CORE CONCEPT

# Advanced Oil and Gas Processing, Refining and Petrochemical Technology Course

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## Introduction:

Advanced oil and gas processing, refining and petrochemical technology is a 1-week course for process, operations, technical support and planning engineers in gas plants, refineries and petrochemical complexes, ending with a Process Unit Performance and Integration Improvement Plan. Units are often run and optimised in isolation, so margin is lost at the interfaces between gas plants, refinery conversion units and petrochemical crackers. Nominees already monitor or troubleshoot process units, and teaching is by case study on crude assays, unit data sheets and heat and material balances. CoreConcept Training Center delivers this advanced processing and refining course.

## Course Objectives:

- Assess gas plant performance across separation, amine sweetening, glycol dehydration, NGL recovery and sulphur recovery
- Interpret crude assays and distillation data to predict yields and product quality from atmospheric and vacuum units
- Analyse the operation of hydrotreating, fluid catalytic cracking, hydrocracking, catalytic reforming and alkylation units against targets
- Evaluate integration options between refinery streams and petrochemical feedstocks for steam cracking and aromatics
- Identify energy and margin improvements using pinch analysis, product blending and linear-programming planning
- Produce a Process Unit Performance and Integration Improvement Plan with prioritised, costed actions

## Target Audience:

- Process engineers responsible for unit design reviews, performance monitoring and debottlenecking
- Operations engineers responsible for running gas plant, refinery or petrochemical units to target
- Technical support engineers responsible for troubleshooting, catalyst performance and test runs
- Planning and economics engineers responsible for crude selection, blending and margin optimisation
- Energy and utilities engineers responsible for heat integration and fuel consumption

## Course Outline:

### Day 1: Hydrocarbon Value Chain and Gas Processing

- Crude Oil and Natural Gas Characterisation for Plant Design
- Three-Phase Separation and Stabilisation Unit Performance Review
- Amine Gas Sweetening Unit Operation and Solvent Management
- Glycol Dehydration and Turbo-Expander NGL Recovery Performance
- Claus Sulphur Recovery Efficiency and Tail Gas Treatment

### Day 2: Refinery Configuration and Primary Separation

- Crude Assay Interpretation for Yield and Quality Prediction
- Atmospheric and Vacuum Distillation Cut Point Optimisation
- Nelson Complexity Index Comparison of Refinery Configurations
- ASTM D86 Distillation and Fuel Specification Test Methods
- Desalting and Preheat Train Fouling Performance Assessment

### Day 3: Conversion and Treating Units in Daily Operation

- Hydrotreating and Hydrodesulphurisation for Ultra-Low-Sulphur Fuels
- Fluid Catalytic Cracking Heat Balance and Catalyst Management
- Hydrocracking Conversion, Catalyst Cycle and Product Selectivity
- Catalytic Reforming, Isomerisation and Alkylation Octane Management
- Delayed Coking Operation and Residue Upgrading Choices

### Day 4: Petrochemical Integration, Energy and Margin Optimisation

- Ethane and Naphtha Steam Cracking Feed Selection
- BTX Aromatics Recovery and Refinery Stream Integration
- Polyethylene and Polypropylene Feedstock Quality Requirements
- Pinch Analysis and Heat Integration Across Process Units
- Linear-Programming Planning Models for Blending and Margin

### Day 5: Case Study Work and the Improvement Plan

- Gas Plant Case Study on Sweetening and NGL Losses
- Refinery Case Study on Conversion Unit Constraint Removal
- Integration Case Study Linking Refinery Streams to Crackers
- Energy Saving and Margin Option Ranking Exercise
- Process Unit Performance and Integration Improvement Plan Completion

## Skills You Will Gain:

- Gas Plant Performance Analysis
- Crude Assay Interpretation
- Conversion Unit Troubleshooting
- Catalyst Performance Monitoring
- Refinery-Petrochemical Integration
- Heat Integration
- Margin Optimisation
- Debottlenecking Assessment

## Why Attend This Course:

- Deliver a Process Unit Performance and Integration Improvement Plan to the technical services manager and the plant management team
- Decide which unit constraints, cut point changes or stream transfers to pursue first based on margin and energy impact
- Avoid off-specification product, catalyst damage and energy losses caused by running units without regard to their interfaces
- Share the crude assay, heat integration and blending methods used in the case studies with process and planning colleagues

## Conclusion:

Back at work, the participant gives the Process Unit Performance and Integration Improvement Plan to the technical services manager, the planning team and the heads of operations for the gas plant, refinery and petrochemical units. They use it to decide which debottlenecking, energy and integration actions to fund and test first. After the first test runs, the organisation should compare yields, energy use and unit margin with the baseline in the plan and drop or rework actions that did not deliver.

## Frequently Asked Questions FAQ:

### What should participants know before an advanced oil and gas processing and refining course?

Participants should already work as engineers on gas plant, refinery or petrochemical units and understand basic mass and energy balances. Bringing anonymised unit data, a crude assay or a recent test run report helps them apply the case studies to their own plant.

## How does an advanced oil and gas processing and refining course differ from a refining fundamentals course?

This course assumes participants already know how each unit works and focuses on troubleshooting, optimisation and integration across gas plants, refineries and petrochemical units. Fundamentals courses introduce the processes and terminology for newcomers or non-technical staff.

## Why does refinery and petrochemical integration matter in oil and gas processing?

Integration lets naphtha, LPG, aromatics and off-gases move to the unit where they earn the most, instead of being sold or burned at low value. Plants that plan streams together usually gain margin and use energy better than plants optimised unit by unit.

## What do participants take back from the advanced oil and gas processing and refining course?

Participants take back a Process Unit Performance and Integration Improvement Plan with unit baselines, identified constraints, energy and margin options and ranked actions, along with the assay, heat integration and blending methods practised during the course.