COURSE OVERVIEW PE0358-4D
Aspen HYSYS (EHY101 EHY202)

Course Title
Aspen HYSYS (EHY101 EHY202)

Course Date/Venue
January 13-16, 2025/TBA Meeting Room, Crowne Plaza Al Khobar, Al Khobar, KSA

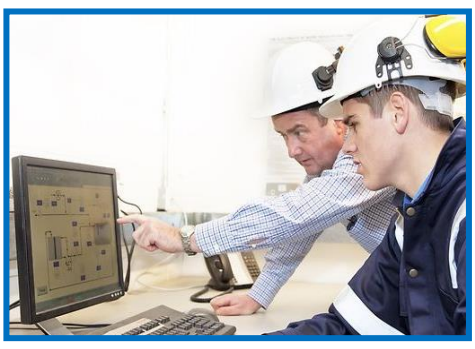
Course Reference
PE0358-4D

Course Duration/Credits
Four days/2.4 CEUs/24 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 an up-to-date overview of Aspen HYSYS. It covers the benefits of process simulation including capabilities of Aspen HYSYS and its graphical user interface and organizational structure; the basic concepts necessary for creating simulations in Aspen HYSYS; building and analyzing propane refrigeration loop; modeling simplified version of a refrigerated gas plant and incorporating multiple flowsheet architecture; the reporting techniques in Aspen HYSYS and generating excel reports from the HYSYS workbook; creating custom unit operation and stream reports; interpreting Aspen HYSYS oil manager; and the assay management features and spreadsheet calculations in Aspen HYSYS.



Further, the course will also discuss the recycle operation to build a two-stage compression flowsheet; using a rating model to determine if an existing heat exchanger will meet desired process specifications; troubleshooting series of Aspen HYSYS simulations and implementing various best practices to get these simulations to solve properly; the pipe segment operation to model single and multi-phase fluid flow; and the NGL fractionation and atmospheric crude column including gas dehydration and vacuum tower and heat integration.

During this interactive course, participants will learn the acid gas package, liquefied natural gas (LNG) plant, turbo expander/fractionation plant model and advanced columns; the real separators, safety analysis environment and blowdown; the acid gas cleaning, optimization techniques and spreadsheet operation; demonstrating equation oriented (EO) modeling in Aspen HYSYS; and the reactors and sulsim.

Course Objectives

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

- Apply and gain an in-depth knowledge on Aspen HYSYS (EHY101 EHY202)
- Identify the benefits of process simulation including the capabilities of Aspen HYSYS and its graphical user interface and organizational structure
- Discuss the basic concepts necessary for creating simulations in Aspen HYSYS
- Build and analyze a propane refrigeration loop, model a simplified version of a refrigerated gas plant and incorporate multiple flowsheet architecture
- Apply reporting techniques in Aspen HYSYS, generate excel reports from the HYSYS workbook and use the report manager to create custom unit operation and stream reports
- Interpret Aspen HYSYS oil manager and assay management features and perform spreadsheet calculations in Aspen HYSYS
- Utilize the recycle operation to build a two-stage compression flowsheet and use a rating model to determine if an existing heat exchanger will meet desired process specifications
- Troubleshoot a series of Aspen HYSYS simulations and implement various best practices to get these simulations to solve properly
- Use the pipe segment operation to model single and multi-phase fluid flow
- Carryout NGL fractionation and atmospheric crude column, including gas dehydration and vacuum tower and heat integration
- Discuss acid gas package, liquefied natural gas (LNG) plant, turbo expander/fractionation plant model and advanced columns
- Recognize real separators, safety analysis environment and blowdown
- Apply acid gas cleaning, optimization techniques and spreadsheet operation
- Demonstrate equation oriented (EO) modeling in Aspen HYSYS, and discuss reactors and sulsim

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 practical aspects and aspen HYSYS (EHY101 EHY202) for Process engineers who need advanced skills for more complex modeling tasks R and D engineers and researchers using Aspen HYSYS for process synthesis, upgrade or modifications.

