COURSE OVERVIEW PE1018
AI in Fertilizer Manufacturing

Course Title
AI in Fertilizer Manufacturing

Course Date/Venue
Session 1: July 20-24, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE
Session 2: November 10-14, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
PE1018

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 of Artificial Intelligence in AI in Fertilizer Manufacturing. It covers the artificial intelligence and its role in fertilizer manufacturing processes; the AI for raw material optimization, ammonia and urea production, process control and automation; the AI-driven optimization of granulation processes, machine learning for predicting granule size distribution, AI-powered monitoring of pellet hardness and stability and AI-assisted process control for consistent fertilizer granule quality; the AI for predictive maintenance of fertilizer plant equipment; and the AI for heat exchanger and boiler efficiency optimization.

Further, the course will also discuss the AI in chemical reactor performance monitoring, pump and compressor health monitoring and pipeline and storage tank monitoring; the AI for fertilizer chemical formulation optimization, nitrogen, phosphate and potash fertilizer processing; the AI-driven optimization of coated fertilizer formulations and machine learning for predicting nutrient release rates; the AI-powered quality control for coated fertilizer granules; and the AI-assisted process monitoring for controlled release fertilizers.

During this interactive course, participants will learn the AI for fertilizer drying and cooling optimization, energy efficiency in fertilizer manufacturing and fertilizer plant safety and risk management; the AI for environmental compliance and emission monitoring and AI-powered digital twin technology for fertilizer plants; the AI in advanced control systems and process automation, smart fertilizer manufacturing and AI-driven decision making; the future AI trends in fertilizer manufacturing; and the AI for AI-driven predictive analytics in fertilizer production including reducing operational costs and increasing efficiency.

Course Objectives

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

- Apply and gain a comprehensive knowledge on artificial intelligence in fertilizer manufacturing
- Discuss artificial intelligence and its role in fertilizer manufacturing processes
- Carryout AI for raw material optimization, ammonia and urea production and process control and automation
- Apply AI-driven optimization of granulation processes, machine learning for predicting granule size distribution, AI-powered monitoring of pellet hardness and stability and AI-assisted process control for consistent fertilizer granule quality
- Employ AI for predictive maintenance of fertilizer plant equipment, heat exchanger and boiler efficiency optimization
- Implement AI in chemical reactor performance monitoring, pump and compressor health monitoring and pipeline and storage tank monitoring
- Illustrate AI for fertilizer chemical formulation optimization as well as nitrogen, phosphate and potash fertilizer processing
- Discuss AI-driven optimization of coated fertilizer formulations and machine learning for predicting nutrient release rates
- Apply AI-powered quality control for coated fertilizer granules and AI-assisted process monitoring for controlled release fertilizers
- Carryout AI for fertilizer drying and cooling optimization, energy efficiency in fertilizer manufacturing and fertilizer plant safety and risk management
- Employ AI for environmental compliance and emission monitoring and recognize AI-powered digital twin technology for fertilizer plants
- Apply AI in advanced control systems and process automation as well as smart fertilizer manufacturing and AI-driven decision making
- Discuss the future AI trends in fertilizer manufacturing and apply AI for AI-driven predictive analytics in fertilizer production including reducing operational costs and increasing efficiency

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 artificial intelligence in fertilizer manufacturing for fertilizer manufacturing engineers, data scientists/analysts, operations managers, R&D specialists, supply chain managers, AI and machine learning engineers, environmental engineers, researchers and other technical staff.

