COURSE OVERVIEW PE0099
Grinding Technology in Cement Production

Course Title
Grinding Technology in Cement Production

Course Date/Venue
June 22-26, 2025/TBA, Sheraton Riyadh Hotel & Towers, Riyadh, KSA

Course Reference
PE0099

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 Grinding Technology in Cement Production. It covers the cement manufacturing processes and the role of grinding in cement production; the types of cement and their requirements for grinding and key performance indicators in grinding; the materials and properties of grinding including the basics of grinding mechanisms; the types of grinding equipment, grinding media and their impact and health, safety and environmental considerations; the ball mill operation, vertical roller mill (VRM) operation and high-pressure grinding rolls (HPGRs) operation; the function of separators in grinding systems and types of separators; and the factors affecting separator efficiency and optimization of separator performance.

Further, the course will also discuss the energy management in grinding, control systems and automation, pre-grinding systems and finish grinding systems; the types and chemistry of grinding aids, mechanism of action of grinding aids, dosage and compatibility with clinker; the environmental considerations of additives and process modeling approaches; the benefits of simulation in system design and simulation tools for grinding circuits; and the new developments in grinding equipment, hybrid grinding technologies, nanotechnology and ultra-fine grinding and future trends in cement grinding.

During this interactive course, participants will learn the quality control in grinding and laboratory testing for grinding optimization; the over-grinding and under-grinding issues, clinker-related grinding problems, separator inefficiencies and causes of high wear in grinding systems; the techniques for identifying grinding inefficiencies, data collection and analysis for troubleshooting and problem-solving frameworks; monitoring wear in grinding components and scheduling preventive maintenance; managing spare parts and reducing maintenance downtime; the relationship between grinding and cement hydration; the effects of grinding on cement strength development; conducting grinding audits and using tools and techniques for data collection; the benchmarking, gap analysis and reporting audit findings and recommendations; reducing energy consumption in grinding and using alternative materials to reduce clinker factor; the carbon capture technologies and the recycling of cement plant by-products; and the digital transformation in grinding, training and capacity building and future trends and innovations.

Course Objectives

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

- Apply and gain an in-depth knowledge on grinding technology in cement production
- Discuss the cement manufacturing processes, role of grinding in cement production, types of cement and their requirements for grinding and key performance indicators in grinding
- Identify the materials and properties of grinding including the basics of grinding mechanisms, types of grinding equipment, grinding media and their impact and health, safety and environmental considerations
- Carryout ball mill operation, vertical roller mill (VRM) operation and high-pressure grinding rolls (HPGRs) operation
- Recognize the function of separators in grinding systems, types of separators, factors affecting separator efficiency and optimization of separator performance
- Apply energy management in grinding, control systems and automation, pre-grinding systems and finish grinding systems
- Identify the types and chemistry of grinding aids, mechanism of action of grinding aids, dosage and compatibility with clinker and environmental considerations of additives
- Illustrate process modeling approaches and discuss the benefits of simulation in system design and simulation tools for grinding circuits
- Explain the new developments in grinding equipment, hybrid grinding technologies, nanotechnology and ultra-fine grinding and future trends in cement grinding
- Apply quality control in grinding and laboratory testing for grinding optimization
- Recognize the over-grinding and under-grinding issues, clinker-related grinding problems, separator inefficiencies and causes of high wear in grinding systems
- Employ techniques for identifying grinding inefficiencies, data collection and analysis for troubleshooting and problem-solving frameworks
- Monitor wear in grinding components, schedule preventive maintenance, manage spare parts and reduce maintenance downtime

- Determine the relationship between grinding and cement hydration and the effects of grinding on cement strength development
- Conduct grinding audits, use tools and techniques for data collection and apply benchmarking, gap analysis and reporting audit findings and recommendations
- Reduce energy consumption in grinding, use alternative materials to reduce clinker factor and discuss carbon capture technologies and the recycling of cement plant by-products
- Discuss digital transformation in grinding, training and capacity building and future trends and innovations

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 grinding technology in cement production 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:

