Marketing
- Tail Gas Treating Units
- Incineration
- Corrosion & Materials of Construction

NATURAL GAS PROCESSING TECHNOLOGY

UETMT- REF- 162

Program Duration: 5 days

INTRODUCTION

The success of every company depends of each employee's understanding of the key business components. Employee training and development will unlock the companies' profitability and reliability. When people, processes and technology work together as a team developing practical solutions, companies can maximize profitability and assets in a sustainable manner. Training and development is an investment in future success – give yourself and your employees the keys to success

PROGRAM OBJECTIVES

- The various physical and chemical properties of natural gas components and industry
- Gain a working knowledge of many of the major processes including dehydration, acid gas removal (gas sweetening), hydrocarbon dew point control (HCDP control), LPG production, and NGL recovery and separation (fractionation)
- Review of the gas laws, calculations of natural gas properties,
- Inlet separation, condensate stabilization,
- Sweetening processes, dehydration processes (Glycol, M. Sieve, etc.),
- Refrigeration, LPG fractionation and gas sweetening processes,
- Unique design/operational features of gas processing plants that enable integration with diverse gas feed streams
- The design and selection criteria of key process equipment including separators, heat exchangers, pumps, compressors, valves and towers
- Some new and emerging technologies
- Safety, risk and hazard considerations

TARGET COMPETENCIES

- Basic Gas Calculations
- Gas Processing Systems
- Physical Properties of Hydrocarbons

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,

- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Process and Production staff,
- Managerial Staff,
- Projects and Constructions Engineers

PROGRAM CONTENT

- Composition and specifications related to natural gas processing physical properties.
- Basic gas calculations
- Gas processing systems
- Physical properties of hydrocarbons
- Qualitative phase behavior
- Vapor-liquid equilibrium
- Water-hydrocarbon phase behavior
- Basic thermodynamic concepts
- General system energy changes and rate processes
- Gas separation
- Condensate Stabilization
- Sweetening processes and sulfur recovery
- Dehydration processes
- Refrigeration (propane refrigeration)
- LPG / LNG
- Computer Dynamic Simulation Laboratories
- The design and selection criteria of key process equipment including separators, heat exchangers, pumps, compressors, valves and towers



GASOLINE/DIESEL BLENDING FOR REFINERS AND TRADERS

UETMT- REF- 163

Program Duration: 5 days

PROGRAM INTRODUCTION

This program is designed to provide practical know-how that can be used immediately by participants when returning home. Topics covered include the latest product/blend component specifications (including EPA Tier 3), blending techniques including Ethanol and Biodiesel, buy/no buy decision making, calculating blend gross profits, calculation of non-linear properties like octanes and RVP, blending optimization/ benefits, and how to fix off-spec tanks. Other subjects discussed are estimating blend-stock prices, gasoline butanizing techniques, ASTM / ISO test methods, on-line analyzers, and measuring compliance with EPA models, and In-Line Blend Certification.

The program content is designed for those involved in clean product trading, fuels blending, and storage terminal operation. Petroleum refiners, petrochemical and automotive industry personnel as well as those from fuel product testing organizations, instrumentation and automation companies, refined product marketing organizations, and government agencies responsible for fuel regulations will also find this program informative and very useful.

TARGET COMPETENCIES

- Types of Blending
- Typical Blending Equipment and Software
- Blending Economics

PROGRAM CONTENT
1. INTRODUCTION TO BLENDING

- Types of Blending
- + Sequential; Tank to Tank; In-Line Blending
- + Linear vs. Non-Linear Blending

2. SPECIFICATIONS, COMPONENTS, AND ADDITIVES

- Typical Specs (US, EU, World) for Conventional, RFG, Diesel
- Blendstock Components and Typical Properties
- Additives (Octane & Cetane Boosters, Detergents, PP Depressants...) and Dyes
- Linear/Non-Linear Property Blending
- Component Interactions and Effects on Specs

3. TYPICAL BLENDING EQUIPMENT AND SOFTWARE

- In-Line Blenders
- On-Line Analyzers (Conventional, NIR, NMR, Raman) for Octane, RVP, Dist, S, Cetane, CP, FP, CFPP, etc. & Typical Performance
- Tank Gauging (Float, Servo, Radar) & Typical Performance
- DCS & Blending Software (Planning, Control, Optimization)

4. HANDS-ON EXERCISES WITH BLENDING TOOLS

- Linear & Non-Linear Gasoline & Diesel Blending Calculators
- Blending LP Gasoline and Diesel Optimizer
- Comparing Linear/Non-Linear/Optimized Results

5. THE BLENDING CONTROL & OPTIMIZATION STEPS

- Types of Optimizers
- Typical Property Correlation Equations for Octane, RVP, Dist, Cetane Index, CP/PP, CFPP, Visc, etc.
- Planning of Blends / Generating Blend Orders
- Executing a Blend / Quality Control
- Blend Documentation

6. BLENDING ECONOMICS

- Blend Component Pricing Methods
- Blend Profit Calculations and Optimization Methods

7. QUALITY ASSURANCE

- Laboratory Measurements
- + ASTM Test Methods for Gasoline and Diesel
- On-Line Analyzers
- + Advantages vs. Single Lab Analysis
- + State-of-the-Art NIR & NMR Analyzers for Blend Control
- Criteria for In-Line Blend Release/Certification
- Dispute Resolution

8. CLEAN FUELS AND ENVIRONMENTAL ISSUES

- EPA Complex (Emissions) Models for Gasoline
- Impacts of USA and EU Regulations
- + Renewable Fuels (RFS2), RIN's/LCFS/Cap & Trade
- + Ethanol Blending, Including New E15 Waiver
- + Sulfur Reduction, Testing, Contamination
- + Bio-Diesel (B2-20) Blending

9. BENEFITS OF IMPROVED BLENDING

- + Inventory Reduction
- + Quality Giveaway Minimization
- + Use of Least Expensive Components
- + Tankage Minimization
- + Blend Key Performance Indicators

HYDROTREATING TECHNOLOGY

UETMT- REF- 164

Program Duration: 5 days

PROGRAM OBJECTIVES

Upon completion of this course, participant will be to gain:

- Overview of Hydrotreating Processes, Yields and Configurations
- Hydrotreating Reactions and Process Principles
- Chemistry and Kinetics of Sulfur Removal
- Chemistry of Nitrogen and Oxygen Removal
- Coke Formation and Catalyst Deactivation
- Describe the implications of process variable changes and their effect on performance and catalyst deactivation
- Explain the catalyst chemistry and its effect on performance
- Identify catalyst poisons
- Monitor process operations
- Troubleshoot typical operating problems
- Overview of the Catalytic Processes in a Refinery, with a special emphasis on Hydrotreaters Systems

TARGET COMPETENCIES

- Hydrotreating Processes
- Hydrotreating Reactions
- Kinetics of Sulfur Removal

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- 1st Line Maintenance personnel,
- Maintenance Supervisors,
- Senior Plant Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,
- Ideal for veterans and those with years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject

PROGRAM CONTENT
Day 1
Discussion of Process

- General
- Theory of process
- Reactions
- Discussion
- Reaction rates and heats of reaction