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. Robert Harvey, MSc (Cum Laude), BSc is a **Senior Process & Chemical Engineer** with over **30 years** of in-depth industrial experience within the **Oil & Gas**, **Refinery**, **Petrochemical**, **Mining** and **Power** industries. His expertise widely covers in the areas of **Operations Abnormalities & Plant Upset**, **Fertilizer Manufacturing** Process Technology, **Fertilizer Storage** Management (Ammonia & Urea), **Petrochemical & Fertilizer** Plants, **Nitrogen Fertilizer** Production, **Petroleum Industry Process** Engineering, **Gas Processing**, **Process Equipment** Design & Troubleshooting, **Process Equipment & Piping Systems**, **Fertilizer** Manufacturing Process Technology, **Production** Management, **Process Plant** Optimization & Continuous Improvement, **Production Process** Optimization, **Process Analyzers**, **Process Equipment** Design, Vinyl Chloride Monomer (**VCM**) Manufacturing & Process Troubleshooting, **Cement** Manufacturing Process Technology & Standards, **Process Equipment & Piping** System, **Process Plant** Optimization & Continuous Improvement, **Process Plant** Performance & Efficiency, **Troubleshooting Process Operations**, Modern **Aluminium Production Processes**, **Cement Kiln Process**, **Process Engineer Calculations**, Steel Making Process, **Process Diagrams** Review, Process Hazard Analysis (**PHA**), Process Mapping, Strategical Process Control in Process Industry, **Revamping & Debottlenecking**, **Pressure Vessel** Operation, **Heat Mass Balance**, **Distillation-Column** Operation, & Troubleshooting, **Debottlenecking**, **Unit Performance** Optimization, Real Time Online Optimization, **Operations Planning** Optimization, **Engineering Problem Solving**, **Bag Filters** Operation & Maintenance, Chemical Reaction Engineering Application, **Phosphatic Industry**, **Diammonium Phosphate**, **Monoammonium Phosphate**, **NPK**, Troubleshooting Improvement, **Production** Management, **Distillation-Column** Operation & Troubleshooting, **Monomer** Handling Safety, Complex Operational Troubleshooting, Incident **Root Cause Analysis** & Corrective Action, **Fertilizer** Manufacturing, Continuous Improvement & Benchmarking, **Energy Efficiency** for Process Plants, **Pressure Vessel** Operation, **Reactors & Storage Tanks**, Dehydrating Columns, Heat & Material Balance, **P&ID** Reading & Interpretation, **Detailed Engineering Design**, **HAZOP** Leadership, Project HSE Review (**PHSER**), Safe Handling of **Propylene Oxide & Ethylene Oxide**, Safety in **Process & Industrial Plants**, Environmental Impact Assessment (**EIA**) and Effective **Risk Assessment & HAZOP** Studies. Further, he is also well versed in Feasibility Studies Analysis & Evaluation, Project Gate System Procedures, Change Management Skills, Change Management Strategy, Developing Commercial Contracts, Project Management Skills, Project Scheduling & Cost Control, FIDIC & Other Model Contracts, EPC & EPCM Contracts, Knowledge Management, Job Evaluation, Creative Problems Solving & Innovation Skills, Problem Solving & Decision Making, Strategic Planning & Creative Thinking and Mind Mapping.

During his career life, Mr. Harvey has gained his practical and field experience through his various significant positions and dedication as the **Commercial Director**, **Manufacturing Director**, **Chief Operating Officer**, **Head Projects Division**, **Project Leader**, **Lead Technical Advisor/Consultant** and **Project Consultant** to various international companies such as the Trade and Industrial Policy Strategies (TIPS), PGBI Johannesburg, IDC Green Industries SBU/Arengo 316 Pty Ltd, Ferrum Crescent Limited, CEF Limited, Rio Tinto Alcan, Industrial Development Corporation of SA (IDC) and AECI Limited.

Mr. Harvey has **Master** (**Cum Laude**) and **Bachelor** degrees in **Chemical Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and has delivered various trainings, seminars, conferences, workshops and courses globally.

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.

Accommodation

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

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.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the workshop 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***
0830 – 0930	***Overview of AI in Fertilizer Industry*** *What is Artificial Intelligence (AI)? • Role of AI in Fertilizer Manufacturing Processes • Key AI Technologies (Machine Learning, Deep Learning, IoT, Digital Twins) • AI versus Traditional Fertilizer Production Methods*
0930 – 0945	*Break*
0945 – 1030	***AI for Raw Material Optimization*** *AI-Driven Raw Material Selection for Nitrogen, Phosphorus, and Potassium (NPK) Fertilizers • Machine Learning for Predicting Raw Material Quality • AI-Based Forecasting of Raw Material Supply & Demand • AI-Powered Blending Optimization for Fertilizer Composition*
1030 – 1130	***AI in Ammonia & Urea Production*** *AI-Driven Optimization of Ammonia Synthesis in the Haber-Bosch Process • Machine Learning for Urea Production Efficiency Enhancement • AI-Powered Monitoring of Nitrogen Recovery Rates • AI-Assisted Process Control for Minimizing Waste in Ammonia Production*
1130 – 1215	***AI for Process Control & Automation*** *AI-Driven Predictive Process Control • Machine Learning for Real-Time Process Optimization • AI-Powered Anomaly Detection in Fertilizer Production • AI-Assisted Early Fault Detection in Manufacturing Units*
1215 – 1230	*Break*

1230 – 1330	***AI in Fertilizer Granulation & Pelletizing*** *AI-Driven Optimization of Granulation Processes • Machine Learning for Predicting Granule Size Distribution • AI-Powered Monitoring of Pellet Hardness and Stability • AI-Assisted Process Control for Consistent Fertilizer Granule Quality*
1330 – 1420	***Hands-On: AI-Based Data Analysis for Fertilizer Production*** *Implementing AI Models for Raw Material Quality Prediction • AI-Driven Process Monitoring in Ammonia Production • Machine Learning for Fertilizer Granulation Optimization • AI-Powered Real-Time Fertilizer Quality Control*
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

