

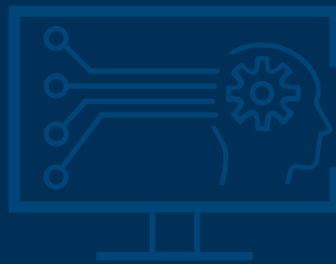
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Aspen[®] eLearning



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Why Aspen eLearning?

The shift to minimal onsite staffing calls for new methods and procedures for production monitoring and management. Aspen eLearning can augment your staff's current skills with the tools and techniques to work effectively in a remote environment.

Aspen eLearning uses state-of-the-art adult learning principles:

- **Teach me:** Learn key concepts by watching short presentations with illustrations
- **Show me:** Observe demonstrations of example concepts using AspenTech software
- **Practice:** Perform hands-on exercises using step-by-step tutorials with AspenTech software

Registration Options

Aspen eLearning can be purchased on a per-user basis or at an enterprise level.

Go to [aspentech.com/elearning](https://www.aspentech.com/elearning) to learn more about these options and to contact a sales representative for more information.

“The training shows the powerful programs available through AspenTech.”

— MOTIVA

“I really liked seeing the ‘live action’ of how to set up a simulation. This will help train new engineers.”

— Major North American Refinery Company

“The localized Aspen PIMS courses are very helpful to understand the content.”

— Hengli Petrochemical

“I found it helpful that all the courses were translated into Chinese.”

— Sinopec

What Is Aspen eLearning?

It's comprehensive training created by experts, delivered on demand in bite-sized modules and courses. Guided learning paths help you find the right training courses for your application, and on-demand access means you can take courses 24/7.



Bite-Sized Modules

30-minute modules are designed to fit into your busy schedule. Each module contains information about the concept, a demonstration, a quiz and an exercise to maximize knowledge retention.



Learning Paths

Modules are organized into learning paths, making it easy for you to progress from beginner to advanced in your focus area, without having to sift through irrelevant topics.



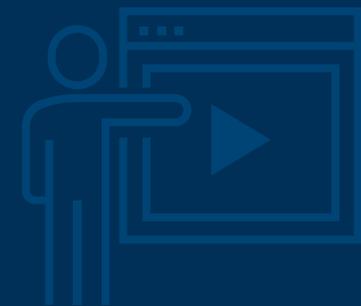
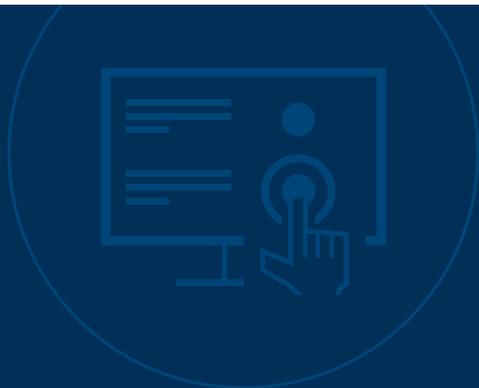
On-Demand Delivery

Aspen eLearning is available 24/7 from AspenTech's Learning Management System, which is accessible from any internet-enabled device. Connectivity to corporate networks is not necessary unless required by your company.



Knowledge Checks

Each bite-sized module consists of multiple-choice quizzes to help you check your knowledge and to reinforce key concepts.



Support Contact Information

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To locate the appropriate call center for your business and view a list of all contact information, please go to the contact us section on the support center homepage found here: esupport.aspentech.com



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ELEARNING CLASSES BY LEARNING PATH — ENGINEERING

aspensONE® Engineering
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 Application: **Basic Engineering**



Aspen Basic Engineering™: Basic Engineering

Aspen Basic Engineering allows the sharing of information among global project teams to promote collaboration and generate FEED packages. This learning path is designed for new and experienced process engineers who need to learn how to shorten the time to complete FEED activities. Complete this learning path to learn how to use Aspen Basic Engineering to create a FEED deliverable.

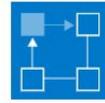
Course Name	Knowledge Delivered	Description
Aspen Basic Engineering (ABE): Learn the Basics	<ul style="list-style-type: none"> Fundamentals of Aspen Basic Engineering 	Get an overview of Aspen Basic Engineering (ABE) and how ABE can integrate with and benefit your work process. You'll learn two installation modes.
Aspen Basic Engineering: Installation and Deployment	<ul style="list-style-type: none"> Install and deploy Aspen Basic Engineering 	Aspen Basic Engineering has two options for the client installation: End-User Tools and Configuration Tools. The Configuration Tools option includes both the End-User Tools and administration tools. Additionally, ABE has two options for the server: Local and Enterprise. The Local Server is recommended for single users. The Enterprise Server allows multiple users and remote connection. Users and roles are assigned in the ABE workspace.
Process Flow Diagrams: Learn the Essentials for Creating PFDs	<ul style="list-style-type: none"> Create process flow diagrams (PFD) 	Learn how to create your first datasheet. Transfer simulation results from Aspen Plus®/Aspen HYSYS® and draw a process flow diagram (PFD) followed by specifying the datasheet. When specifying the datasheet, you will examine options to protect certain fields and add watermarks to the datasheet, as well as print it.
Equipment Datasheets: Learn the Essentials of Working with Datasheets	<ul style="list-style-type: none"> Work with equipment datasheets 	Once you have created a datasheet, you can begin specifying the datasheet and sending it through the review process. Gain an introduction to the document tracking and markup/annotation features built into Aspen Basic Engineering. You'll also learn how to upload sketches to datasheets.

Aspen Basic Engineering: Safety Datasheets	<ul style="list-style-type: none"> • Create safety datasheets 	Learn how to create, revise, and issue safety datasheets in Aspen Basic Engineering.
Aspen Basic Engineering: Datasheet Configuration	<ul style="list-style-type: none"> • Configure datasheets 	Discover Datasheet Definer to create a custom datasheet template and modify an existing datasheet template.
Aspen Basic Engineering: Symbols and Labels Configuration	<ul style="list-style-type: none"> • Configure symbols and labels 	Graphics Definer allows Aspen Basic Engineering users to design and tailor symbols and labels to their project needs. Create and configure new graphics to be used in drawings, demonstrate the process of adapting symbols and labels from the ABE workspace, and extract legacy data from drawing files created in other products to generate symbols and labels enabled for future drawings.

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Energy, Chemicals, Engineering and Construction

Application: **Basic Engineering**



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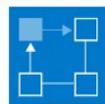


Aspen Basic Engineering™: Process Flow Diagrams

Discover how to represent your process graphically with Aspen Basic Engineering (ABE). Learn how to construct process flow diagrams to meet project specifications, design and configure symbols and labels, and extract legacy graphics for use in ABE drawing applications.

Course Name	Knowledge Delivered	Description
Aspen Basic Engineering: Symbols and Labels Configuration	<ul style="list-style-type: none"> Configure symbols and labels 	Graphics Definer allows Aspen Basic Engineering users to design and tailor symbols and labels to their project needs. Create and configure new graphics to be used in drawings, demonstrate the process of adapting symbols and labels from the ABE workspace, and extract legacy data from drawing files created in other products to generate symbols and labels enabled for future drawings.

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 Application: **Bidding and Estimating**



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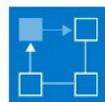


Aspen Capital Cost Estimator (ACCE): Learn the Basics

As more and more capital projects overrun and fall behind schedule, making better estimates as early as possible in the process is key. This learning path is designed for new estimators in Aspen Capital Cost Estimator (ACCE). Complete this learning path to gain a basic understanding of the Key concepts of ACCE, such as navigating the user interface, Project Areas, and Volumetric Models. ACCE enables estimate reuse by leveraging reusable templates and streamlines the workflow, all while shortening estimation time and increasing transparency.

Course Name	Knowledge Delivered	Description
Aspen Capital Cost Estimator (ACCE): Learn the Basics	<ul style="list-style-type: none"> Basics of Aspen Capital Cost Estimator 	Get an overview of the estimating practices and capabilities of Aspen Capital Cost Estimator.
Estimating Background: Learn the Breakdown Structure and Classification Systems	<ul style="list-style-type: none"> Set up your cost breakdown structure Classification set-up 	Learn various cost estimating engineering practices related to Aspen Capital Cost Estimator.
User Interface: Discover Optimized Workflows in ACCE	<ul style="list-style-type: none"> Develop directories 	Get familiar with the Aspen Capital Cost Estimator user interface and learn how to manage the directories
Project Area Concepts: Determine Types and Specifications	<ul style="list-style-type: none"> Construct project areas 	Master what project areas are and how to specify them in Aspen Capital Cost Estimator.
Volumetric Models: Eliminate Factor-Based Estimating	<ul style="list-style-type: none"> Basics of model-based estimates 	Learn Aspen Capital Cost Estimator's recommended practice of factor-based estimating and how AspenTech overcomes the associated challenges by using model-based estimating in Aspen Capital Cost Estimator.

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Aspen Capital Cost Estimator (ACCE): Developing the Estimate

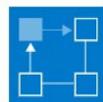
Aspen Capital Cost Estimator (ACCE) can help organize and assess the different engineering disciplines that can drive project costs. This learning path is designed to give estimators a basic understanding of how civil, mechanical, piping, electrical, and instrumentation elements can be specified. Learn to create and customize files in ACCE for calculations and estimation. The user can create both modular and stick build projects.

Course Name	Knowledge Delivered	Description
Basis of Estimate: Document Your Scope, Assumptions and Methodologies	<ul style="list-style-type: none"> Document basis of estimate 	Find out why the basis of estimate or estimate plan document is so important and learn how to modify the document in Aspen Capital Cost Estimator.
Specifying Manpower: Adding Manpower and Productivity Specifications	<ul style="list-style-type: none"> Specify manpower 	Go through the manpower specifications available in Aspen Capital Cost Estimator and learn the system basis, productivity and wage rate adjustments, specifications by craft, workforces and link to contractors and crew mixes.
Cost and Price Escalation: Anticipate Price Changes	<ul style="list-style-type: none"> Understand price escalations 	Discover the Aspen cost database, which is used within Aspen Capital Cost Estimator and supplies data for five global regions. Learn about the system base index, and how Aspen Capital Cost Estimator costs different types of models, including full fabrication, non-full fabrication and bulk item models. Video demonstrations allow you to explore the associated forms, and then you can try it yourself with a self-paced exercise.
Process Design: Reuse Designs, Change Capacities, Create Templates	<ul style="list-style-type: none"> Design reuse Template development 	Review different process design features available in Aspen Capital Cost Estimator. Learn the basis of the integration with the process simulators and how to create templates, changing plant capacity and reusing elements from previous estimates through import and merge.
Contracting Strategies: Specify and Manage Your Contractor Strategy	<ul style="list-style-type: none"> Contractor strategy development 	Learn the following: <ul style="list-style-type: none"> How to specify contractors and their scope of work in Aspen Capital Cost Estimator. The workflow for converting a contractor reporting structure into a tree diagram and linking appropriate workforces to contractors.

		<ul style="list-style-type: none"> Examine the workflow for creating contractor work packages or CONSETs required, assigning scope of work to contractors, and linking areas and systems to CONSETs. Review the contractor reporting options available in Aspen Capital Cost Estimator's evaluation report and the interactive report.
Aspen Capital Cost Estimator: Import and Export a Spreadsheet	<ul style="list-style-type: none"> Import and Export a Spreadsheet 	<p>Aspen Capital Cost Estimator requires a wide variety of information about the plant from all different disciplines. The wide variety of specific information may not be immediately available to the estimator. By exporting an Excel spreadsheet, the more obscure information can be easily entered by the parties most familiar with the equipment. Then, the modified spreadsheet can be imported back into ACCE with the new information. The spreadsheet acts as a standard interface between ACCE and other tools and allows users without access to ACCE to modify the scenario.</p>
Aspen Capital Cost Estimator: Calibration	<ul style="list-style-type: none"> Calibrate ACCE Projects 	<p>Aspen Capital Cost Estimator is a powerful tool for calculating capital costs. However, there are a multitude of project-specific details that can intrinsically skew the costs of a project, such as the location, specialty equipment, or specific expertise. Calibrated projects leverage data from previously completed projects to deliver a more accurate cost estimate.</p>
ACCE Risk Analysis	<ul style="list-style-type: none"> Learn the basic overview and factors of a risk analysis 	<p>Learn the basic overview and factors of a risk analysis. Learn to utilize the two risk analysis options in ACCE, including how to configure and manipulate the Excel input spreadsheet. You'll also learn how to run a risk analysis in ACCE and interpret results.</p>
Aspen Capital Cost Estimator: Detailed Unit Rate Estimating (DURE)	<ul style="list-style-type: none"> Explore how to use Detailed Unit Rate Estimator (DURE) in Aspen Capital Cost Estimator 	<p>Explore how to use Detailed Unit Rate Estimator (DURE) in Aspen Capital Cost Estimator (ACCE). When creating a project in ACCE sometimes a specific line item will need to be changed in a code of account (COA). By default, ACCE does not let you change specific line items, but with DURE you can now do so. After completing this course, you will be familiar with the purpose of DURE in ACCE, and how to use DURE when creating a project.</p>
Aspen Capital Cost Estimator: Material and Man-hour Indexing	<ul style="list-style-type: none"> Learn how to index materials and man-hours 	<p>Explore how to index materials, man-hours and even location in Aspen Capital Cost Estimator (ACCE). When creating a project in ACCE there will be moments where the ACCE preset values will not match what is experienced in real life. The user can index materials or man-hours from as broad as the whole project to even one specific component. After completing this course, you will be familiar with the purpose of material and man-hour indexing, code of account basics, and how to perform the different methods of indexing.</p>

<p>Aspen Capital Cost Estimator: Custom Reports Overview</p>	<ul style="list-style-type: none">• Learn to create custom reports	<p>Learn to apply the tools and processes to create custom Excel reports that can be used in the interactive reporter in ACCE. Become familiar with the basic concepts of SQL and query design to reduce time extracting manipulating and comparing information from files.</p>
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 Application: **Bidding and Estimating**



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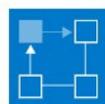


Aspen Capital Cost Estimator (ACCE): Engineering Discipline Estimating

Aspen Capital Cost Estimator (ACCE) can help organize and assess the different engineering disciplines that can drive project costs. This learning path is designed to give estimators a basic understanding of how civil, mechanical, electrical, and instrumentation elements can be specified. Learn to create and customize files in ACCE for calculations and estimation. ACCE can be used to create and design modular projects that can be used to generate useful reports.

Course Name	Knowledge Delivered	Description
Civil, Structural and Steel Costing: Learn the Basics	<ul style="list-style-type: none"> Learn civil, structural and steel costing factors within Aspen Capital Cost Estimator 	Explain how civil, structural and steel specifications drive costs within an Aspen Capital Cost Estimator scenario. Review the data specification hierarchy within Aspen Capital Cost Estimator and walk through the project-level civil and steel specifications. Add civil and steel plant bulks to a project, including pipe racks, truss bridges and many more items. Prepare the land with site development items and place buildings in the project. Create and customize external files to drive cost calculations. View the impact of civil specifications on volumetric models and describe the consequences of hanging equipment.
Mechanical and Piping Costing: Learn the Basics	<ul style="list-style-type: none"> Mechanical and piping 	Learn about the pipe envelope in Aspen Capital Cost Estimator. Learn about component piping and rack piping and how to specify these, as well as how to create and use external fitting frequency rules for piping, as well as how to create and use custom pipe spec files.
Electrical and Instrumentation Costing: Learn the Basics	<ul style="list-style-type: none"> Electrical and instrumentation 	Review key electrical distances that need to be specified in Aspen Capital Cost Estimator and learn how these distances are used to estimate the length of electrical cables and cable supports. Discover how to specify electrical heat tracing on pipes and vessels and how to translate a single line diagram into Aspen Capital Cost Estimator power distribution architecture.
Modular Projects: Learn the Basics	<ul style="list-style-type: none"> Leverage modularization 	Get an overview of modular project design, modular types available in Aspen Capital Cost Estimator, contract specification considering modular project design and useful reports while working with modular project design.

