

<p style="text-align: center;"><b>KLM</b> <b>Technology Group</b></p> <p style="text-align: center;">Practical Engineering Guidelines for Processing Plant Solutions</p>	<div style="text-align: center;">  <p><b>Engineering Solutions</b> <b>Consulting, Guidelines, and Training</b></p> <p><a href="http://www.klmtechgroup.com">www.klmtechgroup.com</a></p> </div>	<p style="text-align: center;">Page 1 of 7</p> <p style="text-align: center;">Rev 1.0</p>
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## **Advanced Ethylene Unit Operations and Troubleshooting Training Course**

### **Course Objective**

This course will guide the participants to develop key concepts and techniques to operate and troubleshoot key Ethylene fundamental unit operation systems. These key concepts can be utilized to make operating decisions that can improve your unit's performance.

Since day-to-day operation problem solving and optimizing are critical to the profitability of plant operations, troubleshooting is a prime responsibility of plant operations, maintenance, and engineering personnel. The importance of troubleshooting has grown as plants push to operate at higher and higher throughput levels. Lost profits due to unsolved unit problems can never be recovered.

The program's content is both comprehensive and wide-ranging. The sessions begin with a discussion of the fundamentals, including process objectives, equipment behavior, interaction of the process and equipment, and troubleshooting techniques. Once the fundamentals are established the session moves into the topics of troubleshooting techniques, analysis, and problem solving.

Program participants will have the opportunity to obtain a broad working knowledge of troubleshooting principles and practice, to gain insight into both traditional and advanced techniques, and to interact with others working in plants. The program is ideal for personnel involved in plant troubleshooting, process engineering, plant operations, and technical services. Process personnel from operating, design, and construction companies, as well as others providing services to the petroleum and petrochemical industries, should also find this program beneficial.

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### **Course Duration and Delivery**

Typical course duration is 3 to 5 days based on the background of the participants. One of our Senior Technical Professional with over 25 years of experience would lead the class. Instruction can be in house or in an online seminar.

### **Syllabus**

1. Introduction
  - Overview of the Processing Industry
  - Chemistry of the Processing Industry
  - Safety for the Operation and Maintenance Groups
  
2. Introduction to Troubleshooting
  - Typical Equipment Problems
  - Integration of Process, Equipment and People
  - Troubleshooting Techniques
  - Troubleshooting Tools

### 3. Ethylene Overview

- Typical Ethylene Flowsheets
- Comparison of Flow Schemes
- Ethylene Process Variables
- Ethylene Economics

### 4. Ethylene Furnaces

- Overview of Ethylene Furnace
  - Historical Development
  - Design Constraints
  - Comparison of Current Designs
  - Furnace Run lengths
  - Anti-Coking
  - Future Opportunities
- Economics – Excess Air Control, Flame Pattern
- Trouble Shooting
  - Convection Bowing
  - Insulation
  - External transition designs
- Case Study
- Maintenance Guidelines
- Safety

## 5. Boilers and Steam Systems

- Overview of Boilers and Steam Systems
  - Boiler Film
- Safe Commissioning of Boilers and Steam Systems
- Design of Boilers
- Burner Management Systems
- Economics–Excess Air Control, Demin Water and Condensate
- Trouble Shooting
- Case Studies
  - Boiler Commissioning Safety Case Study
- Maintenance Guidelines
- Safety

## 7. Ethylene Distillation

- Overview of Distillation Equipment
- Safe Commissioning of Distillation Equipment
- Design of Distillation Equipment
- Economics – Reflux Optimization, Reboiler Optimization, Tray Efficiency
- Trouble Shooting
- Case Studies
- Maintenance Guidelines – Tray verses Packing
- Safety

## 8. Flaring Systems

- Overview of Flaring Systems
- Safe Commissioning of Flare Equipment
- Design of Flaring Systems
- Economics – Process Optimization and Integration
- Trouble Shooting
  - High Delta P
- Case Study
  - Low Embrittlement Case Study
  - Hot Tapping
- Maintenance Guidelines
- Safety

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### **Who Should Attend:**

- People who are making day to day decisions regarding operation and economics of processing plants;
  1. 1<sup>st</sup> Line Operations personnel,
  2. Operation Supervisors,
  3. 1<sup>st</sup> Line Maintenance personnel,
  4. Maintenance Supervisors,
  5. Senior Plant Supervisors,
  6. Operations Engineers
  7. Process Support Engineers,
  8. Design Engineers,
  9. Cost Engineers.
- Ideal for veterans and those with only a few years of experience who want to review or broaden their understanding in Processing Plant Operations.
- Other professionals who desire a better understanding of subject

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**What You Can Expect to Gain;**

- The Ethylene Unit Equipment Fundamentals – how each system functions from a hands on viewpoint
- Safe commissioning and utilization of process equipment
- Maintenance Guidelines
- Process furnace concepts and application
- Distillation concepts and troubleshooting
- Ethylene, Furnace and Distillation Case Studies
- Troubleshooting Concepts