0730 – 0830	***AI for Predictive Maintenance of Fertilizer Plant Equipment*** *AI-Driven Predictive Failure Detection in Production Units • Machine Learning for Equipment Condition Monitoring • AI-Powered Maintenance Scheduling for Critical Machinery • Case Studies of AI-Driven Maintenance in Fertilizer Plants*
0830 – 0930	***AI for Heat Exchanger & Boiler Efficiency Optimization*** *AI-Assisted Heat Exchanger Fouling Prediction • Machine Learning for Optimizing Boiler Performance • AI-Powered Efficiency Monitoring in Thermal Processing Units • AI-Driven Predictive Maintenance for Heat Exchangers*
0930 – 0945	*Break*
0945 – 1100	***AI in Chemical Reactor Performance Monitoring*** *AI-Based Real-Time Monitoring of Reactor Conditions • Machine Learning for Optimizing Reaction Efficiency • AI-Driven Prediction of Catalyst Deactivation Rates • AI-Powered Fault Detection in Chemical Reactors*
1100 – 1215	***AI for Pump & Compressor Health Monitoring*** *Machine Learning for Pump Failure Prediction • AI-Powered Vibration Analysis for Rotating Equipment • AI-Driven Compressor Performance Monitoring • AI-Assisted Predictive Maintenance for Fertilizer Plant Pumps*
1215 – 1230	*Break*
1230 – 1330	***AI for Pipeline & Storage Tank Monitoring*** *AI-Based Pipeline Corrosion Detection • Machine Learning for Real-Time Tank Level Monitoring • AI-Driven Pressure and Leak Detection in Pipelines • AI-Powered Optimization of Storage Tank Inventory*
1330 – 1420	***Hands-On: AI for Predictive Maintenance & Equipment Health*** *AI-Based Vibration Analysis for Rotating Machinery • Machine Learning Models for Pump Failure Prediction • AI-Driven Predictive Maintenance for Heat Exchangers • AI-Powered Efficiency Monitoring in Fertilizer Production Equipment*
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	***AI for Fertilizer Chemical Formulation Optimization*** *AI-Driven Prediction of Optimal NPK Ratios • Machine Learning for Nutrient Solubility and Availability • AI-Powered Simulation of Fertilizer Dissolution Rates • AI-Assisted Process Control for Balanced Fertilizer Formulation*
0830 – 0930	***AI in Nitrogen, Phosphate & Potash Fertilizer Processing*** *AI-Driven Process Optimization for Nitrogen-Based Fertilizers • Machine Learning for Improving Phosphate Extraction Efficiency • AI-Powered Potash Refining and Impurity Removal • AI-Assisted Predictive Modeling for Fertilizer Nutrient Stability*
0930 – 0945	*Break*
0945 – 1100	***AI for Fertilizer Coating & Controlled Release Technologies*** *AI-Driven Optimization of Coated Fertilizer Formulations • Machine Learning for Predicting Nutrient Release Rates • AI-Powered Quality Control for Coated Fertilizer Granules • AI-Assisted Process Monitoring for Controlled Release Fertilizers*
1100 – 1215	***AI for Fertilizer Drying & Cooling Optimization*** *AI-Driven Moisture Content Prediction in Drying Units • Machine Learning for Optimizing Cooling Rates • AI-Powered Monitoring of Drying Bed Efficiency • AI-Assisted Fault Detection in Drying & Cooling Units*
1215 – 1230	*Break*
1230 – 1330	***AI for Energy Efficiency in Fertilizer Manufacturing*** *AI-Driven Energy Consumption Forecasting • Machine Learning for Process Heat Recovery Optimization • AI-Powered Monitoring of Fuel Efficiency in Kilns and Reactors • AI-Assisted Predictive Analytics for Reducing Energy Waste*
1330 – 1420	***Hands-On: AI-Based Process Optimization*** *AI-Driven Optimization of Fertilizer Formulation • Machine Learning for Phosphate Extraction Efficiency Improvement • AI-Powered Predictive Analytics for Controlled-Release Fertilizers • AI-Assisted Energy Efficiency Monitoring in Fertilizer Production*
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

0730 – 0830	***AI for Fertilizer Plant Safety & Risk Management*** *AI-Driven Hazard Identification in Fertilizer Plants • Machine Learning for Accident Prediction and Prevention • AI-Powered Real-Time Gas Detection and Leak Prevention • AI-Assisted Emergency Response and Safety Drills*
0830 – 0930	***AI for Environmental Compliance & Emission Monitoring*** *AI-Driven Predictive Analytics for Greenhouse Gas Emissions • Machine Learning for Reducing Ammonia & NOx Emissions • AI-Powered Real-Time Monitoring of Volatile Organic Compounds (VOCs) • AI-Assisted Compliance with Environmental Regulations*
0930 – 0945	*Break*
0945 – 1100	***AI-Powered Digital Twin Technology for Fertilizer Plants*** *What is a Digital Twin? • AI-Driven Real-Time Plant Simulation Models • Machine Learning for Process Optimization in Digital Twins • AI-Powered Predictive Analytics for Plant Performance Monitoring*