Process Flow and Control

- General description of flow
- Reactor section
- Stripping section
- Splitter section
- Control Flow Plan

Day 2
OPERATING CONDITIONS AND CONTROL
Discussion of Process Variables

- Reactor pressure
- Temperature

- Feed quality
- Hydrogen to hydrocarbon ratio
- Space velocity
- Catalyst protection, aging and poison

Day 3
NORMAL START-UP AND SHUT-DOWN

- Normal Start-Up after Prolonged Shutdown
- Discussion
- Detailed procedure - hydrotreating unit
- Normal Start-Up after Short Shutdown

Day 4
Normal Operations

- Calculation
- Weight balance
- Hydrogen to hydrocarbon ratio
- Stripper off gas
- Stripper reflux ratio
- Splitter reflux ratio
- Hydrogen consumption
- Catalyst life
- Metals contamination
- Water injection
- Fired Charge heater

Day 5
EMERGENCY SHUTDOWN

- Fire
- Loss of Recycle Compressor
- Repairs Which Require Stopping the Compressor without Depress ring or Cooling Reac
- Loss of Feed
- Explosion, Fire, Line Rupture, or Serious Leak –
- Instrument Air Failure
- Power Failure
- Steam Failure
- Cooling Water Failure
- Heater Failure
- Fuel Gas / Fuel Oil Failure
- Other Trouble

HYDRO CRACKING PROCESS

UETMT- REF- 165

Program Duration: 5 days

PROGRAM DESCRIPTION

- This program provides an in-depth review of the Hydrocracking Process. The program covers both theory and practical applications, including a detailed look at the design, monitoring and troubleshooting of hydrocracking units.
- Through lecture and exercises, participants will gain an understanding of the theory behind hydrocracking as well as the knowledge required for safe and efficient unit operation. Best practices and guidelines for evaluating operating data are also covered.
- Participants work with unit flowschemes and equipment, discuss the impact of catalyst selection and process variables on unit performance, review operating procedures and the philosophies behind them, and address metallurgy and corrosion issues specific to hydrocracking units.

TARGET AUDIENCE

This program is designed for process engineers and operations personnel who operate, support, or maintain a Hydrocracking unit or supervise those who do.

TARGET COMPETENCIES

- Hydrocracking Process
- Hydrocracking Catalyst Properties
- Process Variables

PROGRAM OBJECTIVES

- Upon program completion, participants will be able to:
- Explain fundamental principles of the hydrocracking process
- Identify the major equipment used in the process flow
- Explain typical operating procedures
- Develop effective troubleshooting techniques
- Describe the importance of catalyst selection
- Determine the effect of changing process variables on unit performance

PROGRAM CONTENT

- Hydrotreating and hydrocracking chemistry
- Pretreat and hydrocracking catalyst properties and performance criteria
- Process variables and their effects on product yields, product quality, and cycle length
- Hydrocracking unit flowschemes and equipment
- Reactor and internals design
- Current catalyst slate, graded beds, loading and unloading
- Hydrocracking unit metallurgy and corrosion issues (including reactor effluent air cooler)
- HPNA management
- Startup, shutdown, and normal operating procedures (including catalyst activation)
- Feed and product analysis
- Emergency procedures (including temperature excursions)

ISOCRACKING TECHNOLOGY

UETMT- REF- 166

Program Duration: 5 days

PROGRAM OBJECTIVES

The participants will be able to improve the knowledge on hydro-cracking process to produce highly isocracking products effectively.

WHO SHOULD ATTEND

Process engineers and supervisors.

PROGRAM OUTLINE:

- Isocracking process.
- Latest development.
- Troubleshooting.
- Reliability of operation.

PROGRAM OBJECTIVES

To improve the knowledge on Hydro-Cracking Process to produce highly Isocracking products effectively.

WHO SHOULD ATTEND

Process Engineers and Supervisors.

PROGRAM CONTENT

- Hydro-cracking Rule
- Isocracking Chemistry
- Isocracking Process
- Latest Development
- Troubleshooting
- Reliability of operation
- Catalyst Management

HYDROCARBON PRODUCTION OPERATIONS

UETMT- REF- 167

Program Duration: 5 days

INTRODUCTION

This program will provide the participants with an integrated view of the hydrocarbon production and related facilities during the life of the reservoir. It will present an overview/fundamental understanding of the wide range of oilfield production handling and treatment equipment. With this view and tools and knowledge on the properties and flow of the fluids provided in this training session, the participant will be able to understand the behavior of the fluids from the reservoir up to end users. The training gives strong emphasis of the calculation of reserves, fluids properties from reservoir through gathering network. This knowledge is necessary for the surface facility engineer to design or operate the equipments and facilities.

WHO SHOULD ATTEND?

The program is designed for oil & gas production field personnel, operations and maintenance supervisors, technicians, support engineers and engineering trainees. It would also be of benefit to safety and other support staff who have an interest in increasing their understanding of the hydrocarbon production operations.

PROGRAM OBJECTIVES

- Familiarize the participants with global oil & gas related statistics, such as reserves, production, consumption and exports
- Familiarize the participants with both upstream, middle stream and downstream operations and related facilities
- Familiarize the participants with various methods and techniques used to explore, drill, produce, treat and transport oil, gas and their products
- Understand the oil & gas operations of various field facilities from wellhead, flow lines, separators, tanks, pumps and compressors, pipelines, gas treatment and processing, refinery operations, etc
- Understand the basic concept with regards to evaluating oil & gas reserves, artificial lift and enhancing recovery
- Understand the challenge associated with this industry such as offshore operations, horizontal drilling and other safety concerns
- Get a general feel for petroleum economics and risk analysis

TARGET COMPETENCIES

- Global Energy Statistics
- Hydrocarbon Industry Components
- Upstream Operations

TRAINING METHODOLOGY

- The program will include a number of exercises aimed at enhancing each participant capability to conduct various petroleum engineering problems. A number of short films will be presented during the training session to enhance the participants' knowledge about the petroleum field operations.
- Additionally, the program assumes no or limited prior knowledge of the topics covered in this training session. New concepts and tools are introduced gradually to enable delegates to progress from the fundamental to the advanced concepts of oil & gas operation processes.
- The delegates will gain an improved knowledge about various aspects of the oil & gas production operations. These include production of gas and oil, and surface processing units and operations such as artificial Lift and pressure maintenance operations. Issues related to mid-stream and downstream will be discussed as well, including recent developments.

