Advanced Fluid Catalytic Cracking (FCC) Operations Training Course

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Sharm El-Sheikh

4100 € (Per Person)

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Course Introduction / Overview:

The Fluid Catalytic Cracking (FCC) unit is the heart of the modern refinery, critical for converting heavy crude oil fractions into high-value gasoline and other lighter products. This comprehensive training course provides an in-depth exploration of FCC unit operations, from fundamental principles to advanced troubleshooting and optimization strategies. Participants will gain a robust understanding of the complex interplay between process chemistry, catalyst science, and mechanical design that governs unit performance. Drawing on established industry knowledge, such as the principles outlined in Reza Sadeghbeigi's "Fluid Catalytic Cracking Handbook," this program bridges theoretical concepts with practical, real-world applications. BIG BEN Training Center has designed this course to empower professionals with the skills needed to enhance unit reliability, maximize profitability, and ensure safe and environmentally compliant operations. This journey covers everything from reactor and regenerator dynamics to catalyst management and advanced process control, equipping attendees to tackle the operational challenges of today and prepare for the technological advancements of tomorrow.

Target Audience / This training course is suitable for:

- Process Engineers.
- Refinery Operators and Senior Operators.
- FCC Unit Supervisors and Superintendents.
- Chemical Engineers involved in refinery operations.
- Technical Service and Support Professionals.
- Refinery Production Planners.
- Inspection and Reliability Engineers.
- Research and Development Scientists.

Target Sectors and Industries:

- Oil and Gas Refining.
- Petrochemical Manufacturing.
- Chemical Processing Industries.
- Energy Sector.
- Engineering, Procurement, and Construction (EPC) Companies.
- Technology Licensing and Catalyst Manufacturing Companies.
- Governmental bodies and environmental regulatory agencies.

Target Organizations Departments:

- Refinery Operations.
- Process Engineering.
- Technical Services.
- Maintenance and Reliability.
- Research and Development (R&D).
- Health, Safety, and Environment (HSE).
- Production Planning and Economics.

Course Offerings:

By the end of this course, the participants will have able to:

- Analyze the fundamental principles of FCC chemistry, thermodynamics, and catalysis.
- Master the operational control and monitoring of the reactor-regenerator system.
- Develop effective strategies for FCC catalyst selection, management, and optimization.
- Identify and troubleshoot common FCC unit operational problems with confidence.
- Evaluate the impact of various feedstocks on unit performance and product yields.
- Implement process control strategies to enhance unit stability and profitability.
- Understand the key safety procedures and environmental regulations related to FCC units.
- Optimize FCC unit performance for propylene maximization and octane enhancement.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to foster a dynamic and engaging learning environment that goes beyond traditional lectures. This course utilizes a blended approach, combining expert-led instruction with interactive learning modules. Participants will benefit from detailed presentations on core FCC concepts, which are reinforced through collaborative group discussions and brainstorming sessions. A significant portion of the training is dedicated to analyzing real-world case studies, allowing attendees to apply theoretical knowledge to solve practical operational problems. Interactive workshops and problem-solving exercises will challenge participants to think critically and develop effective troubleshooting skills. The methodology encourages active participation, with continuous opportunities for Q&A sessions and peer-to-peer knowledge sharing. This immersive approach ensures that participants not only grasp the technical details of FCC operations but also develop the practical competence to implement these skills effectively in their workplace, driving tangible improvements in unit performance and safety.

Course Agenda (Course Units):

Unit One: Fundamentals of the Fluid Catalytic Cracking Process

- Introduction to the role of the FCC unit in a modern refinery.
- A historical overview of FCC technology development.
- Fundamental principles of catalytic cracking chemistry and reactions.
- Understanding FCC catalysts, additives, and their functions.
- Key process variables and their impact on product yields and quality.
- An overview of different FCC technology designs and licensors.
- Feedstock characterization and its effect on unit operation.

Unit Two: The FCC Reactor-Regenerator System

- Detailed analysis of the riser and reactor design and operation.
- Understanding the function and design of the regenerator.
- Principles of catalyst circulation and standpipe hydrodynamics.
- The role and design of cyclone systems for catalyst recovery.
- Main fractionator and gas concentration unit operations.
- Heat balance management across the reactor-regenerator circuit.
- Metallurgy and materials selection for FCC equipment.

Unit three: Catalyst Management and Feedstock Impact

- FCC catalyst properties, testing, and performance evaluation.
- Strategies for fresh catalyst selection and loading.
- Managing equilibrium catalyst (E-cat) properties and activity.
- Understanding catalyst deactivation mechanisms and solutions.
- The role and application of various catalyst additives.
- Processing challenging feedstocks like resid and heavy oils.
- Impact of feedstock contaminants on catalyst and unit performance.

Unit Four: Unit Operations, Control, and Troubleshooting

- Routine monitoring of FCC unit performance parameters.
- Advanced process control (APC) strategies for optimization.
- Startup, shutdown, and emergency procedures for the FCC unit.
- Troubleshooting common operational problems in the reactor section.
- Diagnosing and resolving issues within the regenerator and flue gas system.
- Addressing problems in the main fractionator and downstream units.
- Utilizing process data and simulation for problem-solving.

Unit Five: Optimization, Safety, and Environmental Compliance

- Strategies for maximizing gasoline yield and octane.
- Techniques for increasing propylene and light olefin production.
- Energy efficiency and heat integration optimization.
- Process safety management (PSM) specific to the FCC unit.
- Managing emissions and environmental compliance (SOx, NOx, Particulates).
- Future trends in FCC technology, including processing bio-feeds.
- Turnaround planning and execution for FCC units.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

Considering the global energy transition, how might the role and design of the FCC unit evolve to process bio-feeds and recycled plastics, and what new operational challenges would this introduce?

What unique qualities does this course offer compared to other courses?

This course distinguishes itself by offering a holistic and deeply practical perspective on Fluid Catalytic Cracking operations, moving beyond standard textbook theory. While many programs focus solely on the chemical engineering principles, this training emphasizes the critical link between theory and on-the-ground operational reality. It is structured to build a comprehensive understanding, starting from the fundamental chemistry and progressing to complex, real-world troubleshooting and optimization scenarios. The curriculum is enriched with insights drawn from decades of industry practice, focusing on the subtle nuances of process control and catalyst management that determine a unit's profitability and reliability. Rather than just presenting information, the course is designed to cultivate critical thinking skills through the extensive use of case studies based on actual plant events. This allows participants to diagnose failures, evaluate solutions, and understand the economic and safety implications of their decisions in a controlled learning environment. The focus is on empowering attendees with the practical wisdom and confidence to manage one of the most complex and vital units in the refinery.