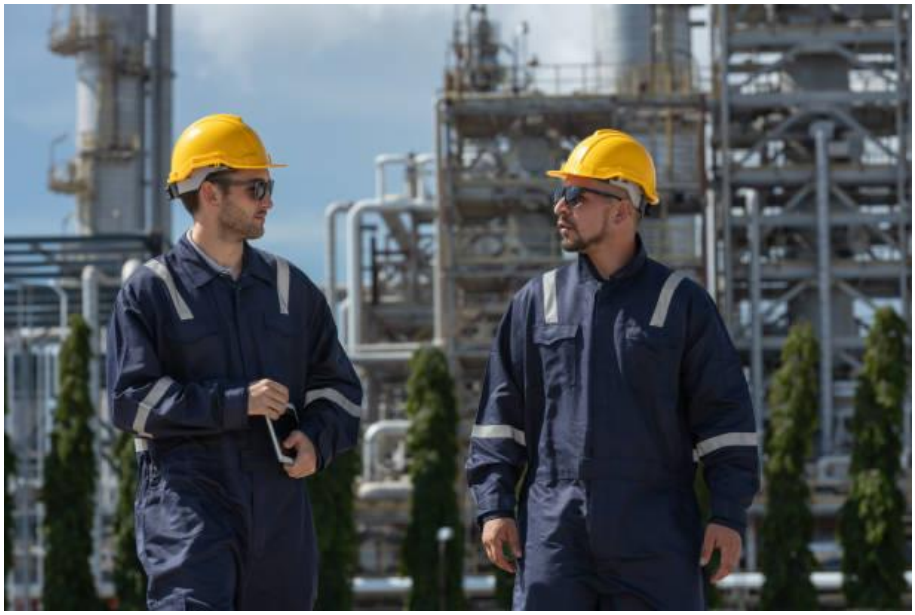
1100 – 1215	***AI in Advanced Control Systems & Process Automation*** *AI-Assisted Distributed Control System (DCS) Optimization • Machine Learning for Advanced Process Control (APC) • AI-Driven Fertilizer Plant Automation Strategies • AI-Powered Decision Support Systems for Operators*
1215 – 1230	*Break*
1230 – 1330	***AI for Smart Fertilizer Manufacturing & AI-Driven Decision Making*** *AI-Powered Real-Time Production Scheduling • Machine Learning for Fertilizer Supply Chain Optimization • AI-Driven Raw Material Procurement and Inventory Management • AI-Assisted Fertilizer Pricing and Profitability Forecasting*
1330 – 1420	***Hands-On: AI for Safety & Digital Twin Applications*** *AI-Driven Risk Prediction Model for Fertilizer Plants • Machine Learning for Environmental Compliance Monitoring • AI-Powered Fertilizer Plant Digital Twin Simulation • AI-Assisted Fertilizer Production Scheduling Optimization*
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

0730 – 0930	***Future AI Trends in Fertilizer Manufacturing*** *AI-Powered Autonomous Fertilizer Production Systems • AI-Driven Real-Time Nutrient Monitoring in Agriculture • AI-Assisted Smart Fertilizer Delivery Technologies • AI for Sustainable and Eco-Friendly Fertilizer Production*
0930 – 0945	*Break*
0945 – 1100	***AI for AI-Driven Predictive Analytics in Fertilizer Production*** *AI-Powered Predictive Maintenance Evolution • AI-Driven Smart Factory Operations • AI-Assisted Workforce Optimization in Fertilizer Plants • AI-Powered Automated Process Troubleshooting*
1100 – 1215	***AI for Reducing Operational Costs & Increasing Efficiency*** *AI-Driven Fertilizer Plant Profitability Optimization • Machine Learning for Cost Reduction in Fertilizer Production • AI-Powered Energy Efficiency Improvement Models • AI-Assisted Raw Material and Product Cost Minimization*
1215 – 1230	*Break*
1230 – 1345	***Hands-On: AI-Powered Fertilizer Manufacturing Optimization Model*** *AI-Based Fertilizer Process Control Simulation • Machine Learning Model for Predictive Maintenance Strategy • AI-Powered Emissions Tracking and Compliance System • AI-Assisted Fertilizer Pricing and Supply Chain Optimization*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t 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:-



Course Coordinator

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