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Application: **Custom Models**



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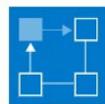
Aspen Custom Modeler: Learn the Basics

This learning path is designed for new and experienced chemical engineers with little or no prior experience of Aspen Custom Modeler who need basic training to get started. Complete this learning path to explore the basics of Aspen Custom Modeler, build a simple model in ACM interface and learn how to export and deploy custom models to re-use in Aspen Plus.

Course Name	Knowledge Delivered	Description
Aspen Custom Modeler: Introduction to Aspen Custom Modeler	<ul style="list-style-type: none"> Basics of custom model creation 	Aspen Custom Modeler or ACM is a tool designed for quick and easy development and use of custom process models. With ACM, you can benefit from quicker and easier development of custom unit operation models that contain specific expertise or proprietary know-how, simulating in steady state, dynamic, optimization and estimation modes, packaging and deploying custom models in a traditional flowsheet simulator such as Aspen Plus. In addition, ACM has built-in Aspen Properties for calculating physical properties to ensure consistency and save time developing models.
Aspen Custom Modeler: Developing a Model in Aspen Custom Modeler	<ul style="list-style-type: none"> Custom model development 	In this course, you will learn how to identify ACM variable types, parameter types, port types, stream types and conditions; create models and develop flowsheets in ACM.
Aspen Custom Modeler: Exporting and Deploying ACM Models	<ul style="list-style-type: none"> Custom model export and deployment 	Models built in Aspen Custom Modeler, or ACM, can be exported and used as unit operation models in Aspen Plus and Aspen HYSYS simulations. In this course, you will explore model properties that can be exported with the ACM model, learn about the non-linear solvers available for ACM models in Aspen Plus and HYSYS, review the port type requirements for use with Aspen Plus or HYSYS and learn how to export ACM models and re-use them in Aspen Plus and Aspen HYSYS.
Aspen Custom Modeler: Exporting and Deploying ACM Simulations to AMR	<ul style="list-style-type: none"> Custom model running in AMR 	Aspen Model Runner, or AMR, is an execution environment for Aspen Custom Modeler (ACM) and Aspen Plus Dynamics (AD). In this

		course, we will introduce what AMR is and demonstrate how to export an ACM simulation to AMR and use that simulation in AMR.
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 Application: **Custom Models**



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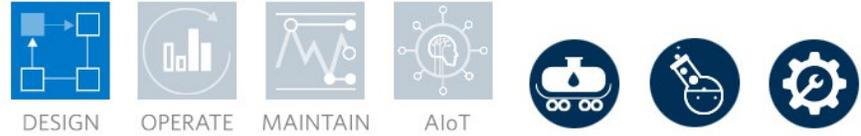


Aspen Custom Modeler: Intermediate Level

This Learning path is designed for chemical engineers who possess a fundamental understanding of Aspen Custom Modeler. Completing this learning path will equip you with the knowledge and skills necessary to create a complex ACM model, including the ability to define sets, multiports, arrays, components, submodels and structures. You will also learn how to create and employ a variety of ACM tools, including forms, tasks, scripts and procedures.

Course Name	Knowledge Delivered	Description
Aspen Custom Modeler: Arrays, Components and Submodels	<ul style="list-style-type: none"> Sets, arrays, components and submodels for custom models 	Use sets, arrays, components and physical properties for model calculations. Modify models to incorporate multiports. Simplify custom models using submodels and hierarchy blocks. Implement structures in calculations to improve consistency and parameter estimation.
Aspen Custom Modeler: Tasks and Procedures	<ul style="list-style-type: none"> Using tasks and procedures in custom models 	In this module, learn to create and utilize tasks and procedures in Aspen Custom Modeler. You will also learn the capabilities and how tasks and procedures can be used to improve models.

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 Application: **Bidding and Estimating**

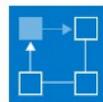


Aspen Capital Cost Estimator (ACCE): Reports and Visualization

When generating capital cost estimates it's important to be able to analyze data in digestible, customizable reports to have a clearer estimate review process. This learning path is designed for those who want to further customize their reports, and visuals. Transform your estimate review process, improve operational excellence, project efficiency, and performance. Follow and complete this learning path, from ACCE insights to learning about the different types of custom reports and visualizations. Use ACCE Insights out of the box or learn to design/customize reports to fit your needs, use milestones/benchmarking to evaluate project estimates, review the different types of custom reports, collaborate, and share your report.

Course Name	Knowledge Delivered	Description
ACCE Insights: Democratize Access to Key Estimate Information	<ul style="list-style-type: none"> Discover ACCE Insights 	ACCE Insights is a collaboration between Aspen Capital Cost Estimator and Aspen Enterprise Insights. Deploy the packaged solution in Aspen Enterprise Insights to improve operational excellence, project efficiency and performance by transforming the estimate review process. Review the requirements to deploy ACCE Insights, walk through the out-of-the-box solution and customize the reports. Use benchmarking and milestones to compare the current estimate against past project actuals, in-progress estimates and previous versions of the same estimate.

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 Application: **Exchanger Design and Rating**



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Aspen Exchanger Design & Rating™ (EDR): Rigorous Design and Rating of Heat Exchangers

This learning path is designed for the new and experienced process engineers. Complete this learning path to learn how to model, monitor and troubleshoot heat exchangers of various types using Shell and Tube, Fired Heater, Air Cooled, Plate Fin, Plate and Coil wound exchanger types. You will also learn examples such as crude preheat train monitoring to apply rigorous models in operation and designs.

Course Name	Knowledge Delivered	Description
Aspen Exchanger Design and Rating: Learn the Basics	<ul style="list-style-type: none"> Heat exchanger design and rating basics 	Learn about the Aspen Exchanger Design and Rating suite of programs and the tools bundled with it. Get an overview of the workflow for heat exchanger design and see some best practices for defining your case.
Shell and Tube Thermal: Learn the Basics for all Major Equipment Types	<ul style="list-style-type: none"> Shell and Tube heat exchanger design 	Understand where shell and tube exchangers are used and how to simulate, rate and design them in Aspen Shell and Tube Exchanger™. We will discuss the program interface, enter process and physical data, specify the exchanger configuration and geometry and then run the case. Once the case is run, we will analyze the results and make decisions about exchanger performance, design, operations, optimization and more.
Plate Heat Exchanger Modeling: Simulate Gasketed, Welded or Brazen Types	<ul style="list-style-type: none"> Plate heat exchanger design 	Learn how to simulate plate exchangers in Aspen Exchanger Design and Rating. We will discuss the program interface, import process data from an Aspen HYSYS case, learn to specify exchanger parameters such as materials of construction and then run the case. Once the case is run, we can analyze the results and look at the optimization path to see how improvements can be made to the design of the exchanger. Finally, we will convert the previously entered data to a rating/checking case.
Fired Heater Heat Exchanger Modeling: Rigorously Analyze Fired Heater Operations	<ul style="list-style-type: none"> Fired heat exchanger design 	Understand the general features and applications of fired heaters and how they are modeled in Aspen Fired Heater®. Learn about entering or generating process data, the property packages available, fluid properties and calculation modes. Review Fuels and Oxidants, geometry input and program options, and learn where to get the most important results and how to interpret them.

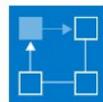
<p>Plate Fin Heat Exchanger Modeling: Address Modern Gas Processing Applications</p>	<ul style="list-style-type: none"> • Plate fin heat exchanger design 	<p>Learn about the general features and applications of plate fin heat exchangers and how to model them in Aspen Plate Fin Exchanger™. Understand process data, the property packages available and fluid properties. Learn terminology and geometry, how geometry is entered and options for controlling design, thermal analysis, and convergence in Aspen Plate Fin Exchanger. Find out where to go to get the most important results and useful tips for evaluating results.</p>
<p>Shell and Tube Mechanical: Optimize the Design of Heat Exchangers</p>	<ul style="list-style-type: none"> • Shell and tube heat exchanger design 	<p>Understand how Aspen Shell and Tube Mechanical™ is used for the mechanical design of shell and tube exchangers. We discuss the mechanical design codes and material standards available, the program interface, how to specify the exchanger configuration and geometry, options for load analysis and costing. Data transfer between Shell and Tube Thermal and Shell and Tube Mechanical is shown, Shell and Tube Mechanical results sections are described, including ASME code calculation results.</p>
<p>Coil Wound Heat Exchanger Modeling: Optimize Complex Cryogenic Processes</p>	<ul style="list-style-type: none"> • Coil wound heat exchanger design 	<p>Learn why coil wound exchangers are used and how to simulate them in Aspen Exchanger Design and Rating. We will discuss the program interface, enter process and physical data, specify the exchanger configuration and geometry, and then run the case. Once the case is run, we can analyze the results and make decisions about exchanger performance, design, operations, optimization and more.</p>
<p>Thermosiphon: Learn How to Model a Thermosiphon Heat Exchanger</p>	<ul style="list-style-type: none"> • Thermosiphon reboiler design 	<p>Understand the working principles of a thermosiphon reboiler and their areas of application. We discuss typical geometry, key Aspen Exchanger Design and Rating input for thermosiphons and modes of calculation, the thermosiphon circuit and piping elements associated with it, and stability issues and how to address them.</p>
<p>Full Process Model: Leverage Heat Exchanger Models within Aspen HYSYS</p>	<ul style="list-style-type: none"> • EDR integration with Aspen HYSYS 	<p>Learn about the integration of Aspen Exchanger Design and Rating heat transfer models with Aspen HYSYS. You will be introduced to the exchanger models in both Aspen HYSYS and Aspen Exchanger Design and Rating and the advantages of the different types. Discover how to implement dual- and multi-stream rigorous Aspen EDR models within Aspen HYSYS and how to access the results.</p>
<p>Full Process Model: Leverage Heat Exchanger Models from Aspen Plus®</p>	<ul style="list-style-type: none"> • EDR integration with Aspen Plus 	<p>Learn about available heat exchanger models in Aspen Plus and Aspen Exchanger Design and Rating. Once the heat exchanger is designed, we will analyze the results and evaluate the exchanger's performance, design, operations and more.</p>

Chemical Processes: Model Heat Exchangers from Within Aspen Plus	<ul style="list-style-type: none"> • EDR integration with Aspen Plus 	Discover the five models that are commonly to simulate heat exchange. Learn about the Heater, HeatX and HXFlux models, including their definitions, UI information and applications.
Crude Preheat Train: Learn the Basics of Heat Exchanger Network Modeling	<ul style="list-style-type: none"> • Refinery crude preheat train optimization 	Review the components of a crude preheat train and how to build a simulation model for a preheat train. We discuss the best practices used while building these models, including both simple and rigorous models. Reports for the preheat train will also be shown.
Crude Preheat Train: Monitor HX Fouling and Cleaning Sequence	<ul style="list-style-type: none"> • Refinery crude preheat train optimization through operational decision support 	Get an understanding of the online and offline applications for exchanger fouling monitoring within various units in a plant. We will go through the data requirements and technologies used and discuss the main benefits of having an automatically calibrated system for live monitoring or offline reports.

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Energy, Engineering and Construction

Applications: **Concurrent Conceptual Engineering, Distillation Design & Revamps, Operations Decision Support, Process Safety Analysis**



DESIGN



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Aspen HYSYS®: Learn the Basics

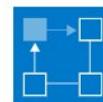
This learning path is designed for new and experienced engineers using Aspen HYSYS who need to address process engineering challenges in their oil and gas processing facilities. You will learn the typical workflow to set up a simulation in Aspen HYSYS to optimize processes. You will also learn how to utilize various tools in Aspen HYSYS to evaluate the scenario, troubleshoot the models, and create custom reports.

Course Name	Knowledge Delivered	Description
Aspen HYSYS: Learn the Basics	<ul style="list-style-type: none"> Process simulation basics Flowsheet creation 	Review the capabilities of Aspen HYSYS, our process simulation software for the petrochemical and related industries. We will introduce the concept of process simulation and some of its advantages and applications. Using a simple hydrocarbon separation as a demonstration, we will introduce and explain the typical workflow for Aspen HYSYS simulations, utilizing the Properties and Simulation environments. We will touch upon common elements of the user interface, some useful keyboard shortcuts, where to access additional resources, some tips for building effective models, and how to troubleshoot models.
Aspen HYSYS: Utilize Analysis and Reporting Tools	<ul style="list-style-type: none"> Analysis and reporting tools 	Review the analysis tools and reporting tools available in Aspen HYSYS. Summarize what each of the tool does within Stream Analysis, Equipment Design, Model Analysis. Explain flowsheet-wide based analysis tools: Case Studies, Data Fit, Optimizer. Illustrate Reporting options, Flowsheet-based reporting options, Report Manager, Data Tables and Spreadsheet. Summarize the functions that can be exported to Excel and demonstrate how to add a stream correlation and export a report using report manager.
Leverage Aspen Simulation Workbook with Aspen HYSYS	<ul style="list-style-type: none"> Operational decision support leveraging Aspen Simulation Workbook 	Get up and running with Aspen Simulation Workbook! Start with a fresh installation and work through activating Aspen Simulation Workbook and linking it to your model, and then progress to advanced features like form controls and working with plant data tags. This is a great place to begin, whether you are just getting started using the software or you are a long-time user who would like to learn about some of the more advanced features.
Aspen HYSYS: Relative Economic Analysis with Activation	<ul style="list-style-type: none"> Map, size and evaluate flowsheets Create comparison reports 	Accelerate process development by utilizing Aspen Process Economic Analyzer (APEA) directly within Aspen HYSYS. Learn how APEA is used to map, size, and evaluate the flowsheet, mapping blocks and

		<p>unit operations into physical pieces of equipment. Create reports to compare different scenarios or export the model entirely to the standalone APEA environment. Apply volumetric cost models to estimate capital costs, operating costs, the payback period, and other investment parameters of your process.</p>
Aspen HYSYS: Developing Automation Solutions	<ul style="list-style-type: none"> • Develop automation solutions 	<p>Discuss the importance of developing automation solutions for Aspen HYSYS. Describe the two commonly used customization methods: programmability and extensibility. Integrate the Aspen HYSYS Type Library and use it to navigate through simulation objects. Model the procedure used to access the Object Browser in Microsoft Excel. Practice linking Aspen HYSYS with Microsoft Excel and recognize the implications of early and late binding. Explain the purpose and functionality of the Macro Language Editor tool and the integration of extensions in Aspen HYSYS. Lastly, recognize the general features of a User Unit Operator and how they relate to extensions.</p>

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Energy, Engineering and Construction

 Applications: **Concurrent Conceptual Engineering, Operations Decision Support**


DESIGN



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Aspen HYSYS® Petroleum Refining: Molecular Modeling

The integration of refineries with chemicals is becoming an important growth strategy for many companies which requires molecule-level tracking from crude oil to chemical products. Molecular modeling is foundational to asset optimization of Crude-to-Chemicals complexes. The 2020 IMO regulation and environmental requirements will have a significant impact on the economics of almost all major refineries. Molecular modeling enables refiners to track contaminants like sulfur compounds closely. This learning path is designed for experienced engineers in Aspen HYSYS that need to learn how to characterize crude assays at the molecular level, develop a high-fidelity digital twin of your hydrocracker unit with the molecule-based hydrocracker model, and improve the refinery LP planning model. Follow the sequence of courses in this learning path to learn how to increase profits by accurately predicting product yields and properties for the hydrocracker unit, and optimize production and product specifications with molecular modeling capabilities in Aspen HYSYS.

