

COURSE OVERVIEW PE1051 Cement Production & Quality Control

<u>Course Title</u> Cement Production & Quality Control

Course Date/Venue

Session 1: June 22-26, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

Session 2: July 27-31, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

(30 PDHs)

Course Reference

PE1051

Course Duration/Credits Five days/3.0 CEUs/30 PDHs

Course Description









This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

This course is designed to provide participants with a detailed and up-to-date overview of Cement Production & Quality Control. It covers the cement industry; the history and evolution of cement industry; the cement manufacturing process flow, raw materials for cement and raw material preparation; the raw mill and grinding systems; the types of grinding mills, grinding aids and their effects, process control parameters and mill operation and troubleshooting; the sampling and material testing techniques and the preheater and precalciner systems, rotary kiln operations, mineralogy. clinker chemistry and fuel management in cement kilns, coolers and clinker handling.

Further, the course will also discuss the kiln performance monitoring, cement grinding technologies, cement additives and their role and blended cement production; the cement storage and packing, final product testing and quality and control of cement quality; the quality control management system, XRF/XRD in cement industry, physical testing lab setup and statistical process control (SPC).



PE1051 - Page 1 of 9





During this interactive course, participants will learn the root cause analysis in quality deviations, calibration and maintenance of instruments, energy efficiency in cement plants and process optimization techniques; the emission monitoring and control, alternative fuels and raw materials (AFR); troubleshooting of common production issues; the raw mill vibration and blockages, klin rings; and the coating formation, cement strength drop and setting failures, bag house and cooler issues.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on cement production and quality control
- Discuss cement industry covering its history and evolution as well as the cement manufacturing process flow, raw materials for cement and raw material preparation
- Explain raw mill and grinding systems covering the types of grinding mills, grinding aids and their effects, process control parameters and mill operation and troubleshooting
- Carryout sampling and material testing techniques and recognize preheater and precalciner systems, rotary kiln operations, clinker chemistry and mineralogy, fuel management in cement kilns, coolers and clinker handling
- Employ kiln performance monitoring, cement grinding technologies, cement additives and their role and blended cement production
- Discuss the cement storage and packing, final product testing and quality and control of cement quality
- Recognize the quality control management system, XRF/XRD in cement industry, physical testing lab setup and statistical process control (SPC)
- Explain the root cause analysis in quality deviations, calibration and maintenance of instruments, energy efficiency in cement plants and process optimization techniques
- Determine the emission monitoring and control, alternative fuels and raw materials (AFR)
- Troubleshoot common production issues covering the raw mill vibration and blockages, klin rings and coating formation, cement strength drop and setting failures, bag house and cooler issues

Exclusive Smart Training Kit - H-STK[®]



Participants of this course will receive the exclusive "Haward Smart Training Kit" (H-STK[®]). The H-STK[®] consists of a comprehensive set of technical content which includes electronic version of the course materials conveniently saved in a Tablet PC.



PE1051 - Page 2 of 9





Who Should Attend

This course provides an overview of all significant aspects and considerations of cement production and quality control for production engineers, quality control engineers, chemists, process engineers, maintenance engineers, plant operators, supervisors, environmental engineers, safety engineers, technical managers, plant managers, laboratory technicians, process control specialists and other technical staff.

Training Methodology

All our Courses are including Hands-on Practical Sessions using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

30% Lectures20% Practical Workshops & Work Presentations30% Hands-on Practical Exercises & Case Studies20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US\$ 5,500 per Delegate + **VAT**. This rate includes H-STK[®] (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.











Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -



British Accreditation Council (BAC)

Haward Technology is accredited by the British Accreditation Council for Independent Further and Higher Education as an International Centre. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the ANSI/IACET 2018-1 Standard which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET 2018-1 Standard.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking Continuing Education Units (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award 3.0 CEUs (Continuing Education Units) or 30 PDHs (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.



