FCC Unit Optimization and Process Control Training Course

30 Nov - 04 Dec 2026

Cape town

4600 € (Per Person)

Ref: #ACE8836_296315

Course Introduction / Overview:

The Fluid Catalytic Cracking (FCC) unit is the cornerstone of modern refineries, pivotal for converting heavy crude oil fractions into high-value products like gasoline and propylene. Mastering its operation, control, and optimization is essential for maximizing refinery profitability and maintaining a competitive edge. This comprehensive course from BIG BEN Training Center provides an in-depth exploration of the entire FCC process, from fundamental principles to advanced optimization strategies. Participants will gain a robust understanding of the complex interplay between catalyst, feedstock, and operating conditions. Drawing on established industry knowledge, such as the principles outlined in Reza Sadeghbeigi's seminal work, "Fluid Catalytic Cracking Handbook," this program bridges theory with practical application. It is designed to equip engineers, operators, and technical staff with the skills to enhance unit performance, troubleshoot operational issues effectively, and implement advanced process control schemes. By focusing on real-world challenges and solutions, this training ensures that attendees can immediately apply their learning to improve yield, energy efficiency, and operational stability within their own FCC units, driving significant economic and safety benefits for their organizations.

Target Audience / This training course is suitable for:

- Process Engineers.
- FCC Unit Operators and Supervisors.
- Control Room and Field Operators.
- Refinery Operations Managers.
- Process Control and Instrumentation Engineers.
- Technical Service Professionals.
- Refinery Planners and Economists.
- Research and Development Scientists.
- Maintenance and Reliability Engineers.

Target Sectors and Industries:

- Oil and Gas Refining.
- Petrochemicals and Chemicals Manufacturing.
- Engineering, Procurement, and Construction (EPC) Companies.
- Technology Licensing and Catalyst Manufacturing Companies.
- Energy Consulting and Advisory Services.
- Governmental Regulatory Bodies and Environmental Agencies.

Target Organizations Departments:

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

Course Offerings:

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

- Analyze the fundamental principles and chemistry of the fluid catalytic cracking process.
- Identify the critical functions of the reactor, regenerator, and catalyst circulation systems.
- Evaluate the impact of feedstock quality and operating variables on product yields and quality.
- Implement effective control strategies for key process loops within the FCC unit.
- Troubleshoot common operational problems and develop systematic solutions.
- Apply advanced process control (APC) concepts to optimize unit performance.
- Develop strategies to maximize the production of valuable products like gasoline and light olefins.
- Enhance energy efficiency and minimize environmental impact from FCC operations.
- Contribute to FCC unit turnaround planning and revamp projects.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to foster a dynamic and engaging learning environment that maximizes knowledge retention and practical application. This course moves beyond traditional lectures by integrating a blend of interactive learning techniques. Participants will benefit from detailed presentations grounded in engineering principles, supplemented by real-world case studies that illustrate both successful optimization projects and challenging operational scenarios. Facilitated group discussions and collaborative problem-solving workshops will encourage attendees to share their experiences and learn from their peers. Interactive sessions will focus on analyzing process data, diagnosing operational upsets, and formulating control strategies. Practical exercises and simulations will provide a hands-on feel for the cause-and-effect relationships within an FCC unit. Our expert instructors provide continuous feedback and guidance, ensuring that complex concepts are thoroughly understood. This participant-centered approach ensures that every individual leaves with not only theoretical knowledge but also the confidence and practical skills to drive performance improvements in their workplace.

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.
- Overview of FCC process chemistry and reaction mechanisms.
- Detailed analysis of feedstocks and their characterization.
- Properties and functions of FCC catalysts and additives.
- Process flow diagram and major equipment overview.
- The function of the reactor, riser, and termination devices.
- The role of the regenerator in catalyst activity restoration.

Unit Two: FCC Unit Operation and Key Process Variables

- Understanding the reactor and regenerator heat balance.
- Controlling the catalyst circulation rate and its impact.
- Managing key operating variables such as riser outlet temperature.
- The effect of pressure, steam, and catalyst-to-oil ratio.
- Main fractionator operation and product separation.
- Wet gas compressor and gas concentration unit operations.
- Monitoring and controlling product yields and quality.

Unit Three: Process Control and Instrumentation for the FCC Unit

- Fundamentals of process control in the FCC context.
- Control strategies for the reactor and regenerator sections.
- Pressure balance and differential pressure control loops.
- Main fractionator temperature and level control.
- Instrumentation for critical process measurements.
- Introduction to advanced process control (APC) and its benefits.
- Model predictive control (MPC) applications in the FCC unit.

Unit Four: FCC Unit Optimization and Troubleshooting

- Strategies for maximizing gasoline and diesel yield.
- Techniques for increasing light olefin production (propylene and butylene).
- Energy efficiency improvement and heat integration.
- Troubleshooting common operational problems and upsets.
- Managing catalyst losses and emissions control.
- Addressing afterburning and temperature excursions in the regenerator.
- Systematic root cause analysis for operational issues.

Unit Five: Safety, Reliability, and Future Trends

- Process safety management (PSM) specific to the FCC unit.
- Managing hazards associated with high temperatures and catalysts.
- Environmental regulations and emissions monitoring (SOx, NOx, CO).
- FCC unit turnaround planning and execution best practices.
- Metallurgy, corrosion, and erosion considerations.
- Introduction to Residue Fluid Catalytic Cracking (RFCC).
- Future trends in FCC technology, catalysts, and integration with petrochemicals.

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:

As the global energy transition accelerates and demand shifts from transportation fuels to petrochemical feedstocks, how must the design, operation, and optimization philosophy of the FCC unit evolve to remain a central pillar of refinery profitability?

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

This course distinguishes itself by offering a holistic and deeply practical perspective on FCC unit optimization and control. While many programs focus narrowly on either process theory or control systems, this training integrates these domains to reflect the interconnected reality of refinery operations. We emphasize the cause-and-effect relationships between process variables, control loop responses, and overall unit profitability. The curriculum is built upon a foundation of fundamental engineering principles but is delivered with a constant focus on real-world application. Instead of just presenting textbook solutions, our expert instructors guide participants through complex, multi-faceted case studies drawn from actual plant operations, fostering critical thinking and advanced troubleshooting skills. The content moves beyond basic operations to explore advanced process control, energy management, and strategies for adapting the FCC unit to shifting market demands, such as maximizing propylene for petrochemical integration. This forward-looking approach ensures that participants are equipped not only to solve today's problems but also to anticipate and address the challenges of tomorrow's refining landscape.