

Course No. 1351

Process Simulation using Aspen HYSYS / Aspen Plus Training Course

PROCESS ENGINEERING
INDUSTRIAL ENGINEERING, MAINTENANCE & OPERATIONS

DURATION

5 Days

DELIVERY

Classroom



Course Overview

The Process Simulation using Aspen HYSYS / Aspen Plus Training Course provides a practical and professionally structured approach to process modelling, simulation, analysis, and optimization for industrial and asset-intensive operations. The course equips participants with the knowledge required to use process simulation as a decision-support tool for evaluating process behaviour, equipment performance, material and energy flows, operating conditions, design alternatives, and improvement opportunities.

Process simulation is highly valuable for government entities, ministries, public sector organizations, oil and gas companies, petrochemical facilities, energy and water utilities, manufacturing operations, and large corporations that manage complex processes, critical assets, and major capital projects. It enables technical teams to test operating assumptions, assess process constraints, evaluate changes, and understand the likely effects of different operating scenarios before committing resources to field implementation.

This Process Simulation using Aspen HYSYS / Aspen Plus Training Course introduces the practical workflow of developing and using steady-state process models. Participants will learn how to define process objectives, select appropriate thermodynamic methods, build material and energy streams, configure unit operations, establish design specifications, perform convergence checks, interpret results, and validate models against available operating data.

The course also explores applications in separation, distillation, heat exchange, compression, pumping, reactors, utility systems, energy efficiency, process troubleshooting, debottlenecking, and yield improvement. Participants will examine the importance of data quality, sound engineering assumptions, model limitations, scenario management, and cross-functional technical review when using Aspen HYSYS or Aspen Plus to support operational and investment decisions.

Through hands-on modelling exercises, guided case discussions, and implementation planning, participants will develop the capability to construct and review process simulation models systematically. The course supports executives and managers in understanding the value and governance of simulation-led analysis, while enabling engineers and specialists to improve process design, operational performance, resource efficiency, reliability, and technical decision-making.

Objectives

- Analyze the role of process simulation in process design, operational optimization, energy efficiency, troubleshooting, safety review, and asset performance during the course.
- Assess process objectives, available data, operating conditions, stream information, and equipment requirements before developing a simulation model.
- Develop a structured simulation workflow that defines system boundaries, assumptions, thermodynamic methods, unit operations, streams, and performance criteria.
- Evaluate the suitability of common thermodynamic property methods for selected hydrocarbon, chemical, water, utility, and separation applications.
- Apply Aspen HYSYS or Aspen Plus to create material streams, energy streams, process equipment models, and connected process flowsheets.
- Design simulation cases for heat exchangers, separators, distillation columns, pumps, compressors, valves, reactors, and utility systems.
- Improve model quality by applying convergence checks, mass and energy balance verification, data reconciliation, sensitivity analysis, and engineering review.
- Assess process performance using simulation outputs such as flow, pressure, temperature, composition, heat duty, energy consumption, recovery, and equipment loading.
- Implement scenario analysis to evaluate operating changes, capacity constraints, energy-saving opportunities, equipment modifications, and process optimization options.
- Strengthen technical decision-making by communicating model assumptions, uncertainties, limitations, findings, and recommended actions clearly.
- Evaluate the relationship between simulation models, process flow diagrams, P&IDs, operating procedures, equipment data sheets, and plant data.
- Develop a time-bound action plan for applying Aspen HYSYS or Aspen Plus process simulation in the participant's organization.

Who Should Attend

The Process Simulation using Aspen HYSYS / Aspen Plus Training Course is designed for process engineering managers, operations managers, production managers, engineering managers, energy managers, utilities managers, maintenance managers, reliability managers, project managers, asset managers, plant managers, and technical services leaders. It is particularly relevant for executives, directors, and decision makers responsible for process performance, capital projects, operational efficiency, energy use, production capacity, technical risk, process safety, and asset investment.

The course is suitable for process engineers, chemical engineers, production engineers, design engineers, project engineers, energy engineers, utilities engineers, mechanical engineers, maintenance engineers, reliability engineers, instrumentation and control engineers, automation specialists, technical analysts, and engineering graduates working in process industries. It is especially useful for professionals involved in process design, feasibility studies, equipment sizing, capacity analysis, operating optimization, troubleshooting, energy assessments, plant modifications, commissioning, and technical assurance.

HSE, quality, risk management, procurement, supply chain, finance, internal audit, contractor management, digital transformation, operational excellence, and sustainability professionals may also benefit where their responsibilities involve capital expenditure, energy performance, process risk, environmental performance, technical specifications, investment evaluation, or improvement governance. The course supports multidisciplinary teams that require a common understanding of how simulation models can support evidence-based decisions.