PROGRAM SUMMARY

- This program will provide an insight into the oil & gas field operation processes and the role of production engineering. It will explain the important concepts in reservoir and well drilling and intervention, productivity optimization, various recovery mechanisms, as well as covering various operational issues. Core Competencies are:
- Gain an overall knowledge of various hydrocarbon production processes from the time a reservoir is discovered to end users
- Understand the role of the petroleum/reservoir engineer in optimizing recovery

- Gain sufficient knowledge of various surface and sub-surface equipments and processing facilities used in a typical oil & gas field
- Gain sufficient knowledge about health, safety and environmental issues
- Understand the role of petroleum economics in evaluating field development projects

PROGRAM CONTENT
DAY 1 -

- Introduction and Overview
- Global Energy Statistics
- Hydrocarbon Industry Components
- The Upstream Operations
 - ✓ Exploration Methods
 - ✓ Seismic Surveys
 - ✓ Drilling Operation
 - ✓ Drilling Problems & Challenges
 - ✓ Well Testing, Completion
 - ✓ Hydrocarbon Production Problems
 - ✓ Well Stimulation & Maintenance

DAY 2 -

- Hydrocarbon Properties
- Rock Properties
- Porosity & Permeability
- Estimating Hydrocarbon Reserves
- Oil & Gas Production
- Artificial Lift Methods & Facilities
- Reservoir Drive Mechanisms
- Pressure Maintenance Technology
- Hydrocarbon Recovery Methods
- Primary, Secondary & Tertiary Recovery
- Reservoir Simulation
- Oil & Gas Field Surface Facilities

DAY 3 -

- **The Downstream Operations**
 - ✓ Wellheads Types
 - ✓ Production Manifolds
 - ✓ GOSP Facilities
 - ✓ Oil & Gas Separation
 - ✓ Emulsion Treatment
 - ✓ Separator types, Operation & Troubleshooting
 - ✓ Oil Treatment, Storage & Transportation
 - ✓ Oil Tank Types
 - ✓ Gas Treatment & Processing
 - ✓ Process Troubleshooting

DAY 4 -

- Heat Exchangers
- Oil & Gas Measurement and Control
- Pipeline Operation & Pigging
- Valve Types
- Pumps & Compressor Stations
- Refinery Operations & Products
- Operation Troubleshooting

DAY 5 -

- The Role of Technology
- Safety & Accident Prevention
- Production Problems
- Corrosion Protection & Cathodic Protection
- Scale Prevention & Treatment
- Petroleum Economics & Risk Analysis

TANK & TANK FARMS: DESIGN, OPERATION, INSTRUMENTATION, INSPECTION & MAINTENANCE

UETMT- REF- 168

Program Duration: 5 days

TARGET AUDIENCE

- Tank Farm Managers, Superintendents, Supervisors, Foremen and Operators
- Oil Storage and Export Managers, Superintendents, Supervisors, Foremen and Technicians
- Maintenance Engineers/Planners, Superintendents, Supervisors, Foremen and Technicians
- Inspectors and Engineers involved with storage tank design, maintenance and inspection
- Process Engineers, Supervisors, Foremen and Technicians
- Section Heads and Shift Supervisors
- Senior Operators and Plant Operators

TARGET COMPETENCIES

- Tank Farms Configuration, Operation and Management
- Cathodic Protection
- Fire System Integrity Assurance

PROGRAM OBJECTIVES

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

- Assess the configuration, operation and management practices of tank farms in terms of facility capacity, operational effectiveness, and the cost/benefit of feed, intermediate and product storage
- Appreciate the importance of codes, standards, regulations & recommended practices in terms of hazard management and incident scenario layer of protection safeguarding
- Identify the different types & classifications of tanks and their applications
- Understand considerations of materials-of-construction & various corrosion protection strategies and tactics including cleaning, coating, & cathodic protection
- Become familiar with fire protection of tanks & tank farms: venting, frangible roofs, flame & detonation arrestors, protection from ignition by static electricity, principles & practices of bonding and grounding, principles of inerting, electrical classification, selection criteria for fire suppression systems
- Become familiar with principles, practices & benefits of "Fire System Integrity Assurance"
- Apply tank emission control measures & procedures to satisfy regulatory requirements
- Understand the principles, preparations, & practices associated with tank cleaning, entry, & inspection & repair
- Use a system approach on tank operations including tank entry, tank bottoms, sludge, source reduction, mitigation, vapor freeing, degassing and tank cleaning
- Determine the various tank accessories used in the tank & tank farm design, operation, inspection & maintenance and be able to explain their features & functions

OIL MOVEMENT, STORAGE & TROUBLESHOOTING IN MODERN REFINERIES, MARINE TERMINALS & OIL PLANTS

UETMT- REF- 169

Program Duration: 5 days

PROGRAM OBJECTIVES

The aim of this course is to provide participants with a complete and up-to-date overview of the oil movements & storage operations in modern refineries, Marine Terminals and Oil plants. Upon the successful completion of this course, participant will gain enough knowledge on oil production and recovery methods, oil terminals and tank farms, methods of gauging tanks, refrigeration of LPG, oil products specifications, tank mixing, oil spill emergencies, tank cleaning methods, work permit systems, operation and cleaning of gas transmission and crude oil pipelines, quality assurance and control, contingency and safety procedures etc. Actual case studies from around the world will be demonstrated to highlight the topics discussed.

TARGET COMPETENCIES

- Oil Production, Recovery, Dehydration & Desalting
- Tank Farm Types

WHO SHOULD ATTEND:

Operations Department Managers, Heads, Engineers, Superintendents, Supervisors, Foremen, Technicians, Operators (seniors and juniors), Production Department Managers, Heads, Engineers, Superintendents, Supervisors, Foremen, Technicians, Operators (Seniors and Juniors) Supply Department Managers, Heads, Engineers, Superintendents, Supervisors, Foremen, Technicians, Operators (Seniors and Juniors), Marine Terminal and Tanker Department Managers, Heads, Engineers, Superintendents, Supervisors, Foremen, Technicians, Operators (seniors and Junior)

PROGRAM CONTENT

- 1: Oil Production, Recovery, Dehydration & Desalting
- 2: General Description & Installation of Tank Farm
- 3: Types of Tanks
- 4: General Operation of the Tank Farm
- 5: Gas Freeing of Tanks & Vessels
- 6: Methods of Gauging Tanks
- 7: Crude Oil Processing
- 8: LPG Refrigeration, Handling & Bulk Storage
- 9: Product Specifications
- 10: Blending
- 11: Tank Mixing
- 12: Meters & Meter Proving
- 13: Cleaning of Crude Oil & Leaded Gasoline Tanks
- 14: Static Electricity
- 15: Oil Spill Emergencies
- 16: Gas Transmission Lines Operation & Cathodic Protection Work Permit System
- 17: Pigging of Crude & Gas Pipelines
- 18: Marine Terminal & SPM Operations
- 19: Ship Loading
- 20: Quality Assurance & Control

OIL MOVEMENT, STORAGE AND TROUBLESHOOTING

UETMT- REF- 170

Program Duration: 5 days

INTRODUCTION

Upon the successful completion of this program, participants will gain enough knowledge on oil production and recovery, oil terminals and tank farms, Methods of gauging tanks, refrigeration of LPG, oil products specifications, tank mixing, emergency of oil spills, cleaning of crude oil tanks, cleaning of leaded gasoline tanks, work permit system, gas transmission pipelines, pigging operations in crude oil pipelines, quality assurance and control, contingency and safety procedures etc.

WHO SHOULD ATTEND?

