COURSE OVERVIEW PE1031
AI in Polyethylene & Polypropylene Manufacturing

Course Title
AI in Polyethylene & Polypropylene Manufacturing

Course Date/Venue
Session 1: August 25-29, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: November 23-27, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

Course Reference
PE1031

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 Artificial Intelligence in Polyethylene & Polypropylene Manufacturing. It covers the role of AI in polyethylene (PE) and polypropylene (PP) production; the AI for raw material selection and feedstock optimization, polymerization process optimization and process control and automation in polymer plants; the AI in polyethylene and polypropylene extrusion, molding and predictive maintenance of polymer processing equipment; the AI for heat exchanger and boiler efficiency optimization, reactor performance monitoring and optimization; and the AI for pump, compressor and conveying system health monitoring.

Further, the course will also discuss the AI for pipeline and storage tank monitoring in polymer plants, polyethylene and polypropylene formulation optimization and copolymer production; the AI for polymer drying, pelletizing optimization and energy efficiency in polymer manufacturing; sorting and classifying recycled polymers; optimizing polymer blending with recyclates and predicting recycled polymer properties; and the process control for enhanced recycled polymer performance.

During this interactive course, participants will learn the AI for polymer plant safety and risk management, environmental compliance and emission monitoring; the machine learning for process optimization in digital twins and AI-powered predictive analytics for plant performance monitoring; the AI in advanced control systems and process automation including smart polymer manufacturing and AI-driven decision making; the future AI trends in polyethylene and polypropylene manufacturing and AI for AI-driven predictive analytics in polymer processing; the AI-driven polymer plant profitability optimization, machine learning for cost reduction in polymer production and AI-powered energy efficiency improvement models; and the AI-assisted raw material and product cost minimization.

Course Objectives

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

- Apply and gain an in-depth knowledge on artificial intelligence in polyethylene and polypropylene manufacturing
- Discuss the role of AI in polyethylene (PE) and polypropylene (PP) production
- Carryout AI for raw material selection and feedstock optimization, polymerization process optimization and process control and automation in polymer plants
- Apply AI in polyethylene and polypropylene extrusion and molding and predictive maintenance of polymer processing equipment
- Employ AI for heat exchanger and boiler efficiency optimization, reactor performance monitoring and optimization as well as pump, compressor and conveying system health monitoring
- Apply AI for pipeline and storage tank monitoring in polymer plants, polyethylene and polypropylene formulation optimization and copolymer production
- Carryout AI for polymer drying and pelletizing optimization and energy efficiency in polymer manufacturing
- Sort and classify recycled polymers, apply polymer blending with recyclates, predict recycled polymer properties and process control for enhanced recycled polymer performance
- Apply AI for polymer plant safety and risk management, environmental compliance and emission monitoring
- Discuss machine learning for process optimization in digital twins and apply AI-powered predictive analytics for plant performance monitoring
- Employ AI in advanced control systems and process automation including smart polymer manufacturing and AI-driven decision making
- Discuss the future AI trends in polyethylene and polypropylene manufacturing and apply AI for AI-driven predictive analytics in polymer processing
- Carryout AI-driven polymer plant profitability optimization, machine learning for cost reduction in polymer production, AI-powered energy efficiency improvement models and AI-assisted raw material and product cost minimization

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 polyethylene and polypropylene manufacturing for engineers and technical professionals, production and operations teams, quality control and R&D professionals, data analysts and IT specialists, business and strategy professionals 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% 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 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. Pete Ludovice, PhD, BSc, is an **Internationally Renowned Polyolefins Expert** with over **20 years** of extensive experience in **Polymer Science**, **Polyolefin** (**Polyethylene & Polypropylene**) **Engineering**, **Chemical & Biomolecular Engineering** and **Bioengineering**. He is currently the **Senior Professor** of **Chemical & Biomolecular Engineering** in **Georgia Institute of Technology**, **USA** wherein he has designed numerous courses on various aspects of **polymer science** and **chemical engineering** that include **Applied Molecular Modelling**, **Numerical Modelling** of **Process Engineering**, and **Chemical Processes** using **Molecular Modelling** to characterize **Polymer Behaviour** and **Methods** for **Technical Innovation.**