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 **2.4 CEUs** (Continuing Education Units) or **24 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. Manuel Dalas, PEng, MSc, BSc, is a **Senior Process Engineer** with almost **30 years** of industrial experience within the **Oil & Gas**, **Refinery**, **Petrochemical** and **Refinery** industries. His expertise widely includes in the areas of **Aspen HYSYS Training**, **Refresher**, **EDR-Exchanger Design** & **Rating**, **Advanced** & **Dynamic Simulation**, **Process Engineering & Systems Failure** Analysis, **Equipment & Mechanical Integrity**, **Process Failure** Prevention, **Engineering Modifications & Systems Failures**, Root Cause Failure Analysis (**RCFA**) Techniques, **Methodology Selection** based on Specific Scenarios, **Process Plant** Optimization, **Revamping & Debottlenecking**, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Plant** Operations, **Mass & Material Balance**, **Oil & Gas Processing**, **Process Plant** Performance & Efficiency, **Crude Distillation** Process Saturated Gas Process Technology, **Crude Dehydration & Desalting**, **Crude** Stabilization Operations, **Heat Exchangers & Fired Heaters** Operation & Troubleshooting, **Pressure Vessels** Maintenance & Operation, **Piping Support**, **Ironworks**, **Rotating & Static Equipment** (**Pumps**, **Valves**, **Boilers**, **Pressure Vessels**, **Tanks**, **Bearings**, **Compressors**, **Pipelines**, **Motors**, **Turbines**, **Gears**, **Seals**), **Hydrogen Sulphide Stripping**, **Crude Oil De Salting** Process, **Gas Conditioning**, **NGL Recovery & NGL Fractionation**, **Flare** Systems, Pre-Fabrication of **Steel Structure**, Alloy Piping Pre-Fabrication, **Vertical Columns/Pressure Vessels**, **Distillation Column**, **Steel Structures**, **Construction** Management, **Building** Structures and **Electrical-Mechanical Equipment**. Currently, he is the **Technical Consultant** of the **Association of Local Authorities** of **Greater Thessaloniki** wherein he oversees mechanical engineering services while focusing on system reviews and improvements. His role involves a strategic approach to enhancing operational efficiencies and implementing robust solutions in complex engineering environments.

During his career life, Mr. Dalas has gained his practical and field experience through his various significant positions and dedication as the **Technical Manager**, **Construction Manager**, **Senior Process Engineer**, **Process Safety Engineer**, **Process Design Engineer**, **Project Engineer**, **Production Engineer**, **Construction Engineer**, **Consultant Engineer**, **Technical Consultant**, **Safety Engineer**, **Mechanical Engineer**, **External Collaborator**, **Deputy Officer** and **Senior Instructor/Trainer** for various companies including the Alpha Astika, Anamorfosis Technical Firm, EKME, ASTE, Elof Consulting and Hypergroup.

Mr. Dalas is a **Registered Professional Engineer** and has a **Master's** degree in **Energy System** from the **International Hellenic University** and a **Bachelor's** degree in **Mechanical Engineering** from the **Mechanical Engineering Technical University**, **Greece** along with a **Diploma** in **Management & Production Engineering** from the **Technical University** of **Crete**. Further, he is a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), a **Certified Project Manager Professional** (**PMI-PMP**), a **Certified Instructor/Trainer**, a **Certified Energy Auditor** for **Buildings**, **Heating & Climate Systems**, a **Member** of the **Hellenic Valuation Institute** and the **Association of Greek Valuers** and a **Licensed Expert Valuer Consultant** of the **Ministry of Development and Competitiveness**. He has further delivered numerous trainings, courses, seminars, conferences and workshops internationally.

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:-

100% Hands-on Practical Exercises, Case Studies and Simulation

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

US$ 4,500 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 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: Monday, 13th January 2025

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Aspen HYSYS Process Simulation Overview*** *Identify the Benefits of Process Simulation • Describe the Capabilities of Aspen HYSYS • Introduce the Aspen HYSYS Graphical User Interface and Organizational Structure*
0930 – 0945	*Break*
0945 – 1030	***Getting Started*** *Enter Necessary Elements to Fully Define a Fluid Package • Specify Required Parameters in Order to Execute Flash Calculations and Fully Define Material Streams • Modify and Set Desired Units of Measure • Review Stream Analysis Options and Emissions Manager to Perform Emissions Calculations - Sustainability Focus • Workshop: Introduce Basic Concepts Necessary for Creating Simulations in Aspen HYSYS*
1030 – 1130	***Propane Refrigeration Loop*** *Add and Connect Unit Operations to Build a Flowsheet • Use Available Tools to Manipulate the User Interface • View and Customize the Aspen HYSYS Workbook • Convert a Simulation Case to a Template • Workshop: Build and Analyze a Propane Refrigeration Loop*
1130 – 1215	***Refrigerated Gas Plant*** *Utilize the Heat Exchanger Model in Aspen HYSYS • Introduce Mathematical Operations, Starting with the Balance and Adjust • Add a Template File to an Existing Simulation • Workshop: Model a Simplified Version of a Refrigerated Gas Plant and Incorporate Multiple Flowsheet Architecture*
1215 – 1230	*Break*

