


<p style="text-align: center;"><b>KLM Technology Group</b></p> <p>Practical Engineering Guidelines for Processing Plant Solutions</p>		<p style="text-align: right;">Page 1 of 7</p> <p style="text-align: right;">Rev 3.0</p>
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## Operation Excellence & Optimizing Unit Operation In Ammonia Plant of a Fertilizer Complex

### Introduction

The success of every company depends of each employee's understanding of the Key Business Components (KBC) which consists of identification & solution for the following questions;

- |   |                 |   |
|---|-----------------|---|
| 1. Where the money is made in the plant?  | How to maximize | ? |
| 2. Where the money is spent in the plant? | How to minimize | ? |
| 3. Where the money is lost in the plant?  | How to avoid    | ? |

Then followed by best implementation of Key Operation Excellence in the Manufacturing unit. Key Operations Excellence is the method of maximizing a company's profitability without impacting Safety, Reliability & Quality.


Employee training and development will unlock the companies' profitability and reliability because when people, processes and technology work together as a team developing practical solutions, companies can maximize profitability and assets in a sustainable manner, that's why training and people development is an investment in future success, because It give yourself and your employees the keys to success

It is strategically important that your 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 are 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.

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## Course Objective

This course will guide the participants to develop key concepts and techniques for optimizing ammonia plant unit operations. These key concepts can be utilized to make operating decisions that can improve your unit's performance.

Many aspects of operations management can be improved including, Operation excellence, product recoveries, purities and energy utilization, safety & reliability. This cannot be achieved without first an understanding of basic fundamental principles of design and operation. These principles need to be understood in advance of operating and trouble shooting a process unit operation for the manager or problem solving to be effective.

This seminar focuses on the core building blocks of the ammonia plant in fertilizer complex process systems, equipment and economics. This program will emphasize the refining process unit operation fundamentals, safe utilization of these fundamentals by operations, engineering, maintenance and support personnel.

There are many aspects of operational Excellence & Optimization. Partial list may include;


1. Safety
2. Reliability – Continuity of Operations
3. Quality
4. Cost
5. People Development

### 1. Safety

Safety is the number one concern. No project or operation can be classified as optimized or best unless it is done safely. The Center for Chemical Plant Safety (CCPS) has conducted benchmarking studies that show a strong culture of safety awareness also has economic benefits as well as the social and humane benefits.

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## 2. Reliability - Continuity of Operations

A stable reliable plant is the largest revenue source. A reliable plant that has high cost will make generate more revenue than a low cost plant that has multiple outages. The on stream factor is a benchmark of reliability. Industry average is 97%, but the top quartile approaches 100%. This three percent increased production is a significant difference in revenue.

## 3. Quality

Quality has two aspects. The first is the external aspect. To develop and maintain the reputation of producing quality products will allow you to charge a premium during the economic up turns and be able to maintain your key customers in a down turn. The second is the internal aspect. There is an added cost of non quality production. Sometime the product can be reprocessed, with an added energy debit. If the product cannot be reprocessed it will need to be sold with a cost debit.

## 4. Cost


Cost control is a very important aspect of operational optimization. The two largest costs are feedstock and energy. A very small feedstock reduction can lead to a very large profit improvement. The industry averages three percent energy improvement per year. The top quartile will improve more than 3%.

## 5. People Development

Most people might rate this higher than fifth. It is a very important aspect of operational excellent, but talent can be acquired for a price. The best plan is to hire talented people, train them well, pay them well, and retain them, but few companies seem to be capable of accomplishing this task. People Development will insure that items one through four are optimized.

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## Outline

### Introduction

- Overview of the Petrochemical Processing Industry
- Review of Process Incidents
- Safety for the Petrochemical Processing Industry
- Fundamentals of Ammonia plant as a part of Petrochemical industry

### Introduction to Ammonia plant Key Management Concepts to maximize profitability & sustainability


- Key Business Components (KBC) in Ammonia Plant
- Key Operation excellence (KOE) in Ammonia Plant  
(Safety, Reliability, Quality, Cost & Training & people development)
- Process Flow Diagrams
- Mass Balance

### Introduction to Key equipment in Ammonia Plant & how to optimize

- Furnace
- Compressor
- Turbine
- Heat Exchange
- Reactors
- Pumps

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### Overview of an Ammonia Plant

- Unit Flow Sheet
- Desulphurization
- Primary & secondary reformer
- HT & LT shift converter
- CO2 removal system
- Methanation
- Syngas drying
- Compression
- Ammonia synthesis
- Hydrogen Recovery Unit (HRU)

### Plant Reliability

- Introduction to Plant Reliability
- Equipment Design for improved Reliability

### Quality


- Introduction to Quality
- Overview of Statistical Process Control

### Cost Control

- Introduction to Cost Control
- Feedstock
- Energy
- Develop Key Performance Indicators
- Managing Projects

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## People Development

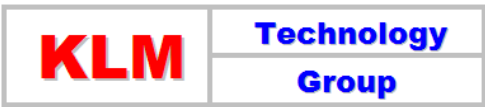
- People Development
- Team Building
- Training

## Who Should Attend:

- People who are making day to day decisions regarding operation, design, 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 matter

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### **What you can expect to gain:**

- An detailed overview of Ammonia plant operations, processes and economics
- Gain an understanding of how to optimize equipment & system in Ammonia plant
- Gain an understanding of the Ammonia plant flow sheets
- Gain an understanding of Ammonia chemistry and catalyst
- Gain an insight to optimization strategies

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