

## COURSE OVERVIEW PE0060 Fertilizers Plant Operations

**Course Title**

Fertilizers Plant Operations

**Course Date/Venue**

Session 1: June 29-July 03, 2025/Boardroom 1,  
Elite Byblos Hotel Al Barsha, Sheikh  
Zayed Road, Dubai, UAE

Session 2: November 24-28, 2025/Fujairah  
Meeting Room, Grand Millennium Al  
Wahda Hotel, Abu Dhabi, UAE



**Course Reference**

PE0060

**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.***



The fertilizer industry is essentially concerned with the provision of three major plant nutrients - Nitrogen, Phosphorus and Potassium (NPK) - in plant-available forms. All major nitrogen (N) fertilizer sources begin with the fixation of non-plant available atmospheric N<sub>2</sub> molecules into anhydrous ammonia molecules (NH<sub>3</sub>). The process of converting N<sub>2</sub> to NH<sub>3</sub> is referred to as the Haber-Bosch process.



Ammonia synthesis requires large amounts of energy. Nowadays, ninety-eight percent of the ammonia produced in the world is by catalytic steam reforming of natural gas. The gas is converted to hydrogen, purified, and reacted with nitrogen to produce ammonia. The development of ever larger, gas-based ammonia plants, affording large amounts of by-product carbon dioxide allowed for utilizing this carbon dioxide in the manufacture of urea. Urea is the product of the reaction of ammonia with carbon dioxide. It contains 46% N. Consequently, it offered a further significant advance in plant nutrient concentration, and hence in savings in nutrient transportation and distribution.

Today, urea is one of the most common nitrogen fertilizer. Urea manufacture is associated with anhydrous ammonia production in modern plants because carbon dioxide is a by-product of ammonia production and is thus readily available to react with the ammonia. The urea can either be dried and granulated into 46% N urea fertilizer, or dissolved in water with ammonium nitrate to make urea ammonium nitrate (UAN) solution.

In most of the modern fertilizer manufacturing plants, most of the ammonia is used on site in the production of urea. The remainder is sold domestically for use in industrial refrigeration systems and other applications that require anhydrous ammonia. The urea is used as a nitrogen-rich fertilizer, and as such is of great importance in agriculture and is also used as a component in the manufacture of resins for timber processing and in yeast manufacture.

This course is designed to provide an in-depth view of nitrogen fertilizer production technologies in general and the **production of ammonia and urea using natural gas** in particular. The course will guide participants to identify future trends and needs of this fast pace industry. The course will examine the status and the most recent fertilizer production technologies to produce fertilizers and intermediate materials. Looking further ahead, the course will review some potentially significant developments and concepts that may impact the manner in which ammonia and urea are produced. Some of these manufacturing routes are being tested or employed at few plants around the world, but have yet to be fully developed into commercial processes.

The course will also provide an opportunity to exchange ideas and disseminate information through discussion of the various technical, economic, safety, and environmental issues. The knowledge gained will enable the participants to solve specific problems at his/her plant as well as improve its operation and enhance its profitability. Further, the course will review new technologies such as isobaric manufacturing, the use of gas heat reformers, hydrogen separation, carbon dioxide removal technology, product ammonia separation, and high activity synthesis catalyst which can result in a significant reduction in energy consumption when compared with traditional technology.

### **Course Objectives**

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

- Apply comprehensive knowledge and skills in the manufacturing process of fertilizers
- Discuss the ammonia production processes such as reforming, oxidation, removal of carbon monoxide & water and synthesis of ammonia
- Identify and list nitrogen fertilizer production such as nitric acid, ammonium nitrate, urea and ammonium sulfate
- Recognize and improve ammonia production processes and identify & describe the various processes involved in ammonia production
- Improve urea production processes and identify & describe the various processes involved in urea production

- Identify fertilizer chemical and physical specifications and determine its product quality
- Recognize speciality fertilizer additives including compound and specialty fertilizers manufacturing process technology
- Apply proper methodology of packaging, transportation and handling of fertilizer products and recognize its importance in the manufacturing industry
- Review energy, environmental and safety issues of fertilizer manufacturing and suggest ways and means on how to resolve such 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**.

### **Who Should Attend**

This course provides an overview of all significant aspects and considerations of fertilizer manufacturing process technology for those who are working in the fertilizer industry, particularly those who have recently assumed new responsibilities, to increase their technical knowledge in fertilizer production and for experienced staff to become better acquainted with new technologies in the industry. The course will help to improve the participants’ skills and broaden their vision and understanding of the entire industry, including technology, economics, energy, use, safety and environmental stewardship.

### **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 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: -

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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.

