

**Production of high purity 1-Butene**

**AXENS ALPHABUTOL™**

**OPERATIONS TRAINING**

**Objective:** To provide in-depth knowledge of the **ALPHABUTOL™** process and particularly the customer's unit. By the end of the course, the participants will have:

- A general understanding of the significance of the unit within the refinery scheme
- A broad technical understanding of the catalyst and the chemical reactions involved in the process
- A solid knowledge of the Process Flow Diagram and equipment
- A thorough knowledge of operating conditions and their impact on performance
- A good overview of the start-up and shutdown activities  
(NB: a detailed review of procedures is not included in the course).
- A working knowledge of the main troubleshooting actions

**Duration:** The training course lasts 4 days. The duration can be tailored to the participants' level of understanding.

**Attendance:** This course is targeted to unit process engineers, unit technical managers, shift leaders, and board men. Suitably qualified or experienced outside operators may attend to enhance their process knowledge.

**Program:** The program below may be modified due to specific customer requirements, subject to an agreement between the customer and AXENS.

### Day 1

#### 1. Introduction

- Supply/demand situation
- Market trends
- Environmental regulation
- Focus on the unit in its context

#### 2. Process Achievements

- General information
- Feed characteristics
- Unit duty
- Products' specifications
- Material Balance

#### 3. Chemical Reactions

- Chemistry and catalysis basics
- Feed chemical composition
- Chemical reactions
- Catalysts
- Catalyst contaminants

### Day 2

#### 4. Process Description

- Process Flow Diagrams
- Piping & Instrumentation Diagrams
- Main equipment (Drawings, pictures and functions)
- Catalyst and chemicals loading procedures

#### 5. Start up Preparation

- Pre-commissioning operations
- Commissioning Operation:
  - Unit drying
  - Unit washing
  - Unit emptying
  - Pump calibration procedure
  - Catalyst and chemicals loading procedures

### Day 3

#### 6. Main Start up Operations

- Detailed description of the steps involved in introducing fresh feed:
  - > Passivation procedure
  - > Unit filling up
  - > Reactive feed instruction
  - > Operating conditions adjustment
  - > Capacity increase

#### 7. Normal Operation and Operating Parameters

- Summary of main operating conditions
- Operating variables
- Adjustment of operating conditions
- Analytical control

### Day 4

#### 8. Shutdown and Restart

- Planned shut-down
- Normal restart

#### 9. Troubleshooting

- Typical causes and resolution of product quality incidents
- Operational disturbances

#### 10. Emergency Situation Description

- Emergency procedures
- Interlock loops

#### 11. Catalyst Special Procedures

- Loop switching
- Changeover of vaporizers
- Equipment washing
- Networks

#### 12. Health, Safety and Environment

#### 13. Quiz