Course Name	Knowledge Delivered	Description
Aspen HYSYS: Learn the Basics	<ul style="list-style-type: none"> Process simulation basics Flowsheet creation 	Review the capabilities of Aspen HYSYS, our process simulation software for the petrochemical and related industries. We will introduce the concept of process simulation and some of its advantages and applications. Using a simple hydrocarbon separation as a demonstration, we will introduce and explain the typical workflow for Aspen HYSYS simulations, utilizing the Properties and Simulation environments. We will touch upon common elements of the user interface, some useful keyboard shortcuts, where to access additional resources, some tips for building effective models, and how to troubleshoot models.
Aspen HYSYS Petroleum Refining: Learn the Basics	<ul style="list-style-type: none"> Deeper insights to petroleum refining 	In the petroleum refining process, a group of unit operations in a production facility is used to convert crude oil into valuable fuel products that can be sold in the marketplace. In this module, you will learn the refining process in the petroleum refining products in Aspen HYSYS. The models and workflows of Aspen HYSYS Petroleum Refining will be showed in detail.
Assay Management: Learn the Basics	<ul style="list-style-type: none"> Leverage assays when building your refinery process models 	We introduce assay characterization, which is the first step towards using an assay in your simulation. We discuss different assay types and how they can be characterized in Aspen Assay Management. Once an assay is characterized, we demonstrate how to use the results in an Aspen HYSYS Petroleum Refining simulation case.
Hydrocracker Modeling: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of hydrocracker modeling in Aspen HYSYS 	Introduce hydroprocessing simulations in Aspen HYSYS with the hydrocracker (HCR) and hydroprocessing bed (HBED) reactor models. Review the industry's use of hydrocracking and hydrotreating. Then,

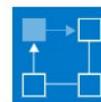
		understand how Aspen HYSYS uses the HCR and HBED models to simulate hydroprocessing operations. Adapt the models to a physical process with multiple configuration layouts. Use the Hydrocracker Configuration Wizard to change the model configuration and explore the simulation results within the results forms.
Molecular Modeling: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of molecular modeling in Aspen HYSYS 	As operating margins tighten and refiners must continuously work to meet evolving regulations, molecular modeling techniques are emerging to redefine the accuracy of simulation technology. In Aspen HYSYS, crude oil assays and chemical reactions can be modeled to a molecular granularity, which provides precise and accurate properties for upstream and refining operations. Here you will learn the basics of molecular characterization and the molecular-based reactor, what the molecular modeling workflow entails, and the data requirements for molecular modeling.
Molecular Modeling: Feedstock Characterization	<ul style="list-style-type: none"> Learn what molecular characterization is and how it is performed in Aspen HYSYS 	Learn what molecular characterization is and how it is performed in Aspen HYSYS. Explore how to use molecular characterization to characterize an assay and the results of the molecular characterization.
Molecular Modeling: Use Molecular Information with Traditional Unit Operations	<ul style="list-style-type: none"> Use molecular information with traditional unit operations 	In Aspen HYSYS V10 and after, users can use molecular information with five traditional unit operations, which include the Hydrocracker, Fluid Catalytic Cracker, Reformer, Visbreaker and Delayed Coker models. Understand the procedures of using molecular information with these traditional reactor models.
Molecular Modeling: Molecular-based Hydrocracker	<ul style="list-style-type: none"> Discover the benefits of a molecular-based reactor 	Identify the potential benefits of using a molecular-based reactor to simulate hydroprocessing operations. Compare the capabilities of this reactor to traditional reactors and explain how the molecular-based reactor results in higher resolution. Delve into the technical approach and utilize the Linear Free Energy Relationship and Langmuir-Hinshelwood-Hougen-Watson mechanism to create accurate simulations. Configure a reactor to model a hydrotreating bed, then calibrate this model to more accurately match plant operations.
Molecular Modeling: Improve Hydrodesulfurization	<ul style="list-style-type: none"> Learn to improve hydrodesulfurization 	In Aspen HYSYS V10 and after, molecular information can be propagated through Aspen HYSYS unit operations. Hydrodesulfurization results can be predicted according to the sulfur molecule distribution generated from molecular-characterized assays.
Molecular Modeling: Achieve a Better Property Prediction in Crude Distillation Units	<ul style="list-style-type: none"> Achieve a better property prediction in crude distillation units 	In Aspen HYSYS V10 and after, molecular information can be propagated through Aspen HYSYS unit operations. In the crude distillation units model, property prediction, such as the octane number in gasoline and the cetane number in diesel, can be made according to the molecular information generated from molecular-characterized assays.

Molecular Modeling: Supporting Refinery- Petrochemical Integration	<ul style="list-style-type: none">• Support refinery petrochemical integration	Learn how molecular modeling enables refinery-petrochemical integration.
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Energy, Engineering and Construction

Applications: **Gas Plant Optimization, Operations Decision Support**



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Aspen HYSYS®: Gas Plant

A gas processing plant takes raw natural gas and produces gas that meets sales specifications. This learning path is designed for new and experienced engineers working with Acid Gas Removal, Dehydration, Sulfur Recovery and other integrated processes.

Complete the learning path to discover how to bring new gas and liquids processing facilities to market faster with a higher return on investment, reduce capital costs through process optimization and lower operating costs by integrating simulation models.

Course Name	Knowledge Delivered	Description
Aspen HYSYS: Learn the Basics	<ul style="list-style-type: none"> • Process simulation basics • Flowsheet creation 	Review the capabilities of Aspen HYSYS, our process simulation software for the petrochemical and related industries. We will introduce the concept of process simulation and some of its advantages and applications. Using a simple hydrocarbon separation as a demonstration, we will introduce and explain the typical workflow for Aspen HYSYS simulations, utilizing the Properties and Simulation environments. We will touch upon common elements of the user interface, some useful keyboard shortcuts, where to access additional resources, some tips for building effective models, and how to troubleshoot models.
Leverage Aspen Simulation Workbook with Aspen HYSYS	<ul style="list-style-type: none"> • Operational decision support leveraging Aspen Simulation Workbook 	Get up and running with Aspen Simulation Workbook! Start with a fresh installation and work through activating Aspen Simulation Workbook and linking it to your model, and then progress to advanced features like form controls and working with plant data tags. This is a great place to begin, whether you are just getting started using the software or you are a long-time user who would like to learn about some of the more advanced features.
Get an Overview of Simulating the Full Gas Plant	<ul style="list-style-type: none"> • Understand and optimize major processes of a gas plant 	Within a typical gas plant, the following units are key to reaching sales gas specifications: Acid Gas Treating, Sulfur Recovery, Tail Gas Treating, and Dehydration. Review the characteristics and purposes of these units and learn how Aspen HYSYS can be used to model them.
Acid Gas Removal: Learn the Basics to Minimize Amine Costs	<ul style="list-style-type: none"> • Basics of acid gas removal in the gas plant 	Explore how to build an acid gas cleaning model from scratch. Common operating conditions are prescribed, and demonstrations are given to build a flowsheet, from properties selection to advanced modeling configuration. The process will utilize an amine solvent,

		methyldiethanolamine (MDEA), to remove acid gases from natural gas. Recycle capability and heat integration are also introduced.
Sulfur Recovery: Learn the Basics to Conquer the SRU	<ul style="list-style-type: none"> Basics of sulfur recovery in the gas plant 	Learn how to build and simulate the typical Claus Process in an SRU with Sulsim™ Sulfur Recovery in Aspen HYSYS.
Glycol Dehydration: Learn the Basics to Minimize Solvent Costs	<ul style="list-style-type: none"> Optimize dehydration by leveraging chemical glycol absorbents 	Explore how to build a natural gas dehydration model from scratch. Common operating conditions are prescribed and demonstrations are given to build a flowsheet, from properties selection to hydrate formation analysis. The process will utilize a glycol absorbent, triethylene glycol (TEG), to remove water from natural gas. Recycle capability and heat integration are also introduced.
Acid Gas Removal: Meet Sales Gas Specs with Rate-Based Modeling	<ul style="list-style-type: none"> Optimizing acid gas column performance leveraging rate-based modeling 	Review a natural gas acid gas treating unit that has degraded to the point of failing a key specification and is in danger of failing a second. Use the Aspen HYSYS hydraulics analysis environment to investigate the current column internals and test substitutes for the current column internals before opting for a column revamp. Finally, with the enhanced separations achieved in the column, use a case study to investigate opportunities for savings in operation expenses (OPEX) in solvent circulation and recovery.
Sulfur Recovery: Optimize Operating Conditions to Reduce Costs	<ul style="list-style-type: none"> Increase sulfur recovery in the gas plant 	Learn how to optimize basic operating conditions of sulfur recovery unit, such as converter temperatures and fuel gas flow rates, using the capabilities available in Aspen HYSYS.
Sulfur Recovery: Respond to a Challenged Crude Feed	<ul style="list-style-type: none"> Understand how crude feed changes affects sulfur recovery 	A gas plant is going to process a more challenged crude feed with a greater concentration of sulfur. In this example, to evaluate the effect that this feed will have on the existing unit, we will change the crude feed compositions and feed flow rate and check the change in process conditions.
Glycol Dehydration: Meet Dew Point Specifications	<ul style="list-style-type: none"> Compare the effects of operational changes in gas plant dehydration 	Review a natural gas dehydration unit that has degraded and is currently failing to meet specifications. Use an Aspen HYSYS case study to compare various operational changes and employ the results of the study to optimize the process, allowing key specifications to be met. Review the hydraulics of absorber column and investigate if a change in column intervals could lead to increased vapor and liquid flowrates to the column. Finally, enhance the safety of the unit by calculating when hydrates would form in the process.
Aspen HYSYS: Compressor Modeling in Steady-State	<ul style="list-style-type: none"> Discover compressor modeling in steady-state 	In modern plants, compressors are the most necessary appliances. Compressors are used to increase the pressure of a gas stream and transport the gas from one point to another in a system. Aspen

		<p>HYSYS allows you to model four compressors: Centrifugal Compressor, Reciprocating Compressor, Screw Compressor and Wet Gas Compressor. For a Centrifugal Compressor, you can use the pressure specification to calculate outlet conditions in the Analysis and Design mode. Or, you can use compressor performance curves to model a Centrifugal Compressor in the Rating model.</p>
<p>Expanded Gas Plant Model: Whether to Process a Heavy Sour Feed</p>	<ul style="list-style-type: none"> • Overcome heavy sour feeds into your gas plant 	<p>Learn how to use Aspen HYSYS petroleum refining and gas plant integrated model to assess whether or not a refinery can process a heavy sour feed for great profits while still meeting product specifications and emissions requirements.</p>

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 Energy, Engineering and Construction
 Application: **Pipeline Flow Hydraulic Analysis**

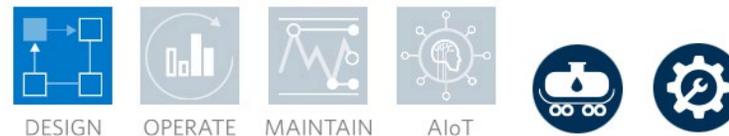


Aspen HYSYS Upstream: Upstream Flow Assurance

When transferring process liquids and gases, it is critical to avoid pipeline downtime in order to maintain both upstream and downstream operations. In the Upstream Flow Assurance Learning Path, both new and experienced process engineers will learn how to accurately model pipe flow and characterize fluids using rigorous correlations. You will also discover how to assess and mitigate the risk of hydrates, wax formation, CO2 corrosion, erosion and slugging. Lastly, you will learn the fundamentals of oil characterization, fluid flow models and steady-state as well as transient pipeline analysis.

Course Name	Knowledge Delivered	Description
Aspen HYSYS: Fluid Flow Modeling Basics	<ul style="list-style-type: none"> Simulate liquid phase, gas phase, multi-phase fluid flows 	Learn about challenges of fluid flow modeling, and the solutions that Aspen HYSYS provides. Review liquid phase, gas phase and multi-phase fluid flows, and learn how to simulate such pipelines using Aspen HYSYS.
Pipe Hydraulics: Model Flow in a Pipe Segment	<ul style="list-style-type: none"> Overcome pipe and pipeline flow constraints 	Learn how to model a pipe and pipe network using the Aspen HYSYS Pipe Segment unit operations. We will discuss the advantages and disadvantages of the Pipe Segment unit operations, as well as key assumptions that may limit the systems for which this unit operation is applicable. Then we will learn how to define key parameters in the pipe and mixer unit operations in Aspen HYSYS to properly set up a pipe network model. Finally, we will solve the pipe network.
Pipeline Hydraulics: Optimize Flow in a Pipeline Network	<ul style="list-style-type: none"> Optimize flow in a pipeline network 	Learn to model fluid flow in pipeline networks with the Hydraulics sub-flowsheet in Aspen HYSYS.

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 Application: **Dynamic Studies**



Aspen HYSYS®: Dynamic Simulation

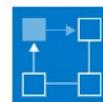
Dynamic simulation allows you to simulate a wider range of operating scenarios including start-up, shut-down and transition states. This learning path is designed for new or experienced engineers who need to learn how to improve the overall safety, operability and controllability of their design. Complete this learning path to learn how to convert existing models to dynamics, to model transient behavior of key pieces of equipment, automate emergency scenarios and perform many other key applications in dynamics.

Course Name	Knowledge Delivered	Description
Aspen HYSYS: Learn the Basics	<ul style="list-style-type: none"> Develop insights into dynamic processes 	Review the capabilities of Aspen HYSYS, our process simulation software for the petrochemical and related industries. We will introduce the concept of process simulation and some of its advantages and applications. Using a simple hydrocarbon separation as a demonstration, we will introduce and explain the typical workflow for Aspen HYSYS simulations, utilizing the Properties and Simulation environments. We will touch upon common elements of the user interface, some useful keyboard shortcuts, where to access additional resources, some tips for building effective models, and how to troubleshoot models.
Aspen HYSYS Dynamics: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen HYSYS Dynamics 	Learn how to get started with Aspen HYSYS Dynamics to model dynamic behavior in your plant. Learn how to configure your simulation case for dynamics, add controllers and view plant behavior graphically. We also provide a review of the mathematics being used to measure dynamic plant behavior, pressure-driven flow, process control and more. Additionally, we demonstrate how to model plant disturbances and black box processes in Aspen HYSYS Dynamics.
Aspen HYSYS: Compressor Modeling in Steady-State	<ul style="list-style-type: none"> Discover compressor modeling in steady-state 	In modern plants, compressors are the most necessary appliances. Compressors are used to increase the pressure of a gas stream and transport the gas from one point to another in a system. Aspen HYSYS allows you to model four compressors: Centrifugal Compressor, Reciprocating Compressor, Screw Compressor and Wet Gas Compressor. For a Centrifugal Compressor, you can use the pressure specification to calculate outlet conditions in the Analysis and

		Design mode. Or, you can use compressor performance curves to model a Centrifugal Compressor in the Rating model.
Single Stage Compressor: Leverage Pre-Configured Template to Build Models	<ul style="list-style-type: none"> Limit surge conditions in your compressors 	Discover how to use Activated Dynamics™ to simulate compressor failure scenarios and examine compressor performance. Start by going through basic theory of compressor surge, and then walk through how the anti-surge valve can be used to prevent a compressor from going into surge. Finally, we demonstrate how to use pre-built failure scenarios and make design changes to ensure safe operation during emergency scenarios.
Multi-Stage Compressor: Leverage Pre-Configured Template to Build Models	<ul style="list-style-type: none"> Develop strategies to prevent compressor surge 	Find out how to use Activated Dynamics to simulate compressor failure scenarios and examine compressor performance. We provide a quick overview of compressor surge and anti-surge control strategies, discuss the pre-built template available in Activated Dynamics and then demonstrate how to use pre-built failure scenarios and make design changes to ensure safe operation during emergency scenarios.
Dynamic Fire Scenario: Model Custom Scenarios with Spreadsheets	<ul style="list-style-type: none"> Optimize FLARE, maximizing process safety 	Learn the basics of spreadsheet unit operations in Aspen HYSYS. This module demonstrates a simple manually executed fire scenario and the use of a spreadsheet in a dynamic simulation to calculate heat input for a fire.
Dynamics Event Scheduler: Set up an Emergency Scenario	<ul style="list-style-type: none"> Prepare for emergency control valve failures with Event Scheduler 	Learn the basics of Event Scheduler in Aspen HYSYS Dynamics, including a walk-through of how to add a basic event in the Scheduler Manager to set up an emergency scenario. A demonstration is added to simulate the closing of the control valves in a fire scenario, and we observe the pressure and liquid level in the separator after turning off the feed.
Compressor Settle-Out: Meet API 521 Compliance	<ul style="list-style-type: none"> Experience a compressor shutdown and verify the compressor has not entered surge conditions 	Learn about compressor settle-out using Aspen HYSYS Dynamics. This will show a dynamic case where the event scheduler is used to simulate a compressor trip, calculate settle-out pressure, and verify that the compressor does not enter surge during the trip.
Dynamic Compressor Modeling: Ensure Safety and Reliability	<ul style="list-style-type: none"> Understand surge conditions and monitor anti-surge controllers 	Explore how to set up a dynamic compressor model in Aspen HYSYS and monitor the performance of anti-surge controllers using head curves. Learn how to set up custom events and strip charts to analyze the compressor in custom surge scenarios and monitor key process variables.
Dynamic Column Modeling: Ensure Reliable Distillation Operation	<ul style="list-style-type: none"> Gain insights to complex dynamic column processes 	Learn how different control schemes can be set up and used for controlling the columns in Aspen HYSYS. Create custom events and analyze the control scheme performance in strip charts.