Dr. Ludovice's research interests include **structure-property relationships** in **polymer materials** including a variety of polymers from basic vinyl polymers to high performance polymer and biological polymers. His researches have been funded by various industries and the **United States National Science Foundation**, the **Department of Energy**, the **Whitaker Foundation** and the **Office of Naval Research**. Further, he has gained his extensive experience through his prior challenging positions such as a **Polymer Product Manager** of **Molecular Simulations Inc**., a **Senior Scientist** for **NASA – Ames Research Center** (**USA**) and the **IBM – Almaden Research Center** (**USA**), a **Research Associate** for the **Institut für Polymere** at the **Eidgenössische Technische Hochschule** in **Zürich**, **Switzerland** and a **Principal Investigator** for 40 diverse international agencies.

Dr. Ludovice holds **PhD** and **Bachelor** degrees in **Chemical Engineering** from the **Massachusetts Institute of Technology**, **USA** and the **University of Illinois**, **USA** respectively. Further, he is an active member of the American Institute of Chemical Engineers (**AIChE**), Society of Plastics Engineers (**SPE**), Materials Research Society and the American Chemical Society. Moreover, he has published **numerous books** and **papers** circulated **internationally** and **delivered technical presentations** and **seminars** in several **international conferences**. He was also one of the inventors of the "**Self-Expanding Intraluminal Composite Prosthesis**" and the "**Pore-Forming Agents to Enhance Transdermal Delivery of Biological Agents**". Amongst all these achievements, he was **honoured** with **various awards** such as the "**Outstanding PhD Thesis Award**" by Georgia Institute of Technology, the "**Outstanding Professor of the Year**" by AIChE and the "**Sherwin Williams Award in Polymer Science**" by the American Chemical Society.

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 Polymer Manufacturing*** *What is Artificial Intelligence (AI)? • The Role of AI in Polyethylene (PE) and Polypropylene (PP) Production • Key AI Technologies (Machine Learning, Deep Learning, IoT, Digital Twins) • AI versus Traditional Process Control in Polymer Manufacturing*
0930 – 0945	*Break*
0945 – 1030	***AI for Raw Material Selection & Feedstock Optimization*** *AI-Driven Optimization of Ethylene and Propylene Feedstocks • Machine Learning for Predicting Catalyst Efficiency • AI-Based Forecasting of Raw Material Supply and Demand • AI-Powered Blending Optimization for Polymer Production*
1030 – 1130	***AI in Polymerization Process Optimization*** *AI-Driven Optimization of Polymerization Reaction Conditions • Machine Learning for Predicting Polymer Molecular Weight Distribution • AI-Powered Monitoring of Reaction Kinetics • AI-Assisted Process Control for Minimizing Polymer Defects*
1130 – 1215	***AI for Process Control & Automation in Polymer Plants*** *AI-Driven Predictive Process Control • Machine Learning for Real-Time Process Optimization • AI-Powered Anomaly Detection in Polymerization Reactions • AI-Assisted Early Fault Detection in Manufacturing Units*
1215 – 1230	*Break*
1230 – 1330	***AI in Polyethylene & Polypropylene Extrusion & Molding*** *AI-Driven Optimization of Extrusion Temperature & Pressure • Machine Learning for Predicting Polymer Flow Behavior • AI-Powered Monitoring of Die Swell and Melt Viscosity • AI-Assisted Process Control for Consistent Polymer Quality*
1330 – 1420	***Hands-On: AI-Based Data Analysis for Polymer Production*** *Implementing AI Models for Catalyst Efficiency Prediction • AI-Driven Process Monitoring in Polymerization Reactions • Machine Learning for Optimizing Polyethylene and Polypropylene Extrusion • AI-Powered Real-Time Polymer 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 Polymer Processing Equipment*** *AI-Driven Predictive Failure Detection in Reactors • Machine Learning for Equipment Condition Monitoring • AI-Powered Maintenance Scheduling for Extrusion and Molding Equipment • Case Studies of AI-Driven Maintenance in Polymer 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 Reactor Performance Monitoring & Optimization*** *AI-Based Real-Time Monitoring of Reactor Conditions • Machine Learning for Optimizing Polymerization Reaction Efficiency • AI-Driven Prediction of Catalyst Deactivation Rates • AI-Powered Fault Detection in Polymerization Reactors*
1100 – 1215	***AI for Pump, Compressor & Conveying System 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 Pneumatic Conveying Systems*
1215 – 1230	*Break*
1230 – 1330	***AI for Pipeline & Storage Tank Monitoring in Polymer Plants*** *AI-Based Pipeline Corrosion and Blockage Detection • Machine Learning for Real-Time Tank Level Monitoring • AI-Driven Pressure and Leak Detection in Resin Storage Tanks • AI-Powered Inventory Management for Polymer Granules*
1330 – 1420	***Hands-On: AI for Predictive Maintenance & Equipment Health*** *AI-Based Vibration Analysis for Polymer Processing Equipment • Machine Learning Models for Pump Failure Prediction • AI-Driven Predictive Maintenance for Heat Exchangers • AI-Powered Efficiency Monitoring in Polymer 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 Polyethylene & Polypropylene Formulation Optimization*** *AI-Driven Prediction of Optimal Polymer Properties • Machine Learning for Polymer Molecular Weight Distribution Control • AI-Powered Simulation of Polymer Crystallinity and Mechanical Properties • AI-Assisted Process Control for Balanced Polymer Formulations*
0830 – 0930	***AI in Polypropylene & Polyethylene Copolymer Production*** *AI-Driven Process Optimization for Copolymerization Reactions • Machine Learning for Predicting Impact Resistance and Melt Flow Index • AI-Powered Monitoring of Polymer Morphology • AI-Assisted Predictive Modeling for Copolymer Performance*
0930 – 0945	*Break*

