

**Distillation Operation, Control, Design  
and Troubleshooting Course****Training Date:** 02 - 06 July, 2012**Training Venue:** Kuala Lumpur, Malaysia**Training Time:** 0900 – 1600 hours**Training Fee:** USD3,500.00 per participant**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 correct equipment selection, 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 very 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 on going continuous life long goal.

**COURSE OBJECTIVE**

This course will guide the participant to develop key concepts and techniques to design, operate and troubleshoot a distillation system. These key concepts can be utilized to make design and operating decisions. Training and development is 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 understanding of distillation principles and design. These principles need to be understood in advance of designing, operating and trouble shooting a distillation column for the operator, designer, or problem solving to be effective.

**COURSE OUTCOMES**

At the end of the training, participants will be able to gain:-

- The operation, control and trouble shooting of a distillation columns and it's 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 trouble shooting problems.

# **COURSE OUTLINE**

## **A. General Introduction**

### **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. Thermodynamics and Equilibrium**

### **Vapor Liquid Equilibrium**

- Select the correct vapor-liquid equilibrium equation for your system
- Review vapor pressure and equilibrium diagrams
- Interpret mole fraction equilibrium curves, commonly called y-x diagrams
- Azeotropes and the challenges they create for distillation

### **Stages & Transfer Units Efficiencies**

- Calculate the number of equilibrium stages using short cut methods
- Calculate minimum reflux and stages using graphical & analytical Methods
- Determine number of theoretical stages needed in a distillation column

### **Stage Efficiency**

- Methods for determining efficiency
- Calculate an overall column efficiency for tray columns
- Calculate point and tray efficiencies, and their difference
- Calculate the number and height of transfer units for packing
- Effects on distillation column by changing amount of reflux and reflux temperature
- How flooding and foaming affects efficiencies and capacities

## **C. Column Design**

### **Tray Column Design**

- The major design differences between tray types
- The operational limits for trays – operating window
- Size a distillation column for a given vapor and liquid rate

### **Packed Column Design**

- The different types of packing and their characteristics
- The best type of packing for a given system
- Size a packed column diameter for a given vapor and liquid rate
- Designing columns for fouling service
- Designing columns for vacuum service
- Designing Columns for improved operation and maintenance

## **D. Process Control**

### **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

### **Typical controlled and manipulated process variables**

- Level
- Pressure
- Composition
- Temperature
- Flow

### **Feed Forward Control of an Ideal Process**

- Feedback and Feed forward Control Loops

## **E. Troubleshooting**

### **Introduction**

- Evaluate operation of a packed column
- Evaluate operation of a tray column
- Use tools to diagnosis problems

### **Installation**

- Common column installation mistakes
- List tasks to insure a proper installation

### **Commissioning**

- Common start up problems and understand how to correct them

### **Utilizing Process Engineering Software for troubleshooting.**

## Who Should Attend?

Professionals dealing with all aspects of the Distillation Unit. All engineers involved in the operation and design of Distillation facilities. Any technical personnel wishing to gain an insight into the practical aspects of distillation. Those who are experienced in other fields and seek a review of the fundamentals of Distillation.

## About the Course Instructor

**Engr. Maurice Michel Hanna**, graduated with Bachelor of Science in Petroleum Refining Engineering from Suez Canal University, Egypt and Master Degree in Petroleum Refining and Petrochemical Industry from Petroleum Institute of Romania, and he is a Certified Saudi Aramco Training Specialist.

He has more than 30 years of extensive field experience oil & gas, petrochemical and other process plants, and mainly in project management, design, selection, specification, installation, maintenance, operation, plant optimization and trouble-shooting of oil, water and gas handling facilities in the oil and gas industry. Throughout his professional career he have served for several oil & gas companies such as;

- Process Engineer at El-Nasr Petroleum Company, Alexandria, Egypt.
- Senior Technical Instructor at Saudi Aramco, Saudi Arabia.
- Technical Instructor (On-Job-Training) at Saudi Arabian marketing and Refining (SAMARC), Jeddah - Saudi Arabia.
- Process Advisor at Al-Furat Petroleum Company (AFPC), Shell Joint Venture (Subcontractor: IHRDC), Syria.
- Production Trainer (On-Job-Training) at Abu Dhabi Marine Operating Company (ADMA – OPCO, Subcontractor: IHRDC), United Arab of Emirates.
- Commissioning (Process) Engineer at Middle East Oil Refinery (MEDOR, Subcontractor: TECNIP International), Egypt.
- Production Advisor at Al-Furat Petroleum Company (AFPC) Shell Joint Venture (Subcontractor: TriStar Meddle East), Syria.

