

# FLUID CATALYTIC CRACKING DETAILED PLANT ANALYSIS

## OBJECTIVES

To give participants a **thorough technical understanding** of the operation of FCC units and to explain them how it can be optimized.

On completion of the course, the participants:

- know the physical and chemical phenomena related to the FCC catalyst and its use (fluidization, circulation activity, regeneration, poisons, ...),
- understand the main FCC operating issues around the catalytic section through typical calculations of the material, heat and pressure balances, and are initiated to interpret the effect of the operating parameters,
- master the operation of the FCC unit in fluidized bed and the main operating guidelines (of their own FCC, if course customized).

*This course can be tailored to the customer's FCC unit, on request, on a confidential basis.*

## COURSE CONTENT

### MAIN FLUID CATALYTIC CRACKING PROCESSES 0.5 day

Conventional processes and comparison between various technologies.  
Recent developments: new design for residue conversion or propylene production.

### CHARACTERISTICS OF FCC FEEDSTOCKS 0.5 day

Origins and physical properties.  
Chemical composition and impurities (sulfur, nitrogen metals i.e. Ni, V).  
Routine quality controls and impact of the cracking results.  
Catalytic hydrotreatment of feedstocks and benefits for cracking.

### CHEMICAL TRANSFORMATIONS AND FCC CATALYSTS 1 day

FCC reactions and effect on feedstocks; consequences on products.  
Coke formation and parameters impacting it.  
FCC catalysts: composition, acid properties of zeolites, interpretation of microactivity test results.

### FCC PRODUCTS 1.5 days

Average yields and composition of cuts, propylene separation.  
End-use properties: gasoline octane number, cetane number and stability of LCO.  
Purification treatment of gases, LPG, olefins and gasolines: typical schemes and new trends.

### ANALYSIS OF INDUSTRIAL FCC UNIT OPERATING CONDITIONS 3.5 days

Material balance - Sulfur balance.  
Conversion and adjusted conversion.  
Fluidization phenomenon - Measuring levels and catalyst inventory.  
Calculation of coke production.  
Thermal balance - Calculation of catalyst circulation.  
Pressure balance: survey of operating parameters, slide value  $\Delta P$  monitoring and safety and environment protection.  
Flue gas line: heat recovery; dust separation.

### CRACKING PROCESS OPERATING PARAMETERS 1 day

Severity-conversion-yield relationship  
Influence of the operating parameters governing cracking severity: temperature, pressure, equilibrium catalyst properties, cat-rate, feedstock characteristics, ...  
Impact of the main parameters influencing the coke yield.

### REGENERATOR OPERATION 0.5 day

Analysis of coke combustion conditions in the regenerator.  
Partial combustion phenomena and related operation strategy.  
Total combustion operation and use of CO promoters.

### CATALYTIC SECTION OPERATION 1.5 days

Control systems - Safety systems.  
Operation case studies: change in feed characteristics and in cracking conditions; optimizing unit operating conditions in terms of material constraints (coke combustion capability, regenerator temperature, gas production, catalyst loss, ...).  
Shut-down - Start-up - Troubleshooting.

*Der Vortrag über dieses Thema kann auch auf Deutsch gehalten werden.*

### ▲ Who should attend?

Operators, panel operators, supervisors and graduate engineers working on catalytic cracking units and personnel from refineries, research centers and oil and engineering companies concerned by different aspects of the operation of this type of unit.

### ▲ Duration

**10 days**

### ▲ Dates & Location

**Non-scheduled**

**May only be organized for a single company**

### ▲ Tuition Fees

**To be agreed upon**

### ▲ Course Coordinator

**Jean-Pierre Baumann**

Ref. **PTF / FCCDPA**