0945 – 1100	***AI for Polymer Drying & Pelletizing Optimization*** *AI-Driven Moisture Content Prediction in Drying Units • Machine Learning for Optimizing Pellet Size and Uniformity • AI-Powered Monitoring of Pellet Cooling Rates • AI-Assisted Fault Detection in Drying and Pelletizing Units*
1100 – 1215	***AI for Energy Efficiency in Polymer Manufacturing*** *AI-Driven Energy Consumption Forecasting • Machine Learning for Process Heat Recovery Optimization • AI-Powered Monitoring of Fuel Efficiency in Polymerization Reactors • AI-Assisted Predictive Analytics for Reducing Energy Waste*
1215 – 1230	*Break*
1230 – 1330	***AI in Polymer Recycling & Circular Economy Initiatives*** *AI-Driven Sorting and Classification of Recycled Polymers • Machine Learning for Optimizing Polymer Blending with Recyclates • AI-Powered Prediction of Recycled Polymer Properties • AI-Assisted Process Control for Enhanced Recycled Polymer Performance*
1330 – 1420	***Hands-On: AI-Based Process Optimization*** *AI-Driven Optimization of Polymer Formulations • Machine Learning for Optimizing Polymer Molecular Weight Distribution • AI-Powered Predictive Analytics for Copolymer Performance • AI-Assisted Energy Efficiency Monitoring in Polymer 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 Polymer Plant Safety & Risk Management*** *AI-Driven Hazard Identification in Polymer Processing • 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 Volatile Organic Compound (VOC) Emissions • AI-Powered Real-Time Monitoring of Polymer Processing Emissions • AI-Assisted Compliance with Environmental Regulations*
0930 – 0945	*Break*
0945 – 1100	***AI-Powered Digital Twin Technology for Polymer 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 Polymer Plant Automation Strategies • AI-Powered Decision Support Systems for Operators*
1215 – 1230	*Break*