## About CfPE Technology Solutions

The **Center for Professional Enhancement Technology Solutions** (known as CfPE Technology Solutions) is incorporated in July 2001 and began as a training and consulting company for power plant, oil & gas and petrochemical sectors in Malaysia.

With a small team of experienced and dedicated engineers and multi skilled technical staff we have come a long way. From those humble beginnings, we have successfully grown and today we have achieved reorganization as a premier in organizing short training in Malaysia. Our professional experience and excellent consulting strengths provide insights and understanding of the challenges facing the industries we serve. CfPE Technology Solutions aims to make a difference.

The need for leading-edge training has intensified and is advancing beyond all expectation; it is the basis upon which performance can be measured in an increasingly competitive marketplace. In the world of today, it is not simply a case of having the necessary professional skills; people must develop interpersonal skills alongside their ability to handle the changes brought about by technological progress. We expect the people who attend our training courses to make an immediate impact, both back at the workplace and in their career and personal development. CfPE Technology Solutions is a training and consulting company dedicated to increasing our client's competitive edge through the improved performance of their human and capital assets.

## SELECTED CUSTOMERS



ارامكو السعودية  
Saudi Aramco



MALAYSIA LNG SDN. BHI

DOLPHIN ENERGY



قطر للبترول  
Qatar Petroleum



QAPCO  
شركة قطر البتروكيماويات  
QATAR PETROCHEMICAL COMPANY



# Registration Form

## Please Send Your Registration to:

<b>Tel:</b>	006.013.2082143	<b>Fax:</b>	006.09.6178443	<b>E-mail</b>	info@cfpets.com
-------------	-----------------	-------------	----------------	---------------	-----------------

## Course Details

<b>Course Name:</b>	Distillation Operation, Control, Design and Troubleshooting Course
---------------------	--------------------------------------------------------------------

<b>Course Fee:</b>	USD 3,500.00 per participant
--------------------	------------------------------

<b>Course Date:</b>	02 - 06 July, 2012
---------------------	--------------------

<b>Venue:</b>	Kuala Lumpur, Malaysia
---------------	------------------------

## Company Information

<b>Organization</b>	
---------------------	--

<b>Address</b>	
----------------	--

### HR / Training Manager

<b>Name :</b>	
---------------	--

<b>Tel no.:</b>	
-----------------	--

<b>Fax no.:</b>	
-----------------	--

<b>E-mail :</b>	
-----------------	--

### Invoice to be sent to

## Participant Information

### Participant # 1

### Participant # 2

### Participant # 3

<b>Full Name :</b>			
--------------------	--	--	--

<b>Job Title :</b>			
--------------------	--	--	--

<b>Department :</b>			
---------------------	--	--	--

<b>Telephone No. :</b>			
------------------------	--	--	--

<b>Mobile No. :</b>			
---------------------	--	--	--

<b>Fax No. :</b>			
------------------	--	--	--

<b>E-mail Address :</b>			
-------------------------	--	--	--

## Please Pay by Telegraphic Transfer to:

<b>Account Name :</b>	CFPE TECHNOLOGY SOLUTIONS
-----------------------	---------------------------

<b>Account No. :</b>	563064120047
----------------------	--------------

<b>Bank Name :</b>	Maybank Islamic Berhad
--------------------	------------------------

<b>Branch Name &amp; Address :</b>	Malayan Banking Berhad – CPI, JALAN AIR JERNIH, KUALA TERENGGANU, TERENGGANU, MALAYSIA.
------------------------------------	-----------------------------------------------------------------------------------------

<b>SwiftCode :</b>	MBBEMYKL
--------------------	----------

## CFPE TECHNOLOGY SOLUTIONS

Lot 1196, Jalan Mawar 8, Taman Permint Jaya, 21080 Chendering, Kuala Terengganu, Terengganu, MALAYSIA.

Tel.: 006.013.2082143 Fax: 006.09.6178443

Website: [www.cfpets.com](http://www.cfpets.com) Email: [info@cfpets.com](mailto:info@cfpets.com)