Cause and Effect Matrix: Ensure Safe Operations	<ul style="list-style-type: none"> Improving Safety leveraging Cause and Effect Matrixes 	Learn the basic concepts and applications of the Cause and Effect Matrix in Aspen HYSYS® are introduced. Then, the user interface and its associated functions are presented. Finally, a demonstration case is attached to enforce understanding of this Boolean Logic block.
Safety Workflow: Enhance Safety Analysis with Dynamic Simulation	<ul style="list-style-type: none"> Enhance Safety Analysis with Dynamic Simulation 	Learn about the safety solution tools from AspenTech. These tools help you with the planning and modeling of safety systems. Aspen HYSYS, PSV, and Aspen Flare System Analyzer™ will allow you to model an emergency scenario, size pressure relieving devices, and setup flare systems.

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 Application: **Distillation Improvement**



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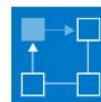
Aspen HYSYS®: Fractionation & Distillation

Separation by distillation is a key step in many oil and gas processes. This learning path is designed for new and experienced process engineers who need to understand how factors including feedstock and feed conditions, internal flow conditions and state of internals affect column performance. The optimized CDU operation allows refiners to quickly troubleshoot operational issues, put in place the most effective heat exchanger maintenance schedules and improve refinery profits by maximizing the unit's crude flexibility. Complete this learning path to learn how to meet product demands and simultaneously reduce energy consumption with a single solution to optimize the entire crude distillation unit operation.

Course Name	Knowledge Delivered	Description
Aspen HYSYS: Learn the Basics	<ul style="list-style-type: none"> Learn the basics that will lead to improved refinery fractionation and distillation 	Review the capabilities of Aspen HYSYS, our process simulation software for the petrochemical and related industries. We will introduce the concept of process simulation and some of its advantages and applications. Using a simple hydrocarbon separation as a demonstration, we will introduce and explain the typical workflow for Aspen HYSYS simulations, utilizing the Properties and Simulation environments. We will touch upon common elements of the user interface, some useful keyboard shortcuts, where to access additional resources, some tips for building effective models, and how to troubleshoot models.
Aspen HYSYS Petroleum Refining: Learn the Basics	<ul style="list-style-type: none"> Deeper insights to petroleum refining 	In the petroleum refining process, a group of unit operations in a production facility is used to convert crude oil into valuable fuel products that can be sold in the marketplace. In this module, you will learn the refining process in the petroleum refining products in Aspen HYSYS. The models and workflows of Aspen HYSYS Petroleum Refining will be showed in detail in this lesson.
Crude Distillation Unit: Rigorously Model a Crude Distillation Column	<ul style="list-style-type: none"> Improve profits of your crude distillation unit 	Learn to build a model for a crude distillation unit (CDU) in Aspen HYSYS. Simulation models of the crude distillation unit can serve many purposes. Because the feedstocks to refineries often change, models can be used to evaluate the effects of these changes in the feed. Models of the CDU are also devalued to monitor the unit, to advise on operations and to analyze column hydraulics. In addition, they can be used to update to the assay table in the planning model in Aspen PIMS™. Throughout the training there are quizzes and

		<p>exercise to give you a better understanding of how to develop the different parts of the model and to reinforce the best practices.</p>
<p>Crude Preheat Train: Learn the Basics of Heat Exchanger Network Modeling</p>	<ul style="list-style-type: none"> • Improve the operation efficiency of your CDU preheat train 	<p>Go over the components of a crude preheat train and how to build a simulation model for a preheat train. The components of a typical preheat train will be described, and best practices used while building these models with both simple and rigorous models will be discussed. Reports for the preheat train will also be shown.</p>

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 Energy, Engineering and Construction
 Application: **Refinery Profit Improvement**



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Aspen HYSYS® Petroleum Refining: Advanced Refining Reactors Modeling

This learning path is designed for experienced Aspen HYSYS users who need to model and optimize refinery processes. You will learn how to simulate/calibrate key refinery reactors such as Fluidized Catalytic Cracking (FCC), Hydrocracker, Visbreaker and Catalytic Reformer. You will learn about the workflow to calibrate FCC Reactor using First Principles Driven Hybrid Models using plant data. In addition, you will also learn about Planning Model Update workflow with an example for FCC reactor.

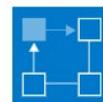
Course Name	Knowledge Delivered	Description
Aspen HYSYS: Learn the Basics	<ul style="list-style-type: none"> Understand the importance of starting your modeling with physical properties 	Review the capabilities of Aspen HYSYS, our process simulation software for the petrochemical and related industries. We will introduce the concept of process simulation and some of its advantages and applications. Using a simple hydrocarbon separation as a demonstration, we will introduce and explain the typical workflow for Aspen HYSYS simulations, utilizing the Properties and Simulation environments. We will touch upon common elements of the user interface, some useful keyboard shortcuts, where to access additional resources, some tips for building effective models, and how to troubleshoot models.
Aspen HYSYS Petroleum Refining: Learn the Basics	<ul style="list-style-type: none"> Learn the basics improving your refinery processes 	In the petroleum refining process, a group of unit operations in a production facility is used to convert crude oil into valuable fuel products that can be sold in the marketplace. In this module, you will learn the refining process in the petroleum refining products in Aspen HYSYS. The models and workflows of Aspen HYSYS Petroleum Refining will be showed in detail in this lesson.
Assay Management: Learn the Basics	<ul style="list-style-type: none"> Leverage assays when building your refinery process models 	We introduce assay characterization, which is the first step towards using an assay in your simulation. We discuss different assay types and how they can be characterized in Aspen Assay Management. Once an assay is characterized, we demonstrate how to use the results in an Aspen HYSYS Petroleum Refining simulation case.
Fluid Catalytic Cracker Modeling: Learn the Basics	<ul style="list-style-type: none"> Fluid catalytic cracker modeling basics 	The fluid catalytic cracking process, or FCC, is the “heart” of the modern-day refining process. It is the most important and widely used petroleum refining process for cracking heavy oil fractions into lighter valuable products. We will review the FCC process in petroleum

		refining and how to configure a new FCC unit operation in the Aspen HYSYS flowsheet. We will go over the key features of the Aspen HYSYS FCC unit operation.
Fluid Catalytic Cracker Modeling: Configure, Calibrate and Simulate	<ul style="list-style-type: none"> Improve your FCC operations 	Explore how to use the Aspen HYSYS Petroleum Refining CatCracker model in Aspen HYSYS flowsheets and the configuration, calibration and simulation features as key models of workflows. You will be introduced to the FCC modeling including configuring a FCC template, calibrating the FCC template, converting the calibrated FCC model to simulation, applying the template in an Aspen HYSYS case simulation, and adding a new feed to the FCC model. A product fractionation in the FCC flowsheet and a flowsheet to calibration round-trip is also covered.
FCC Reactor Calibration using First Principles-Driven Hybrid Models	<ul style="list-style-type: none"> Use first principles-driven hybrid models to calibrate an FCC 	First Principles Driven Hybrid Models combine the benefits of traditional first principles models and AI-based machine learning models. First principles-driven hybrid models augment the rigorous mechanistic models already available in Aspen Plus and Aspen HYSYS in which some of the phenomena occurring inside it are unknown resulting in deviations of model predictions from process data. First principles-driven hybrid modeling allows you to use our fundamental system knowledge such as mass, energy balances, reaction chemistry and thermodynamics as a framework, and then leverage machine learning to build correlations from process data. These models offer improved accuracy over the pure first principles and machine learning models. First Principles-Driven Hybrid Models offer higher value from simulations by automatically calibrating the FCC and expanding the scope of what can be modeled.
Planning Model Update: Use Rigorous FCC Models for Accurate Planning	<ul style="list-style-type: none"> Updating planning models using refinery operational data 	Understand why planning models need to be updated and discover five high-level steps in the Planning Model Update workflow. Learn how to determine the operating ranges of jet variables and how to set up shift vectors in Aspen HYSYS. Additionally, this lesson will cover how to update the base and shift vectors in Aspen HYSYS case study to reflect any changes and then export the simulation data from Aspen HYSYS to update the planning model.
Aspen HYSYS: Maintain Accurate Planning Models Using the Streamlined Planning Model Update Workflow	<ul style="list-style-type: none"> Learn about the importance of maintaining planning models 	As time passes, the value delivered by refinery planning models decreases due to changes in operations. Updating planning models maintains this value but has historically been overly time consuming and difficult. Available in Aspen HYSYS V9 and later, the streamlined planning model update workflow integrates Aspen HYSYS with Microsoft Excel, allowing for automation and collaboration. Review the

		five high-level steps of the planning model update workflow, then follow the workflow from start to finish. Import plant data, calibrate the Aspen HYSYS model, validate the calibrated model predictions, generate base-and-shift vectors, and utilize the new model in Aspen PIMS.
Hydrocracker Modeling: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of hydrocracker modeling in Aspen HYSYS 	Introduce hydroprocessing simulations in Aspen HYSYS with the hydrocracker (HCR) and hydroprocessing bed (HBED) reactor models. Review the industry's use of hydrocracking and hydrotreating. Then, understand how Aspen HYSYS uses the HCR and HBED models to simulate hydroprocessing operations. Adapt the models to a physical process with multiple configuration layouts. Use the Hydrocracker Configuration Wizard to change the model configuration and explore the simulation results within the results forms.
Hydrocracker Modeling: Configure, Calibrate and Simulate	<ul style="list-style-type: none"> Explore the hydrocracker unit operation in Aspen HYSYS 	Explore the hydrocracker unit operation in Aspen HYSYS. Review how hydrocracker template files can stand alone or be used to integrate a hydrocracker model with larger processes. Take advantage of the Hydrocracker Configuration Wizard to define the geometry of the simulated hydrocracker, then calibrate the model to replicate real-world data. Use multiple data sets to tune the hydrocracker model and switch between calibration setting without re-calibrating the model. Customize the hydrocracker template for use and re-use in other Aspen HYSYS cases and update the hydrocracker model to maintain accurate results.
Delayed Coker Modeling: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of delayed coker modeling in Aspen HYSYS 	Review the delayed coking technology, which is an important thermal cracking process for residual oil treatments. Understand how it works and use the delayed coker reactor model in Aspen HYSYS to simulate the process.
Visbreaker Reactor Modeling: Learn the Basics	<ul style="list-style-type: none"> Master the basics of Visbreaker reactor modeling 	Review the visbreaking technology, which is a mature and simple thermal cracking process for residual oil treatments. Compare two types of visbreaking processes and decide which one better benefits the refinery. Use the Visbreaker reactor model in Aspen HYSYS to simulate the process.
Visbreaker Modeling: Configure, Calibrate and Simulate	<ul style="list-style-type: none"> Understand how to configure, calibrate and simulate Visbreaker modelling 	Explore the Visbreaker block in Aspen HYSYS by navigating its specification forms and explaining the requirements for its simulation. Begin by using a Petroleum Feeder block to generate a compliant material stream. Configure the Visbreaker, declaring the presence of a soaker drum and specifying conditions and parameters used to converge the model. Replicate a physical Visbreaker with the Aspen HYSYS model by calibrating the model. Tune a variety of factors and

		<p>modify the Aspen HYSYS Solver parameters to improve convergence. Simulate the results of product fractionation.</p>
<p>Catalytic Reformer Modeling: Learn the Basics</p>	<ul style="list-style-type: none"> • Improve your refinery operations of your catalytic reformers 	<p>Catalytic reforming converts low-octane naphtha into higher-octane reformate products for gasoline blending. There are three types of catalytic reformer: semi-regenerative catalytic reformer (SRR), continuous catalyst regeneration reformer (CCR) and cyclic reformers. Aspen HYSYS reformer model can be used to model the first two types. The Catalytic Reformer operation includes a feed characterization system, reactor section, optional stabilizer and product mapper. The key features of the naphtha reformer include support for various reformer configurations, an unlimited number of feed streams, operating variables that can be specified to match your operation and a calibration environment that allows you to specify plant data.</p>
<p>Catalytic Reformer Modeling: Configure, Calibrate and Simulate</p>	<ul style="list-style-type: none"> • Improve your refinery operations of your catalytic reformers 	<p>Learn the following topics:</p> <ul style="list-style-type: none"> • Configuring a reformer model • Calibrating a reformer model • Converting calibration to simulation • Adding reformer model to flowsheet • Adding a feed to reformer model • Adding product fractionation to reformer model • Simulation to calibration round-trip

aspenONE® Engineering
 Energy, Engineering and Construction
 Application: **Refinery Profit Improvement**



DESIGN



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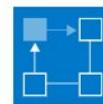
Aspen HYSYS® Petroleum Refining: Basics

Petroleum refining products must meet stringent specifications including limits on octane, sulfur, nitrogen, olefin, etc. This learning path is designed for new and experienced engineers. Complete this learning path to characterize crude assay, model a reformer unit to represent an actual unit operation and support the refinery LP planning model. Increase refinery profits by improving operations, debottlenecking and optimizing production and product specifications.

Course Name	Knowledge Delivered	Description
Aspen HYSYS: Learn the Basics	<ul style="list-style-type: none"> Understand the importance of starting your modeling with physical properties 	Review the capabilities of Aspen HYSYS, our process simulation software for the petrochemical and related industries. We will introduce the concept of process simulation and some of its advantages and applications. Using a simple hydrocarbon separation as a demonstration, we will introduce and explain the typical workflow for Aspen HYSYS simulations, utilizing the Properties and Simulation environments. We will touch upon common elements of the user interface, some useful keyboard shortcuts, where to access additional resources, some tips for building effective models, and how to troubleshoot models.
Aspen HYSYS Petroleum Refining: Learn the Basics	<ul style="list-style-type: none"> Learn the basics improving your refinery processes 	In the petroleum refining process, a group of unit operations in a production facility is used to convert crude oil into valuable fuel products that can be sold in the marketplace. In this module, you will learn the refining process in the petroleum refining products in Aspen HYSYS. The models and workflows of Aspen HYSYS Petroleum Refining will be showed in detail in this lesson.
Assay Management: Learn the Basics	<ul style="list-style-type: none"> Leverage assays when building your refinery process models 	We introduce assay characterization, which is the first step towards using an assay in your simulation. We discuss different assay types and how they can be characterized in Aspen Assay Management. Once an assay is characterized, we demonstrate how to use the results in an Aspen HYSYS Petroleum Refining simulation case.
Catalytic Reformer Modeling: Learn the Basics	<ul style="list-style-type: none"> Improve your refinery operations of your catalytic reformers 	Catalytic reforming converts low-octane naphtha into higher-octane reformate products for gasoline blending. There are three types of catalytic reformer: semi-regenerative catalytic reformer (SRR), continuous catalyst regeneration reformer (CCR) and cyclic reformers. Aspen HYSYS reformer model can be used to model the first two

		<p>types. The Catalytic Reformer operation includes a feed characterization system, reactor section, optional stabilizer and product mapper. The key features of the naphtha reformer include support for various reformer configurations, an unlimited number of feed streams, operating variables that can be specified to match your operation and a calibration environment that allows you to specify plant data.</p>
<p>Catalytic Reformer Modeling: Configure, Calibrate and Simulate</p>	<ul style="list-style-type: none"> • Improve your refinery operations of your catalytic reformers 	<p>Learn the following topics:</p> <ul style="list-style-type: none"> • Configuring a reformer model • Calibrating a reformer model • Converting calibration to simulation • Adding reformer model to flowsheet • Adding a feed to reformer model • Adding product fractionation to reformer model • Simulation to calibration round-trip

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 Energy, Engineering and Construction
 Application: **Refinery Profit Improvement**



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Aspen HYSYS® Petroleum Refining: Planning Model Update

This learning path is designed for experienced Aspen HYSYS users who need to model refinery processes and utilize these models for their Refinery Planning Models in Aspen PIMS. You will learn how to model a Fluid Catalytic Cracking (FCC) model and utilize that model for Planning Model Update. You will also learn about Aspen Hybrid Models and how Hybrid Models can improve the workflow and accuracy of your planning.

