COURSE OVERVIEW PE0092
Blended Cement & Optimization of Grinding Process

Course Title
Blended Cement & Optimization of Grinding Process

Course Date/Venue
August 17-21, 2025/TBA, Sheraton Riyadh Hotel & Towers, Riyadh, KSA

Course Reference
PE0092

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

Course Description

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview on Blended Cement & Optimization of Grinding Process. It covers the classification of blended cement; the advantages over ordinary portland cement; the standards and specifications for blended cement and global trends and applications; the types of supplementary cementitious materials (SCMs); the fly ash types and properties; the ground granulated blast furnace slag (GGBFS); the silica fume and its characteristics; and the natural pozzolans and their applications.

Further, the course will also cover the cement chemistry, hydration reactions of portland cement, influence of SCMs on hydration and effect of hydration on cement performance; the grinding processes and quality control in blended cement production; the variability of raw materials, optimization for specific applications, environmental challenges and sustainability and economic considerations; the properties of SCMs in cement blending, raw material preparation and grinding equipment and systems; the functions of grinding aids and selection of grinding aids for blended cement; and the dosage optimization for efficiency.

During this interactive course, participants will learn the importance of specific surface area (blaine), measurement techniques, effect of particle size distribution on cement properties and the role in achieving desired strength and durability; the impact of SCMs on grinding efficiency; the process diagnostics and audit and energy efficiency in grinding; the temperature control in grinding, optimization of material flow and advanced grinding technologies; testing blended cement properties and the compressive strength testing, setting time and consistency, workability tests for concrete and durability assessment; the cement fineness and its impact and the relationship between fineness and strength, measurement methods and the impact on concrete rheology; the chemical analysis of blended cement and the influence of grinding process on cement properties; the quality assurance in cement plants and the environmental impact of cement grinding; the circular economy in cement manufacturing; and the future of grinding technologies.

Course Objectives

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

- Apply and gain an in-depth knowledge on blended cement and optimization of grinding process
- Classify blended cement and discuss the advantages over ordinary portland cement, standards and specifications for blended cement and global trends and applications
- Identify the types of supplementary cementitious materials (SCMs) covering fly ash types and properties, ground granulated blast furnace slag (GGBFS), silica fume and its characteristics and natural pozzolans and their applications
- Recognize cement chemistry, hydration reactions of portland cement, influence of SCMs on hydration and effect of hydration on cement performance
- Describe grinding processes and apply quality control in blended cement production
- Discuss variability of raw materials, optimization for specific applications, environmental challenges and sustainability and economic considerations
- Recognize the properties of SCMs in cement blending, raw material preparation and grinding equipment and systems
- Identify the functions of grinding aids and apply selection of grinding aids for blended cement and dosage optimization for efficiency
- Discuss the importance of specific surface area (blaine), measurement techniques, effect of particle size distribution on cement properties and the role in achieving desired strength and durability
- Explain the impact of SCMs on grinding efficiency including process diagnostics and audit and energy efficiency in grinding
- Apply temperature control in grinding, optimization of material flow and advanced grinding technologies
- Carryout testing blended cement properties covering compressive strength testing, setting time and consistency, workability tests for concrete and durability assessment

- Discuss cement fineness and its impact including the relationship between fineness and strength, measurement methods and the impact on concrete rheology
- Apply chemical analysis of blended cement and discuss the influence of grinding process on cement properties including quality assurance in cement plants
- Explain the environmental impact of cement grinding, circular economy in cement manufacturing and the future of grinding technologies

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**.*

Who Should Attend

This course provides an overview of all significant aspects and considerations of blended cement and optimization of grinding process for cement plant engineers and technicians, quality control managers, process engineers, research and development specialists, production managers, environmental engineers, consultants and other technical staff.

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.

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% Lectures
20% Practical Workshops & Work Presentations
30% Hands-on Practical Exercises & Case Studies
20% 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 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.

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:

