

<p>KLM Technology Group</p> <p>Practical Engineering Guidelines for Processing Plant Solutions</p>	<div>The logo for KLM Technology Group, featuring the letters 'KLM' in red and 'Technology Group' in blue, enclosed in a grey rectangular border.</div> <p>Engineering Solutions Consulting, Guidelines, and Training</p> <p>www.klmtechgroup.com</p>	<p>Page 1 of 10</p> <p>Rev 1.0</p>
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Optimizing Petroleum Refining Fluidized Catalytic Cracking (FCC) Unit Training Course

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 are an investment in future success - give yourself and your employees the keys to success

It is strategically important that your team understands the fundamentals of process unit operations concepts. This is the difference between being in the best quartile of operational ability and being in the last quartile. There is vast difference in the operational ability of operating companies and most benchmarking studies have confirmed this gap in operational abilities.

Whether you have a team of new or seasoned employees, an introduction or review of these concepts are very beneficial in closing the gap if you are not in the best quartile or maintaining a leadership position. Most studies show that a continuous reinforcement of best practices in operational principles is the most effective way to obtain the desired results. Training and learning should be an ongoing continuous lifelong goal.

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Course Objective

This course will guide the participants to develop key concepts and techniques for optimizing petroleum refining FCC unit operations. These key concepts can be utilized to make operating decisions that can improve your unit's performance.

Many aspects of petroleum refining operations management can be improved including, product recoveries, purities and energy utilization, and safety. This cannot be achieved without first an understanding of basic fundamental principles of design and operation. These principles need to be understood in advance of operating and troubleshooting a process unit operation for the manager or problem solving to be effective.

This seminar focuses on the core building blocks of the petroleum refining FCC process systems, equipment, and economics. This program will emphasize the refining process unit operation fundamentals, safe utilization of these fundamentals by operations, engineering, maintenance, and support personnel.

Course Duration and Delivery

Typical course duration is 3 to 5 days based on the background of the participants. One of our Senior Technical Professional with over 25 years of experience would lead the class. Instruction can be in house or in an online webinar.

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There are many aspects of operational optimization. Partial list may include;

1. Safety
2. Reliability – Continuity of Operations
3. Quality
4. Cost
5. People Development

1. Safety

Safety is the number one concern. No project or operation can be classified as optimized or best unless it is done safely. Many Studies show a strong culture of safety awareness also has economic benefits as well as the social and humane benefits.

2. Reliability - Continuity of Operations

A stable reliable plant is the largest revenue source. A reliable plant that has high cost will make generate more revenue than a low cost plant that has multiple outages. The on stream factor is a benchmark of reliability. Industry average is 97%, but the top quartile approaches 100%. This three percent increased production is a significant difference in revenue.

3. Quality

Quality has two aspects. The first is the external aspect. To develop and maintain the reputation of producing quality products will allow you to charge a premium during the economic up turns and be able to maintain your key customers in a downturn.

The second is the internal aspect. There is an added cost of non-quality production. Sometime the product can be reprocessed, with an added energy debit. If the product cannot be reprocessed it will need to be sold with a cost debit.

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4. Cost

Cost control is a particularly important aspect of operational optimization. The two largest costs are feedstock and energy. An exceedingly small feedstock reduction can lead to an exceptionally large profit improvement. The industry averages three percent energy improvement per year. The top quartile will improve more than 3%.

5. People Development

Most people might rate this higher than fifth. It is a particularly important aspect of operational excellent, but talent can be acquired for a price. The best plan is to hire talented people, train them well, pay them well, and retain them, but few companies seem to be capable of accomplishing this task. People Development will ensure that items one through four are optimized.

Outline

Introduction

- Overview of the Chemical Processing Industry

Review of Process Incidents

- Safety for the Chemical Processing Industry

Fundamentals of Petroleum Chemistry

- Description of a Hydrocarbon Molecule
- Types of Hydrocarbon Molecules
- Definition and Function of a Catalyst

Introduction to Petrochemical Key Concepts

- Unit Operations
- Process Flow Diagrams
- Mass Balance
- Troubleshooting

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

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Overview of a Refinery

- Refinery Flow Sheet
- Gasoline Processing Options
- Bottoms Heavy Oil Processing Options
- Alkylation
- Hydrotreating
- Reforming
- Gas Sweetening
- Sulfur Recovery
- FCC

Overview of FCC Fundamentals

- FCC Typical Flow Sheet
- FCC Pressure Balance
- FCC Process Fundamentals

Overview of FCC Chemistry and Heat / Material Balance

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

Overview of FCC Variable Effects

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

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Process Equipment Overview

- FCCU Configurations; Hardware Modifications
- Riser/Reactor/Fractionator Design Principles
- Recovery Side Operating Guidelines
- Cyclone Design Operation
- Air Blower Operation
- Quench Tower Overview

Overview of Cracking of Heavy Feedstocks and Resids

- Characterization of Heavy Feeds and Resids
- Effects on Yields & Operating Conditions
- Effect of Carbon and Metals
- Metals Passivation in FCC

Overview of Fluidization Fundamentals for FCC

- Basics of FCC Fluidization
- Flow in Standpipes

Overview of FCC Catalyst Technology

- Zeolite Cracking Catalysts
- Catalyst Composition and Selectivity Effects
- FCC Catalyst and Additive Fundamentals
- Catalyst Selection and Testing

Overview of FCC Catalyst Evaluation

- Analytical Characterization
- Performance Testing
- Impact of Catalyst Properties on FCCU Operation
- Understanding Equilibrium Catalyst Data

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Overview of Review of Recent FCC Technology Developments

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

Process Equipment Troubleshooting

- Troubleshooting concepts and techniques
- Typical Problems
- Interaction of Process and Equipment
- Tower Scan Case Study
- Tower Inspection Case Study
- FCC Reactor/Regenerator Troubleshooting
- Quench Tower Troubleshooting

Plant Reliability

- Introduction to Plant Reliability
- Equipment Design for improved Reliability
- FCC Operating and Reliability Issues

Quality

- Introduction to Quality
- Overview of Statistical Process Control

Cost Control

- Introduction to Cost Control
- Feedstock
- Energy
- Develop Key Performance Indicators
- Managing Projects

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People Development

- People Development
- Team Building
- Training

Who Should Attend:

- People who are making day to day decisions regarding operation, design, and economics of processing plants;
 1. 1st Line Operations personnel,
 2. Operation Supervisors,
 3. 1st Line Maintenance personnel,
 4. Maintenance Supervisors,
 5. Senior Plant Supervisors,
 6. Operations Engineers
 7. Process Support Engineers,
 8. Design Engineers,
 9. Cost Engineers
- Ideal for veterans and those with only a few years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject matter

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What you can expect to gain:

- A detailed overview of refinery FCC operations, processes, and economics
- Gain an understanding of the equipment of a refinery FCC
- Gain an understanding of the refinery FCC flow sheets
- Gain an understanding of refinery FCC chemistry and catalyst
- Gain an understating of refinery margins
- Troubleshooting Techniques
- Gain an insight to optimization strategies