1230 – 1330	***Reporting in Aspen HYSYS*** *Survey Common Result Reporting Techniques in Aspen HYSYS • Generate Excel Reports from the HYSYS Workbook • Use the Report Manager to Create Custom Unit Operation and Stream Reports • Identify Steps to Perform CO2 Emissions Tracking, Carbon Fee, Utility Consumption and Cost Calculations - Sustainability Focus • Discover How to Report Non-Standard Physical Properties in your Material Streams • Introduce Data Tables as an Option to Create Customized Simulation Results Tables • Provide a Brief Introduction to Aspen Simulation Workbook, Enabling Integration Between Microsoft Excel and Aspen HYSYS*
1330 – 1420	***Oil Characterization & HP Separation*** *Introduce the Aspen HYSYS Oil Manager and Assay Management Features and How they are Used for Assay Characterization • Perform Spreadsheet Calculations in Aspen HYSYS • Use the Case Study Feature to Run Flowsheet-Wide Scenarios • Workshop: Use the Assay Management Tools to Characterize a Crude Assay, then Employ the Spreadsheet and Case Study Features to Determine How Gas-Oil Ratio (GOR) Varies with Operating Pressure*
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: ***Tuesday, 14th January 2025***

0730 – 0830	***Two Stage Compression*** *Introduce the Recycle Operation in Aspen HYSYS • Recognize Suitable Locations for a Recycle Operation • Enter Compressor Curves to Determine Head and Efficiency as a Function of Inlet Flow • Workshop: Utilize the Recycle Operation to Build a Two-Stage Compression Flowsheet; Define and Activate Compressor Curves Thus Modeling a HYSYS Compressor with Real-World Data*
0830 – 0930	***Heat Exchanger Rating*** *Review the Available Heat Transfer Unit Operations in Aspen HYSYS • Compare and Contrast the Applicability and Operation of Different Heat Exchanger Models • Learn How to Assign Process Utilities to Energy Streams to See Usage at Stream Level - Sustainability Focus • Implement Aspen Exchanger Design & Rating (EDR) for Rigorous Heat Exchanger Calculations within Aspen HYSYS • Introduce the Activated Exchanger Analysis Feature for Continuous Heat Exchanger Study and Design • Workshop: Use a Rating Model to Determine if an Existing Heat Exchanger will Meet Desired Process Specifications; Design and Rate a Heat Exchanger Using the EDR Interface Inside Aspen HYSYS*
0930 – 0945	*Break*
0945 – 1100	***Best Practices & Troubleshooting*** *Discover Activated Analysis for Continuous Evaluation of Economics, Energy Usage, Equipment Design and Dynamic Modelling • Recognize How "Pinch Technology" is Used to Minimize Energy Use and Optimize Heat Exchangers - Sustainability Focus • Identify Best Practices for Using Aspen HYSYS • Investigate Reasons Why a Simulation may Produce Poor Results or Errors • Use Suggested Tips to Debug a Variety of Simulations • Workshop: Troubleshoot a Series of Aspen HYSYS Simulations and Implement Various Best Practices to Get these Simulations to Solve Properly*