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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. Mervyn Frampton** is a **Senior Process Engineer** with over **30 years** of industrial experience within the **Oil & Gas, Refinery, Petrochemical** and **Utilities** industries. His expertise lies extensively in the areas of **Process Troubleshooting, Distillation Towers, Fundamentals of Distillation** for Engineers, **Distillation** Operation and Troubleshooting, **Advanced Distillation** Troubleshooting, **Distillation** Technology, Vacuum **Distillation, Distillation Column** Operation & Control, **Oil Movement** Storage &

Troubleshooting, **Process Equipment** Design, Applied **Process Engineering** Elements, **Process Plant** Optimization, **Revamping & Debottlenecking, Process Plant** Troubleshooting & Engineering Problem Solving, **Process Plant** Monitoring, **Catalyst** Selection & Production Optimization, Operations Abnormalities & Plant Upset, **Process Plant** Start-up & Commissioning, **Clean Fuel** Technology & Standards, Flare, Blowdown & Pressure Relief Systems, **Oil & Gas Field Commissioning** Techniques, **Pressure Vessel** Operation, **Gas Processing, Chemical** Engineering, **Process Reactors** Start-Up & Shutdown, **Gasoline Blending** for Refineries, **Urea Manufacturing** Process Technology, Continuous Catalytic Reformer (**CCR**), **De-Sulfurization** Technology, Advanced Operational & Troubleshooting Skills, Principles of Operations Planning, **Rotating Equipment** Maintenance & Troubleshooting, **Hazardous Waste Management & Pollution Prevention, Heat Exchangers & Fired Heaters** Operation & Troubleshooting, **Energy Conservation** Skills, **Catalyst Technology, Refinery & Process Industry, Chemical Analysis, Process Plant, Commissioning & Start-Up, Alkylation, Hydrogenation, Dehydrogenation, Isomerization, Hydrocracking & De-Alkylation, Fluidized Catalytic Cracking, Catalytic Hydrodesulphuriser, Kerosene Hydrotreater, Thermal Cracker, Catalytic Reforming, Polymerization, Polyethylene, Polypropylene, Pilot Water Treatment Plant, Gas Cooling, Cooling Water Systems, Effluent Systems, Material Handling Systems, Gasifier, Gasification, Coal Feeder System, Sulphur Extraction Plant, Crude Distillation Unit, Acid Plant Revamp and Crude Pumping.** Further, he is also well-versed in HSE Leadership, Project and Programme Management, Project Coordination, Project Cost & Schedule Monitoring, Control & Analysis, Team Building, Relationship Management, Quality Management, Performance Reporting, Project Change Control, Commercial Awareness and Risk Management.

During his career life, Mr. Frampton held significant positions as the **Site Engineering Manager, Senior Project Manager, Process Engineering Manager, Project Engineering Manager, Construction Manager, Site Manager, Area Manager, Procurement Manager, Factory Manager, Technical Services Manager, Senior Project Engineer, Process Engineer, Project Engineer, Assistant Project Manager, Handover Coordinator and Engineering Coordinator** from various international companies such as the **Fluor Daniel, KBR** South Africa, **ESKOM, MEGAWATT PARK, CHEMEPIC, PDPS, CAKASA, Worley Parsons, Lurgi** South Africa, **Sasol, Foster Wheeler, Bosch & Associates, BCG** Engineering Contractors, Fina Refinery, Sapref Refinery, Secunda Engine Refinery just to name a few.

Mr. Frampton has a **Bachelor's degree** in **Industrial Chemistry** from **The City University** in **London**. Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management (ILM)** and has delivered numerous trainings, courses, workshops, conferences and seminars 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**

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	<b>PRE-TEST</b>
0830 – 0930	<b>A Global Overview and Outlook of the Nitrogen Fertilizer Industry</b> Fertilizer Terminology • Fertilizer Materials and Product Types • Characteristics of Efficient Distribution Systems • Physical Properties of Fertilizer
0930 – 0945	Break
0945 – 1100	<b>A Global Overview and Outlook of the Nitrogen Fertilizer Industry (cont'd)</b> Chemical Characteristics of Fertilizers • Sampling of Fertilizers • Automatic Sampling Equipment • Fertilizer Regulations
1100 – 1230	<b>Economics of the Industry</b>
1230 – 1245	Break
1245 – 1420	<b>Economics of the Industry (cont'd)</b>
1420 – 1430	<b>Recap</b> 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 – 0930	<b>Ammonia Production</b> Steam Reforming of Natural Gas • Excess Air Secondary Reforming • Heat Exchange Autothermal Reforming
0930 – 0945	Break
0945 – 1100	<b>Ammonia Production (cont'd)</b> Partial Oxidation of Hydrocarbons • Hydrogen Production
1100 – 1230	<b>Ammonia Production (cont'd)</b> Nitrogen Addition • Removal of Carbon Monoxide • Water Removal
1230 – 1245	Break
1245 – 1420	<b>Ammonia Production (cont'd)</b> Removal of Carbon Oxides • Synthesis of Ammonia
1420 – 1430	<b>Recap</b> 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 – 0930	<b>Nitrogen Fertilizer Production</b> Nitric Acid • Ammonium Nitrate
0930 – 0945	Break
0945 – 1100	<b>Nitrogen Fertilizer Production (cont'd)</b> Calcium Ammonium Nitrate
1100 – 1230	<b>Nitrogen Fertilizer Production (cont'd)</b> Ammonium Nitrate-Sulfate • Urea
1230 – 1245	Break
1245 – 1420	<b>Nitrogen Fertilizer Production (cont'd)</b> Ammonium Sulfate
1420 – 1430	<b>Recap</b> 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**

