Program

DYNAMIC MODELLING SIMULATION USING ASPEN HYSYS

BLOOM Institute Training & Consulting

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United Arab Emirates - Abu Dhabi
P.O. Box: 41647 | Tel: 0097126678586 | Fax: 0097126678587
Web: www.bloomuae.com | E-mail: info@bloomuae.com
Training Methodology

- Individual action plans (to follow up and evaluate training results)
- Brief presentations by the instructor
- Group debriefs
- Self-analysis questionnaires and learning instruments
- Video films, videotaping and playback
- Case studies, simulations and small projects
- One-to-one and group discussions
- Individual and team exercises, indoors and outdoors
- Behavior modeling and role-plays

Bloom Training Methodology
Training Methods

- Action Learning
- Team Training
- Experiential Programs
- Behavior Modeling
- Classroom Instruction
- Audiovisual Training
- Computer-Based Training
- On-the-Job Training
- Business Games & Case Studies
- Simulations
Develop the skills and techniques required for creating and running dynamic simulations. Build dynamic models of vessel relief scenarios, compressor surge control, distillation column control, and pipeline hydraulics. Apply the best practices for transitioning from steady-state to dynamic modeling and discover shortcuts for efficient use of Aspen HYSYS Dynamics.

**Course Overview**

- Develop the skills and techniques required for creating and running dynamic simulations
- Build dynamic models of vessel relief scenarios, compressor surge control, distillation column control, and pipeline hydraulics
- Apply the best practices for transitioning from steady-state to dynamic modeling and discover shortcuts for efficient use of HYSYS Dynamics.

**Benefits**

- Explore Dynamic models to introduce various real-life disturbances to a simulation and discover how different control strategies can mitigate these disturbances
- Automate actions within a HYSYS Dynamics simulation by using the Event Scheduler and Cause & Effect Matrix tools
- Learn pressure flow theory, column dynamics concepts, pipeline hydraulics, and basic process control theory
- Properly define and adjust pressure/flow specifications, strip charts, and controller parameters.
Getting Started in Steady State

- Review the fundamental steps and requirements for building a steady-state model in Aspen HYSYS
- Learn about a variety of shortcuts, tips and tricks to aid in analyzing a HYSYS model
- Workshop: Introduction to the basic concepts necessary for creating, solving and analyzing simulations in Aspen HYSYS

Transitioning from Steady State to Dynamics

- Provide a theoretical overview of the Aspen HYSYS Dynamics Pressure/Flow Solver
- Define dynamic pressure/flow specifications and equipment sizing data
- Review the solving strategy and degrees of freedom analysis of HYSYS Dynamics
- Utilize the Dynamics Assistant to check the preparedness of a simulation for dynamic calculations
- Workshop: Convert a steady-state Aspen HYSYS simulation a HYSYS Dynamics simulation
Controllers and Strip Charts

- Review basic process control theory and methodology
- Discuss the commonly used Controller operations in HYSYS Dynamics
- Add Strip Charts to monitor and graph key process variables
- Workshop: Introduce PID controllers and Strip Charts to augment an Aspen HYSYS Dynamics simulation.

Dynamic Details

- Study valve characteristics and actuator parameters
- Implement heat loss models for process vessels
- Introduce nozzle location and hydrostatic head calculations
- Discuss the HYSYS Dynamics Integrator
- Workshop: Add operational details to an existing dynamic simulation to more accurately model real equipment.

Expanding the Model

- Follow best practices for adding dynamic specifications, unit operations and controllers in the dynamic mode
- Develop appropriate control strategies using split range and on-off controllers
- Install a relief valve for vessel overpressure protection

Workshop: Add equipment, modify the control system and add a pressure relief valve to a simulation directly in dynamic mode.
Compressor Curves and Surge Control

- Learn how to model real process equipment by using performance curves on a Compressor model
- Model rotating equipment in the dynamic mode
- Devise an anti-surge control scheme around a Compressor
- Workshop: Apply performance curves to better represent the dynamic behavior of a compressor model and implement a surge control strategy to protect the equipment from potential damage

Dynamic Column Modeling

- Review the procedure for converting a steady state model into dynamics
- Prepare a distillation column for dynamic simulation by using a Tray Sizing analysis
- Model an LPG distillation column in dynamics and develop an effective control strategy
- Workshop: Set up a distillation column in steady state mode, transition back into dynamics, and operate the distillation column as a dynamic unit operation

Column Pressure Relief

- Modify the condenser overhead section of a distillation column to include an Air Cooled Exchanger operation
- Further develop model-building techniques and best practices by adding operations and controllers in the dynamic mode
- Install a relief valve for protection of the column overhead system
- Workshop: Set up a customized distillation column overhead condenser system and protect it from overpressure with a relief valve
The Event Scheduler and Cause & Effect Matrix

- Implement the Event Scheduler and Cause and Effect Matrix tools to build automated sequences in HYSYS Dynamics
- Review the Spreadsheet operation
- Workshop: Set up a fire scenario for a vessel and implement process safety measures via the Event Scheduler and Cause & Effect Matrix

| 5 hours | Day 5 |

Dynamic User Variables and Aspen Simulation Workbook

- Learn how to work with User Variables in HYSYS Dynamics
- Discover Aspen Simulation Workbook as a tool to link HYSYS Dynamics with Microsoft Excel
- Use ASW Profile Tables into represent dynamic model data in Excel
- Workshop: Implement and edit a User Variable in Aspen HYSYS Dynamics and create Profile Tables in Aspen Simulation Workbook

Pipeline Hydraulics

- Discuss the basics of multiphase flow modeling in pipelines
- Review pipeline modeling options in Aspen HYSYS
- Introduce Aspen Hydraulics as an option for steady state and dynamic pipeline modeling
- Workshop: Review and Aspen Hydraulics in a dynamic model and introduce pipeline pigging calculation capabilities
THANK YOU!

INTERNATIONAL FUNDS AND CERTIFICATES

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