

## Course Content



**Title:** Crude Oil Distillation

**Potential PDH:** 24      **Code:** BTT043

### Description:

Crude distillation is the first process in the refining sequence and is vital to the profitability of refinery operations. This importance has grown with the advent of cleaner fuels. This program has been developed to provide an in-depth yet practical review of the art and science of crude distillation. Consistently maintaining smooth operation, capacity and product quality are critically important goals that can be difficult to achieve. Many complex process, equipment, and reliability issues have to be balanced to optimize run-length, capacity, and quality. With the many variables involved, constant adjustments are required.

The program's content is both comprehensive and wide-ranging. Sessions begin with a discussion of fundamentals, including process objectives, crude oil characterization, products, process flow sequences, heat integration, desalting, and major equipment design. Attendees will gain an understanding of how process requirements, equipment operation, and economic objectives interact. Once the fundamentals are established, the session moves into the topics of operation, control, troubleshooting, and revamps. The program speaker is Mr. Andrew Sloley, a Principal Engineer at CH2M Hill in Bellingham, Washington.

### Outline:

#### Introduction and Process Objectives

- Feed and Products
- Importance to Refinery Operations
- General Process Sequences
- Major Equipment
- Heat Integration

#### Crude Properties

- Crude Types
- Crude Oil Characterization
- Heavy Oil Fractions

#### Crude Unit Products

- Lights Ends
- Naphthas
- Kerosene and Jet Fuel
- Diesel
- Gas Oils
- Residues

#### Process Flow Sequences

- Topping and Simple Units
- Conventional Atmospheric-Vacuum
- Preflash Columns and Drums
- Gas Oil Columns
- Vacuum Columns
- Diesel Recovery Options

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- Naphtha-Kerosene Recovery Options
- Heat Integration and Exchangers
  - Heat Exchanger Networks
  - Heat Train Limitations
  - Cold Versus Hot Train Duties
  - Split Trains
  - Pinch Analysis
  - Exchanger Design
  - Typical Operating Conditions and Performance
- Desalting
  - Corrosion, Fouling, Contaminants
  - Single Versus Two-Stage
  - Operation
  - Salt Content and Removal Efficiency
- Fired Heaters
  - Heater Types
  - Operating Limits
  - Heat Flux
  - Steam Injection
- Atmospheric Distillation
  - Process
  - Equipment
  - Overhead Systems
  - Metallurgy
- Vacuum Distillation
  - Process
  - Equipment
  - Vacuum Systems
  - Metallurgy
- Control, Monitoring, Troubleshooting
  - Daily Monitoring
  - Control Options
  - Troubleshooting Common Problems
    - Poor Separations
    - Heat Removal and Heat Input
    - Entrainment – Black Products
    - Foaming
    - Hydraulics
- Revamps
  - Revamp Strategies
  - Defining Unit Performance
  - Discovering Opportunities
  - Future Directions: Energy Efficiency and Climate Change
- Current Topics
  - Light Crudes and Tight Oils
  - Diesel Recovery
  - Condensate Splitting

**Instructor:**

Andrew W. Sloley is an independent consultant with over 40 years of experience in the hydrocarbon processing industry. His specialty in this area has been on product separation, distillation, and heat integration including process design, equipment design, troubleshooting, control analysis, training, and operations optimization. This has covered the range from crude and heavy oils to cryogenic systems for light-ends recovery and gas treating. His other responsibilities have included technology analysis and economic evaluation. Andrew has authored or co-authored over 400 publications in these areas. He is currently a contributing editor on equipment and plant design for Chemical Processing magazine. He has a B.S. degree in Chemical Engineering from the University of Tulsa and is a licensed professional engineer in Texas. His experience in over 100 crude units has covered the entire range of crude blending, process configuration, optimization, equipment design, control, and troubleshooting issues for all types of crude units. Specific experience in steam cracking covers all parts of the plant from furnaces and hot-ends through the cold-ends section including refrigeration systems.