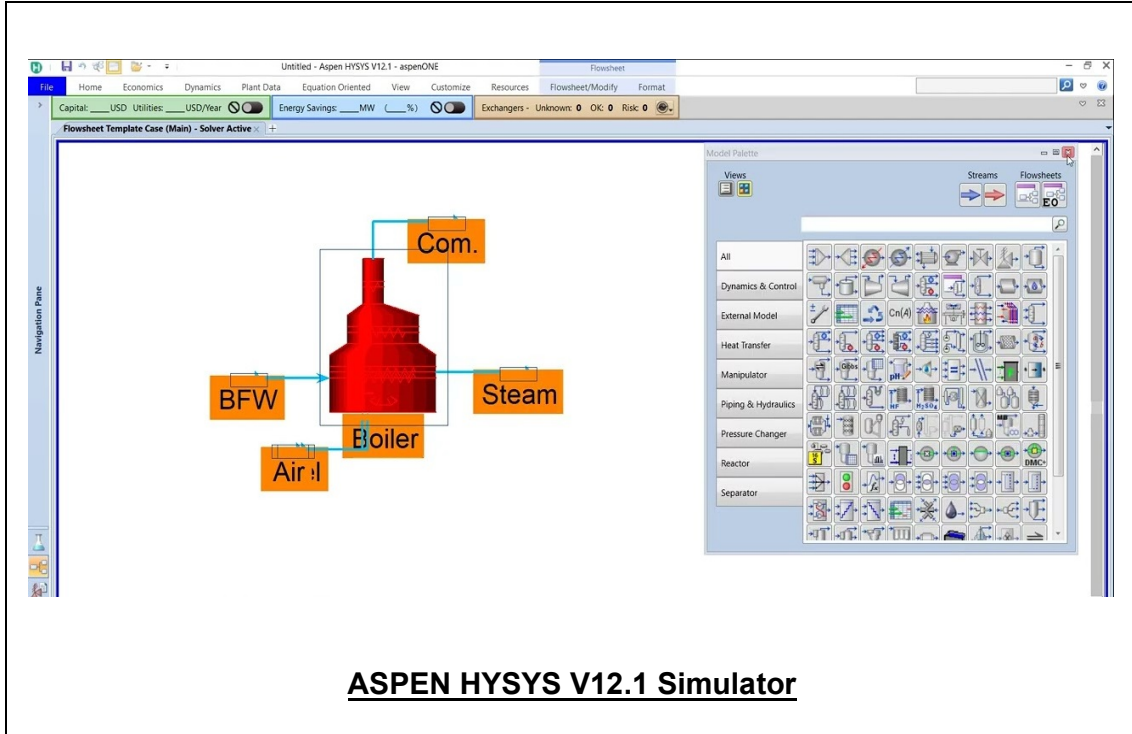
0730 – 0930	<b>Urea Production</b> Once-Through Process • Partial Recycle Process • Total Recycle Process
0930 – 0945	Break
0945 – 1100	<b>Urea Production (cont'd)</b> Carbon Dioxide Stripping • Ammonia Stripping • Advanced Cost and Energy Saving (ACES) Process • Isobaric Double Recycle (IDR) Process
1100 – 1230	<b>Urea Production (cont'd)</b> Urea Synthesis • Urea Purification
1230 – 1245	Break
1245 – 1420	<b>Urea Production (cont'd)</b> Urea Concentration • Urea Granulation
1420 – 1430	<b>Recap</b> 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	<b>Fertilizer Chemical and Physical Specifications and Product Quality</b>
0930 – 0945	Break
0945 – 1100	<b>Packaging, Transportation, and Handling</b>
1100 – 1230	<b>Energy, Environmental, and Safety Issues</b> Pollution of Air, Water and Soil • The Disposal of Waste • Decommissioning Old Plants
1230 – 1245	Break
1245 – 1345	<b>Energy, Environmental, and Safety Issues (cont'd)</b> Global Warming and Ozone Depleting Substances • Health & Safety
1345 – 1400	<b>Course Conclusion</b> Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1400 – 1415	<b>POST-TEST</b>
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

**Simulator (Hands-on Practical Sessions)**

Practical session will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the simulator “ASPEN HYSYS”.



**ASPEN HYSYS V12.1 Simulator**

**Course Coordinator**

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