PE1051 - Page 4 of 9





Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Fred Du Plessis is a Senior Project & Management Consultant with over 30 years of extensive experience within the Oil, Gas, Petrochemical, Refinery & Power industries. His expertise widely covers in the areas of Introduction to Cement Production, Cement Raw Materials Basics, Steps in Cement Manufacturing, Kiln Operation Fundamentals, Basics of Clinker Production, Cement Grinding and Packing, Introduction to Quality Control in Cement, Cement Testing Methods Overview, Process Monitoring in Cement Plants and Common Defects in Cement &

their Causes. Further he is also well verse in Leadership for Organizational Change, Leading People & Change, Embracing Innovation Culture, Ethical Leadership in Leadership Development, Leadership Strategies for Business. Employee Engagement, Strategic Leadership Development, Leadership & Conflict Resolution, Risk Assessment & Mitigation Business & Performance Leadership, Leadership & Business Management, Emotional Intelligence, Communication & Presentation Skills, Influencing Skills, Training & Designing a Training Plan, Techniques for Coaching & Mentoring, Executive Coaching, Mentoring & Team Building, Coaching & Counselling, Strategies for Setting Annual Goals, Monitoring Progress and Evaluation Performance, Contract Management & Negotiation, Risk Management, Project Management Essentials, Project Quality Management Techniques, Project Planning & Delegating, Risk, Budgeting & Cost management in Projects, Managing Global Projects, Project Portfolio Management, Project Management, Project Risk Management, Feasibility Studies, Governance, Risk Identification Tools & Techniques, Project Life Cycle, Project Stakeholder & Governance, Project Management Processes, Project Integration Management, Project Management Plan, Project Work Monitoring & Control, Project Scope Management, Strategic Management, Conflict Management, Stakeholder Management, Project Time Management, Project Cost Management, Project Quality Management, Value Engineering, Quality Assurance, Project Human Resource Management and Project Communications Management.

During Mr. Du Plessis's career life, he has gained his practical experience through several significant positions and dedication as the **Project Manager/Owner**, **Maintenance Manager**, **Project Excecution Manager**, **Commissioning & Operating Manager**, **Acting Operating Manager**, **Optimization/Commissioning Manager**, **Operating Support Manager**, **Operating Production/Shift Manager**, **Operations Lead Engineer**, **Electrical Engineer**, **Production/Maintenance Planner**, **Unit Shift Supervisor**, Principal **Plant Operator**, **Workshop & Maintenace Consultant**, Assistant **Electrical Supervisor**, Trainee **Motor Mechanic** and **Senior Instructor/Trainer** from various international **power station** companies like the Dunamis Energy, Peterhead Power Station, Lijaco Services, Eskom, Matla Power Station, Grootvlei Power Station, Ellisras Brick & Ceramic, Hlalisanani Mechanical Contractor, Matimba Power Station, Matimba Power Station, Eskom Kriel Power Station and Transvaal Provincial.

Mr. Du Plessis has a **Bachelor's** (with Honours) degree in **Operations Management**. Further, he holds certification in Red & Silver Seal Accreditation Power Generation – (ESETA), a SAMTRAC & NOSA **Auditor** – (NOSA), a **Certified Instructor/Trainer** and has further delivered various trainings, seminars, conferences, workshops and courses globally.



