



Aspen HYSYS Process Simulation Course: Steady-State Flowsheets to Dynamic Modelling



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Introduction:

Aspen HYSYS process simulation, from steady-state flowsheets to dynamic modelling, is a 1-week course for process, simulation, design and operations support engineers in oil, gas, refining and chemical organisations, ending with a Validated Steady-State and Dynamic Process Model and study report. Models built without sound thermodynamics, validation against plant data or a dynamic check give misleading answers on capacity, control and relief. Nominees already apply chemical engineering calculations at work, and teaching is by hands-on lab work in Aspen HYSYS on a gas processing flowsheet. CoreConcept Training Center delivers this Aspen HYSYS simulation course.

Course Objectives:

- Select component lists and fluid packages such as Peng-Robinson, glycol and amine property packages for the process being modelled
- Build steady-state flowsheets with separators, heat exchangers, compressors, expanders and columns in Aspen HYSYS
- Apply recycle, adjust, set and spreadsheet operations and run case studies and the optimiser to answer design questions
- Validate a process model against plant data and explain the remaining differences
- Convert a steady-state model to dynamics with pressure-flow specifications, sized equipment, valves and tuned PID controllers
- Run dynamic scenarios such as compressor trips and depressuring studies and report the results

Target Audience:

- Process engineers responsible for design calculations, heat and material balances and debottlenecking studies
 - Simulation engineers responsible for building and maintaining plant models
 - Process design engineers responsible for equipment sizing and relief and depressuring inputs
 - Operations support engineers responsible for troubleshooting and what-if studies on running units
 - Control engineers responsible for control loop design and tuning checks
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Course Outline:

Day 1: Simulation Basis and Thermodynamics

- Aspen HYSYS Simulation Basis and Component List Setup
- Peng-Robinson and Activity Model Fluid Package Selection
- Glycol and Amine Property Package Application Limits
- Stream Specification, Phase Envelopes and Hydrate Prediction
- Existing Plant Model Review Against Simulation Good Practice

Day 2: Steady-State Unit Operations and Flowsheets

- Separator, Heater and Shell-and-Tube Exchanger Modelling
- Compressor, Expander and Pump Performance Curve Setup
- Distillation and Absorber Column Specification and Convergence
- Recycle, Adjust and Set Logical Operations
- Spreadsheet Operation for Custom Calculations and Reports

Day 3: Case Studies, Optimisation and Model Validation

- Case Study Tool for Sensitivity and Capacity Checks
- Aspen HYSYS Optimiser Setup for Energy and Recovery Targets
- Plant Data Reconciliation and Model Tuning Methods
- Gas Processing Flowsheet Build From Inlet to Sales Gas
- Convergence Troubleshooting for Recycles and Columns

Day 4: Dynamic Modelling, Control and Safety Studies

- Pressure-Flow Specifications and Equipment Sizing for Dynamics
- Control Valve Sizing and Cv Data Entry
- PID Controller Configuration, Tuning and Strip Chart Analysis
- Compressor Trip and Feed Loss Dynamic Scenarios
- Depressuring Utility Studies With API 521 Inputs

Day 5: Lab Work and the Validated Process Model

- Lab Exercise Building a Compression and Dehydration Train
 - Lab Exercise Validating the Model Against Plant Data
 - Lab Exercise Converting the Train to Dynamics
 - Lab Exercise Testing Control Response to Upsets
 - Validated Steady-State and Dynamic Process Model Completion
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Skills You Will Gain:

- Thermodynamic Package Selection
- Steady-State Flowsheet Building
- Column Convergence
- Model Validation
- Process Optimisation
- Dynamic Model Conversion
- Control Loop Tuning
- Depressuring Analysis

Why Attend This Course:

- Deliver a Validated Steady-State and Dynamic Process Model with a study report to the process engineering lead and the operations manager
- Decide whether a model is fit for design, debottlenecking or operating studies before its results are used
- Avoid wrong capacity figures, poorly tuned controllers and unsupported relief inputs caused by unvalidated or steady-state-only models
- Guide colleagues on fluid package choice, convergence fixes and dynamic conversion steps practised in the lab

Conclusion:

Back at work, the participant gives the Validated Steady-State and Dynamic Process Model and study report to the process engineering lead, the operations manager and the control engineers. They use it to decide on debottlenecking options, control changes and the inputs passed to relief and depressuring reviews. After its first use, the organisation should compare model predictions with plant test data, record where the model was reliable and update its modelling guidelines where gaps appear.

Frequently Asked Questions FAQ:

What should participants know before an Aspen HYSYS process simulation course?

Participants should understand mass and energy balances, phase behaviour and basic unit operations, and have opened Aspen HYSYS before. Bringing a simplified flowsheet or plant data from their own unit helps them use the lab time on a familiar process.

How does an Aspen HYSYS process simulation and dynamics course differ from a basic HYSYS course?

Basic courses teach the interface and simple steady-state flowsheets. This course assumes that start and adds model validation, optimisation and conversion to dynamics, including control tuning, trip scenarios and depressuring studies used in design and operations work.

Why does dynamic modelling matter in Aspen HYSYS process simulation?

Steady-state models show where the plant settles, not how it gets there. Dynamic models show how pressures, levels and flows move during trips, start-ups and depressuring, which is what control design, operator procedures and relief studies depend on.

What do participants take back from the Aspen HYSYS process simulation course?

Participants take back a Validated Steady-State and Dynamic Process Model of a compression and dehydration train, a study report on control and trip behaviour, and checklists for fluid package choice, convergence and dynamic conversion.