- Team Leaders, Project Managers, Refinery Managers, Plant managers, Oil Terminal
- Managers/Superintendent/Supervisors, Section Heads, Plant Supervisors, Process Engineers, Mechanical Engineers, Electrical Engineers, Instrumentation/Control Engineers, technical staff and contractor personnel involved in oil movement and storage

PROGRAM OBJECTIVES

- Provide participants with a complete and up-to-date overview of the oil movements and storage operations in modern refineries, marine terminals and oil plants
- Acquire knowledge on oil production, recovery, dehydration and desalting and be able to understand the description and installation of a tank farm
- Identify the different types of tank and review and improve the operation of a tank farm
- Illustrate the process of gas freeing of tanks and vessels and be able to determine the various methods of gauging tanks
- Describe marine terminal & SPM operations and be able to explain the various product specifications
- Perform blending, tank mixing, meters and meter proving and cleaning of crude oil and leaded gasoline tanks
- Identify oil spill emergencies and be able to review the operation and cathodic protection of gas transmission lines
- Increase knowledge on pigging of crude and gas pipelines and be able to demonstrate the process of ship loading
- Recognize the role and importance of quality assurance, control and work permit system

TARGET COMPETENCIES

- Oil Production, Recovery, Dehydration and Desalting
- Oil Terminal & Tank Farm

TRAINING METHODOLOGY

Oil Movement, Storage & Troubleshooting is a hands on, stimulating learning experience. The program will be highly interactive, with opportunities to advance your opinions and ideas. Participation is encouraged in a supportive environment. To ensure the concepts introduced during the program are understood, they will be reinforced through a mix of learning methods, including lecture style presentation, and open discussion. The program will be presented with the use of PowerPoint slides and videos. This will be augmented by case studies and facilitated discussions, to engage the delegates and to encourage the exchange of ideas.

PROGRAM SUMMARY

This program describes the requirements for efficient, effective, and safe operation of Oil movement facilities. This material is covered by concentrating only on the most commonly applied topics in each case, rather than attempting to discuss everything.

PROGRAM CONTENT
DAY 1 -OVERVIEW INTRODUCTION

- Oil Production, Recovery, Dehydration and Desalting
- Oil Terminal & Tank Farm
- Types of Tanks
- General Description and Installation of Tank Farm

DAY 2 -TANKS AND FACILITIES

- Gas Freeing of Tanks and Vessels
- Methods of Gauging Tanks
- Static Electricity
- Crude Oil Processing
- Refrigeration of LPG, Handling and Bulk Storage

DAY 3 -BLENDING AND LOADING OPERATIONS

- Marine Terminal Loading: SPM Operations
- Product Specifications and Blending
- Tank Mixing & Tank-Tank Transfer
- Meter Proving and Meter Factor

DAY 4 -ABOVEGROUND STORAGE TANKS

- Emergency of Oil Spills
- Cleaning of Crude Oil and Leaded Gasoline Tanks
- Gauging of Marine Cold Product Tanks
- Gas Transmission Lines: Operation & Cathodic Protection

DAY 5 -CLEANING & LOADING

- Pigging of Crude & Gas Pipelines
- Ship Loading and Checklist
- Quality Assurance, Control and Work Permit System
- Review and Presentation of Certificates

ADVANCED FACILITIES OPERATIONS

UETMT- REF- 171

Program Duration: 5 days

PROGRAM CONTENT
SECTION ONE: UNIVERSAL TROUBLESHOOTING PROCESS
Plant Troubleshooting

- Objectives and Approach
- The Skills of Troubleshooters
- Importance of Troubleshooting

Current Trends in Petroleum Refining Industry

- (Configuration Flowschemes)
- The Refinery From 1950 To 1970
- The Refining Flow Diagram of The 1980s
- The Refining Flow Diagram of The 1990s
- Refining Configuration Beyond Year 2000

Troubleshooting Concepts and Techniques

- Typical Problems
- Interaction of Process and Equipment
- Universal Troubleshooting Techniques
- Troubleshooting Process

SECTION TWO: REFINING OPERATIONS
Petroleum Refinery Operations

- Refinery Types and Feedstocks
- Fuel Products Refinery (Energy Refineries)
- Refinery Basic Processes:
 - The Processes Common to most Energy Refineries
 - The Processes not so Common to Energy Refineries
- Oxygenated Gasolines: (Ether Compounds - Methyl Tertiary Butyl Ether, MTBE)
- None-Energy Producing Refineries

Typical Crude Distillation Unit (Process Variables)
Technical Terms:

- Heat Stability
- Overflash
- Flash Zone Temperature
- Bottoms Stripping Steam

Process Variables of Atmospheric Distillation
Process Variables of Vacuum Distillation
Refinery Operation Difficulties:
(A) Tower Overloading
(B) Tower Underloading
(C) Ineffective Control of Tower Operation:

- Off-Specifications Products (Off-Test Products)
- Low Yield of the Desired Products
- Too High a Purity of the Desired Products

(D) Abnormal Operations

- Flooded Trays, High Levels, Dry Trays, Trapped Water, Trapped Water, Upset Trays, Loss of Cooling Medium, Loss of Heat, Plugged Outlets, and Loss Vacuum.
- Poor Column Performance: (Caused by Troublesome Column Internals and their Installation)
- Other Typical Operating Problems: Flooding, Foaming, and Efficiency

SECTION THREE: TROUBLESHOOTING PROCESS OPERATIONS
Specific Processes

1. Crude Distillation Unit
2. Amine Treating Systems
3. Sulfur Recovery Unit
4. Alkylation Process
5. Cracking Processes, FCC

Process Equipment

1. Vacuum Tower
2. Centrifugal Pumps
3. Process Direct Fired Heaters
4. Alarms and Trips

Practical Problems

1. Vapor-Liquid Separation

Process Engineer's Job

1. How to Make Field Measurements

SECTION FOUR: NEXT GENERATION PROCESSES and PRODUCTS IMPROVEMENT
Building Operational Excellence
Unit Monitoring and Control:

- Material Balance
- Heat Balance
- Pressure Balance
- Process Control Instrumentation

Effective Troubleshooting

- Debottlenecking and Optimization

Future Trends in Refineries Technologies and Operations

- Refinery Processes
- Hydrogen Production
- New Liquid Fuels for Fuel Cell Vehicles
- The environment for technology innovation
- Human Capital

APPENDIXES

- Appendix (I) Refining Terms
- Appendix (II) References
- Summary and Revision & Course Evaluation

ADVANCED OIL TREATMENT TECHNOLOGY

UETMT- REF- 172

Program Duration: 5 days

PROGRAM OBJECTIVES

- Understand the fundamentals of separation in vessels by Gravity.
- Operate and Troubleshoot Separator Problems.
- Identify Emulsions, Emulsifying Agents, and Demulsifiers.
- How to operate and troubleshoot Heater-Treaters
- Understand the Basic Pump Hydraulics.
- Identify Storage Tank Types and components.
- Identify Hazardous Conditions and apply Safety Procedures.
- Know the required measurements for oil the storage tanks (Gravity, Temperature, Volume, Salt Content, Water and Sediment)

TARGET COMPETENCIES

- Fundamentals of Separation in Vessels
- Separators Operation and Troubleshooting.
- Fundamentals of Crude Oil Emulsions

WHO SHOULD ATTEND?