PE1051 - Page 5 of 9





<u>Course Program</u> The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1	
0730 - 0800	Registration & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	PRE-TEST
	Overview of Cement Industry
0830 - 0930	History & Evolution of Cement • Global & Regional Cement Market Trends •
	Cement Types & Applications • Environmental & Regulatory Considerations
0930 - 0945	Break
	Cement Manufacturing Process Flow
0945 - 1030	Dry & Wet Processes • Process Stages: from Quarry to Final Product •
	Overview of Energy Consumption • Material & Heat Balance Basics
	Raw Materials for Cement
1030 1130	Types of Raw Materials (Limestone, Clay, Additives) • Raw Material Properties
1050 - 1150	Affecting Quality • Chemical Composition & Suitability • Exploration &
	Mining Techniques
	Raw Material Preparation
1130 - 1230	Crushing Systems (Primary, Secondary, Tertiary) • Raw Mix Proportioning &
	Blending • Homogenization Techniques • Pre-Blending Stockpile Systems
1230 - 1245	Break
	Raw Mill & Grinding Systems
1245 - 1335	Types of Grinding Mills (Ball Mill, Vertical Roller Mill) • Grinding Aids &
	their Effects • Process Control Parameters • Mill Operation & Troubleshooting
	Sampling & Material Testing Techniques
1335 - 1420	Sampling Techniques for Raw Materials • Moisture & Size Analysis •
	Chemical Testing Using XRF • Physical Testing for Material Consistency
1420 - 1430	Recap
	Using this Course Overview, the Instructor(s) will Brief Participants about the
	Topics that were Discussed Today and Advise Them of the Topics to be
	Discussed Tomorrow
1430	Lunch & End of Day One

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0730 - 0830	Preheater & Precalciner Systems Cyclone Preheaters: Design & Function • Precalciner Configurations & Fuel Use • Residence Time & Combustion Efficiency • Common Issues & Maintenance Tips
0830 - 0930	Rotary Kiln Operations Kiln Components & Refractory Lining • Clinker Formation Process • Kiln Operation Control Parameters • Emission Control & Kiln Optimization
0930 - 0945	Break
0945 - 1100	<i>Clinker Chemistry & Mineralogy</i> <i>Clinker Phases (C3S, C2S, C3A, C4AF)</i> • <i>Effect of Raw Mix on Phase</i> <i>Formation</i> • <i>Alite & Belite Formation Temperature</i> • <i>Free Lime Control &</i> <i>Implications</i>



PE1051 - Page 6 of 9 PE1051-06-25|Rev.00|20 April 2025





1100 - 1230	Fuel Management in Cement Kilns
	<i>Coal, Petcoke, Alternative Fuels</i> • <i>Fuel Preparation & Handling</i> • <i>Combustion</i>
	Chemistry • Safety & Emissions Aspects
1230 – 1245	Break
	Coolers & Clinker Handling
1245 – 1330	Grate, Rotary & Planetary Coolers • Cooling Rate & Clinker Quality • Heat
	Recovery from Coolers • Clinker Storage & Transportation
1330 - 1420	Kiln Performance Monitoring
	Key Performance Indicators (KPI) • Online Process Monitoring Tools • Root
	Cause Analysis for Process Variations • Maintenance & Inspection Practices
1420 - 1430	Recap
	Using this Course Overview, the Instructor(s) will Brief Participants about the
	Topics that were Discussed Today and Advise Them of the Topics to be
	Discussed Tomorrow
1430	Lunch & End of Day Two

Day 3

0730 - 0830	Cement Grinding Technologies
	Closed & Open Circuit Systems • Roller Press & Ball Mill Comparison •
	Grinding Media & Liner Design • Optimization of Grinding Efficiency
0830 - 0930	Cement Additives & their Role
	<i>Types: Strength Enhancers, Retarders, Accelerators</i> • <i>Effect on Setting Time &</i>
	Workability • Compatibility with Other Admixtures • Dosage & Blending
	Considerations
0930 - 0945	Break
	Blended Cement Production
09/5 - 1100	Pozzolanic Materials (Fly Ash, Slag, Silica Fume) • Benefits & Challenges of
0545 - 1100	Blending • Quality Control for Blended Cements • Performance in Different
	Applications
	Cement Storage & Packing
1100 – 1230	Cement Silos: Design & Aeration Systems • Bulk versus Bag Packing •
	Packing Machine Operation & Maintenance • Dispatch & Logistics
1230 – 1245	Break
	Final Product Testing & Quality
1245 – 1330	Fineness (Blaine & Sieve Analysis) • Setting Time & Soundness • Compressive
	Strength Testing • False Set & Flash Set Issues
	Control of Cement Quality
1330 - 1420	Standard Specifications (ASTM, EN, BS) • Internal versus External Quality
	Audits • Shelf-Life & Re-Testing Protocols • Root Cause Analysis for Quality
	Deviations
1420 – 1430	Recap
	Using this Course Overview, the Instructor(s) will Brief Participants about the
	Topics that were Discussed Today and Advise Them of the Topics to be
	Discussed Tomorrow
1430	Lunch & End of Day Three



