

<p><b>KLM Technology Group</b></p> <p>Practical Engineering Guidelines for Processing Plant Solutions</p>	<table border="1"><tr><td></td><td><b>Technology Group</b></td></tr></table> <p><b>Engineering Solutions</b></p> <p><a href="http://www.klmtechgroup.com">www.klmtechgroup.com</a></p>		<b>Technology Group</b>	<p>Page 1 of 7</p> <p>Rev 3.2</p>
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# **Introduction to Distillation Operation, Control, and Troubleshooting Training Course for Operations Personnel**

## **Introduction**

The success of every company depends of each employee's understanding of the business's key components. Employee training and development will unlock the companies' profitability and reliability. When people, processes, and technology work together as a team developing practical solutions, companies can maximize profitability and assets in a sustainable manner.

Distillation is the most common separation technique and is energy intensive. Distillation can consume more than 50% of a process plant's operating energy cost. A way to improve an existing plant's operating cost or to reduce a new distillation system's operating cost is to improve the efficiency and operations by the correct process optimization and control.

It is strategically important that your operations team understands the fundamentals of process unit operations concepts. This is the difference between being in the best quartile of operational ability and being in the last quartile. There is vast difference in the operational ability of operating companies and most benchmarking studies have confirmed this gap in operational abilities.

Whether you have a team of new or seasoned employees, an introduction or review of these concepts is greatly beneficial in closing the gap if you are not in the best quartile or maintaining a leadership position. Most studies show that a continuous reinforcement of best practices in operational principles is the most effective way to obtain the desired results. Training and learning should be an ongoing continuous lifelong goal.

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## **Course Objective**

This course will guide the participants to develop key concepts and techniques to operate and troubleshoot a distillation system. These key concepts can be utilized to make operating decisions. Training and development are an investment in future success - give yourself and your employees the keys to success.

Product recoveries, purities and energy utilization can be improved in most distillation systems. This cannot be achieved without first an understanding of distillation operation principles. These principles need to be understood in advance of operating and troubleshooting a distillation column for the operator or problem solver to be effective.

This course is an introductory course for these topics – for an advanced course consider attending our Advanced Training Course for these topics.

## **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 webinar.

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## Course Syllabus

The goal of the course would be to refresh the knowledge of those who have a basic understanding of distillation and to build a foundation to those who are new to the distillation.

### Typical Course Outline

#### A. General Introduction

##### 1. General Column Design

- The components of a distillation system, more than just a tower – it is a system of different components
- History of distillation
- Different types of distillation columns
- Differences among batch, flash, and multistage distillation process
- Relative advantages of tray and packed columns
- Steps in the process design

#### B. Distillation Equipment

##### 1. Tray Column Equipment

- The major design differences between tray types
- The operational limits for trays – operating window

##### 2. Packed Column Equipment

- The different types of packing and their characteristics
- The best type of packing for a given system

##### 3. Optimizing Columns for improved operation and maintenance

##### 4. Conducting a High Load Test

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### C. Process Control

1. Distillation Column Control
  - Functions of Process Control
  - Characteristics of a Continuous Process
  - Select appropriate composition and column pressure control schemes
  - Process settings during column operation
2. Typical controlled and manipulated process variables
  - Level
  - Pressure
  - Composition
  - Temperature
  - Flow
3. Controller Performance Criteria
4. Feed Forward Control of an Ideal Process
  - Feedback and Feed forward Control Loops

### D Commissioning

1. Tower Pre Commissioning Guidelines
2. Tower Start Up Guidelines
  - Common startup problems and understand how to correct them
3. Tower Shut Down Guidelines

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F. Troubleshooting

1. Introduction to Troubleshooting
  - Evaluate operation of a packed column
  - Evaluate operation of a tray column
  - Use tools to diagnosis problems
2. Installation Issues
  - Common column installation mistakes
  - List tasks to insure a proper installation

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## What You Can Expect To Gain;

- The operation, control and trouble shooting of a distillation column and its associated equipment,
- An overview of distillation, practical solutions as well as theory
- An understating of essential distillation concepts,
- Valuable practical insights for trouble free design and field proven techniques for commissioning, start up and shutdown of distillation operation.
- The fundamental knowledge of distillation control.
- To tailor your approach to specific design, analysis and troubleshooting problems.

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## Who Should Attend

- People who are making day to day decisions regarding operation, maintenance, and economics of process industry 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
- This course has been designed for operations personnel who may or may not have a technical degree. The course will review the fundamentals of design but will focus more on the practical application of these fundamentals. Key distillation inspection, troubleshooting and commissioning guidelines will be reviewed.
- Ideal for veterans and those with only a few years of experience who want to review or broaden their understanding of distillation. This course would be a very practical overview for fresh graduate engineers.
- Other professionals who desire a better understanding of the subject matter.