

<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 Storage Tank Design, Operation and Troubleshooting for Operations Personnel**

### **Introduction**

The success of every company depends of each employee's understanding of the key business 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. Training and development are an investment in future success - give yourself and your employees the keys to success.

It is strategically important that your operations group understands the fundamentals of process tank design, operations and troubleshooting 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, understand the design and troubleshoot Storage Tank Systems. These key concepts can be utilized to make decisions that can improve your unit's performance.

This course will help;

1. Provide an appreciation of the fundamentals design requirements for storage tanks from an operations view.
2. Understand best operating practices. Develop good tank farm management skills. Have in-depth knowledge of operations & management of oil and oil product terminals
3. Appreciate how correct product blending can minimize quality giveaway, add value, and improve Tank Farm Operations and Performance. Enhance your understanding of correct sampling and custody transfer / Bill of Lading
4. Technical skills advancement and knowledge to comprehend and carry out how vapor emissions and recovery are carried out
5. Appreciation of the technical, commercial, and environmental aspects of Hydrocarbon storage business
6. Understand the various troubleshooting techniques

## 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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## Outline

The goal of the course would be to refresh the knowledge of those who have a basic understanding of tank farm system operations and to build a foundation to those who are new to process operations. This course is an advanced course for these topics – for a more introduction to these topics consider attending our introduction to storage tank course. The purpose of this seminar is to improve and update the participant’s personal knowledge of Storage Tank Systems and will include:

### 1. Introduction

- Introduction to the Processing Industry
- Safety for the Processing Industry

### 2. Tank Types, Construction & Requirements for Stored Products

- Tank Farms Differences and Purpose
- Tank Design & Engineering considerations, Codes & Standards
  - Crude & Refined Product Storage
  - LNG, LPG, CNG Storage
- Roof Types
  - Fixed, Dome & Cone
  - Floating Roof, Internal / External
  - Suction Levels Fixed / Floating
- Loading Rack Design and Overview
- Estimation and Measurement of Tank Emissions and Losses
- Vapor Recovery Systems
- Facility Siting and Risk Management
- Pipeline thermal relief

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### 3. Tank Terminal Operations

- Tank Farm Layout, Secondary Containment, Bund Walls
- Emergency Response, Handling Oil Spills
- Water Drainage Systems Network and Process Water Treatment
- Ship to Shore Transfers, Ship Loading and Discharge Process
- The of Bill of Lading, Custody Transfer and Administration
- Tank Gauging and Metering, Meter Proving, Stock Loss & Pipeline Transfer Loss
- Sampling and Quality Control
- Blending Equipment
- Tank Product Settling

### 3 Tank Product Properties

- Tank Farm Operations, Planning and Scheduling
- Physical, Chemical & Hazardous Properties of Stored Products
- Effects of Physical & Chemical Properties on Choice of Storage
- Safety and Risk
- Ignition Sources
- Fire Detection, Firefighting & Protection

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#### **4 Terminal Management Issues**

- Comingled Stock & Unpumpables
- Terminal Inventory Control & Inter Tank Transfers
- Changing Tanks Service
- Tank Calibration / Recalibration
- Instrumentation, Flow and Level Measurement
  - Spill and Overfill Control
  - Level Alarms / Independent Level Alarms
- Product Blending and Product Failures
- Release Detection, Response, Reporting and Investigation
- Pipeline transfer loss

#### **4 Maintenance Management Issues**

- Tank Cleaning
- Gas Freeing and Confined Entry
- API 653 Tank Inspection
  - Tank Failure Causes and Prevention
  - Settling
  - Corrosion

#### **5. Storage Equipment Troubleshooting**

- Troubleshooting concepts and techniques
- Typical Problems
- Interaction of Process and Equipment
- Tank Troubleshooting Case Study

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## 6. Auxiliary Equipment

- Pumps
- Control Valves
- Relief Valves / Flame Arresters
- Heaters / Heat Exchangers
- Compressors
- Refrigeration / BOG Systems
- Instrumentation

### What You Can Expect To Gain;

- Overview of the Storage Tank System
- Design Evaluation Techniques
- An understanding of tank / and stored product interaction
- An understanding of essential tanking concepts
- Valuable practical insights for trouble free design and field proven techniques for commissioning, start up and shutdown of storage system operations
- 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, design, maintenance, 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.
- 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.
- 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