Course Name	Knowledge Delivered	Description
Aspen HYSYS: Learn the Basics	<ul style="list-style-type: none"> Understand the importance of starting your modeling with physical properties 	Review the capabilities of Aspen HYSYS, our process simulation software for the petrochemical and related industries. We will introduce the concept of process simulation and some of its advantages and applications. Using a simple hydrocarbon separation as a demonstration, we will introduce and explain the typical workflow for Aspen HYSYS simulations, utilizing the Properties and Simulation environments. We will touch upon common elements of the user interface, some useful keyboard shortcuts, where to access additional resources, some tips for building effective models, and how to troubleshoot models.
Aspen HYSYS Petroleum Refining: Learn the Basics	<ul style="list-style-type: none"> Learn the basics improving your refinery processes 	In the petroleum refining process, a group of unit operations in a production facility is used to convert crude oil into valuable fuel products that can be sold in the marketplace. In this module, you will learn the refining process in the petroleum refining products in Aspen HYSYS. The models and workflows of Aspen HYSYS Petroleum Refining will be showed in detail in this lesson.
Assay Management: Learn the Basics	<ul style="list-style-type: none"> Leverage assays when building your refinery process models 	We introduce assay characterization, which is the first step towards using an assay in your simulation. We discuss different assay types and how they can be characterized in Aspen Assay Management. Once an assay is characterized, we demonstrate how to use the results in an Aspen HYSYS Petroleum Refining simulation case.
Fluid Catalytic Cracker Modeling: Learn the Basics	<ul style="list-style-type: none"> Fluid catalytic cracker modeling basics 	The fluid catalytic cracking process, or FCC, is the “heart” of the modern-day refining process. It is the most important and widely used petroleum refining process for cracking heavy oil fractions into lighter valuable products. We will review the FCC process in petroleum refining and how to configure a new FCC unit operation in the Aspen

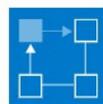
		HYSYS flowsheet. We will go over the key features of the Aspen HYSYS FCC unit operation.
Fluid Catalytic Cracker Modeling: Configure, Calibrate and Simulate	<ul style="list-style-type: none"> Improve your FCC operations 	Explore how to use the Aspen HYSYS Petroleum Refining CatCracker model in Aspen HYSYS flowsheets and the configuration, calibration and simulation features as key models of workflows. You will be introduced to the FCC modeling including configuring a FCC template, calibrating the FCC template, converting the calibrated FCC model to simulation, applying the template in an Aspen HYSYS case simulation, and adding a new feed to the FCC model. A product fractionation in the FCC flowsheet and a flowsheet to calibration round-trip is also covered.
FCC Reactor Calibration using First Principles-Driven Hybrid Models	<ul style="list-style-type: none"> Use first principles-driven hybrid models to calibrate an FCC 	First Principles Driven Hybrid Models combine the benefits of traditional first principles models and AI-based machine learning models. First principles-driven hybrid models augment the rigorous mechanistic models already available in Aspen Plus and Aspen HYSYS in which some of the phenomena occurring inside it are unknown resulting in deviations of model predictions from process data. First principles-driven hybrid modeling allows you to use our fundamental system knowledge such as mass, energy balances, reaction chemistry and thermodynamics as a framework, and then leverage machine learning to build correlations from process data. These models offer improved accuracy over the pure first principles and machine learning models. First Principles-Driven Hybrid Models offer higher value from simulations by automatically calibrating the FCC and expanding the scope of what can be modeled.
Planning Model Update: Use Rigorous FCC Models for Accurate Planning	<ul style="list-style-type: none"> Updating planning models using refinery operational data 	Understand why planning models need to be updated and discover five high-level steps in the Planning Model Update workflow. Learn how to determine the operating ranges of jet variables and how to set up shift vectors in Aspen HYSYS. Additionally, this lesson will cover how to update the base and shift vectors in Aspen HYSYS case study to reflect any changes and then export the simulation data from Aspen HYSYS to update the planning model.
Aspen HYSYS: Maintain Accurate Planning Models Using the Streamlined Planning Model Update Workflow	<ul style="list-style-type: none"> Learn about the importance of maintaining planning models 	As time passes, the value delivered by refinery planning models decreases due to changes in operations. Updating planning models maintains this value but has historically been overly time consuming and difficult. Available in Aspen HYSYS V9 and later, the streamlined planning model update workflow integrates Aspen HYSYS with Microsoft Excel, allowing for automation and collaboration. Review the five high-level steps of the planning model update workflow, then

		follow the workflow from start to finish. Import plant data, calibrate the Aspen HYSYS model, validate the calibrated model predictions, generate base-and-shift vectors, and utilize the new model in Aspen PIMS.
Aspen Hybrid Models: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen Hybrid Models 	AspenTech combines Artificial Intelligence technology with all the deep processing expertise that we have in the process industries over the past 40 years to develop a brand new product, Aspen Hybrid Models. With Aspen Hybrid Models, users can build a more accurate and efficient model.
Aspen Hybrid Models: Choosing a Purpose	<ul style="list-style-type: none"> Learn to create models for each scenario in Aspen AI Model Builder 	Use Aspen AI Model Builder to create many different models through artificial intelligence. Review the model types available in Aspen AI Model Builder and decide which model is the best fit for a given scenario. For each model type, describe the model characteristics and common use cases, the data required to create the model, and quickly get an overview of the workflow to create a model.
Aspen Hybrid Models: Planning Model Update with AI-Powered Models	<ul style="list-style-type: none"> Create a model in Aspen AI Model Builder to be used within Aspen PIMS-AO 	Beginning with a single Aspen HYSYS case, walk through the entire workflow of creating a reduced order planning model. Generate a dataset in Aspen Multi-Case to ensure a consistently high-quality model. Then, use Aspen AI Model Builder to consume, clean and build a model from this dataset. Constrain the model under a mass balance, then create, validate and compare multiple versions of the model. Review the statistics used to quantify model accuracy and predictability. Finally, export the model file and use this file to replace and existing submodel within an Aspen PIMS project.

aspenONE® Engineering

Energy, Chemicals, Engineering and Construction

Application: **Process Safety Analysis**



DESIGN



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Aspen HYSYS®: Process Safety

In a plant emergency, process material must be safely relieved to limit consequences. This learning path is designed for new or experienced engineers and safety engineers who need to learn how to design single or multiple relief valves for all applicable scenarios in an overpressure study. Complete this learning path to learn the BLOWDOWN® technology and how it is used to accurately determine temperature profiles during the depressurization process. You will also learn how to design a flare network to simultaneously evaluate multiple emergency scenarios, identify potential process bottlenecks and validate the capacity of the flare network to meet design constraints.

Course Name	Knowledge Delivered	Description
Aspen HYSYS: Learn the Basics	<ul style="list-style-type: none"> Understand the importance of starting your modeling with physical properties 	Review the capabilities of Aspen HYSYS, our process simulation software for the petrochemical and related industries. We will introduce the concept of process simulation and some of its advantages and applications. Using a simple hydrocarbon separation as a demonstration, we will introduce and explain the typical workflow for Aspen HYSYS simulations, utilizing the Properties and Simulation environments. We will touch upon common elements of the user interface, some useful keyboard shortcuts, where to access additional resources, some tips for building effective models, and how to troubleshoot models.
BLOWDOWN Analysis: Learn the Essentials to Size and Rate Blowdown Systems	<ul style="list-style-type: none"> Size and rate your BLOWDOWN® process 	Learn how BLOWDOWN can be used to model the depressurization safety system in your plant. We will demonstrate the process of creating a single-vessel BLOWDOWN analysis, from configuring the layout of the piping system to adding rating information for each vessel and pipe. After defining rating information, initial conditions and heat transfer information, we will run the simulation. Results can be viewed graphically to help analyze the performance of the plant blowdown system.
PSV Sizing: Design and Revalidate PSVs on a Separator Vessel	<ul style="list-style-type: none"> Improve overpressure analysis knowledge 	Understand the basics of performing overpressure analysis using the Safety Analysis Environment in Aspen HYSYS. Review overpressure scenario identification and some common relief calculations, with application to a single separator vessel.

<p>PSV Sizing: Learn the Essentials for Overpressure Protection</p>	<ul style="list-style-type: none"> • Essentials of overpressure analysis 	<p>Get an introduction to the fundamental concepts and workflow for PSV sizing by using the Safety Analysis environment in Aspen HYSYS and Aspen Flare System Analyzer™. Explore the importance of overpressure protection and the use of standards and codes in designing pressure relief devices, AspenTech's streamlined solution to protect your assets against overpressure, how to use the Safety Analysis environment and become familiar with its user interface, how to customize default values in the Preferences Manager, how to create PRD's, how to define limiting equipment for a PSV analysis, how to specify and analyze different overpressure scenarios, Design and rate a relief valve and how to transfer a PSV system to Aspen Flare System Analyzer.</p>
<p>Dynamics Relief Scenarios: Calculate Relief Loads</p>	<ul style="list-style-type: none"> • Calculate accurate relief loads 	<p>You will learn the basics of performing dynamic simulations of relief scenarios using Aspen HYSYS Dynamics. This will show a simple manually executed dynamic scenario, use of a spreadsheet in a dynamic simulation to calculate heat input for a fire and a scenario which uses the event scheduler to make several changes simultaneously.</p>
<p>Blowdown Analysis: Design and Revalidate a Blowdown Valve</p>	<ul style="list-style-type: none"> • Design and revalidate a blowdown valves 	<p>Learn about blowdown valve design and revalidation using BLOWDOWN technology in Aspen HYSYS.</p>
<p>Flare Hydraulic Modeling: Learn the Essentials to Analyze Disposal Systems</p>	<ul style="list-style-type: none"> • Improve flare header design and operation 	<p>Disposing excess material through disposal systems like flare headers in chemical and hydrocarbon processing plants is an essential part of relief systems analysis. Learn about relevant process safety guidelines for designing flare headers and learn how to use Aspen Flare System Analyzer in accordance with these guidelines.</p>
<p>Blowdown Analysis: Minimize Flare Loads by Staggering Valve Openings</p>	<ul style="list-style-type: none"> • Manage and address peak flare loads 	<p>Learn to run blowdown analysis for multiple vessels and stagger the opening time of the blowdown valves to meet the peak flow constraints in the flare tip.</p>
<p>Blowdown Analysis: Use BLOWDOWN for Analyzing Pipeline Pressurization</p>	<ul style="list-style-type: none"> • Enhance safety analysis with a blowdown study 	<p>See why it's important to run a blowdown study when pressurizing a pipeline and learn how to use BLOWDOWN in Aspen HYSYS to model this scenario. You will receive an overview of the theory and assumptions, such as choked flow, as you model an ethylene pipeline pressurization system in BLOWDOWN.</p>
<p>Aspen Basic Engineering: Safety Datasheets</p>	<ul style="list-style-type: none"> • Create safety datasheets 	<p>Learn how to create, revise and issue safety datasheets in Aspen Basic Engineering.</p>

aspenONE® Engineering
 Energy, Engineering and Construction
 Application: **Equation-Oriented Modeling**



Aspen HYSYS®: Equation-Oriented Workflow

This learning path is designed for new and experienced process engineers who need to gain experience in building and optimizing flowsheets using the Equation Oriented strategies. You can tune flowsheets by employing real-time data with parameter estimation and data reconciliation using Aspen OnLine®. You will also learn how to work effectively on real-time optimization projects with Aspen HYSYS.

Course Name	Knowledge Delivered	Description
Aspen HYSYS Equation-Oriented: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of equation-oriented modeling in Aspen HYSYS 	Learn the basis of Equation-Oriented (EO) modeling theory in Aspen HYSYS. Command the basic EO workflow as well as be able to run and build simple EO flowsheets in Aspen HYSYS.
Aspen HYSYS Equation-Oriented: Specifications	<ul style="list-style-type: none"> Equation-oriented specifications 	Explore Aspen HYSYS Equation-Oriented (EO) specifications, including variables, specification groups, EO connections and EO measurements. EO variables have several attributes that enable fast process optimization. EO specification groups are essential features of equation-oriented modeling. They allow you to change the specification of variables. EO connections are additional equations that can be added to the system to equate two variables, ensuring that they have the same value in the solution. Measurements allow the use of process data in equation-oriented model calculations.
Aspen HYSYS Equation-Oriented: Run Modes	<ul style="list-style-type: none"> Use different run modes in equation-oriented modeling 	Aspen HYSYS Equation-Oriented modes enable you to rapidly develop plant models using open-form model equations. Open-form equation plant models allow the same model to be used for several different types of applications. We can solve and optimize flowsheets in either of the EO run modes: Simulation, Optimization, Parameter Estimation, Data Reconciliation.
Aspen OnLine Configuration for HYSYS EO Models	<ul style="list-style-type: none"> Combine Aspen OnLine and equation-oriented 	Aspen OnLine (AOL) can help you use Aspen HYSYS to work effectively on real-time optimization projects. In this course, we will use an EO optimization case as an example. Demonstrate an EO model to navigate to the AOL Graphical User Interface forms to configure inputs and outputs for the optimization case and the ramper module. Learn about the available features for validity checking for parameter estimation and optimization cases in AOL that can help you

		implement online optimization projects efficiently. Also, you will outline the AOL case history system and be able to re-run a simulation in Aspen HYSYS by using the AOL case history system.
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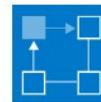


aspenONE® Engineering

Chemicals, Engineering and Construction

Application: **Chemical Plant Profit Improvement, Operations**

Decision Support



DESIGN



OPERATE



MAINTAIN



AIoT



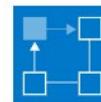
Aspen Plus®: Learn the Basics

This learning path is designed for new and experienced process engineers who need to address process engineering challenges in their chemical plants. Complete this learning path to learn how to use state-of-the-art physical property models and the unit operation library in Aspen Plus to optimize processes by minimizing the overall operating and capital expenses for a process. You will also learn how to accelerate equipment design and evaluate troubleshooting scenarios.