PE1051 - Page 7 of 9 PE1051-06-25|Rev.00|20 April 2025





Day 4

0730 - 0830	Quality Control Management System
	<i>QA/QC in Cement Manufacturing</i> • <i>Documentation & Traceability</i> • <i>SOPs &</i>
	Work Instructions • Audits & Corrective Actions
	XRF/XRD in Cement Industry
0830 - 0930	Working Principle & Setup • Sample Preparation Methods • Calibration &
	Standardization • Result Interpretation & Troubleshooting
0930 - 0945	Break
	Physical Testing Lab Setup
0945 – 1100	Standard Lab Equipment (Vicat, Le Chatelier) • Lab Safety & Ergonomics •
	Sample Handling & Curing Procedures • Reporting & Documentation
1100 - 1230	Statistical Process Control (SPC)
	Control Charts & Process Capability • Trends & Variation Analysis • Process
	Improvement Methods • Integration with SCADA & ERP
1230 - 1245	Break
	Root Cause Analysis in Quality Deviations
1245 - 1330	Pareto & Fishbone Diagrams • 5 Whys Technique • CAPA Implementation •
	Lessons Learned System
	Calibration & Maintenance of Instruments
1330 1420	Schedule-Based Calibration Practices • Traceability & Calibration Certificates
1550 - 1420	• Preventive versus Corrective Maintenance • Internal & External Calibration
	Audits
1420 - 1430	Recap
	Using this Course Overview, the Instructor(s) will Brief Participants about the
	Topics that were Discussed Today and Advise Them of the Topics to be
	Discussed Tomorrow
1430	Lunch & End of Day Four

Day 5

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0730 - 0830	
	Heat Recovery Opportunities • Electrical Consumption Reduction • Waste
	Heat Utilization Systems • Energy Audit Strategies
0830 - 0930	Process Optimization Techniques
	Process Simulation & Modeling • Advanced Process Control (APC) • Use of
	AI & Digital Twins • Case Studies of Optimization Success
0930 - 0945	Break
	Emission Monitoring & Control
0945 – 1100	NOx. SOx. CO2 & Dust Emissions • Bag Filters & ESP Systems •
	Continuous Emission Monitoring Sustems (CEMS) • Environmental
	Compliance Strategies
	Alternative Fuelo C Dary Materials (AFD)
1100 – 1230	Alternative Fuels & Kaw Materials (AFK)
	Co-Processing Strategies • Pre-Processing of Alternative Fuels •
	Environmental & Economic Benefits • AFR Impact on Clinker & Emissions
1230 - 1245	Break
1245 - 1315	Troubleshooting Common Production Issues
	Raw Mill Vibration & Blockages • Kiln Rings & Coating Formation • Cement
	Strength Drop & Setting Failures • Bag House & Cooler Issues



PE1051 - Page 8 of 9





1315 - 1345	Cement Industry Trends & Future Outlook
	Carbon Capture Technologies • Green Cement & Geopolymer Alternatives •
	Digital Transformation & Industry 4.0 • Market Demand & Product
	Diversification
1345 - 1400	Course Conclusion
	<i>Using this Course Overview, the Instructor(s) will Brief Participants about the</i>
	Course Topics that were Covered During the Course
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



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PE1051 - Page 9 of 9

