

5-Day Cement Industry Training Course In

KILN FEED CHAMBER BUILDUP

Dubai - UAE, 15 – 19 June 2026

COURSE LEVEL: INTERMEDIATE

COURSE OVERVIEW:

The kiln feed chamber, or kiln inlet, is the critical interface between the preheater and the rotary kiln, and it is highly susceptible to material build-up. This course defines the chemical and mechanical conditions that cause "Inlet Scaling" and "Meal Rings," which can severely restrict gas flow and material progression. By understanding the volatile cycles of sulfur, chlorine, and alkalis, participants will learn how to stabilize this vital process junction.

The scope of this training includes the study of the kiln inlet temperature profile, the influence of secondary air, and the impact of fuel ash on the stickiness of the raw meal. It covers the mechanical design of the feed shelf, the inlet seal, and the riser duct, identifying how design flaws contribute to build-up. Furthermore, the course addresses the operational trade-offs required to manage build-up while maintaining production targets and clinker quality.

Coverage includes detailed modules on the use of air cannons, high-pressure water cleaning, and chemical mitigation strategies to prevent material adhesion. Participants will explore the safety risks of "Inlet Poking" and the dangers of hot material "flushes" associated with feed chamber obstructions. Attendees will gain the technical proficiency to detect the early signs of build-up through pressure and temperature monitoring, implementing effective interventions to ensure continuous kiln operation.

COURSE OBJECTIVES:

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

- Describe the function and design of the kiln feed chamber and inlet.
- Identify the primary chemical compounds that cause feed chamber build-up.
- Analyze the "Sulfur/Alkali" ratio and its impact on material stickiness.
- Monitor kiln inlet "Negative Pressure" to detect early build-up.
- Understand the role of the "Chlorine Bypass" in reducing inlet scaling.
- Optimize air cannon positioning and timing for the feed chamber.
- Adjust the "Kiln Inlet Temperature" to minimize meal melting.
- Explain the impact of fuel selection on the rate of build-up.
- Identify the mechanical risks of build-up on the kiln inlet seal.
- Execute safe "Manual Cleaning" procedures for the feed shelf.
- Evaluate the effectiveness of "Anti-Sticking" refractory materials.
- Develop a troubleshooting guide for managing chronic inlet blockages.

TARGET AUDIENCE:

This course is intended for Kiln Operators, Process Engineers, Production Supervisors, and Refractory Technicians.

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: ANATOMY OF THE KILN INLET**

- Mechanical components: Riser duct, feed pipe, and inlet chamber.
- Understanding the gas-material counterflow at the inlet.
- Importance of the "Inlet Seal" for preventing false air.
- Material trajectory: From the preheater to the kiln bed.
- Safety hazards in the vicinity of the feed chamber.

MODULE 2: CHEMISTRY OF COATING AND SCALING

- The role of "Volatile Cycles" in build-up formation.
- Formation of Calcium Langbeinite and Spurrite.
- Impact of Chlorine on the "Liquid Phase" at low temperatures.
- Understanding the "Stickiness Temperature" of raw meal.
- Sampling and laboratory analysis of feed chamber scale.

MODULE 3: COMBUSTION IMPACTS ON THE INLET

- Effect of "Reducing Conditions" on sulfur behavior.
- Impact of CO levels at the kiln inlet on coating rates.
- Burner flame length and its influence on inlet temperatures.
- Role of the calciner burner in contributing to inlet build-up.
- Managing fuel ash chemistry to prevent "Sticky" ash.

MODULE 4: PRESSURE AND TEMPERATURE MONITORING

- Interpreting "Kiln Inlet Draft" as a diagnostic tool.
- Using thermocouples to detect temperature "shadows" from build-up.
- Visual monitoring: Using high-temperature cameras and ports.
- Recognizing the DCS "Trends" of a developing blockage.
- Impact of "False Air" on temperature readings.

MODULE 5: MECHANICAL CLEANING AND AIR CANNONS

- Principles of pneumatic "Shock Blasting" with air cannons.
- Strategic placement of nozzles in the feed chamber.
- Maintenance of air cannon internal seals and solenoids.
- High-pressure water jetting: Risks and benefits.
- Automated cleaning cycles vs. manual intervention.

MODULE 6: REFRACTORY SOLUTIONS FOR BUILD-UP

- "Anti-Sticking" refractory: Silicon Carbide (SiC) and Zirconia.
- Impact of refractory porosity on material adhesion.
- Maintenance of the "Feed Shelf" castable.
- Thermal shock risks during cleaning operations.
- Lifecycle analysis of inlet refractory in high-volatile kilns.

MODULE 7: THE ROLE OF THE BYPASS SYSTEM

- Design and purpose of the "Alkali/Chlorine Bypass."
- Impact of bypass "Extraction Rate" on inlet build-up.
- Managing the "Quenching Air" to stabilize gas chemistry.
- Economic and environmental cost of bypass operations.
- Troubleshooting bypass probe blockages.

MODULE 8: OPERATIONAL STRATEGIES FOR MITIGATION

- Adjusting the "Kiln Speed" to clear the feed shelf.
- Managing the "Raw Meal" chemistry (LSF and SR) to reduce stickiness.
- Impact of "Alternative Fuels" on inlet scaling.
- Short-term "Cooling Surges" to break brittle coatings.
- Coordinating with the quarry to manage raw material volatiles.

MODULE 9: INLET SEAL INTEGRITY AND PERFORMANCE

- Types of inlet seals: Graphite, leaf, and pneumatic.
- Impact of "False Air" on kiln stability and fuel use.
- Mechanical wear of the seal due to build-up friction.
- Monitoring seal "Gap" and lubrication requirements.
- Emergency repairs of the inlet seal during operation.

MODULE 10: SAFETY PROTOCOLS FOR INLET CLEANING

- Risks of "Meal Flushes" and thermal burns.
- Personal Protective Equipment (PPE) for "Hot Poking."

- Communication protocols: Field to Control Room.
- Establishing "Danger Zones" during air cannon firing.
- First aid for dust exposure and heat exhaustion.

MODULE 11: CASE STUDIES AND RCA

- Analyzing a "Total Blockage" event and its recovery.
- Root Cause Analysis of recurring "Inlet Rings."
- Comparing build-up rates between different fuel mixes.
- Lessons learned from improper air cannon installation.
- Group exercise: Developing a "Build-up Management" SOP.

MODULE 12: COURSE CONCLUSION AND FINAL EXAM

- Final examination on kiln feed chamber dynamics.
- Review of key prevention and cleaning strategies.
- Summary of chemical and mechanical take-aways.
- Course feedback and closing remarks.