Dr. Hesham Abdou, PhD, MSc, PgDip, BSc, is a **Senior Process & Petroleum Engineer** with **40 years** of integrated experience within the **Oil & Gas** industries. His specialization widely covers in the areas of **Artificial Lift** System, **Artificial Lift** Methods, **Petroleum Economics**, **Petroleum Refinery Processing**, **Refinery** Material Balance Calculation, **Refinery** Gas Treating, **Asset Operational Integrity**, **Drilling** Operations, **Drilling Rig**, **Bits & BHA**, **Mud Pumps, Mud logging** Services, **Wireline & LWD Sensors**, **Casing & Cementing** Operation, **Completion & Workover** Operations, **Petroleum** Engineering, **Production Optimization**, **Well Completion**, **Rig & Rigless Workover**, Advanced **PVT & EOS Characterization**, **PVT/Fluid Characterization/EOS**, Advanced **Phase Behaviour & EOS Fluid Characterization**, **PVT Properties of Reservoir Fluids**, **Directional Drilling** Fundamentals, Application & Limitation, **Horizontal & Multilateral Wells** (Analysis & Design), **Directional**, **Horizontal & Multilateral Drilling**, Root Cause Analysis (**RCA**), Root Cause Failure Analysis (**RCFA**), **Root Cause Analysis** Study, **Root Cause Analysis** Techniques & Methodologies, Process Hazard Analysis (**PHA**), **Crude Oil Testing & Water Analysis**, **Crude Oil & Water** Sampling Procedures, **Equipment Handling** Procedures, **Crude & Vacuum Process** Technology, **Gas Conditioning & Processing**, **Cooling Towers** Operation & Troubleshooting, **Sucker Rod Pumping**, **ESP & Gas Lift**, **PCP & Jet Pump**, **Pigging** Operations, Electric Submersible Pumps (**ESP**), Progressive Cavity Pumps (**PCP**), **Natural & Artificial Flow Well Completion**, **Well Testing** Procedures & Evaluation, **Well** Performance, **Coiled Tubing** Technology, **Oil Recovery Methods** Enhancement**, Well Integrity** Management, **Well Casing & Cementing**, **Acid Gas** Removal, **Heavy Oil Production** & Treatment Techniques, **Water Flooding**, **Water Lift Pumps** Troubleshooting, **Water System Design** & Installation, **Water Networks Design** Procedures, **Water Pumping** Process, **Pipelines**, **Pumps**, **Turbines**, **Heat Exchangers**, **Separators**, **Heaters**, **Compressors**, **Storage Tanks**, **Valves** Selection, **Compressors**, **Tank & Tank Farms** Operations & Performance, **Oil & Gas Transportation**, **Oil & Gas Production** Strategies, **Artificial Lift** Methods, **Piping & Pumping** Operations, Oil & Water Source Wells Restoration, **Pump** Performance Monitoring, **Rotor Bearing** Modelling, **Hydraulic** Repairs & Cylinders, **Root Cause Analysis**, **Vibration & Condition** Monitoring, **Piping Stress** Analysis, **Amine Gas Sweetening & Sulfur Recovery**, Heat & Mass Transfer and Fluid Mechanics.

During his career life, Dr. Hesham held significant positions and dedication as the **General Manager**, **Petroleum Engineering Assistant General Manager**, **Workover Assistant General Manager**, **Workover Department Manager**, **Artificial Section Head**, **Oil & Gas Production Engineer** from Agiba Petroleum Company and **Engineering Consultant/Instructor** for various Oil & Gas companies as well as a **Senior Instructor/Lecturer** for **PhD, Master & BSc degree students** from **various universities** such as the Cairo University, Helwan University, British University in Egypt, Banha University.

Dr. Hesham has **PhD** and **Master** degrees as well as **Post Graduate Diploma** in **Mechanical Power Engineering** and a **Bachelor** degree in **Petroleum Engineering**. Further, he is a **Certified Instructor/Trainer** and a **Peer Reviewer**. Dr. Hesham is an active member of Egyptian Engineering Syndicate and the Society of Petroleum Engineering. Moreover, he has published technical papers and journals and has delivered numerous trainings, workshops, courses, seminars and conferences internationally.

Course Program

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: ***Sunday, 17th of August 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of Blended Cement*** *Definition & Classification of Blended Cement • Advantages Over Ordinary Portland Cement • Standards & Specifications for Blended Cement • Global Trends & Applications*
0930 – 0945	*Break*
0945 – 1040	***Types of Supplementary Cementitious Materials (SCMS)*** *Fly Ash: Types & Properties • Ground Granulated Blast Furnace Slag (GGBFS) • Silica Fume & Its Characteristics • Natural Pozzolans & Their Applications*
1040 – 1135	***Chemistry of Cement & Hydration Process*** *Overview of Cement Chemistry • Hydration Reactions of Portland Cement • Influence of SCMs on Hydration • Effect of Hydration on Cement Performance*
1135 – 1230	***Basics of Grinding Processes*** *Purpose & Principles of Grinding • Key Grinding Technologies (Ball Mills, VRMs, & Roller Presses) • Energy Consumption in Grinding • Influence of Grinding on Cement Properties*
1230 – 1245	*Break*
1245 - 1340	***Quality Control in Blended Cement Production*** *Key Parameters in Quality Assessment • Importance of Fineness & Particle Size Distribution • Chemical Analysis of Blended Cement • Ensuring Consistency in Production*
1340 - 1420	***Challenges in Producing Blended Cement*** *Variability of Raw Materials • Optimization for Specific Applications • Environmental Challenges & Sustainability • Economic Considerations*
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*

Day 2: ***Monday, 18th of August 2025***

0730 – 0830	***Properties of SCMS in Cement Blending*** *Pozzolanic Reactivity • Chemical Composition & Impact on Cement Properties • Impact of SCMs on Workability • Heat of Hydration & Its Control*
0830 – 0930	***Raw Material Preparation*** *Pre-Blending & Proportioning Techniques • Crushing & Pre-Grinding of Raw Materials • Moisture Content Management • Storage & Handling Challenges*
0930 – 0945	*Break*
0945 - 1100	***Grinding Equipment & Systems*** *Comparison of Grinding Systems (Open versus Closed Circuit) • Role of Grinding Media in Ball Mills • Performance of Vertical Roller Mills (VRMs) • Roller Press Applications & Advantages*

