

▲ Who should attend?

**Graduate engineers and technical staff** from the refining and petrochemical industry.  
**Process engineers** and people in charge of process control

▲ Duration

5 days

▲ Dates & Location

May 11-15, 2009  
Rueil-Malmaison

▲ Tuition fees

€ excl. tax 2,440

▲ Lecturers from

• IFP Training

Ref. **PSE / DSS-E**

# DISTILLATION

## Operation and troubleshooting

### OBJECTIVES

To provide a broader understanding of the **operational behavior** of industrial distillation columns and of optimization strategies.

On completion of the course, the participants:

- know the essential parameters and profiles to analyze qualitatively the operation of a continuous distillation column
- have got the concepts necessary to optimize the operation of a column
- know the **performances and the limits of the different control systems**
- have an increased knowledge of the potential origins of the troubles and of the means how to detect it.

### COURSE CONTENT

#### OPERATING PARAMETERS: DEFINITION AND SIGNIFICATION 0.5 day

Material balance of the virtual column: cut point, separation quality and separating power concept.

Column pressure: pressure control and pressure profile along the column.

Heat balance. Reflux and reboiling ratio and selectivity evaluation.

Flow rates, concentration and temperature profiles. Concentration peaks.

#### SEPARATING POWER OF AN INDUSTRIAL DISTILLATION 0.5 day

Impact of the parameters related to the separating power:

Liquid-vapor **flow rates, reflux and reboiling ratio**

Number of **theoretical stages** and internal equipment efficiency

Position of feedstock inlet related to feed characteristics.

Separating power and decrease of **energy consumption**.

*Each item is illustrated by means of handlings performed by the trainees themselves with binary columns.*

#### PROCESS CONTROL PARAMETERS 3 days

*The simulator scenario covers the different aspects of operation and control of columns. It starts with a simple control system and successively brings into play more and more sophisticated control systems on increasingly complex columns such as a depropanizer, a debutanizer, and a multiple draw-off column (crude oil distillation).*

Survey of operating disturbances; origins and causes.

Process control strategy and optimization targets.

External or internal reflux control, reboiling control by means of flowrates or duty.

Material balance control: **sensitive tray, temperature control systems**.

Optimization of the heat balance: additional energy through the feed or the reboiler, **low pressure operation**.

Implementation of control systems based on quality measurement.

Analysis of **disturbances caused by the feed and systems for feed forward control**.

Specific case of draw-off columns.

Implementation of process control in multi-column trains.

Control of the **multiple draw-off** columns: quality tuning through material balance (temperature flow rate or level control).

Heat balance and optimization of **pumparounds and vaporizing refluxes**.

#### EQUIPMENT TECHNOLOGY AND TROUBLESHOOTING 1 day

Trays: technology, functioning; high efficiency trays, performances and flexibility.

Packings and distribution systems: flooding, fouling, mechanical damages and remedies.

Reboilers and condensers: implementation and functioning, various possibilities of control, troubles and related origins, possible remedies.

*The lecture uses a dynamic simulator based on the analytical modelling of the main physical phenomena involved in the distillation process. It makes the learning process very efficient in as much each participant performs many personal handlings with the virtual columns.*