Mr. Saad Bedir, MSc, BSc, is a **Senior Chemical Engineer** with over **30 years** of extensive experience in the **Power**, **Petrochemical**, **Oil & Gas** and **Cement** industries. He is well-versed in the areas of Introduction to **Cement Production**, Grinding Technology in **Cement**, **Blended Cement** & Optimization, **Process Troubleshooting**, **Polyethylene** Manufacturing & Process Troubleshooting, **Polyethylene Flexible Packaging**, **Polyethylene** Wire & Cable, **Polymers**, **Polymers & Composites**, **Distillation Column** Operation & Control, **Polymers & Polymerization**, **Oil Movement** Storage & Troubleshooting, **Process Equipment** Design, Applied **Process Engineering** Elements, **Polymer & Materials** Engineering, **Polyethylene Processing** Techniques, Advanced **Polymer Chemistry**, **Plastics** Technology, **LLDPE** Productions & Utilization, **Process Plant** Optimization, **Heat & Power Consumption**, **Heat Transfer**, **Clean Energy & Power Saving**, Fuel Handling System, **Oil Movement & Operation**, Oil Production, Gas Conditioning & Processing, Plastic Additives, Process Plant Performance & Efficiency, Plant Optimization and Process Operations. His expertise also includes the implementation of Environmental Impact Assessment (**EIA**), **OHSAS 18001**, **ISO 9001**, **ISO 14001**, **QHSE** Management Planning, Air Quality Management, Health, Fire, Safety, Security & Environmental Codes of Practice, Legislations and Procedures. Crisis & Business Continuity Management Planning, Emergency Response & Procedures, Industrial Security Risk Assessment & Management, , Behavioural Safety, Incident & Accident Investigation, Integrated EHS Aspects, Risk Assessment & Hazard Identification, Environmental Audits, Hazardous & Non-Hazardous Waste Management, Confined Space Safety, **SHEMS** Principles, Process Safety, Basic & Advanced Construction Safety, Rig & Barge Inspection, , Safety & Occupational Health Awareness, Loss Control, Lifting & Slinging, Marine Pollution Hazards & Control, Ground Contamination & Reclamation Processes, Waste Management & Recycling, **HAZOP**, **HAZID**, **HSEIA**, **QRA**, Hazardous Area Classification, Radiation Protection, Active and Positive Fire Fighting, Fire & Gas Detection Systems, Fire Fighting Systems, Fire Proofing, ESD, Escape Routes. Presently, he is the **HSE Director** for one of the largest and renowned companies in the Middle East, wherein he takes charge of all HSE and security operations of the company.

Mr. Saad's vast professional experience in directing & managing process operations and health, safety and the environment aspects as per OSHA framework and guidelines can be traced back to his stint with a few international companies like **Saudi ARAMCO**, **CONOCO**, **Kuwait Oil Co.** (**KOC**), etc, where he worked as the **Field Senior Process Consultant** handling major projects and activities related to the discipline. Through these, he gained much experience and knowledge in the implementation and maintenance of **internationally accepted principles** of process operations. Through this, he has also gained knowledge regarding international safety standards for the National Fire Protection Association (**NFPA**), the American Petroleum Institute (**API**), Safety of Life at Sea (**SOLAS**), and Safety for Mobile Offshore Drilling Unit (**MODU**).

Mr. Saad has a **Bachelor's** degree in **Chemistry** from the **Ain Shams University** and a **NEBOSH** certificate holder. Further, he is a **Certified Instructor/Trainer**, a **Certified Lead Auditor** for **OHSAS 18001**, **ISO 9001**, **ISO 14001** and a **member** of the **Egyptian Syndicate** & **Scientific Professions**. His passion for development and acquiring new skills and knowledge has taken him all over the Middle East to attend and share his expertise in numerous trainings and workshops.

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, 22nd of June 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Cement Grinding*** *Overview of Cement Manufacturing Processes • Role of Grinding in Cement Production • Types of Cement & their Requirements for Grinding • Key Performance Indicators in Grinding*
0930 – 0945	*Break*
0945 – 1040	***Materials & their Properties*** *Clinker Characteristics & Grindability • Additives & their Effects on Grinding • Moisture Content & its Impact on Grinding Efficiency • Material Handling Considerations*
1040 – 1135	***Basics of Grinding Mechanisms*** *Particle Size Reduction Principles • Fracture & Deformation in Grinding • Energy Requirements for Grinding • Bond's Law & Other Grinding Theories*
1135 – 1230	***Types of Grinding Equipment*** *Ball Mills: Design & Operation • Vertical Roller Mills (VRMs): Features & Advantages • High-Pressure Grinding Rolls (HPGRs) • Other Advanced Grinding Systems (e.g., Horomills)*
1230 – 1245	*Break*
1245 - 1340	***Grinding Media & their Impact*** *Types of Grinding Media • Media Wear & Replacement Schedules • Selection Criteria for Grinding Media • Effects of Media Shape & Size on Grinding Efficiency*
1340 - 1420	***Health, Safety, & Environmental Considerations*** *Dust Control in Grinding Operations • Noise Reduction Techniques • Energy Efficiency & Carbon Footprint • Workplace Safety 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 One*

Day 2: ***Monday, 23rd of June 2025***

0730 – 0830	***Ball Mill Operation*** *Mill Internals & Liners • Charge Dynamics & Grinding Action • Control of Mill Temperature • Operational Troubleshooting*
0830 – 0930	***Vertical Roller Mill (VRM) Operation*** *Working Principles of VRMs • Advantages & Limitations of VRMs • Maintenance of VRM Components • VRM Performance Optimization*
0930 – 0945	*Break*
0945 - 1105	***High-Pressure Grinding Rolls (HPGRs)*** *Principles of HPGR Operation • Benefits of HPGRs in Pre-Grinding & Finish Grinding • Maintenance & Wear Management • Integration with Other Grinding Systems*

