5-Day Cement Industry Training Course
In

INCIDENT DIAGNOSIS AND RECOVERY IN THE CEMENT INDUSTRY (SITE VISIT)

Cairo - Egypt, 06 – 10 Apr. 2026

COURSE LEVEL: ADVANCED

COURSE OVERVIEW:

Industrial incidents in a cement plant, whether mechanical failures or process upsets, require a systematic and forensic approach to minimize downtime and prevent recurrence. This course defines the methodologies of Root Cause Analysis (RCA) and the technical diagnostic tools used to evaluate equipment failure and process deviations. By focusing on evidence-based decision making, participants will learn how to transition from reactive firefighting to proactive recovery management.

The scope of this training includes the investigation of major plant events such as kiln shell deformations, mill drive failures, and large-scale preheater blockages. It covers the use of vibration analysis, oil debris monitoring, and DCS trend reconstruction to "re-play" an incident and identify the initiating event. Furthermore, the course addresses the human element of incident management, including communication protocols and the mobilization of emergency maintenance resources.

Coverage includes detailed modules on the "Five Whys" technique, Fishbone diagrams, and the development of "Incident Recovery Plans" that prioritize safety and structural integrity. Through a site visit to previously recovered assets, participants will analyze historical data and physical evidence of past failures to understand the long-term impact of recovery decisions. Attendees will gain the advanced analytical skills required to lead multidisciplinary teams through the diagnosis and restoration of complex cement plant systems.

COURSE OBJECTIVES:

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

- Define the technical difference between a "Symptom" and a "Root Cause."
- Implement a structured Root Cause Analysis (RCA) for any plant incident.
- Use "Failure Mode and Effects Analysis" (FMEA) to predict potential risks.
- Interpret DCS "Post-Mortem" data to reconstruct the sequence of events.
- Analyze mechanical fracture surfaces to identify the type of metal failure.
- Coordinate the "Incident Command" structure during a major plant shutdown.
- Develop a step-by-step recovery plan for a kiln "Red Spot" or "Ring Fall."
- Evaluate the structural integrity of equipment before authorizing a restart.
- Conduct professional "Post-Incident Briefings" for plant management.
- Manage the "Spares and Resources" logistics during an emergency repair.
- Implement "Corrective and Preventive Actions" (CAPA) based on findings.

- Audit the effectiveness of past recovery actions to ensure long-term reliability.

TARGET AUDIENCE:

This course is intended for Plant Managers, Maintenance Managers, Process Engineers, Reliability Engineers, and Senior Shift 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: THE PSYCHOLOGY AND LOGIC OF DIAGNOSIS

- Understanding cognitive bias in incident investigation.
- Transitioning from "Blame Culture" to "Learning Culture."
- Introduction to the Apollo and TapRooT investigation methodologies.
- The role of the "Lead Investigator" in a cement plant.
- Importance of "Preserving the Scene" and evidence collection.

MODULE 2: MECHANICAL FAILURE DIAGNOSIS

- Fatigue, ductile, and brittle fracture identification.
- Analyzing bearing failures: Lubrication vs. Alignment vs. Load.
- Gearbox diagnostics: Interpreting vibration and noise signatures.
- Role of Non-Destructive Testing (NDT) in incident recovery.
- Diagnosis of conveyor belt rips and structural collapses.

MODULE 3: PROCESS INCIDENT RECONSTRUCTION

- Using DCS "Historical Trends" to find the "Point of No Return."
- Interpreting gas analyzer and temperature excursions.
- Reconstructing the kiln "Heat Balance" during an upset.
- Analyzing "Operator Intervention" logs during the event.
- Correlation between raw material changes and process failure.

MODULE 4: ROOT CAUSE ANALYSIS (RCA) TOOLS

- The "Five Whys": Finding the systemic reason for failure.
- Ishikawa (Fishbone) diagrams: Categorizing contributing factors.
- Fault Tree Analysis (FTA) for complex system failures.
- Barrier Analysis: Identifying where the safety system failed.
- Documenting the RCA report for corporate compliance.

MODULE 5: KILN RECOVERY STRATEGIES

- Managing a "Red Spot" event: Cooling protocols and shell checks.
- Recovery after a "Kiln Flush" or major preheater blockage.
- Handling "Kiln Tire" and "Roller" mechanical incidents.
- Refractory failure: Deciding between "Patching" and "Replacement."
- Safe restart procedures for the pyro-processing line.

MODULE 6: MILL AND SEPARATOR RECOVERY

- Diagnosing "Mill Plugging" and internal diaphragm collapse.
- Recovery from a Vertical Roller Mill "Vibration Trip."
- Handling separator drive failures and rotor imbalances.
- Managing "Water Injection" incidents and mill flooding.
- Restarting a mill circuit after a "Full Load" trip.

MODULE 7: ELECTRICAL AND AUTOMATION DIAGNOSTICS

- Diagnosing "Nuisance Trips" in the electrical system.
- Recovery from a "Total Plant Blackout": The Black Start.
- Troubleshooting PLC and Communication "Bus" failures.
- VFD failure diagnosis: Cooling, harmonics, or component age.
- Managing "Software Glitches" and control logic errors.

MODULE 8: STRUCTURAL AND CIVIL INCIDENTS

- Diagnosing cracks and settlement in kiln piers.
- Recovery after a silo "Clogging" or structural failure.
- Managing "Foundation Vibrations" in large process fans.
- Emergency repairs for preheater tower steel structures.
- Inspection protocols for aging industrial buildings.

MODULE 9: HUMAN FACTORS AND EMERGENCY RESPONSE

- Communication protocols during an active plant incident.
- Stress management for operators and field technicians.
- Shift handover requirements during extended recovery.
- Training and competency gaps as root causes of incidents.
- Role of the "Safety Watch" during emergency maintenance.

MODULE 10: SITE VISIT: CASE STUDY REVIEW

- Inspection of a previously repaired kiln shell or mill drive.

- Review of the "Incident File" for a specific plant event.
- Interviewing the recovery team about challenges and lessons.
- Visualizing the "Evidence Trail" in the physical plant.
- Comparison of "Pre-Incident" and "Post-Recovery" performance.

MODULE 11: PREVENTING RECURRENCE (CAPA)

- Developing actionable "Corrective and Preventive Actions."
- Tracking the implementation of RCA recommendations.
- Updating "Standard Operating Procedures" (SOPs) post-incident.
- Sharing "Lessons Learned" across the cement group.
- Role of "Predictive Maintenance" in preventing the next event.

MODULE 12: FINAL ASSESSMENT AND PRESENTATION

- Final exam on diagnosis and recovery techniques.
- Group exercise: Presenting a recovery plan for a simulated incident.
- Course feedback and summary of key methodologies.
- Closing remarks on operational resilience.