Course Name	Knowledge Delivered	Description
User Interface: Discover Optimized Workflows in Aspen Plus	<ul style="list-style-type: none"> Discover optimized workflows in Aspen Plus 	Explore how to navigate the main Aspen Plus environments and the basics of Aspen Plus. Demonstrations will be given on how to create, define, save and run flowsheet elements. Understand how to access additional resources, as well as what SM and EO solution modes are. Finally, explore a typical workflow in Aspen Plus.
Unit Operations: Familiarize Yourself with the Models Available	<ul style="list-style-type: none"> Familiarization with unit operations 	Learn about all the unit operations in Aspen Plus! We introduce all the unit operations that are built into Aspen Plus, briefly discussing how each one can be used and giving an overview of its functionalities.
Flowsheeting: Learn the Essentials for Creating, Viewing and Modifying Flowsheets	<ul style="list-style-type: none"> Learn the basics of flowsheeting 	Learn to create, view, and modify the flowsheet. Master how to use hierarchies as containers of blocks and streams to organize your main flowsheet. Discuss how to organize various parts of the flowsheet into different sections to better organize and sort different sections of the model. Lastly, we will learn how to use the annotation and formatting tools available in Aspen Plus.
Flowsheeting Options: Unlock Efficiency with Tips and Tricks	<ul style="list-style-type: none"> Flowsheeting best practices 	Learn about the three blocks of flowsheeting options: Calculator, Design Specifications and Transfer. These blocks are commonly used to facilitate the simulation process. We introduce the user interface and associated functions, including some important notes. Applications are displayed through demonstrations to enhance the comprehension of the block capability.
Data Fit: Match Simulation Models to Plant or Laboratory Data	<ul style="list-style-type: none"> Leverage process data to improve your model results 	Learn about the Data Fit tool in Aspen Plus, which will help you fit simulation models to existing plant or lab data through parameter estimations. This course includes multiple demos to showcase the

		usage of Data Fit in different example cases, as well as exercises that allow you to set up these simulations for data fitting.
Convergence Options: Understand the Aspen Plus Solver	<ul style="list-style-type: none"> Gain an overview of Convergence Options 	Gain an understanding of Convergence Options in Aspen Plus through the topics of flowsheet-level and block-level convergence, convergence options available, additional convergence options and convergence options for batch and EO (Equation-Oriented) solving. Master the convergence settings in Aspen Plus and get tips on how to manipulate the convergence to facilitate your simulation.
Model Analysis Tools: Find Optimums with Sensitivity and Optimization Features	<ul style="list-style-type: none"> Gain insights into the integrity of your model with sensitivity and optimization features 	Get familiar with the model analysis tools that are available in Aspen Plus to help you understand a process and improve its performance. A quiz and exercise will help you better master how to apply these tools when solving an engineering problem.
Leverage Aspen Simulation Workbook™ with Aspen Plus®	<ul style="list-style-type: none"> Leverage process data that will provide improved operational decision making 	Get up and running with Aspen Simulation Workbook! Start with a fresh installation and work through activating Aspen Simulation Workbook and linking it to your model, and then progress to advanced features like form controls and working with plant data tags. This is a great place to begin, whether you are just getting started using the software or you are a long-time user who would like to learn about some of the more advanced features.
Economic Analysis: Leverage Costing Data in Design to Reduce CAPEX	<ul style="list-style-type: none"> Develop cost insight into your designs, and compare designs to optimize cost 	Accelerate process development by utilizing Aspen Process Economic Analyzer™ (APEA) directly within Aspen Plus. Learn how APEA is used to map, size and evaluate the flowsheet, mapping blocks and unit operations into physical pieces of equipment. Create reports to compare different scenarios or export the model entirely to the standalone APEA environment. Apply volumetric cost models to estimate capital costs, operating costs, the payback period and other investment parameters of your process.
Energy Analysis: Reduce Energy Costs with Pinch Technology	<ul style="list-style-type: none"> Develop energy cost and use insights into your designs, and compare designs to optimize energy savings 	Learn how the Activation Dashboard of Aspen Energy Analyzer™ within Aspen Plus can provide energy savings information without impeding flowsheet simulations. Review the energy analysis form to summarize process utility usage information or investigate potential heat exchanger revamps within the Energy Analysis environment. Create and modify different scenarios for the simulation, then compare all layouts side-by-side. Finally, export the model entirely to the standalone Aspen Energy Analyzer environment to review composite curves, visualize heat exchanger networks and more.

aspenONE® Engineering
 Chemicals, Engineering and Construction
 Application: **Batch Process Improvement**



DESIGN



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AIoT



Aspen Plus®: Batch Process Design and Optimization

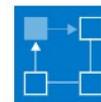
Batch processing industries are relying more and more on predictive tools to design and optimize their processes and plants. Aspen Plus offers targeted solutions to tackle these challenges. This learning path is designed for new and experienced engineers who need more insight on batch process design and optimization. Complete this learning path to learn how to develop, design and document new processes, as well as optimize existing ones, to accelerate innovation and rate of new product introduction. You will also learn recipe-based and rigorous, first-principle modeling of individual unit operations as well as entire batch and mixed batch or continuous processes.

Course Name	Knowledge Delivered	Description
Batch Flowsheets: Build Integrated Processes	<ul style="list-style-type: none"> Improve batch operations through batch flowsheet integrated processes 	Learn about Batch Flowsheets in Aspen Plus. You will learn how and when to use Batch Flowsheets, which industries typically use Batch Flowsheets, and the capabilities of Batch Flowsheets. Using the synthesis of aspirin as an example flowsheet, you will be introduced to the several functions within Batch Flowsheets including Unit Procedures, the Batch Process unit operation, and Strip Charts.
Batch Reactors: Master Design and Recipes	<ul style="list-style-type: none"> Specify batch reactions within your batch flow-sheeting 	Learn how to use the BatchOp unit operation in Aspen Plus and get familiar with its capabilities. Discover how to specify the reaction(s) to be used within your BatchOp block and see several features of BatchOp unit operation, including Unit Procedures and Strip Charts.
Batch Distillation: Design with Geometry-Based Modeling	<ul style="list-style-type: none"> Include batch distillation in your batch flow sheet 	Find out how to model a batch distillation process by using the BatchSep block in Aspen Plus.

aspenONE® Engineering

Chemicals, Engineering and Construction

Applications: **Batch Process Improvement, Distillation Improvement**



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Aspen Plus®: Distillation

This learning path is designed for new or experienced engineers who need experience in building a representative model of a distillation column from conceptual design through detailed design and rating. Complete this learning path to learn the fundamentals of column operability and to simulate complex systems including azeotropes, three-phase regions and chemical reactions.

Course Name	Knowledge Delivered	Description
Residue Curves: Understand Two Component Separations	<ul style="list-style-type: none"> Insight into multiple component distillation parameters 	Learn about using residue curves to design feasible distillation systems. We will use the binary residue curves tool (“Binary”) to analyze the vapor-equilibrium dynamics of a mixture of components. Through the demo, we will explore the visualization tools such as “T-xy” and “y-x” to determine the presence of azeotropes, understand the effect they have on the system design and determine the composition of the distillate and the bottoms. Results will be shown graphically.
Conceptual Design: Identify Separation Schemes	<ul style="list-style-type: none"> Debottleneck distillation processes 	Discover how Aspen Distillation Synthesis can aid conceptual design based on physical properties. This includes two major components: property analysis tools and the ConSep unit operation for conceptual design. Aspen Distillation Synthesis can be applied to conceptual design for new processes as well as re-configuration of existing processes for low-cost debottlenecking and retrofits while providing insight into operational improvement.
Rigorous Modeling: Learn the Advanced Capabilities of RADFRAC	<ul style="list-style-type: none"> Address complex processes in distillation columns 	<p>Get an overview of the RADFRAC block in Aspen Plus through six topics:</p> <ul style="list-style-type: none"> Applications of RADFRAC Input Specification Design Specifications Overview of Column Hydraulic Analysis RADFRAC Convergence Results and Plotting <p>There are three demonstrations to guide you on how to setup RADFRAC block and use the design specifications to achieve your basic separation goals. You will also get familiar with the Column Hydraulic Analysis feature.</p>

<p>Column Hydraulics: Visualize Column Operability with Trays and Packings</p>	<ul style="list-style-type: none"> • Visualize column operability with trays and packings 	<p>Distillation column performance is evaluated by analyzing the impact of thermodynamics and vapor/liquid traffic on column internals (e.g., trays and packing). These column internals put physical limits on the operation of the distillation column which need to be considered through the design and operation of an asset. In this module, you will learn how to model a distillation column using RADFRAC in Aspen Plus, and then leverage Column Hydraulic Analysis to model the internals to visualize the column operability from a design and rating standpoint.</p>
<p>Distillation: Troubleshooting Column Models</p>	<ul style="list-style-type: none"> • Troubleshoot distillation column models 	<p>Understand the best practices for converging RADFRAC distillation columns, while gaining tips and tricks to help troubleshoot failed convergence. Learn how to take advantage of RADFRAC's advanced convergence algorithms and understand error messages to improve your column's convergence.</p>
<p>Rate-Based Distillation: Model with the Rigor of Mass Transfer Effects</p>	<ul style="list-style-type: none"> • Summarize correlations and models • List tuning models 	<p>Compare the Equilibrium Modeling Approach to the Rate-Based Modeling Approach and review the advantages of the rate-based approach. We will summarize the correlations and models offered in rate-based modeling, introduce the procedures to set up and configure a rate-based model with and without reactive processes. We will list the tuning options for a rate-based model and discuss the typical errors that occur in a rate-based simulation as well as the common techniques for achieving convergence.</p>

aspenONE® Engineering
 Chemicals, Engineering and Construction
 Applications: **Fermentation Modeling**

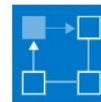


Aspen Plus®: Fermentation

This learning path is designed for new and experienced process engineers in Aspen Plus who need to gain experience in building a fermentation model. Complete this learning path to learn the basics of fermentation. You will also learn how to build a rigorous bioreactor and define various types of fermentation reaction models in Aspen Plus.

Course Name	Knowledge Delivered	Description
Aspen Plus: Overview of Fermentation Modeling	<ul style="list-style-type: none"> Fermentation modeling in Aspen Plus 	Learn the basis of fermentation theory, various types of fermentation reaction model as well as how to simulate fermentation by using the BatchOP block in Aspen Plus.

aspenONE® Engineering
 Chemicals, Engineering and Construction
 Application: **Physical Property Estimation**



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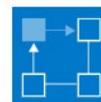
Aspen Plus®: Physical Properties

This learning path is designed for new and experienced process engineers. Complete this learning path to learn how to use physical property calculations in Aspen Plus and develop the skills and techniques required to specify and use thermodynamic property models in your simulation. You will learn how to build and validate thermodynamic models against data to better understand the thermodynamic implications of your process and improve the accuracy of your process simulation model.

Course Name	Knowledge Delivered	Description
Physical Properties in Aspen Plus: Learn the Basics	<ul style="list-style-type: none"> Understand the importance of starting your modeling with physical properties 	<p>Explore the Properties Environment in Aspen Plus through three main topics:</p> <ul style="list-style-type: none"> An introduction to the Properties Environment Components, Component Types and Databank Overview of Property Methods <p>The Properties Environment is the first stop before moving into Simulation Environment. Get familiar with all the settings required in the Properties Environment and learn to set it up according to your own needs.</p>
Thermodynamic Packages: Choose the Right Property Methods	<ul style="list-style-type: none"> Choose the right property method early in your modeling 	<p>Learn about several thermodynamic property methods in Aspen Plus, including basic concepts, commonly used models, parameters and databanks of each method. Two methods are introduced for choosing the right property methods.</p>
Property Sets: Set up and Use Property Sets	<ul style="list-style-type: none"> Learn the set-up and use of Property Sets 	<p>A Property Set is a collection of thermodynamic, transport, and other properties. These properties can be used in physical property tables and property analyses, and they are essential to advanced tools and advanced analysis. This lesson demonstrates how to set up a Property Set in Aspen Plus, as well as using Property Sets in the Simulation report to calculate stream results.</p>
Property Estimation: Estimate Missing Parameters	<ul style="list-style-type: none"> Improve your model by understanding missing parameters 	<p>Two powerful property estimation tools inside Aspen Plus are introduced: The Property Constant Estimation System and the NIST Thermo Data Engine. You will get familiar with the settings in Property Estimation and learn how to estimate missing parameters.</p>

<p>Electrolytes: Set up and Analyze Electrolyte and Salt Systems</p>	<ul style="list-style-type: none"> • Set up of salt and electrolyte chemistry 	<p>Learn how to model electrolytes and salts in Aspen Plus, which includes three types of solids: conventional solids, nonconventional solids and salts. The first two can be set up from the component list, while salts are set up using the Electrolyte Wizard. The focus here is how to set up salts and utilize electrolyte chemistry.</p>
<p>Property Analysis: Understand Your System's Chemical and Physical Interactions</p>	<ul style="list-style-type: none"> • Understand your system's chemical and physical interactions 	<p>Explore how property models are used to represent parameters, and how to retrieve and view the parameters used within these models in Aspen Plus. You will perform analyses on pure components, binary and solubility systems, and plots will be developed for each situation. In the case of binary analysis, you will use experimental data from the National Institute of Standards and Technology (NIST) to support and validate the model contained in Aspen Plus.</p>
<p>Property Regression: Match Your Model to Experimental or Plant Data</p>	<ul style="list-style-type: none"> • Match your model to experimental or plant data 	<p>Learn about data regression, including its merits, limitations and value. Explore multiple cases of data regression involving pure component, mixture, vapor-liquid equilibrium (VLE), liquid-liquid equilibrium (LLE) and three-phase vapor-liquid-liquid equilibrium (VLLE) systems. Alongside manually tabulated data, experimental data from the National Institute of Standards and Technology's (NIST) ThermoData Engine is used throughout the demonstrations. Results will be shown graphically.</p>

aspenONE® Engineering
 Chemicals, Engineering and Construction
 Application: **Polymers**



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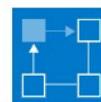
Aspen Plus®: Process Simulation for Polymers Processes

This learning path provides an overview of the physical property methods and models available in Aspen Plus Polymers. You will learn how key thermodynamic and transport properties are evaluated, and how to fit the models to match measured data.

Course Name	Knowledge Delivered	Description
Aspen Polymers: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of polymer processing in Aspen Plus 	Discover Aspen Polymers as an extension of Aspen Plus. Learn the polymer simulation process and realize the benefits of Aspen Polymers throughout the engineering lifecycle. Review the different component types supported and how to characterize them. Define reference molecular weight in the Aspen Polymers context and learn the theory of the method moments. Determine how to characterize polymers using component attributes and learn how Aspen Polymers tracks each property. Finally, define molecular weight distribution and learn the different Aspen Polymers models that support it.
Aspen Polymers: Physical Properties Overview	<ul style="list-style-type: none"> Learn about the databanks stored in Aspen Plus for polymer processes 	The Aspen Plus databanks contain physical property data on polymers. There are databanks for multiple property methods. The van Krevelen group contribution models are used to estimate properties for polymers not listed in the databases. The accuracy of the model can be improved by fitting it to experimental data.
Aspen Polymers: Pure Component Properties	<ul style="list-style-type: none"> Discover component properties of polymers in Aspen Plus 	Polymer molecules are much larger than conventional components which makes the calculation of their properties more complex. There are a number of different models that can be used for the calculation of different properties. One method mentioned throughout is the van Krevelen group contribution method, which calculates the properties of polymers from the properties of the molecular groups that make up each polymer segment. Here we will discuss the most important polymer properties, the models used to calculate them, and how to fit model parameters using experimental data.
Aspen Polymers: Phase Equilibrium	<ul style="list-style-type: none"> Learn about phase equilibrium in Aspen Polymers 	Discover the different property methods for polymers in Aspen Plus including using an activity coefficient model and an equation-of-state model. Learn how to use the polymer NRTL model in Aspen Plus. Walk through an example using POLYNRTL for a property data

		<p>regression to match experimental vapor pressure data and learn some tips for fitting data.</p>
<p>Aspen Polymers: Using PC SAFT</p>	<ul style="list-style-type: none"> Discover the PC-SAFT model in Aspen Polymers 	<p>The PC-SAFT equation-of-state is a copolymer-based model and has more accurate thermodynamic predictions for copolymers and phase equilibrium. The key parameters, segment number, segment diameter and segment energy are included within the Aspen database for common segments. These parameters could also be fit to plant or experimental data. Fitting the PC-SAFT model to data will improve the accuracy of component properties and phase equilibrium.</p>
<p>Aspen Polymers: Free-Radical Model</p>	<ul style="list-style-type: none"> Discover the free radical model in Aspen Polymers 	<p>Aspen Polymers has built-in models for polymerization processes. The free-radical reaction model covers bulk and solution polymerization. The model has built-in reactions for the main steps: initiation, propagation, termination and transfer, along with other types of reactions. Additionally, Aspen Polymers can consider copolymers. The data-fit tool should be used to fit reaction models to experimental or plant data.</p>
<p>Aspen Polymers: Emulsion Polymerization</p>	<ul style="list-style-type: none"> Discover the emulsion polymerization model in Aspen Polymers 	<p>Learn the advantages of emulsion polymerization and explain the theory behind the model in Aspen Plus. Set up emulsion kinetics and describe the various reactions used in the emulsion model. Discover particle generation kinetics for both micellar and homogeneous nucleation and explain partition coefficients for emulsion polymerization. Finally, set up an emulsion model in Aspen Plus.</p>
<p>Aspen Polymers: Ziegler-Natta and Metallocene Polymerization</p>	<ul style="list-style-type: none"> Discover the Ziegler-Natta Polymerization model in Aspen Polymers 	<p>Learn about Ziegler-Natta Polymerization in Aspen Plus, how it is modeled, and the overall reaction kinetics. Summarize catalyst site tracking in Aspen Polymers and identify the influence of a catalyst. Discover a deconvolution utility in Excel to analyze a molecular weight distribution curve. Identify the different kinetic site reactions for site activation, inhibition, deactivation, propagation and branching, and chain transfer. Learn the basics of selecting the appropriate reactions for a model. Set up a Ziegler-Natta Kinetics Model in Aspen Polymers and get a brief overview of how to fit a Ziegler-Natta model in Aspen Polymers.</p>

aspenONE® Engineering
 Chemicals, Engineering and Construction
 Application: **Process Optimization**



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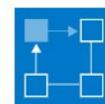


Aspen Plus®: Reactor Modeling

This learning path is designed for new or experienced process engineers in Aspen Plus who need to gain experience in reactor modeling. Complete this learning path to learn the fundamentals of chemical reactors and the various reaction and reactor models inside Aspen Plus to best describe your reaction system. You will also learn how to troubleshoot models for improved convergence.