1100 – 1215	***Gas Gathering & Crude Pre-Heat Train*** *Use the Pipe Segment Operation to Model Single and Multi-Phase Fluid Flow • Introduce Pipe Segment Flow Assurance Capabilities to Ensure Short and Long-Term Viability of Pipelines •. Workshop Gas Gathering (O&G Focus): Use the Pipe Segment and Its Built-In Flow Assurance Tools to Model and Study a Piping Network in Aspen HYSYS -Or- Workshop Crude Pre-Heat Train (Refinery Focus): Using a Variety of Heat Transfer, Separations, and Piping Unit Operations, Construct a Raw Crude Pre-Heat Train Flowsheet*
1215 – 1230	*Break*
1230 – 1330	***NGL Fractionation & Atmospheric Crude Column*** *Introduce Aspen HYSYS Column Models and Templates • Use the Input Expert to Add and Define a Distillation Column • Add and Manipulate Column Specifications to Meet Process Objectives • Include Column Side Operations for Additional Distillation Configuration Options • Workshop NGL Fractionation (O&G Focus): Model a Two Column Natural Gas Liquids (NGL) Fractionation Train -Or- Workshop Atmospheric Crude Column (Refinery Focus): Construct, Run, Manipulate, and Analyze an Atmospheric Crude Distillation Column*
1330 – 1330	***Gas Dehydration & Vacuum Tower & Heat Integration*** *Review Methods for Saturating a Hydrocarbon Stream with Water in Aspen HYSYS • Use the Hydrate Formation Analysis to Calculate Hydrate Formation Temperatures and Pressures • Build a Vacuum Distillation Tower with Side Draws and Pump Arounds • Apply the Recycle Operation as a Flowsheet-Building Tool Appropriate for a Variety of Simulations • Workshop Gas Dehydration (O&G Focus): Model a Typical Gas Dehydration Unit and Study Gas Saturation, Hydrate Formation Conditions, and Unit Operation Performance Throughout the Model -Or- Workshop Vacuum Tower & Heat Integration (Refinery Focus): Define and Analyze a Vacuum Distillation Tower; Simulate Heat Integration to Reduce Energy Usage within an Overall Crude Processing System*
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: ***Wednesday, 15th January 2025***

0730 – 0830	***Optional Exercises & Extra Materials (Time Permitting): Acid Gas Package*** *Introduce the Acid Gas Property Package • Carbon Capture and Storage Example of Carbon Capture Using DEPG (Physical Solvents) and MEA (Chemical Solvents) - Sustainability Focus • Dynamic Modeling Capabilities for Acid Gas Columns in V12 - Sustainability Focus • Workshop: Model an Acid Gas Sweetening Process Using Diethanolamine*
0830 – 0930	***Liquefied Natural Gas (LNG) Plant*** *Use the LNG Exchanger Operation to Simulate Multi-Pass Heat Exchangers • Utilize the Sub-Flowsheet to Build a Modularized Process Flowsheet • Workshop: Model an LNG Production Process*
0930 – 0945	*Break*
0945 – 1100	***Getting Started*** *Apply Aspen HYSYS Simulation-Building Techniques to Build a Turbo Expander/Fractionation Plant Model • Use the LNG Exchanger Operation to Simulate Multi-Pass Heat Exchangers • Link Process Variables Using the Set Logical Operation…•Apply Physical Properties Via the Correlation Manager • Workshop: Construct a Comprehensive Turbo Expander/Fractionation Plant Model*

1100 – 1215	***Advanced Columns*** *Build Customized Column Model Configurations in Aspen HYSYS • Introduce Efficiency by Discussing Theoretical Versus Actual Stage Calculation Approaches • Perform Hydraulic Calculations on Column Trays and Packing Using the Aspen HYSYS - Column Analysis • Workshop: Customize Standard HYSYS Column Models for More Detailed Condenser and Reboiler Modeling and Investigate the Influence of Stage Efficiencies and Column Internals on Tower Performance*
1215 – 1230	*Break*
1230 – 1330	***Real Separators*** *Model Separators to Include Carryover and Better Account for Imperfect Separation • Predict the Effect of Vessel Geometry and Secondary Separation Devices on Mitigating Liquid Carryover • Workshop: Define and Predict Carryover for a HYSYS Separator Based on Defined Process Conditions, Vessel Parameters, and Secondary Separation Devices*
1330 – 1330	***Safety Analysis Environment*** *Identify HYSYS Safety Analysis Environment as a Comprehensive, Process-Wide Pressure Relief Modeling Tool • Size and Rate Pressure Safety Valves (PSVs) for Single or Multiple Relief Scenarios • Demonstrate How to Setup and Report Results from PSV Calculations in the Safety Analysis Environment • Workshop: Perform Pressure Safety Valve (PSV) Sizing Calculations for Various Relief Scenarios and Generate Compliance Reports*
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*

