5-Day Cement Industry Training Course
In

CEMENT MANUFACTURING (SITE VISIT)

Cairo - Egypt, 14 – 18 Sep. 2026

COURSE LEVEL: BASIC TO INTERMEDIATE

COURSE OVERVIEW:

Cement Manufacturing is a complex industrial process that transforms raw earth materials into the world's most used construction binder. This course defines the end-to-end journey of production, from the initial quarrying of limestone to the final dispatch of bagged and bulk cement. By examining the chemical, thermal, and mechanical stages involved, participants will develop a holistic understanding of how a modern cement plant operates as a synchronized system.

The scope of this training covers the fundamental principles of raw material preparation, pyro-processing in the rotary kiln, and the final grinding of clinker. It highlights the critical importance of energy efficiency, quality control, and environmental sustainability in today's industrial landscape. Furthermore, the course addresses the safety culture required to manage the risks associated with high temperatures, heavy machinery, and large-scale material handling.

Coverage includes the role of modern technology in optimizing production, such as automated laboratories and advanced process control systems. Through an extensive site visit, participants will experience the scale of the operations firsthand, observing the massive equipment and the precision required in the central control room. Attendees will leave with a clear understanding of the cement manufacturing value chain and the technical expertise needed to maintain a competitive and sustainable plant.

COURSE OBJECTIVES:

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

- Outline the main stages of the cement manufacturing process.
- Identify the key raw materials and their chemical contributions.
- Explain the operation of primary and secondary crushers in the quarry.
- Describe the homogenization process and its importance for the kiln.
- Understand the thermal reactions in the preheater tower and calciner.
- Identify the mechanical and chemical zones within the rotary kiln.
- Explain the function of the clinker cooler and heat recovery systems.
- Differentiate between the various types of cement grinding circuits.
- Recognize the importance of quality control at every stage of production.
- List the environmental measures taken to control dust and gas emissions.
- Understand the health and safety risks inherent in a cement plant.
- Appreciate the economic and logistical factors affecting plant performance.

TARGET AUDIENCE:

This course is suitable for New Technical Recruits, Non-Technical Managers, Suppliers to the Cement Industry, Government Regulators, and Graduate Engineers.

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 CEMENT INDUSTRY AND GLOBAL CONTEXT

- History of cement and the development of Portland cement.
- Economic importance of cement in national development.
- Overview of a typical cement plant layout and infrastructure.
- Market trends: from traditional to sustainable cement.
- Key terminology used by industry professionals.

MODULE 2: RAW MATERIALS AND QUARRY OPERATIONS

- Geological prospecting for limestone and additives.
- Blasting, loading, and hauling operations in the quarry.
- Primary crushing and material transport to the plant.
- Managing the "stripping ratio" and quarry life.
- Safety and environmental restoration in mining areas.

MODULE 3: RAW MATERIAL PREPARATION AND STORAGE

- Pre-blending beds: the stacker and reclaimer system.
- Raw meal grinding: Ball mills versus Vertical Roller Mills.
- Drying raw materials using kiln exhaust gases.
- Achieving the target fineness for optimal burnability.
- Storage and homogenization in large concrete silos.

MODULE 4: PYRO-PROCESSING: THE PREHEATER SYSTEM

- Heat exchange principles in the cyclone stages.
- The chemistry of calcination: removing CO2 from limestone.
- The role of the pre-calciner in modern high-capacity kilns.
- Managing pressure and gas velocity in the preheater tower.
- Refractory lining and insulation in the preheater.

MODULE 5: THE ROTARY KILN AND CLINKER FORMATION

- The "Heart of the Plant": Rotary kiln design and mechanics.
- Reaching 1450 degrees Celsius: combustion and the main burner.
- The sintering process and the formation of clinker nodules.
- Monitoring the kiln via shell scanners and pyrometers.
- Operational challenges: rings, balls, and snowmen.

MODULE 6: CLINKER COOLING AND STORAGE

- Thermal efficiency: recovering heat for the secondary air.
- Grate cooler mechanics and the cooling air fans.
- Impact of cooling speed on clinker quality and grindability.
- Transporting clinker to the storage hall or silos.
- Handling dust and "hot spots" in clinker storage.

MODULE 7: CEMENT GRINDING AND FINISHING

- Grinding clinker with gypsum and other additives.
- Closed-circuit grinding: the mill and the separator.
- Cooling the finished cement for storage and packing.
- Types of cement produced: OPC, PPC, and SRC.
- Quality standards and the role of the laboratory.

MODULE 8: PACKING, LOADING, AND DISPATCH

- Bulk loading of cement into tankers and rail cars.
- Automatic bag packing machines and palletizers.
- Managing inventory and warehouse logistics.
- Quality assurance during the dispatch process.
- Safety in the packing plant and transportation zones.

MODULE 9: ENERGY AND UTILITIES MANAGEMENT

- Power consumption in a cement plant: where the energy goes.
- Water management: cooling towers and recycling.
- Compressed air systems for instrumentation and transport.
- Use of alternative fuels to replace coal and oil.
- Waste heat recovery (WHR) systems for power generation.

MODULE 10: ENVIRONMENTAL PROTECTION

- Bag filters and Electrostatic Precipitators (ESP).
- Continuous Emission Monitoring Systems (CEMS).

- Noise reduction and vibration control strategies.
- Managing the "carbon footprint" of cement.
- Regulatory compliance and environmental auditing.

MODULE 11: SITE VISIT: FULL PLANT TOUR

- Walking tour from the raw material storage to the kiln.
- Viewing the cement grinding and packing facilities.
- Visit to the Central Control Room (CCR).
- Observation of the laboratory and quality testing.
- Discussion on safety protocols and plant maintenance.

MODULE 12: COURSE CONCLUSION AND ASSESSMENT

- Summary of the cement manufacturing value chain.
- Final knowledge test and feedback session.
- Career paths and further learning in the industry.
- Closing remarks by the lead trainer.