Course Name	Knowledge Delivered	Description
Reaction Models: Address a Wide Range of Reaction Types	<ul style="list-style-type: none"> Gain insight into reaction sets and classes 	Discover reaction sets and reaction classes used in Aspen Plus to model non-electrolyte systems. Review which reactor blocks in Aspen Plus require reaction sets and break down the GENERAL reaction set. You'll also learn how to customize reaction rate expressions. Follow the demonstrations to familiarize yourself with the associated forms, and then try it yourself with self-paced exercises.
Reactor Equipment: Design Kinetic, Equilibrium and Balanced Based Reactors	<ul style="list-style-type: none"> Understand and optimize multiple reactor types 	Introduce three types of reactor models in Aspen Plus: balanced-based, equilibrium-based and kinetic-based reactors. For each type, describe the basic concepts, configurations and applications of the typical reactors.

aspensONE® Engineering
 Chemicals
 Application: **Solids Process Modeling**



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Aspen Plus®: Solids Modeling

This learning path is designed for new or experienced process engineers to learn how to use the solids modeling operations in Aspen Plus, including crushers, granulators, fluidized beds, and more. Understand how Aspen Plus handles solid material and represents solid particles and particle size distributions, including the definitions of key performance indicators used to characterize size distributions. You will also learn the basics of the theory behind the models, giving you a deeper understanding of the calculations performed by Aspen Plus.

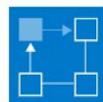
Course Name	Knowledge Delivered	Description
Aspen Plus: Overview of Solids Modeling	<ul style="list-style-type: none"> Gain knowledge on modelling bulk solids in Aspen Plus 	Learn how to model bulk solids in Aspen Plus. An introduction of the theory of particle size distributions is included. Define particle size distributions, then plot the results and view other particle characterization properties. Determine which options to use depending on the particle compound, size, and other properties. An overview of Aspen Plus solids equipment is given as well as examples of how to create conceptual equipment models.
Aspen Plus Communion: Mills and Grinders	<ul style="list-style-type: none"> Simulating different crusher types in Aspen Plus 	Learn to simulate many kinds of crushers in Aspen Plus and the theory involved in the simulations.
Aspen Plus: Drying Theory and Dryers	<ul style="list-style-type: none"> Master the drying curve and theory for different types of dryers 	Learn about the drying curve and dryer theory for different types of dryers. Start designing a process by defining moisture components and using conceptual dryer models. Switch the conceptual dryers to more rigorous models and design convective, contact, and spray dryers. Exercises are included that demonstrate how to set up these dryers. Batch dryers are also covered but are only available in Aspen Plus V11 or higher.
Aspen Plus: Fluidized Beds	<ul style="list-style-type: none"> Master and model a fluidized bed in Aspen Plus 	Learn about fluidized beds theory and model a fluidized bed in Aspen Plus. Reactions can also be added to the fluidized bed model. Inputs – such as the Geldart classification for solid particles, correlations for key parameters, and change in particle size distribution – are explained. Exercises are included to demonstrate how to use the main fluidized bed model, as well as how to include reactions.
Aspen Plus: Granulation and Agglomeration	<ul style="list-style-type: none"> Master the methodology and use of agglomerators and granulators in Aspen Plus 	Describe the methods and use of agglomerators and granulators. Simulate agglomerators and granulators in Aspen Plus.

Aspen Plus: Modeling Crystallization	<ul style="list-style-type: none"> • Simulate crystallization in Aspen Plus 	Learn how to simulate crystallization using the Crystallizer block, BatchOp block, and RCSTR block in Aspen Plus, as well as how to use a solubility analysis to generate solubility data.
Aspen Plus: Modeling Pneumatic Conveying	<ul style="list-style-type: none"> • Learn to model solids conveying in Aspen Plus 	Model solids conveying in Aspen Plus using the Pipe and Pipeline blocks. Both dilute phase and dense phase conveying are covered. Learn the differences between these types of conveying and their required inputs. Exercises for both types are included.

aspenONE® Engineering

Energy, Chemicals, Engineering and Construction

Application: **Project Cost Estimation**



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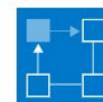
Aspen Process Economic Analyzer: Relative Cost Analysis with Aspen Process Economic Analyzer

It is now more important than ever to understand different manufacturing configurations and equipment types early in the engineering design activities. This knowledge leads to lower capital equipment costs and optimized operating margins. This learning path is designed for both new and experienced process engineers, introducing Aspen Process Economic Analyzer (APEA), which delivers economic comparisons for processes and equipment. Follow and complete this learning path to understand the benefits of activated economics within a process simulator, and the benefits of using a consistent model-based standalone APEA tool. Learn how to obtain a consistent relative cost analysis through the use of templates and design rules within APEA, producing reliable return of investment analysis.

Course Name	Knowledge Delivered	Description
Economic Analysis: Leverage Costing Data in Design to Reduce CAPEX	<ul style="list-style-type: none"> Accelerate process development 	Accelerate process development by utilizing Aspen Process Economic Analyzer (APEA) directly within Aspen Plus. Learn how APEA is used to map, size, and evaluate the flowsheet, mapping blocks and unit operations into physical pieces of equipment. Create reports to compare different scenarios or export the model entirely to the standalone APEA environment. Apply volumetric cost models to estimate capital costs, operating costs, the payback period, and other investment parameters of your process.
Activated Economic Analysis: Using Aspen HYSYS	<ul style="list-style-type: none"> Accelerate process development 	Accelerate process development by utilizing Aspen Process Economic Analyzer (APEA) directly within Aspen HYSYS. Learn how APEA is used to map, size, and evaluate the flowsheet, mapping blocks and unit operations into physical pieces of equipment. Create reports to compare different scenarios or export the model entirely to the standalone APEA environment. Apply volumetric cost models to estimate capital costs, operating costs, the payback period, and other investment parameters of your process.
Aspen Process Economic Analyzer: Learn the Basics	<ul style="list-style-type: none"> Learn the basics 	Aspen Process Economic Analyzer, or APEA, is a tool developed to improve the workflow and reliability of preliminary estimates. Process simulators can gain insights into the cost drivers for a process early in the design stages. Review the interface of APEA and walk through a project from creation to estimation. Define the style of the estimate, import simulator files, map simulator models into pieces of equipment, refine the specifications for the equipment characteristics, and estimate project costs.

Aspen Process Economic Analyzer: Successful Decision Making	<ul style="list-style-type: none"> • Successful decision making 	Gain insight into process models and enable greater confidence in early process estimations. Customize and take advantage of component sizing models to derive dimensions for process equipment. Then, push these component dimensions into volumetric models to gain more accurate estimates for equipment costs and associated installation bulk costs. Use the Decision Analyzer to change the project scale or location. Finally, view the project's net present value, internal rate of return, and other economic metrics through time with Investment Analysis.
Aspen Process Economic Analyzer: Integration to ACCE	<ul style="list-style-type: none"> • Integrate ACCE 	Use Aspen Capital Cost Estimator (ACCE) and Aspen Process Economic Analyzer (APEA) together for economic evaluations. Learn how to create a template and define options in ACCE. Compare the limits and capabilities of ACCE and APEA. Integrate process simulations or projects created in APEA to ACCE using one of three methods.

aspenONE® Engineering
 Engineering and Construction
 Application: **Online Configuration**



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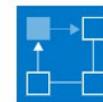
Aspen OnLine®: Plant Data in Aspen HYSYS

Creating a plant digital twin solution involves the deployment of a rigorous engineering model online. The effort is typically divided into three categories, including offline model calibration with historical data, linking models with real-time data sources, and developing real-time interfaces for end-users. Among these three steps, model calibration with historical plant data is the most time-consuming step. With the Plant Data feature in Aspen HYSYS, simulation users can import historical plant measurements from real-time data sources or Excel files, clean the raw data and calibrate the Aspen HYSYS model with multiple conditioned data sets. They can compare the model values with the plant values to understand the gaps. After calibrating the model, users can reuse the automatically generated Aspen OnLine project to connect the model to a real-time data source to run the model 24/7 without user intervention. Follow the sequence of courses in this learning path to learn how to validate models with raw plant data and deploy models online via Aspen OnLine.

Course Name	Knowledge Delivered	Description
Aspen OnLine and HYSYS: Overview of Model Deployment for Plant Operation	<ul style="list-style-type: none"> Basics of Aspen Online integrated in Aspen HYSYS 	Learn the current situations of using models to improve plant operations. You will learn the basics of Aspen OnLine integrated in Aspen HYSYS and how industries use this technology to optimize plant operations.
Aspen OnLine and HYSYS: Import Raw Plant Data from Microsoft Excel and Data Historians	<ul style="list-style-type: none"> Importing data 	The first step of calibrating the offline model with historical plant data is to import historical plant measurements from Microsoft Excel files or real-time data sources into Aspen HYSYS.
Aspen OnLine and HYSYS: Manage Tags and Condition Raw Plant Data	<ul style="list-style-type: none"> Manage tags and condition data 	The second step of calibrating the offline model with historical plant data is to manage the tags and condition the raw plant data.
Aspen OnLine and HYSYS: Map Model Variables with Tags	<ul style="list-style-type: none"> Map model variables and tags 	After importing and conditioning plant data, you can map model variables with tags. The mapping connection sets the value transfer between model variables and tags at the start of model runs.
Aspen OnLine and HYSYS: Calibrate Model Manually to Match Plant Measurements	<ul style="list-style-type: none"> Manually calibrate a model 	Learn how to manually calibrate a model using plant data in Aspen HYSYS.
Aspen OnLine and HYSYS: Calibrate the Model Automatically to Match Plant Measurements via Data Reconciliation	<ul style="list-style-type: none"> Automatically calibrate a model 	The fifth step of calibrating the offline model with historical plant data is to calibrate the model automatically to match plant measurements via the Plant Data feature.

Aspen Online Model Deployment	<ul style="list-style-type: none">• Deploy the model online	The final step in the Aspen OnLine Model process is deployment. Deploying the model connects the offline model with real-time plant data. In this course, you will deploy both Aspen Plus and Aspen HYSYS models online.
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aspenONE® Engineering
 Engineering and Construction
 Application: **Online Configuration**



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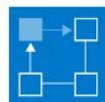
Aspen OnLine: Plant Data in Aspen Plus

Creating a plant digital twin solution involves the deployment of a rigorous engineering model online. The effort is typically divided into three categories, including calibrating offline models with historical data, linking models with real-time data sources and developing real-time interfaces for end-users. Among these three steps, model calibration with historical plant data is the most time-consuming step. With the Plant Data feature in Aspen Plus, users can import historical plant measurements from real-time data sources or Excel files, clean the raw data and calibrate the Aspen Plus model with multiple conditioned data sets. They can then compare the model values with the plant values to understand the gaps. After calibrating the model, users can reuse the automatically generated Aspen OnLine project to connect the model to a real-time data source to run the model 24/7 without user intervention. Follow the sequence of courses in this learning path to learn how to validate models with raw plant data and deploy models online via Aspen OnLine.

Course Name	Knowledge Delivered	Description
Aspen OnLine and Aspen Plus: Overview of Model Deployment for Plant Operation	<ul style="list-style-type: none"> Basics of Aspen OnLine integrated in Aspen Plus 	Learn the current situations of using models to improve plant operations. You will learn the basics of Aspen OnLine integrated in Aspen Plus and how industries use this technology to optimize plant operations.
Aspen OnLine and Aspen Plus: Import Raw Plant Data from Microsoft Excel and Data Historians	<ul style="list-style-type: none"> Importing data 	Import plant data into Aspen Plus from Microsoft Excel files or a data historian connection. Retrieve and utilize the appropriate Microsoft Excel template for your data and use the template to format recorded plant data. If required, walk through the process to establish a connection between the client and server computers. Then, import plant data directly from a data historian.
Aspen OnLine and Aspen Plus: Define Data Validation and Condition Raw Plant Data	<ul style="list-style-type: none"> Define data validation and condition raw data 	We will learn how to manage properties for tags and add a new tag. Use data validation, frozen value detection, average data and steady-state detection to condition raw plant data and understand the conditioned run results.
Aspen OnLine and Aspen Plus: Map Model Variables with Tags	<ul style="list-style-type: none"> Map model variables with tags 	Use the Select & Map Variables command to map model variables with tags.
Aspen OnLine and Aspen Plus: Calibrate Model Manually to Match Plant Measurements	<ul style="list-style-type: none"> Calibrate the model manually 	Manually calibrate a model using plant measurements in Aspen Plus.

Aspen OnLine and Aspen Plus: Calibrate Model Automatically via Data Fit	<ul style="list-style-type: none"> • Calibrate the model automatically 	Build a data reconciliation model via data fit tool and calibrate the model automatically to match plant measurements in Aspen Plus.
Aspen Online Model Deployment	<ul style="list-style-type: none"> • Deploy the model online 	The final step in the Aspen OnLine Model process is deployment. Deploying the model connects the offline model with real-time plant data. In this course, you will deploy both Aspen Plus and Aspen HYSYS models online.

aspenONE® Engineering
Energy, Chemicals, Engineering and Construction
Application: **Hybrid Modeling**



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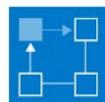
Aspen Hybrid Models™: AI Model Builder

Aspen AI Model Builder is a cloud-native application that combines the power of first-principles, machine learning, and embedded AI to build and sustain Aspen Hybrid Models. These hybrid models are fit for purpose and can be deployed to multiple AspenTech tools across the asset lifecycle from design to operation. They are also interpretable, so that the results are understandable and usable by engineers close to the process; democratized for the process industry, which means that users do not need to be data science experts; and sustainable, allowing models to be maintained as new data is available or process conditions change.

