مركز المستشار الوطني للتدريب
National Consultant Centre For Training
YOUR GATE TO HANDS-ON TRAINING

5-Day Cement Industry Training Course
In

UNBLOCKING A CYCLONE

Abu Dhabi - UAE, 21 – 25 Sep. 2026

COURSE LEVEL: INTERMEDIATE

COURSE OVERVIEW:

Cyclone blockages in the preheater tower are high-risk operational emergencies that cause immediate plant shutdowns and significant production losses. This course defines the mechanical and chemical causes of "Plug-ups" and establishes a rigorous protocol for the safe and efficient unblocking of these systems. It provides a critical balance between rapid operational recovery and the stringent safety requirements of handling hot, fluidized material.

The scope of this training involves the technical identification of blockage signs, such as pressure surges and temperature drops in the preheater tower. It covers the maintenance of air cannons, the use of specialized poking tools, and the logic of material aeration. Furthermore, the course addresses the severe hazards of "Hot Meal Splashes" and "Steam Explosions" that can occur during unblocking activities, emphasizing the necessity of Personal Protective Equipment (PPE).

Coverage includes detailed modules on the role of volatile cycles in creating "sticky" material, the impact of "False Air" on buildup formation, and the design of the dip tube and flap valves. Participants will explore the sequential steps for unblocking, from the initial detection in the Central Control Room to the physical intervention at the tower. Through the study of emergency response and preventative maintenance, attendees will gain the skills to minimize downtime and ensure personnel safety.

COURSE OBJECTIVES:

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

- Identify the early warning signs of a cyclone blockage in the DCS.
- Understand the chemical causes of "Sticky" build-ups (Alkali/Sulphur).
- Execute the "Safe Shutdown" procedure following a preheater plug.
- Operate and maintain high-pressure "Air Cannons" effectively.
- Demonstrate the correct use of "Poking Holes" and unblocking tools.
- Implement the "Hot Meal" safety protocols and exclusion zones.
- Understand the function of "Flap Valves" and "Dip Tubes" in blockages.
- Calculate the pressure differentials that indicate a stage blockage.
- Apply "Cardox" or similar carbon dioxide blasting techniques safely.
- Perform a "Root Cause Analysis" (RCA) to prevent recurrence.
- Inspect and repair preheater refractory after an unblocking event.
- Develop a "Standard Operating Procedure" for preheater tower emergencies.

TARGET AUDIENCE:

This course is intended for Preheater Operators, Mechanical Maintenance Teams, Safety Officers, and Production Supervisors.

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: CYCLONE PRINCIPLES AND BLOCKAGE MECHANISMS

- Physics of gas-solid separation in preheater cyclones.
- How "Material Overloading" leads to mechanical plugging.
- Impact of "False Air" on localized cooling and condensation.
- Identifying the "Critical Stages" (Stage 4 and 5) for blockages.
- The role of "Meal Fineness" in material flowability.

MODULE 2: DETECTION AND MONITORING FROM THE CCR

- Interpreting "Pressure Drop" across cyclone stages.
- Analyzing "Cyclone Outlet Temperature" for sudden drops.
- Monitoring the "Kiln Feed" vs. "Clinker Production" balance.
- Role of "Oxygen and CO Analyzers" in predicting build-ups.
- Setting "Low-Flow" and "High-Pressure" alarms in the DCS.

MODULE 3: VOLATILES AND CHEMICAL BUILD-UP

- The role of Alkalis, Sulphur, and Chlorine in "Sticky" meal.
- Formation of "Eutectic Melts" at preheater temperatures.
- Understanding "Scaling" in the riser ducts and cyclone cones.
- Impact of "Alternative Fuels" on preheater coating.
- Chemical analysis of "Blockage Samples" for root cause.

MODULE 4: AIR CANNON TECHNOLOGY AND OPTIMIZATION

- Design and working principle of "Pneumatic Air Cannons."
- Strategic placement of cannons in the preheater tower.
- Managing "Firing Sequences" and "Timer Settings."
- Maintenance of solenoid valves and reservoir tanks.
- Troubleshooting "Failed Firing" and air leaks.

MODULE 5: MECHANICAL DESIGN: FLAP VALVES AND DIP TUBES

- Function and maintenance of "Cyclone Flap Valves" (Counterweights).
- Role of the "Dip Tube" (Vortex Finder) in separation efficiency.
- Identifying "Dip Tube Collapse" as a blockage cause.
- Inspecting "Riser Duct" geometry and splash plates.
- Maintenance of "Expansion Joints" to prevent air ingress.

MODULE 6: EMERGENCY SAFETY AND PERSONAL PROTECTION

- Hazards of "Fluidized Hot Meal": Burn and suffocation risks.
- Required PPE: Heat-resistant suits, face shields, and gaiters.
- Establishing "Exclusion Zones" around poking areas.
- Communication protocols between the Tower and the CCR.
- Managing the "Hot Meal Splash" risk during door opening.

MODULE 7: PHYSICAL UNBLOCKING TECHNIQUES

- Standard "Manual Poking" procedures and safety.
- Use of "Compressed Air Lances" and water-jetting (Risks).
- Introduction to "Cardox" blasting: Safety and efficiency.
- Sequential unblocking: Working from the "Bottom-Up."
- Handling "Flash Steam" explosions in hot cyclones.

MODULE 8: REFRACTORY MANAGEMENT IN THE TOWER

- Impact of mechanical unblocking on cyclone lining.
- Identifying "Refractory Failure" as a cause of blockages.
- Use of "Anti-Sticking" refractory materials (SiC).
- Inspecting "Anchors" and castable integrity after a plug.
- Repair techniques for "Riser Duct" linings.

MODULE 9: POST-BLOCKAGE RECOVERY AND RESTART

- Managing the "Material Surge" into the kiln after unblocking.
- Cleaning the "Kiln Inlet" and "Sump" area.
- Slow-start protocols for the ID fan and kiln drive.
- Stabilizing the "Thermal Profile" of the preheater.
- Documenting the event: Time, location, and cause.

MODULE 10: PREVENTION AND OPERATIONAL EXCELLENCE

- Developing a "Preheater Cleaning Schedule."
- Role of "High-Temperature Cameras" in early detection.

- Optimizing the "Sulphur/Alkali Balance" through the raw mix.
- Training and competency for "Tower Walkers."