

## Cement kiln Process and Operation



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### ➡ Course Overview

This course has been developed to achieve optimum economy, the kiln system must be in continuous operation for as long a period as possible. By upgrading skills and knowledge of the personnel involved in kiln operation, the effect of internal and external influences on kiln operation can be reduced. This will reduce variations in the plant's capacity utilization and energy consumption which will improve overall plant profitability.

The purpose of the course is to upgrade the skills and knowledge of process engineers and operators in kiln operation.

### ➡ Course Objective

After completing this course participants will have:

- The basic principles of process and design of kiln systems with preheater and Calciner.
- In-depth understanding of the kiln process and equipment.
- Proper process control.
- Their skills in operation control will be improved.
- Hereby increasing the plants' capacity utilization.
- Boost the production rate.
- Become familiar with all types of kiln.
- Become familiar with all types of kiln Coolers.
- Become familiar with all types of refractory.

## ➔ Target Audience

- This course will have a particular focus for people working in the Cement production and process control Engineers, Production supervisors, Production technicians.

## ➔ Course Outline

### Day One

#### **Module (01) Introduction to Process and kiln system.**

- 1.1 Kiln Design Aspects.
- 1.2 Kiln Zones.
- 1.3 Basic principles of operation.
- 1.4 Cyclone construction and functions,
- 1.5 Suspension Preheater Kilns, The function of preheater.
- 1.6 Calciner Design.
- 1.7 Calciner types and function.

#### **Module (02) Kiln Control.**

- 2.1 Heat Transfer in the Kilns and Heat exchange .
- 2.2 flow of gas and materials.
- 2.3 movement of gas and materials in the preheater.
- 2.4 The control parameters in the Kiln, Temperature, Pressure, air flow, fuel flow.
- 2.5 What is the Short circuiting.
- 2.6 Chemical Reactions in the kilns.

### Day Two

#### **Module (03) Circulation Phenomena / Volatile Matter.**

- 3.1 Volatile components.
- 3.2 Volatile circles.

- 3.3 The BY-PASS(Alkalis volatiles) and By-pass gas removal system.
- 3.4 Dust collection system and the function of Pelletizer System.

### **Day Three**

#### **Module (04) Kiln Cooler.**

- 4.1 Clinker Cooler History.
- 4.2 Coolax/CFG Grate cooler.
- 4.3 Reciprocating Grate Coolers,
- 4.4 Latest Technology for Clinker Coolers.
- 4.5 Controlled Impact Section (CIS)Operation of a Clinker Cooler.
- 4.6 Air Blasters at Cooler Inlet, CIS/MFR Style, ABC Inlet (Direct Blast Grate).
- 4.7 SF Cooler System
  - - Mechanical Flow Regulators (MFR).
  - - Crossbar Module.
  - - Water Spray.
  - - Clinker Breaker.
  - - Pan Conveyor.
  - - Crossbar Cooler Replacement Parts

### **Day Four**

#### **Module (05) Combustion Systems and Burners.**

- 5.1 The Basics of Combustion.
- 5.2 Sources for Combustion Air.
- 5.3 Heat Transfer.
- 5.4 Flame Temperature.
- 5.5 Flame Formation.
- 5.6 Duoflex Burner.
  - - Design of Duoflex Burner.
  - - Kiln burner position Initial adjustment.
  - - Ignition Gas Burner.

- - Flame adjustment.
- - Radial & Axial air adjustment.
- - Design of Oil gun.

### **Day Five**

#### **Module (06) Refractories (Bricks and Castables in Preheater, Kiln, Hood and Cooler).**

- 6.1 Types of Refractories and Brick Sizes.
- 6.2 Magnesite Bricks.
- 6.3 Alumina Bricks.
- 6.4 Unshaped Products Monolithic.
- 6.5 Refractories Storage.
- 6.6 Refractories Installation and unshaped refractories installation,
- 6.7 Mechanical problems and its effects on refractory,
- 6.8 Thermal effects.
- 6.9 Chemical effects.
- 6.10 Performance Targeting.
- 6.11 How to select the right refractories types.

#### **Module (07) Kiln operation screens.**

- 7.1 Kiln operation screens.

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