- Operation Supervisors
- 1st Line Maintenance Personnel
- Maintenance Supervisors
- Senior Plant Supervisors
- Operations Engineers
- Process Support Engineers
- Design Engineers
- Process and Production Staff
- Projects and Constructions Engineers

PROGRAM CONTENT

- Fundamentals of separation in vessels
- Separators Operation and Troubleshooting.
- Fundamentals of Crude Oil Emulsions
- Method for treat emulsion
- Operation , configuration and Sizing of Heater-Treaters
- Electrostatic Heater Treater Operation, configuration and Sizing.
- Basic Pump Hydraulics.
- Types of pumps and pump system , troubleshooting
- Hazardous Conditions, Safety Procedures and Measurements.
- Storage Tank Types and components.
- Storage tanks correction and calibration methods

BLENDED OPERATIONS

UETMT- REF- 173

Program Duration: 5 days

PROGRAM OBJECTIVES

By the end of this program, participants will be able to

- To improve Efficiency of Distillates Blending
- To improve Understanding of Asphalt blending and Residual Fuel Blending

TARGET COMPETENCIES

- Blending Methods
- Gasoline Blending
- Distillates Blending

WHO SHOULD ATTEND?

- Chemicals Engineers
- Shift Engineers
- Forman's

PROGRAM CONTENT
Introduction (Purpose of Blending & Blending Methods)

- Purpose of Blending Operations
- Operational Requirements and Variables
- Blending Methods (Batch Blending, In-line Blending)

Gasoline Components and Specifications

- Products Produced by Blending Operations & Grades of Gasoline
- Gasoline Specifications (Volatility, Vapor / Liquid Ratio, Octane Number)

Gasoline Quality

- Calculating Gasoline Quality
- Additives & Reformulated Gasoline

Gasoline Blending

- In-line Blending System
- Examples of in-line Gasoline Blending

Distillates Blending

- Jet Fuel Components and Specifications
- Diesel Fuel Components and Specifications
- Furnace Oil Components and Specifications

Asphalt Blending and Residual Fuel Blending

- Types of Asphalts (Straight run Asphalts, Liquid Asphalts, Blown Asphalts)
- Asphalt Specifications
- Residual Fuel Components and Specifications

FUNDAMENTALS OF CHEMICAL ENGINEERING

UETMT- REF- 174

Program Duration: 5 days

PROGRAM OBJECTIVES

- Utilized as a refresher for engineers with experience. Understanding the practical
- applications of basic design engineering principles is a challenge for fresh graduates.
- Young engineers within the first year should be able to perform task such as:
- Understand the content of process flow diagrams (PFD)
- Understand the content of piping and instrument diagrams (P&ID)
- Understand the calculation of line sizes and pressure drops
- Understand flow measurement sizing and develop a flow measurement process data sheet
- Understand control valve sizing and develop a control valve process data sheet
- Understand relief valve sizing and develop a relief valve process data sheet
- Understand flash drum sizing and develop a flash drum process data sheet
- Understand distillation tray sizing and develop a distillation tray process data sheet
- Understand heat exchanger sizing and develop a heat exchanger data sheet
- Understand pump sizing and develop a pump data sheet
- Understand compressor sizing and develop a compressor data sheet
- Understand flare sizing and develop a flare data sheet
- Understand the relationship between process design and Safety

TARGET COMPETENCIES

- Design Engineering
- Process Flow Diagrams (Pfd)
- Piping and Instrument Diagrams (P&Id)

CHEMICAL TREATMENT FOR OIL AND GAS FIELD

UETMT- REF- 175

Program Duration: 5 days

ABOUT THE PROGRAM

- This course covers the selection and use of chemicals used in oil and gas production.
- As oil fields mature more water is produced which requires the use of more chemicals to maintain production. Chemicals used for controlling corrosion, emulsions, foaming, mineral scales, paraffins (waxes), asphaltenes, gas hydrates, hydrogen sulfide scavengers. The course includes methods to determine the need for chemical treating, how to select the proper chemicals, and how testing for chemical compatibility with the formation and other chemicals is performed. Requirements for environmentally friendly products and products for deep water production are discussed. The course will include how the use of chemicals can prevent problems, improve production and economics, and extend the life of the production equipment.

PROGRAM OBJECTIVES

- Recognize corrosive conditions and monitor corrosion rates
- Select and apply corrosion inhibitors
- Predict and treat emulsions
- Understand causes and control of foaming
- Predict scale forming conditions
- Select and apply scale inhibitors
- Control gas hydrate formation
- Predict and control paraffin (wax) deposition
- Evaluate methods for asphaltting control
- Scavenge low concentrations of H₂S

TARGET COMPETENCIES

- Corrosive Conditions and Monitor Corrosion Rates
- Corrosion Inhibitors
- Emulsions Treatment

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
- 1st Line Operations personnel,
- Operation Supervisors,
- Operations Engineers
- Process Support Engineers,
- Design Engineers,

PROGRAM CONTENT
Day 1

- Introduction to Oil & Gas Industry
- Crude Oil Origin and properties of crude
- Crude Oil Chemistry & Contaminants

Day 2:

- Overview of oil and gas processing facilities
- Oil treating , Field desalting
- Oil field treatment technology
- Basics of oil field emulsions
- Demulsifier selection and field application
- Foam basics
- Defoamers
- Oil carryover in water
- Removal of oil and oily solids
Crude stabilization & sweetening

Day 3

- Gas processing facilities
- Requirements for gas hydrates to form
- Types of compounds used to control
- hydrate formation

Day 4

- Corrosive agents
- Corrosion inhibitor selection and application
- Compounds that cause scaling
- Prediction of scaling tendency
- Scale inhibitors
- Solvents to dissolve scales
- Causes of paraffin (wax) problems

Day 5

- Paraffin treatment chemicals
- Asphaltting stability tests
- Asphaltene treatment chemicals
- Chemicals used as H₂S scavengers
- Application of scavengers

CHEMICAL ENGINEERING FOR NON-CHEMICAL ENGINEERS

UETMT- REF- 176

Program Duration: 5 days

INTRODUCTION

This program identifies the areas of chemical engineering that are most commonly encountered by the non-specialist with examples that will be drawn from a range of process industries including oil and gas processing, petrochemicals, chemical manufacturing. In this program you will:

- Learn to interpret flowsheets and process flow diagrams
- Develop and understand mass and energy balances in process design
- Learn about fluid flow, pumps and compressors, and mixing
- Discuss heat transfer equipment and their design, including heat exchangers
- Understand distillation and separations used in oil and gas processing
- Discuss effluent minimization and treatment
- Learn how to control processes
- Perform a basic economic analysis of a project
- Understand the safety and environmental responsibility on process engineers

WHO SHOULD ATTEND?

- All those working in the chemical, petrochemical, oil and process industries with a need to understand and discuss issues with the chemical engineering specialists
- These will include geo-scientists, petroleum engineers, production engineers, trainee process engineers, R&D chemists, plant chemists, plant operators and economists
- Case studies and examples will cover a range of levels, making the program also suitable non-technical staff

PROGRAM OBJECTIVES

- Learn to interpret flowsheets and process flow diagrams
- Understand the use of mass and energy balances in process design
- Gain a basic understanding of fluid flow, including pumping and mixing
- Study examples relevant to the oil and gas industry
- Design a heat exchanger and know advantages/disadvantages of different types
- Understand distillation and separations used in oil and gas processing
- Appreciate the need to control environmental pollution from industry
- Learn how to control processes
- Perform a basic economic analysis of a project
- Case studies from the oil, gas and chemical industry are used to illustrate the material

TARGET COMPETENCIES

- Fluid Flow
- Heat Transfer
- Separation Processes

TRAINING METHODOLOGY

In addition to formal lectures and discussions, the delegates will learn by active participation through the use of problem-solving exercises, group discussions and analysis of real-life case studies.