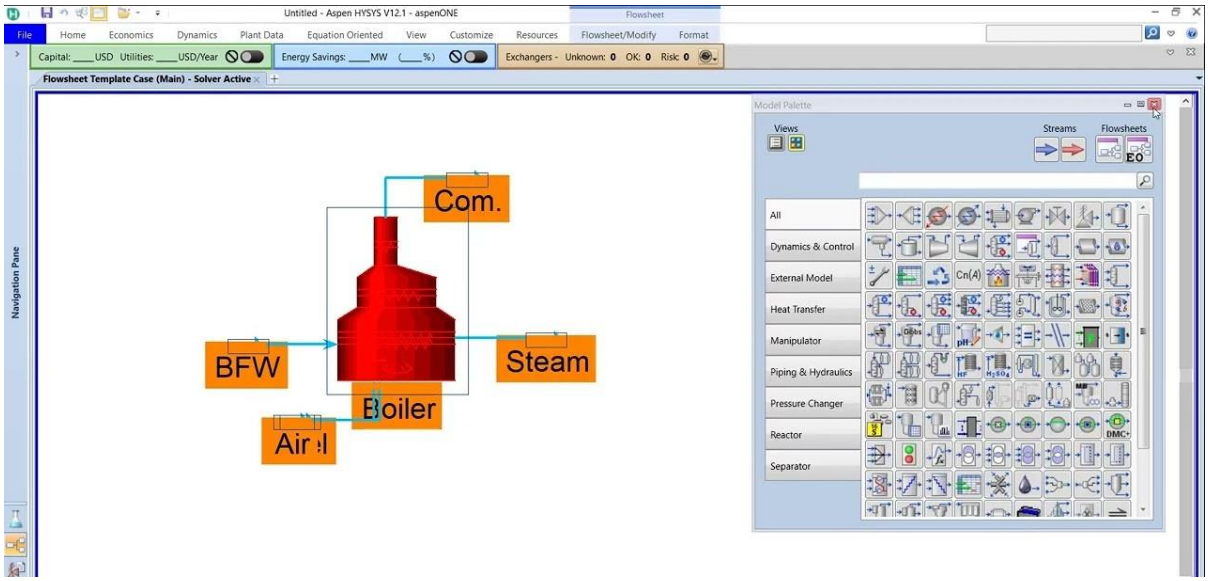
Day 4: Thursday, 06th January 2025

0730 – 0830	***Blowdown™*** *Use Blowdown™ in Aspen HYSYS to Predict Process Conditions Inside Vessels and Associated Valves During Pressure Let-Downs and Emergency Scenarios • Size Single Pressure Safety Valves and Blowdown Valves to Safely Meet the Relief Conditions in Your Process •Workshop: Use Blowdown™ Analysis to Size a Valve for Vessel Blowdown and Rate a Relief Valve for a Fire Case*
0830 – 0930	***Acid Gas Cleaning*** *Identify Different Acid Gas Property Packages • Discuss How the Acid Gas Property Packages Addresses the Challenges of Modeling Acid Gas Cleaning Processes such as Electrolyte Thermodynamics, Column Non-Ideality, and Solvent Make-Up • Workshop: Model an Acid Gas Sweetening Process Using Mixed Amines and Study the Effect of Introducing a Second Amine to a Blend*
0930 – 0945	*Break*
0945 – 1030	***Optimization*** *Review Optimization Techniques and Options in Aspen HYSYS • Use the Spreadsheet Operation to Define an Objective Function for the Original Optimizer • Discover the Hyprotech SQP Optimizer as an Alternative to the Original Optimizer for More Complex Calculations • Workshop: Use the Available Optimization Methods to Maximize Profit in a Turbo Expander/Fractionation Plant*
1030 – 1130	***Equation-Oriented Simulation*** *Demonstrate Equation Oriented (EO) Modeling in Aspen HYSYS • Demo: Convert an Existing Case to EO and Synchronize Results*

1130 – 1215	***Optional Topics: Reactors*** *Introduce the Available Reactor Unit Operation Models in Aspen HYSYS • Create Chemical Reactions and Reaction Sets • Workshop: Model a Simplified Synthesis Gas Production Flowsheet Using a Variety of Reactor Types*
1215 – 1230	*Break*
1230 – 1330	***Sulsim*** *Discuss the Modified Claus Process, the Reactions Involved, and How to Optimize its Conversion • Use Sulsim's Empirical Models to Develop Predictive and Fully-Rigorous Simulations of the Sulfur Recovery Process • Introduce Various Sulsim Unit Operation Models and Optimization Techniques • Workshop: Model a Sulfur Recovery Unit (SRU) by Configuring the Thermal and Catalytic Stages Using the Specialized Sulfur Recovery Sub-Flowsheet Tools and Increase the Overall Performance Using the Air Demand Analyzer*
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*

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 V14 Simulator

Course Coordinator

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