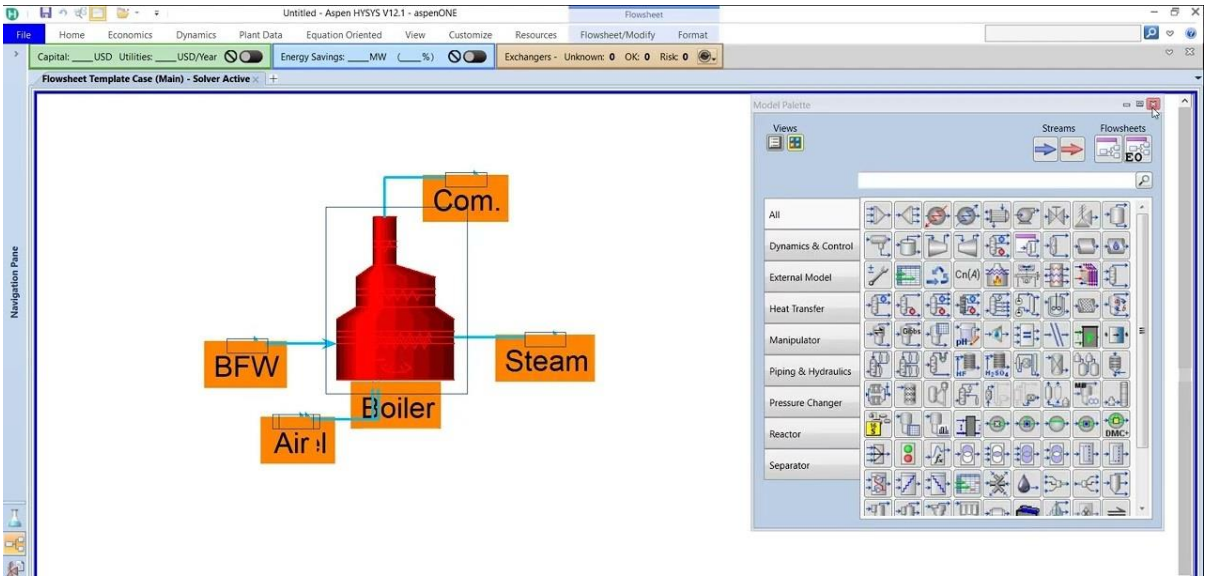
1230 – 1330	***AI for Smart Polymer Manufacturing & AI-Driven Decision Making*** *AI-Powered Real-Time Production Scheduling • Machine Learning for Polymer Supply Chain Optimization • AI-Driven Raw Material Procurement and Inventory Management • AI-Assisted Polymer Pricing and Profitability Forecasting*
1330 – 1420	***Hands-On: AI for Safety & Digital Twin Applications*** *AI-Driven Risk Prediction Model for Polymer Plants • Machine Learning for Environmental Compliance Monitoring • AI-Powered Polymer Plant Digital Twin Simulation • AI-Assisted Polymer 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 Polyethylene & Polypropylene Manufacturing*** *AI-Powered Autonomous Polymer Production Systems • AI-Driven Real-Time Polymer Property Monitoring • AI-Assisted Smart Polymer Delivery Technologies • AI for Sustainable and Eco-Friendly Polymer Production*
0930 – 0945	*Break*
0945 – 1100	***AI for AI-Driven Predictive Analytics in Polymer Processing*** *AI-Powered Predictive Maintenance Evolution • AI-Driven Smart Factory Operations • AI-Assisted Workforce Optimization in Polymer Plants • AI-Powered Automated Process Troubleshooting*
1100 – 1215	***AI for Reducing Operational Costs & Increasing Efficiency*** *AI-Driven Polymer Plant Profitability Optimization • Machine Learning for Cost Reduction in Polymer Production • AI-Powered Energy Efficiency Improvement Models • AI-Assisted Raw Material and Product Cost Minimization*
1215 – 1230	*Break*
1230 – 1345	***Hands-On: AI-Powered Polymer Manufacturing Optimization Model*** *AI-Based Process Control Simulation for Polymer Plants • Machine Learning Model for Predictive Maintenance Strategy • AI-Powered Emissions Tracking and Compliance System • AI-Assisted Polymer 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*

Simulator (Hands-on Practical Sessions)

Practical sessions 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 our state-of-the-art "ASPEN HYSYS" simulator.



ASPEN HYSYS V12.1 Simulator

Course Coordinator

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