Learning Outcomes

- Explain the purpose and business value of process simulation using Aspen HYSYS and Aspen Plus in design, operations, optimization, and technical decision-making.
- Define process objectives, model boundaries, assumptions, available data, and acceptance criteria for a selected simulation case.
- Select an appropriate thermodynamic property method based on fluid composition, operating conditions, phase behaviour, and process requirements.
- Create and connect material streams, energy streams, unit operations, and utility systems within a process simulation flowsheet.
- Develop steady-state models for common process equipment, including separators, heat exchangers, pumps, compressors, valves, distillation columns, and reactors.
- Apply mass and energy balance checks to validate simulation results and identify inconsistent data or assumptions.
- Interpret simulation outputs related to flow rate, pressure, temperature, composition, heat duty, energy use, recovery, capacity, and equipment loading.
- Conduct sensitivity analyses and scenario comparisons to evaluate operating changes, process constraints, and improvement opportunities.

- Assess the effect of changes in feed conditions, operating pressure, temperature, utility duty, equipment capacity, and control targets on process performance.
- Identify model limitations, uncertainties, convergence issues, and data-quality risks that require engineering judgement or field verification.
- Present simulation findings, assumptions, risks, and recommendations clearly to technical teams, managers, and decision makers.
- Produce an initial workplace roadmap for using Aspen HYSYS or Aspen Plus to support process improvement and engineering analysis.

Course Outline

DAY 01

Process Simulation Foundations and Model Development Strategy

- The role of process simulation in process design, operations, troubleshooting, debottlenecking, energy efficiency, safety review, and asset lifecycle management.
- Overview of Aspen HYSYS and Aspen Plus capabilities, typical applications, model boundaries, and simulation project workflows.
- Defining model objectives, scope, assumptions, required input data, operating cases, process constraints, and performance indicators.
- Process flow diagrams, mass and energy balances, stream data, equipment data sheets, operating records, and model-data preparation.

PRACTICAL APPLICATION OR DISCUSSION

Defining a simulation objective and preparing a model basis for a selected process, utility system, or operational challenge.

DAY 02

Thermodynamics, Streams, and Basic Flowsheet Construction

- Thermodynamic property methods, phase behaviour, fluid composition, physical properties, and criteria for selecting an appropriate method.
- Creating material streams, energy streams, stream specifications, pressure, temperature, flow, composition, and unit conversions.

DAY 02 — CONTINUED

- Building basic flowsheets using mixers, splitters, valves, pumps, compressors, heaters, coolers, separators, and recycle streams.
- Convergence principles, degrees of freedom, specifications, calculation sequence, error identification, and model troubleshooting.

PRACTICAL APPLICATION OR DISCUSSION

Building and validating a basic process flowsheet with material and energy streams in Aspen HYSYS or Aspen Plus.

DAY 03

Modelling Heat Transfer, Separation, and Distillation Systems

- Heat exchanger modelling: heat duty, temperature approach, utility selection, pressure drop, fouling assumptions, and energy performance.
- Separator and flash calculations: phase behaviour, vapour-liquid separation, operating pressure, temperature, recovery, and product specifications.
- Distillation modelling: columns, feed conditions, trays or packing, reflux, reboiler duty, condenser duty, pressure profile, and product quality.
- Reviewing model results against mass and energy balances, equipment limitations, design data, and available plant operating data.

PRACTICAL APPLICATION OR DISCUSSION

Developing a heat exchanger, separator, or distillation model and evaluating key operating-performance results.

DAY 04

Scenario Analysis, Optimization, and Process Improvement

- Sensitivity analysis, case studies, scenario management, design specifications, optimization variables, and target constraints.
- Evaluating the impact of feed changes, pressure and temperature changes, utility conditions, equipment loading, and operational set points.

DAY 04 — CONTINUED

- Applying simulation to debottlenecking, yield improvement, energy reduction, heat integration, equipment sizing, and capacity-expansion analysis.
- Validating results through engineering judgement, operating data, field observations, reliability considerations, process safety review, and technical peer review.

PRACTICAL APPLICATION OR DISCUSSION

Comparing simulation scenarios and selecting practical improvement options for a process-performance case.

DAY 05

Model Governance, Communication, and Implementation Planning

- Model documentation, assumptions registers, version control, calculation records, data sources, validation evidence, and review requirements.
- Communicating simulation results to executives, operational teams, project stakeholders, and technical decision makers.
- Integrating simulation outputs with PFDs, P&IDs, operating procedures, maintenance plans, energy-management initiatives, and management of change.
- Managing model updates after process modifications, equipment changes, operating deviations, or new data availability.

FINAL WORKSHOP, ACTION PLAN, OR IMPLEMENTATION EXERCISE

Developing a 90-day process simulation action plan using Aspen HYSYS or Aspen Plus, including priority models, required data, accountable owners, milestones, review controls, and performance measures.



Register or Request More Information

Course page: <https://quest-training.com/courses/process-simulation-using-aspen-hysys-aspen-plus-training-course>

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