PROGRAM SUMMARY

This program identifies the areas of chemical engineering that are most commonly encountered by the non-specialist such that the dialogue between the two sides can be fruitful and productive. Program examples will be drawn from a range of process industries including the oil and gas processing, petrochemicals and chemical manufacturing industries.

PROGRAM CONTENT
DAY 1 - Process Engineering Fundamentals

- Basic Concepts to remember
- Flow diagrams
- Piping and Instrumentation Diagrams (P&IDs)
- Process equipment
- Introduction to mass and energy balances
- Batch vs. Continuous
- Risk Assessments and Hazard Studies
- Workshop Session

DAY 2 - Fluid Flow

- Pressure and Head
- Bernoulli's Theorem
- Flow of Liquids
- Reynolds number, pressure drop in pipes
- Compressible flow
- Introduction to Thermodynamics
- Two-phase and Multi-phase Flow
- Pumps and Compressors
- Mixing and Mixers
- Workshop Session

DAY 3 - Heat Transfer

- Thermal conductivity
- Conduction and convection
- Insulation
- Heat transfer coefficients
- Heat exchangers, type and sizing
- Chemical reactions
- Reaction kinetics
- Introduction to catalysis
- Workshop session

DAY 4 - Introduction to Separation Processes

- Distillation basics
- Phase behaviour and vapour/liquid equilibria
- Gas/Liquid separation
- Absorption and adsorption
- Solid Liquid separation
- Air and water pollution control
- Workshop Session

DAY 5 - Process Control, Utilities and Economics
Process Control basics

- Measured variables
- Simple feedback control

Process Utilities

- Air
- Water and cooling water
- Steam
- Electricity and power generation

Process Economics

- Preliminary economic analysis
- Fixed and variable costs, break even
- Calculating raw materials usage
- Scale up and six tenths rule



BASIC OF PETROCHEMICALS INDUSTRY

UETMT- REF- 177

Program Duration: 5 days

PROGRAM OBJECTIVES

Upon completion of this course, participant will be to gain:

- History of Petrochemicals
- Primary Raw Materials for Petrochemicals
- Hydrocarbon Intermediates
- Crude Oil Processing and Production of Hydrocarbon Intermediates
- Non Hydrocarbon Intermediates
- Chemicals based on Ethane, Ethylene, Propylene, Butane

TARGET COMPETENCIES

- Fundamentals of Petrochemicals
- Crude Oil Processing
- Hydrocarbon Intermediates

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding Operation, Design, and Economics of Processing Plants
- 1st Line Operations Personnel
- Operation Supervisors
- 1st Line Maintenance Personnel
- Senior Plant Supervisors
- Operations Engineers
- Process Support Engineers

PROGRAM CONTENT
Day 1

- History of Petrochemicals
- Primary Raw Materials for Petrochemicals
- Composition of Oil and Natural Gas

Hydrocarbon Intermediates

- Paraffinic Hydrocarbons
- Olefinic Hydrocarbons
- Dienes
- Aromatic Hydrocarbons
- Liquid Petroleum Fractions and Residues

Day 2
Crude Oil Processing and Production of Hydrocarbon Intermediates

- Physical Separation Processes
- Conversion Processes
- Production of Olefins

Day 3
Non Hydrocarbon Intermediates

- Hydrogen
- Sulfur
- Carbon Black
- Synthesis Gases
- Naphthenic Acids
- Cresylic Acid

Day 4

- Chemicals based on Ethane
- Chemicals based on Ethylene
- Chemicals based on Propylene
- Chemicals based on C4 Olefins and Diolefins

Day 5

- Chemicals based on Benzene, Toluene and Xylenes
- Polymerization
- Petroleum based Polymers

OVERVIEW OF OIL, GAS AND PETROCHEMICALS

UETMT- REF- 178

Program Duration: 5 days

PROGRAM OBJECTIVES

- To give an idea of the entire system of the hydrocarbon value chain, from oil and natural gas production to valorization into refinery products and petrochemicals.
- To present overview of the operations of refinery
- Highlight technology aspects in the chain.

TARGET COMPETENCIES

- Conventional / Nonrenewable Energy Sources
- Crude Oil
- Natural Gas
- Petrochemical

WHO SHOULD ATTEND?

- Who want to gain a complete overview of the entire value chain of hydrocarbon industry (Oil & Gas, refinery and petrochemicals)
- Who want to know the technical aspects of the industry they are working in oil and gas
- Executives who have interaction with upstream and downstream of the industry they are working in.
- Those working in major hydrocarbon projects.

PROGRAM CONTENT

- Introduction to Conventional / Nonrenewable Energy Sources
- Overview of Crude Oil
- Overview of Natural Gas
- Overview of Petrochemical



REFINERY-PETROCHEMICAL INTEGRATION AND ECONOMICS

UETMT- REF- 179

Program Duration: 5 days

PROGRAM OBJECTIVES
Upon completion of this course, participant will be to gain:

- Crude Oil Quality
- Overview of Refinery Process Technology
- Refinery Types, Complexity
- Refinery Margins
- How do Refiners select Crude Oils
- Refinery/Petrochemical Integration
- Levels of Refining and Petrochemical Integrations
- Crude Oil Processing and Production of Hydrocarbon Intermediates
- Non Hydrocarbon Intermediates
- Chemicals based on Ethane, Ethylene, Propylene, Butane
- World-wide Crude Oil Supply and Demand
- Important Petroleum product demand Trends
- Impact of market demand and Crude Oil Quality on Refinery Configuration
- Refinery Margin Calculation
- How do Refiners select Crude Oils
- Case Study of new Grassroots Refinery
- Options for increasing Refinery Profitability
- To study Petrochemical value chains and their end uses.
- To discover the major Industry players & learn the Fundamentals that drive the business
- To have an overview to pricing and price Analysis which may help in making informed business decisions.
- Joining this course ensures that you can get quickly up to speed and have the expertise you need to operate effectively in this complex market.

TARGET COMPETENCIES

- Crude Oil Quality
- Refinery Process Technology
- Refinery Types and Complexity

WHO SHOULD ATTEND?

