

5-Day Cement Industry Training Course In

PYRO-PROCESS OF CLINKER (SITE VISIT)

Cairo - Egypt, 07 – 11 Sep. 2026

COURSE LEVEL: INTERMEDIATE

COURSE OVERVIEW:

The pyro-process of clinker is the specialized technical sequence that converts mineral raw materials into the hydraulic phases essential for cement. This course defines the specific physical and chemical parameters required to maintain a stable sintering zone and produce clinker with the desired mineralogical fingerprint. It bridges the gap between theoretical thermodynamics and the operational realities of the burner floor.

The scope of this training focuses on the practical observation of the kiln and preheater during live operation to understand material behavior at extreme temperatures. It covers the visual assessment of the flame, the monitoring of clinker granulometry at the cooler discharge, and the inspection of preheater tower components. Furthermore, the course addresses the critical role of the clinker cooler as a heat exchanger that directly impacts the plant's overall energy efficiency.

Coverage includes hands-on modules on the burner floor and the central control room to witness the response of the kiln to operational adjustments. Participants will explore the mechanical components of the kiln drive, the operation of air cannons in the preheater, and the functionality of clinker crushers. Through a detailed site visit, attendees will gain a physical understanding of the massive scale of pyroprocessing equipment and the precision required to manage it.

COURSE OBJECTIVES:

After completion of this course, the participants will be able to:

- Identify the key physical components of a clinker production line.
- Describe the visual characteristics of a stable kiln flame.
- Understand the role of the calciner in the clinkerization process.
- Explain the function of the kiln inlet seal and its maintenance.
- Observe and assess the clinker bed in the grate cooler.
- Understand the operation of high temperature gas sampling probes.
- Identify different types of refractory materials used in the kiln.
- Explain the startup and shutdown sequence for a rotary kiln.
- Recognize the physical signs of kiln ring and coating formation.
- Understand the role of secondary air in the combustion process.
- Inspect the condition of the clinker cooler grates and plates.
- Correlate physical process observations with control room data.

TARGET AUDIENCE:

This course is intended for Junior Process Engineers, Control Room Trainees, Maintenance Technicians, and Production Staff.

TRAINING COURSE METHODOLOGY:

A highly interactive combination of lectures, discussion sessions, and case studies will be employed to maximize the transfer of information, knowledge, and experience. The course will be intensive, practical, and highly interactive. The sessions will start by raising the most relevant questions and motivating everybody to find the right answers. The attendants will also be encouraged to raise more of their questions and to share in developing the right answers using their analysis and experience. There will also be some indoor experiential activities to enhance the learning experience. Course material will be provided in PowerPoint, with necessary animations, learning videos, and general discussions.

The course participants shall be evaluated before, during, and at the end of the course.

COURSE CERTIFICATE:

National Consultant Centre for Training LLC (NCC) will issue an Attendance Certificate to all participants completing a minimum of 80% of the total attendance time requirement.

COURSE OUTLINE / COURSE CONTENT:**MODULE 1: SITE ORIENTATION AND PYRO-PROCESS OVERVIEW**

- General layout of the clinker production line.
- Safety protocols for working near hot kiln equipment.
- Overview of the material flow: From preheater to cooler.
- Identifying the main drive, auxiliary drive, and tires.
- Role of the induced draft (ID) fan in gas movement.

MODULE 2: THE PREHEATER TOWER INSPECTION

- Visual inspection of the cyclone stages and riser ducts.
- Functionality of the material splash plates and flap valves.
- Observation of air cannons and their firing sequences.
- Identifying locations for pressure and temperature sensors.
- Managing the kiln inlet and its importance for process flow.

MODULE 3: CALCINER AND TERTIARY AIR DUCT

- Observing fuel injection points in the calciner.
- Function and inspection of the tertiary air duct (TAD).
- Role of the TAD damper in controlling air distribution.
- Managing the combustion of fuels in the pre-calciner.
- Physical signs of calciner overheating or blockage.

MODULE 4: KILN BURNER AND FLAME MANAGEMENT

- Inspection of the main burner trolley and positioning.
- Understanding the primary air and fuel transport pipes.
- Visual assessment of flame shape, length, and brightness.
- Identifying the sintering zone and clinker formation area.
- Safety procedures for burner floor operations.

MODULE 5: ROTARY KILN MECHANICALS (SITE VISIT)

- Observing the kiln rotation and the function of the tires.
- Inspection of the support rollers and hydraulic thrust rollers.
- Understanding the kiln inlet and outlet seals.
- Monitoring the kiln shell temperature using scanners.
- Signs of mechanical stress: Vibration and lubrication status.

MODULE 6: CLINKER COOLER OPERATION AND COOLING

- Visual inspection of the cooler grates and air chambers.
- Observing the clinker bed and the "Red River" phenomenon.
- Function of the cooling fans and under-grate pressure.
- Identifying the clinker crusher (breaker) and its role.
- Heat recovery: Secondary and Tertiary air extraction points.

MODULE 7: REFRACTORY AND LINING MATERIALS

- Overview of the different types of bricks: Alumina vs. Magnesite.
- Inspection of the kiln coating and its protective role.
- Role of castables in the preheater and cooler housing.
- Identifying areas prone to refractory wear and erosion.
- Maintenance and replacement of refractory during shutdowns.

MODULE 8: GAS ANALYSIS AND EMISSION MONITORING

- Location and operation of the kiln inlet gas probe.
- Monitoring stack emissions: Dust, NOx, SOx, and CO.
- Role of the Selective Non-Catalytic Reduction (SNCR) system.
- Calibration and maintenance of process gas analyzers.
- Understanding the impact of combustion on emission levels.

MODULE 9: THE CENTRAL CONTROL ROOM (CCR) INTERFACE

- Observing the DCS screen and process flow diagrams.
- Correlate field observations with digital trends and alarms.
- Role of the operator in managing the pyro-process balance.
- Key performance indicators (KPIs) for clinker production.
- Emergency stop and safety interlock logic demonstration.

MODULE 10: SITE VISIT REVIEW AND TECHNICAL ASSESSMENT

- Group discussion on the observations made during the visit.
- Troubleshooting exercise based on simulated process upsets.
- Final review of clinker quality and production efficiency.



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YOUR GATE TO HANDS-ON TRAINING

- Safety debriefing and operational best practices.