11050– 1230	***Optimization of Grinding Aids*** *Functions of Grinding Aids • Selection of Grinding Aids for Blended Cement • Dosage Optimization for Efficiency • Case Studies on Grinding Aid Applications*
1230 – 1245	*Break*
1245 – 1340	***Particle Size Distribution & Fineness*** *Importance of Specific Surface Area (Blaine) • Measurement Techniques • Effect of Particle Size Distribution on Cement Properties • Role in Achieving Desired Strength & Durability*
1340 - 1420	***Impact of SCMs on Grinding Efficiency*** *Influence of Fly Ash on Grinding Energy • Effect of Slag Fineness on Performance • Challenges with Silica Fume Grinding • Blending Methods for Optimal Performance*
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: ***Tuesday, 19th of August 2025***

0730 – 0830	***Process Diagnostics & Audit*** *Identifying Inefficiencies in Grinding Processes • Key Performance Indicators (KPIs) for Grinding Systems • Use of Diagnostic Tools & Software • Importance of Regular Process Audits*
0830 – 0930	***Energy Efficiency in Grinding*** *Specific Energy Consumption & Its Reduction • Use of High-Efficiency Separators • Role of Pre-Grinding Systems • Case Studies on Energy Savings*
0930 – 0945	*Break*
0945 – 1100	***Temperature Control in Grinding*** *Effect of Grinding Temperature on Cement Properties • Techniques for Temperature Control • Influence of Grinding Aids on Heat Generation • Solutions for Hot Spots in Grinding Circuits*
1100 – 1230	***Optimization of Material Flow*** *Improving Feed & Discharge Systems • Avoiding Material Buildup in Grinding Equipment • Role of Air Classifiers & Separators • Balancing Material Flow in Closed-Circuit Systems*
1230 – 1245	*Break*
1245 – 1340	***Advanced Grinding Technologies*** *Use of Hybrid Grinding Systems • Impact of Artificial Intelligence in Process Control • Automation Trends in Cement Grinding • Real-Time Monitoring & Feedback Systems*
1340 - 1420	***Case Studies on Grinding Optimization*** *Successful Optimization Projects in The Industry • Challenges Faced During Implementation • Lessons Learned from Industrial Applications • Innovations & Best 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 Three*

Day 4:	Wednesday, 20th of August 2025
0730 – 0830	***Testing Blended Cement Properties*** *Compressive Strength Testing • Setting Time & Consistency • Workability Tests for Concrete • Durability Assessment*
0830 – 0930	***Cement Fineness & Its Impact*** *Relationship Between Fineness & Strength • Measurement Methods (Blaine, Laser Particle Analysis) • Impact on Concrete Rheology • Case Studies on Fineness Optimization*
0930 – 0945	*Break*
0945 – 1100	***Chemical Analysis of Blended Cement*** *Role of X-Ray Fluorescence (XRF) • Analysis of Major Oxides & Their Ratios • Trace Element Impact on Performance • Standard Test Methods for Blended Cement*
1100 – 1230	***Influence of Grinding Process on Cement Properties*** *Relationship Between Grinding & Hydration • Influence on Heat of Hydration & Durability • Impact on Early & Late-Age Strength • Role in Mitigating Alkali-Silica Reaction (ASR)*
1230 – 1245	*Break*
1245 – 1340	***Quality Assurance in Cement Plants*** *Implementing ISO Standards • Role of Statistical Process Control (SPC) • Managing Variability in Production • Training Personnel for Quality Management*
1340 – 1420	***Case Studies on Quality Control*** *Examples of Quality Assurance Systems in Cement Plants • Common Challenges in Ensuring Consistency • Role of Automation in Quality Management • Industry Benchmarks & Standards*
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:	Thursday, 21st of August 2025
0730 – 0830	***Environmental Impact of Cement Grinding*** *Carbon Footprint of Blended Cement Production • Role of SCMs in Reducing Emissions • Energy Conservation Measures • Waste Management in Cement Plants*
0830 – 0930	***Circular Economy in Cement Manufacturing*** *Use of Industrial By-Products as Raw Materials • Recycling & Reuse in Cement Production • Case Studies on Waste Utilization • Innovations in Sustainable Practices*
0930 – 0945	*Break*
0945 – 1230	***Future of Grinding Technologies*** *Advancements in Grinding Equipment • Role of Nanotechnology in Cement Grinding • Smart Systems & IoT Applications • Predictive Maintenance & AI Tools*

1230 – 1245	*Break*
1245 – 1345	***Standards & Certifications for Blended Cement*** *International Standards (ASTM, EN, BIS) • Certification Processes for Green Cement • Role of Life Cycle Assessment (LCA) • Adherence to Sustainable Development Goals (SDGs)*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the 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 the following real-life case studies:-

Course Coordinator

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