1105 – 1230	***Separator Technology*** *Function of Separators in Grinding Systems • Types of Separators: Static & Dynamic • Factors Affecting Separator Efficiency • Optimization of Separator Performance*
1230 – 1245	*Break*
1245 – 1340	***Energy Management in Grinding*** *Specific Energy Consumption & its Optimization • Role of Grinding Aids in Energy Efficiency • Use of Alternative Fuels in Grinding • Heat Recovery & Utilization in Grinding Circuits*
1340 - 1420	***Control Systems & Automation*** *Process Control Strategies in Grinding • Benefits of Automated Grinding Systems • Sensors & Instrumentation in Grinding Operations • Data Analytics & Predictive Maintenance*
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, 24th of June 2025

0730 – 0830	***Pre-Grinding Systems*** *Pre-Crushers & Roller Presses • Benefits of Pre-Grinding on Final Grinding • Integration of Pre-Grinding Systems • Case Studies of Pre-Grinding Installations*
0830 – 0930	***Finish Grinding Systems*** *Closed-Circuit Grinding versus Open-Circuit Grinding • Importance of Fineness & Particle Size Distribution (PSD) • Impact of Finish Grinding on Cement Properties • Adjustments for Specialty Cements*
0930 – 0945	*Break*
0945 - 1105	***Grinding Aids & Additives*** *Types & Chemistry of Grinding Aids • Mechanism of Action of Grinding Aids • Dosage & Compatibility with Clinker • Environmental Considerations of Additives*
1105 – 1230	***Modeling & Simulation of Grinding*** *Process Modeling Approaches • Benefits of Simulation in System Design • Simulation Tools for Grinding Circuits • Real-World Examples of Simulation in Optimization*
1230 – 1245	*Break*
1245 – 1340	***Innovations in Grinding Technology*** *New Developments in Grinding Equipment • Hybrid Grinding Technologies • Nanotechnology & Ultra-Fine Grinding • Future Trends in Cement Grinding*
1340 - 1420	***Case Studies: Grinding Optimization Projects*** *Examples of Successful Grinding Optimizations • Lessons Learned from Industry Challenges • Cost-Benefit Analysis of Grinding Upgrades • Best Practices in Grinding Project Management*
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, 25th of June 2025
0730 – 0830	***Quality Control in Grinding*** *Cement Quality Parameters Affected by Grinding • Role of Blaine Fineness & PSD • Laboratory Testing for Grinding Optimization • Online Quality Monitoring Tools*
0830 – 0930	***Common Operational Challenges*** *Over-Grinding & Under-Grinding Issues • Clinker-Related Grinding Problems • Separator Inefficiencies • Causes of High Wear in Grinding Systems*
0930 – 0945	*Break*
0945 - 1105	***Root Cause Analysis & Troubleshooting*** *Techniques for Identifying Grinding Inefficiencies • Data Collection & Analysis for Troubleshooting • Problem-Solving Frameworks • Real-World Troubleshooting Examples*
1105 – 1230	***Wear Management & Maintenance*** *Monitoring Wear in Grinding Components • Scheduling Preventive Maintenance • Spare Parts Management • Reducing Maintenance Downtime*
1230 – 1245	*Break*
1245 – 1340	***Grinding & Cement Performance*** *Relationship Between Grinding & Cement Hydration • Effects of Grinding on Cement Strength Development • Adjusting Grinding for Different Applications • Optimization for Blended Cements*
1340 - 1420	***Case Studies: Grinding Failures*** *Examples of Grinding Failures & Causes • Lessons Learned from Past Incidents • Strategies to Prevent Recurrence • Best Practices for Risk Management*
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, 26th of June 2025
0730 – 0830	***Plant Audits & Assessments*** *Methodology for Conducting Grinding Audits • Tools & Techniques for Data Collection • Benchmarking & Gap Analysis • Reporting Audit Findings & Recommendations*
0830 – 0930	***Sustainability in Grinding Operations*** *Reducing Energy Consumption in Grinding • Use of Alternative Materials to Reduce Clinker Factor • Carbon Capture Technologies • Recycling of Cement Plant By-Products*
0930 – 0945	*Break*
0945 – 1100	***Digital Transformation in Grinding*** *Role of Industry 4.0 in Grinding Technology • Predictive Maintenance Using AI & IoT • Advanced Process Control Systems • Real-Time Data Visualization & Dashboards*
1100 – 1230	***Training & Capacity Building*** *Importance of Skill Development in Grinding Operations • Training Programs for Operators & Engineers • Certification Programs in Grinding Technology • Knowledge Sharing & Collaboration Across the Industry*
1230 – 1245	*Break*

1245 - 1345	***Future Trends & Innovations*** *Green Grinding Technologies • Smart Factories & Digital Twins in Cement Grinding • Circular Economy & Grinding Practices • Advances in Material Science for Grinding*
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

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org