- People who are making day to day decisions regarding Operation, Design, and Economics of Processing Plants;
- 1st Line Operations Personnel
- Operation Supervisors
- 1st Line Maintenance Personnel
- Senior Plant Supervisors
- Operations Engineers
- Process Support Engineers

PROGRAM CONTENT
Day 1
Crude Oil Quality

- Crude Oil Composition
- Typical Elemental Breakdown

- Hydrocarbon Types
- Bulk Crude Oil Properties
- API Gravity
- Sulfur Content
- Distillation range
- Other important Properties

Refinery Process Technology

- Separation
- Distillation Fundamentals
- Atmospheric Distillation
- Vacuum Distillation
- Gas Plants

Day 2

- Conversion Processes
- Hydrocracking
- Fluid Catalytic Cracking
- Hydrocracking
- Fluid Catalytic Cracking
- Delayed Coking
- Fluid Coking
- Visbreaking
- Solvent Deasphalting
- Resid Hydrocracking
- Hydrotreating
- Catalytic Reforming
- Isomerization
- Alkylation

Day 3

- Refinery Types, Complexity
- Refinery Margins
- Options for Improving Refinery Profitability
- History of Petrochemicals
- Primary Raw Materials for Petrochemicals
- Hydrocarbon Intermediates
- Paraffinic Hydrocarbons
- Olefinic Hydrocarbons
- Dienes
- Aromatic Hydrocarbons
- Liquid Petroleum Fractions and Residues

Day 4

- Olefins and Derivatives
- Aromatics and Derivatives
- Chemicals based on Ethane
- Chemicals based on Ethylene
- Chemicals based on Propylene
- Chemicals based on C4 olefins and Diolefins
- Chemicals based on Benzene, Toluene and Xylenes
- Polymerization
- Petroleum based Polymers
- Levels of Refining and Petrochemical Integrations
- Forward Integration
- Backward Integration
- Side-wide Integration
- System-wide Integration
- Integrating Refinery/ Aromatic complex
- Petrochemicals Raw Materials - value Chain elements
- Petrochemicals Pricing & Forecasting
- Introduction to Petrochemicals Pricing
- Examining oil and its relationship with Petrochemicals
- Petrochemical in Middle East

Day 5

- Markets, Cost and Profitability
- Market Dynamics of three main Olefins Methanol & Ammonia Market Dynamics
- Aromatics Market Dynamics / Cost and Profitability
- Petrochemical value Chains and their end uses
- Syndicate Exercise
- Case Study

UNDERSTANDING SUCCESS FACTORS IN PETROCHEMICALS INDUSTRY

UETMT- REF- 180

Program Duration: 5 days

INTRODUCTION

- Petrochemicals are a growth business. Plastics and chemicals can be characterized as “the bricks and mortar of contemporary civilization”. This program will offer the perspective of the value of petrochemicals and the success factors that can improve financial performance and help companies’ weather industry challenges. In this program you will study:
- The overview of petrochemical industry, the global chemical business and its key market segments.
- The overview of hydrocarbons groups in crude oil, the basic refining operations and processes, and the working knowledge of basic equipment used in petrochemical industry.
- The rearrangement of Hydrocarbons chains, and the measure of conversion and yield in a refinery, and to identify the seven basic chemicals groups.
- What is meant by the integration of refining and petrochemicals? Explore what are the benefits and challenges of integrating refinery with petrochemicals.
- The definition of petrochemical participation concepts with the examples of Strategies/Business Models of International Oil Companies (IOC’s), National Oil Companies (NOC’s), and Non-Oil Companies.
- The Major Business Incentives in each class (IOC’s, NOC’s, and Non-Oil), know about the *Best in Class* summary, and understand the key success factors in each category.
- What are project management? and Project Management Evaluation Steps?
- What are the key considerations in selecting proper technology, capital, and operating costs for the project? Petrochemical innovations, challenges & future trends

WHO SHOULD ATTEND?

- New entrants to the downstream oil and gas industry, including refining, petrochemicals, and supply chain management.
- Managers and analyst working on improving the oil & gas downstream operations
- Professionals personnel such as legal, environmental, banking, insurance, finance – either within or outside oil companies but dealing with refining, and petrochemicals industry
- Sales & Marketing, Auditing, Government Regulators working in petrochemicals
- Plastics & polymer engineers, refinery professionals,
- Traders in petrochemicals
- Supply Planners & Scheduling professionals
- Negotiators and Contracting professionals
- Petrochemical industry journalists and reporters

PROGRAM OBJECTIVES

- Gain broad perspective of the petrochemical industry
- Boost your understanding of petrochemical operations, refining, petrochemical demand forecasting, contracts, prices, distribution, sales, etc
- Master the petrochemical value chain from the crude oil to finished plastics, polymers, and other synthetic material used in our daily lives

- Evaluate the petrochemical markets, strategies and petrochemical models
- Confidently discuss the technical terms, concepts and buzzwords in the petrochemical industry with your peers and clients

TARGET COMPETENCIES

- Oil & Gas Upstream
- Hydrocarbon Supply Sources
- Crude Oil Classifications
-

TRAINING METHODOLOGY

Participants will learn by active participation throughout the program through the use of program materials, case study exercises, quizzes, training videos and discussion of business cases issues related to crude oil source, value chain consisting of building blocks, refining & petrochemicals integration, and petrochemicals key strategies& marketing in their organizations.

PROGRAM SUMMARY

This 5-Day accelerated program provides a wider management perspective of global petrochemical business and highlights the success factors in each category of several business models. How innovation in energy and petrochemicals is helping to drive economic growth and improve living standards around the world. How we can achieve these goals while delivering value to shareholders. The program effectively deals with the core issues, including strategies and essential concepts of successfully running the petrochemical business.

PROGRAM CONTENT
DAY 1 - CRUDE OIL THE MAIN SOURCE

- Introduction to Oil & Gas Upstream and its influence on petrochemicals
- Essence of Hydrocarbon Supply Sources – Global Reserves, Production & Trade
- Global Oil Resources –Industry units – for the USA, Europe and Asia, Conversion factors
- Crude oil classifications
- Crude oil quality indicators, its characterization by assays
- Crude oil distillation – refined products
- Crude oil industry units and conversion factors
- Fundamentals of oil economics
- Delivered price of crude oil – the concept GPW (Gross Product Worth)
- Net Refining Margin calculation
- Value of Crude Oil and the Determining Factors in Crude Selection

DAY 2 - VALUE CHAINS AND BUILDING BLOCKS

- Introduction to Petrochemical
- Oil & Gas Value Chain leading to Petrochemicals – 2
- Classification of Petrochemicals
- How Petrochemical derived from Well Head to Products
- Petrochemical History and Its Key Role

UNDERSTANDING SUCCESS FACTORS IN PETROCHEMICALS INDUSTRY

UETMT- REF- 180

(Continued)

Program Duration: 5 days

- The Beginning of Petrochemical Industry
- Petrochemical Applications in Daily Life
- Petrochemical Applications in Health Care
- Basic Chemistry
- Key Properties of Organic chemicals
- Classification of Chemicals into Groups
- The Building Blocks in Petrochemicals
- Reactions/Process Technologies of Petrochemical Industry

DAY 3 - FEEDSTOCKS AND PROCESS INTEGRATION

Feedstock for Petrochemicals

- The different raw material for petrochemicals from C1 to C50
- Different feedstock sources for petrochemicals
- World oil refining and petrochemicals output composition
- Difference between fuels and chemicals
- "Alternate Value" of hydrocarbons: Gasoline Pool vs. Petrochemicals
- World gas oil industry basic functions

Petrochemical Processes And Equipment

- The overview of hydrocarbons groups in crude oil
- The basic refining operations and processes
- The working knowledge of basic equipment used in petrochemical industry,
- Rearrangement of Hydrocarbons chains
- The measure of conversion and yield in refinery

Refinery-Petrochemical Integration

- Identify the seven basic chemicals
- Learn what is meant by the integration of refining and petrochemicals
- **Explore what are the benefits and challenges of integrating refinery with petrochemicals**

DAY 4 - VALUE CHAIN ENHANCEMENTS & MARKETS

Petrochemical Value Chains I

- Understand the concept of value chain
- Understand how series of upgrades are made from the raw material to the finished products
- Learn how these value chain are optimized
- Understand the chemical linkage from hydrocarbons to end uses

Petrochemical Value Chains II

- Exploring olefins value chain – ethylene, propylene, and polyvinyl chloride.
- Understanding how their demand is driven
- Olefins product applications and manufacturing technology

Petrochemical Markets

- The global chemical business
- Looking at the chemical industry market segments
- Learning basic market research
- Learn what is forecasting
- **Explore the forecasting / planning techniques**

DAY 5 - KEY STRATEGIES AND BUSINESS MODELS

Petrochemical Strategies

- Define the petrochemical participation concept
- With examples of Strategies/Business Models of
- International Oil Companies
- National Oil Companies
- Non-Oil Companies

International oil Companies Key Strategies

- National Oil Companies – Chemicals Business Structure and Key Strategies
- Major Non-Oil Companies competitive advantage
- Major Business Incentives – Five Categories
- Know about the best in Class summary
- Understand the key success factors

Petrochemical Project Evaluation

- What are project management, and its core activities and considerations?
- Project Management Evaluation Steps
- What are the considerations in selecting proper technology, capital, and operating costs for the project?
- Capital Cost estimates accuracy
- The different ways of conducting financial evaluation, measures for its success and adding share-holder value
- Comparative measures of performance
- Investment Appraisal Methods
- Project Selection Criteria
- Conclusions

Petrochemical Innovations, Challenges & Future Trends

- What are the drivers for innovations in Petrochemicals
- Innovations in Petrochemicals – Hi Tech
- Innovations to Meet Market Demand – MTO
- Emergence of Bio-feedstock's
- How the unique properties of petrochemicals cater to the different industries
- **What are the refining challenges, future trends, and risks involved in petrochemicals**




FUNDAMENTALS OF THE FERTILIZERS BUSINESS

UETMT- REF- 181

Program Duration: 2 days

INTRODUCTION

Understanding the basic concepts of the fertilizer market and its trade will help you make better informed business decisions.

Attending this course will provide you with a professional forum to learn about the key fundamentals that drive the fertilizer business and understand the key concepts that will help you to work effectively in the industry. The content delivered in this course uses IFA statistics and other data.

This course is offered by ICIS, with the participation of IFA, and includes a video presentation by IFA on the fertilizer market short term outlook.

PROGRAM BENEFITS
Benefits to you and your company:

- The course will help you make better informed business decisions by covering the basic concepts of the fertilizer market and its trade.
- Join this professional forum to learn about the key fundamentals that drive the fertilizer business and understand the key concepts that will help you to work effectively in the industry.

PROGRAM OVERVIEW

By the end of the course, you will learn about:

- **The Fertilizer Production Tree:** The links between different commodities: urea and other nitrogen products, ammonia, phosphates (DAP, MAP, TSP, phosphate rock, NPKs), sulphur and potash
- **The use of main Commodities:** Analysis of main commodities and their uses for agriculture/crop production and industrial purposes, plus key prices and trade terms
- **Fertilizer Supply:** Supply analysis for main fertilizer commodities covering major producing and exporting countries and trade flows
- **Fertilizer Demand:** Demand analysis for each product covering major import countries and volumes
- **Main Players:** Analysis of different players in the trading business for each product including producers, traders and importers
- **Production Costs:** Impact on trade and profitability
- **Shipping:** Basic principles of shipping for ammonia and dry bulk fertilizers
- **Basic Hedging and Financial Principles:** Basic aspects of hedging, including major financial products, and its influence on physical trade

TARGET COMPETENCIES

- Fertilizer Production Tree
- Fertilizer Supply

Hands on Practice

You will put into practice some of the learning, working in groups with the help of the workshop leaders and addressing some basic questions/exercises. You will also have the opportunity to interact with your colleagues from different companies and functions, helping you to build network of industry contacts.

WHO SHOULD ATTEND

The course is suited to a range of professionals, including but not limited to:

- People who have recently joined fertilizer commercial divisions, financial companies and any other companies that work in association with or support the fertilizer industry
- People who work in other functions within fertilizer companies and need to understand the basics of the business
- Senior managers who have moved from other divisions or returned to the fertilizer division after a period of absence

PROGRAM CONTENT
Day 1
General introduction to the industry

- Fertilizer basics and fertilizer drivers
- Fertilizer production tree – Raw materials and finished products
- The use of fertilizers in agriculture/crop production and in industrial production
- Pricing and trade terms

Raw materials section 1 - Ammonia

- Production and Trade
- Main export and import regions, main players
- Key prices, key factors and price mechanisms

Raw Materials Section 2 - Potash

- Supply and major producing countries
- Demand and major import countries
- Key pricing regions

Raw Materials Section 3 - Sulphur and Sulphuric acid

- Production and Trade, main players
- Demand, main buying regions
- Trade and Key prices
- Q&A time for additional discussion, although we will leave time for questions during and after each session

Finished Products session 1 - Urea and other nitrogen products

- Description of various nitrogen products
- Urea production and trade, main players
- Urea demand, main importing regions, main buyers
- Key prices
- Q&A time for additional discussion, although we will leave time for questions during and after each session

Finished Products Session 2 – Phosphate Products

- Description of various phosphate products
- DAP main producing regions
- DAP key import markets
- Pricing key drivers
- Q&A time for additional discussion, although we will leave time for questions during and after each session
- Networking evening – Wine bar to be named - Optional and at delegate expenses

Day 2
Production Costs - Integer UK

- Raw materials versus finished fertilizers
- Impact on trade and profitably
- Comparison between main fertilizer companies

Fertilizer Social Media – Networking tools - IFA

- What does the fertilizer industry use for networking purposes and to share good standards of practice?
- Q&A time for additional discussion, although we will leave time for questions during and after each session

Shipping – Clarkson UK

- Basic principles
- Ammonia shipping
- Dry bulk fertilizer shipping
- Q&A time for additional discussion, although we will leave time for questions during and after each session

Hedging and financial mechanisms - Direct Hedge

- Basic principles
- Major financial products
- Impact on physical trade
- Interactive sessions and basic exercises
- End of program, presentation of certificates

For more details on Refinery & Petrochemicals Training Programs
Kindly send e-mail to sherine@uetmt.ae / admin@uegdx.ae
"or" visit our Website: www.uetmt.ae



UNITED EASTERN
TECHNICAL & MANAGEMENT TRAINING

Liberty Tower, Khalifa Street,
P.O.Box: 7615, Abu Dhabi-UAE
Tel : +971 2 627 2737
Fax : +971 2 627 0048
E-mail: admin@uegdx.ae

Al Salemiyah Tower, 1003,
P.O.Box: 8670, Dubai-UAE
Tel : +971 4 221 9911
Fax : +971 4 222 6642
E-mail: sherine@uetmt.ae



ABU DHABI | DUBAI | KUWAIT | OMAN | EGYPT