Course Name	Knowledge Delivered	Description
Aspen Hybrid Models: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen Hybrid Models 	AspenTech combines Artificial Intelligence technology with all the deep processing expertise that we have in the process industries over the past 40 years to develop a brand new product, Aspen Hybrid Models. With Aspen Hybrid Models, users can build a more accurate and efficient model.
Aspen Hybrid Models: Choosing a Purpose	<ul style="list-style-type: none"> Learn to create models for each scenario in Aspen AI Model Builder 	Use Aspen AI Model Builder to create many different models through artificial intelligence. Review the model types available in Aspen AI Model Builder and decide which model is the best fit for a given scenario. For each model type, describe the model characteristics and common use cases, the data required to create the model, and quickly get an overview of the workflow to create a model.
Aspen Hybrid Models: Data Cleaning	<ul style="list-style-type: none"> Generate, import and clean data in Aspen AI Model Builder 	Use Aspen Multi-Case to generate data for a reduced order hybrid model in Aspen AI Model Builder, import data into Aspen AI Model Builder and discover how to clean data for an AI driven model in Aspen AI Model Builder.
Aspen Hybrid Models: AI-Driven Hybrid Models	<ul style="list-style-type: none"> Discover the workflow for AI-Driven Hybrid Models 	An AI-Driven Hybrid Model is an empirical model based on plant or experimental data, augmented with first principles (e.g., Reynolds number etc.), constraints (e.g., mass balance) and domain knowledge. Learn the workflow to create this hybrid model.
Aspen Hybrid Models: Reduced Order Engineering Models	<ul style="list-style-type: none"> Discover the workflow for Reduced Order Engineering Models 	From Aspen Multi-Case and Aspen AI Model Builder to Aspen Plus and Aspen HYSYS walk through the entire workflow of creating both reduced order sensor and equipment models from a process simulator flowsheet. Efficiently generate a strong, high-quality dataset in Aspen Multi-Case. Then, use Aspen AI Model Builder to digest, clean and

		build a model from this dataset. Enforce a mass balance for sensor models and define stream ports for equipment models. Create the model and iterate with changes if needed. Finally, export the model and use it within Aspen Plus and Aspen HYSYS.
Aspen Hybrid Models: Planning Model Update with AI-Powered Models	<ul style="list-style-type: none"> • Create a model in Aspen AI Model Builder to be used within Aspen PIMS-AO 	Beginning with a single Aspen HYSYS case, walk through the entire workflow of creating a reduced order planning model. Generate a dataset in Aspen Multi-Case to ensure a consistently high-quality model. Then, use Aspen AI Model Builder to consume, clean and build a model from this dataset. Constrain the model under a mass balance, then create, validate and compare multiple versions of the model. Review the statistics used to quantify model accuracy and predictability. Finally, export the model file and use this file to replace and existing submodel within an Aspen PIMS project.
Aspen Hybrid Models: Model Validation	<ul style="list-style-type: none"> • Understand different plots in the validate model page and model improvement methods 	Validate the model results by viewing different plots and implement model improvement methods.

aspenONE® Engineering
Energy, Chemicals, Engineering and Construction
Application: **Hybrid Modeling**



DESIGN



OPERATE



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Aspen Hybrid Models™: First-Principles Driven Hybrid Models

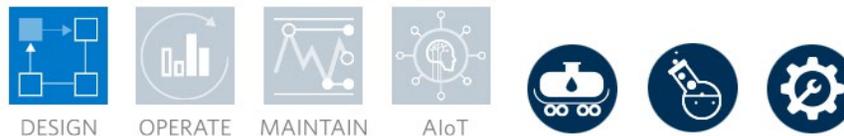
First-principle driven hybrid models can be created directly inside the AI Training workspace of Aspen Plus or HYSYS. A base first principle model is used as a framework to establish mass/energy/atom balance relationships between model inputs and outputs. Machine learning is then used to create or improve additional relationships in the model using the available plant data. This technology can be applied to ANY unit operation model in the simulators and allows process engineers to create more accurate models in less time.

Course Name	Knowledge Delivered	Description
Aspen Hybrid Models: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen Hybrid Models 	AspenTech combines Artificial Intelligence technology with all the deep processing expertise that we have in the process industries over the past 40 years to develop a brand new product, Aspen Hybrid Models. With Aspen Hybrid Models, users can build a more accurate and efficient model.
First Principles-Driven Hybrid Models: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of first principles-driven hybrid models 	First principles-driven hybrid models augment the rigorous models already available within Aspen Plus and Aspen HYSYS to include artificial intelligence. Understand the concepts behind these hybrid models, including common applications and how the artificial neural network expands the applicability of a model. Explore the AI Training ribbon used to generate these models and walk through a high-level workflow creating a model with complex reaction kinetics.
First Principles-Driven Hybrid Models: Mastering the Development Process	<ul style="list-style-type: none"> Master the development of first principles-driven hybrid models 	Dive deeper into the workflow of building first principles-driven hybrid models within Aspen Plus and Aspen HYSYS. Review general guidelines and understand the importance of quality and applicability within a dataset. Master the plotting tools to thoroughly explore and analyze datasets for the hybrid models. Explore dataset conditioning, both in general and for each specific rule's application. Finally, use basic and advanced configuration parameters to fine-tune the structure and training of the hybrid model's artificial neural network.
FCC Reactor Calibration using First Principles-Driven Hybrid Models	<ul style="list-style-type: none"> Use first principles-driven hybrid models to calibrate an FCC 	First Principles Driven Hybrid Models combine the benefits of traditional first principles models and AI-based machine learning models. First principles-driven hybrid models augment the rigorous mechanistic models already available in Aspen Plus and Aspen HYSYS in which some of the phenomena occurring inside it are

		<p> unknown resulting in deviations of model predictions from process data. First principles-driven hybrid modeling allows you to use our fundamental system knowledge such as mass, energy balances, reaction chemistry and thermodynamics as a framework, and then leverage machine learning to build correlations from process data. These models offer improved accuracy over the pure first principles and machine learning models. First Principles-Driven Hybrid Models offer higher value from simulations by automatically calibrating the FCC and expanding the scope of what can be modeled. </p>
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aspenONE® Engineering
 Energy, Chemicals, Engineering and Construction
 Application: **Multi-Case**



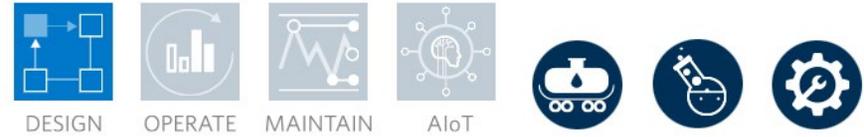
Aspen Multi-Case™: Simulate Process Scenarios in Parallel

Aspen Multi-Case is an analysis tool that can create and run many simulation cases concurrently, manage case files and analyze results. The scalability of running multiple simulators in a short period of time can be achieved by Aspen Multi-Case's parallelization capabilities. Project types include case studies, reduced order models and multi-file analysis. As an example, you can determine the best settings for a process at various capacities and seasons. Furthermore, you can also consider different feedstocks and flowsheet configurations.

Course Name	Knowledge Delivered	Description
Aspen Multi-Case: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen Multi-Case 	Aspen Multi-Case is an analysis tool that can create and run many simulation cases concurrently, manage case files and analyze results. Project types include case studies, reduced order models and multi-file analysis. In a case study, the effect of varying independent variables on certain dependent variables are observed. Reduced order models are required for AI Model Builder to address optimization problems. Multi-File projects allow you to compare many simulation files at once and also consider differences at the flowsheet level. Additionally, Multi-Case provides data visualization tools to better view results from each project.
Aspen Multi-Case: Multi-File Design	<ul style="list-style-type: none"> Discover multi-file design in Aspen Multi-Case 	Multi-File analysis projects allow you to run and compare cases with different topologies in addition to changing key variables.

<p>FCC Reactor Calibration using First Principles-Driven Hybrid Models</p>	<ul style="list-style-type: none"> • Use first principles-driven hybrid models to calibrate an FCC 	<p>First Principles Driven Hybrid Models combine the benefits of traditional first principles models and AI-based machine learning models. First principles-driven hybrid models augment the rigorous mechanistic models already available in Aspen Plus and Aspen HYSYS in which some of the phenomena occurring inside it are unknown resulting in deviations of model predictions from process data. First principles-driven hybrid modeling allows you to use our fundamental system knowledge such as mass, energy balances, reaction chemistry and thermodynamics as a framework, and then leverage machine learning to build correlations from process data. These models offer improved accuracy over the pure first principles and machine learning models. First Principles-Driven Hybrid Models offer higher value from simulations by automatically calibrating the FCC and expanding the scope of what can be modeled.</p>
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aspenONE® Engineering
 Energy, Chemicals, Engineering and Construction
 Application: **Operator Training**



Aspen Operator Training

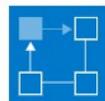
Aspen Operator Training drives process improvement through the efficient training of plant operators. In this learning path, discover how to turn your process into a dynamic model. Develop virtual control systems and create graphical user interfaces that mimic control rooms. Connect your project to an OPC server and client for easier access. Simulate test scenarios with Aspen Operator Training and gain a greater understanding of your process.

Course Name	Knowledge Delivered	Description
Aspen Operator Training: Learning to Develop Operator Training Simulations	<ul style="list-style-type: none"> Process improvement with Aspen Operator Training 	Explore how to use Aspen Operator Training to improve your process. Train your operators in a more efficient way. Turn your process plant into a dynamic model, add a control system using control emulation and simulate different scenarios in your plant. Create and customize your own graphical user interface so it mimics your actual control room. Connect your project to an OPC server and client for easy access.

aspenONE® Engineering

Energy, Chemicals, Engineering and Construction

Application: **Basic Engineering**



DESIGN



OPERATE



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AIoT



Aspen Basic Engineering™ Datasheets: Datasheet Configuration, Use and Revision

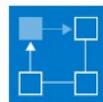
Learn how to configure datasheet templates in Aspen Basic Engineering(ABE) to meet your project specifications, how to generate equipment datasheets and lists seamlessly, and how to revise them for a given revision level in a project.

Course Name	Knowledge Delivered	Description
Equipment Datasheets: Learn the Essentials of Working with Datasheets	<ul style="list-style-type: none"> Work with equipment datasheets 	Once you have created a datasheet, you can begin specifying the datasheet and sending it through the review process. Gain an introduction to the document tracking and markup/annotation features built into Aspen Basic Engineering. You'll also learn how to upload sketches to datasheets.
Aspen Basic Engineering: Safety Datasheets	<ul style="list-style-type: none"> Create safety datasheets 	Learn how to create, revise, and issue safety datasheets in Aspen Basic Engineering.
Aspen Basic Engineering: Datasheet Configuration	<ul style="list-style-type: none"> Configure datasheets 	Discover Datasheet Definer to create a custom datasheet template and modify an existing datasheet template.

aspenONE® Engineering

Energy, Chemicals, Engineering and Construction

Application: **Layout Development**



DESIGN



OPERATE



MAINTAIN



AIoT



Aspen OptiPlant™: Develop a 3D Layout

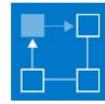
A 3D layout provides the opportunity to visualize, analyze and optimize your design early. This learning path is designed for new users of Aspen OptiPlant 3D Layout (OptiPlant 3D). Follow and complete this learning path to develop a 3D model with Equipment, Steel, and Pipe. OptiPlant 3D empowers users to rapidly develop a 3D model to support cost estimates, pre-FEED and FEED stage deliverables, and project visualization. Learn how to model 3D equipment and structures, how to import data to support autorouting, how to autoroute pipe, and generate bulk quantities from the model automatically.

Course Name	Knowledge Delivered	Description
Aspen OptiPlant: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen OptiPlant 	Discover Aspen OptiPlant. Create a new project, import an equipment list, and copy equipment. Explain line list creation, import a line list, and auto route piping. Learn to add components to a model. Finally, generate deliverables, including a 3D CAD file, and a 2D plot plan drawing.
Aspen OptiPlant: Schematic Creator	<ul style="list-style-type: none"> Discover Schematic Creator in Aspen OptiPlant 	Schematic Creator is a new tool built into OptiPlant that automatically populates a model's line list and selects nozzle type based on user-specified starting and ending objects. Demonstrate how to connect and configure lines in Schematic Creator.
Aspen OptiPlant: ACCE Integration	<ul style="list-style-type: none"> Discover ACCE integration in Aspen OptiPlant 	The OptiPlant ACCE interface can exchange data between OptiPlant and ACCE for equipment, pipe-racks and piping. It is a bi-directional interface for equipment and pipe-rack transfers whereas, it is a one-way transfer (from OptiPlant to ACCE) for a piping quantities transfer. It helps owner operators and engineering firms alike optimize and improve the accuracy of capital project cost estimates by being able to visually see the 3D conceptual models during design optimization and project scope development.

aspenONE® Engineering

Energy, Chemicals, Engineering and Construction

Application: **Layout Development**



DESIGN



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Aspen OptiRouter™: Auto-route Pipes within Hexagon Smart3D

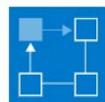
3D Pipe auto-routing is the most effective approach to rapidly design 3D clash-free pipe in the model to study space, availability and get the major centerlines in the model. This learning path is designed for piping designers experienced with Hexagon S3D to autoroute pipe in the model. In this module, you will learn how to set up rules for the S3D equipment and structures, how to create or import a line list and autoroute 3D pipe. The 3D pipes are intelligent and spec-driven and are editable by the users after auto-routing.

Course Name	Knowledge Delivered	Description
Aspen OptiRouter: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen OptiRouter 	Discover Aspen OptiRouter, an add-on to Hexagon Smart 3D. Demonstrate the process of creating rules around pieces of equipment in an S3D model. Import nozzle reports from S3D and auto-route pipes in the S3D environment.

aspenONE® Engineering

Energy, Chemicals, Engineering and Construction

Application: **Layout Development**



DESIGN



OPERATE



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Carbon Capture Process Modeling

Modeling end-to-end carbon capture processes is crucial to meet net-zero emissions targets. This learning path will teach you how to develop thermodynamic models for carbon capture processes and explore the application of AspenTech products for simulating carbon capture technologies and reducing carbon emissions. Specifically, you will learn to identify basic thermodynamic concepts for modeling solvent-based carbon capture processes, regress data and validate properties to match experimental or plant data of solvent-based carbon capture, understand the fundamentals of modeling those processes in Aspen Plus and Aspen HYSYS, perform carbon emissions analysis, and apply the concepts of concurrent engineering.

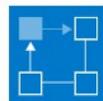
Course Name	Knowledge Delivered	Description
Thermodynamic Background of Solvent-Based Carbon Capture	<ul style="list-style-type: none"> Thermodynamics background of carbon capture 	Learn the basic background of solvent-based carbon capture, especially electrolyte systems for CO ₂ absorption process. Learn electrolyte chemistry and electrolyte thermodynamic properties. Outline the thermodynamic framework developed in the example of MEA-H ₂ O-CO ₂ system in Aspen Properties.
Property Regression for Solvent-Based Carbon Capture	<ul style="list-style-type: none"> Regressing properties for carbon capture 	The accurate modeling of thermodynamic properties of CO ₂ loaded solvent is crucial for simulating and designing CO ₂ capture processes. So, it is vital to understand the pure and mixture parameter requirements for each model and estimate any corresponding missing parameters. The missing property parameters can be determined through data regression, a technique that determines the model parameters by fitting them to the experimental data. In this course, we will begin by providing an overview of electrolyte property regression in Aspen Properties, and then demonstrate how to perform property regression for the MEA-H ₂ O-CO ₂ system. We will also use Aspen Properties Excel Calculator to verify the model results by comparing them with experimental data.
Carbon Capture in Aspen HYSYS	<ul style="list-style-type: none"> Discover carbon capture in Aspen HYSYS 	Carbon capture is a promising method to address the environmental impact of greenhouse gas emissions. In this course, we will illustrate the growing need for carbon capture technologies and explain the role of chemical and physical solvents in absorption processes. You will learn how to compare and contrast equilibrium-based distillation and rate-based distillation; run absorption columns in both Efficiency and Advanced Modeling modes; model carbon capture processes in Aspen HYSYS using chemical and physical solvents; and identify

		supported solvents in Aspen HYSYS. In addition, we will demonstrate how to change solvents and investigate the effects.
Carbon Capture in Aspen Plus	<ul style="list-style-type: none"> Discover carbon capture in Aspen Plus 	Carbon capture is an increasingly important process. Learn how carbon capture works and how Aspen Plus is used to model these processes.
Sustainability Solution: Carbon Emissions Calculation and Pricing	<ul style="list-style-type: none"> Learn about tracking, reducing, and costing carbon emissions in Aspen HYSYS 	With global warming initiatives growing, tracking and reducing carbon emissions is more important than ever. Aspen HYSYS calculates the amount of carbon emissions in a process and the cost associated to them.
Sustainability Solutions: Concurrent Engineering for Design of Carbon Capture	<ul style="list-style-type: none"> Use a wide range of Aspen products to design a carbon capture facility 	The AspenTech Concurrent Engineering solution is a holistic strategy for feasibility evaluation and development of FEED packages. It incorporates process simulation and modeling, economic estimation, 3D layout, risk analysis and management of engineering data and deliverables. It allows multiple stakeholders to access the common project data repository, facilitating collaboration across disciplines. You can make earlier decisions to avoid risks, ensure cost savings and accelerate time to market.

aspenONE® Engineering

Energy, Chemicals, Engineering and Construction

Application: **Green Fuels**



DESIGN



OPERATE



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AIoT



Engineering Bio-Based Processes

Build, model and cost bio-based processes, such as green diesel or jet fuel, using Aspen HYSYS and Aspen Capital Cost Estimator.

Course Name	Knowledge Delivered	Description
Green Diesel Production from Waste Cooking Oil	<ul style="list-style-type: none"> Learn the basics of designing Green Diesel Production Processes in Aspen HYSYS 	<p>When looking at greenhouse gas emissions in the U.S. the transportation sector accounted for the highest output of all economic sectors. Production of liquid transportation fuel from renewable resources has been expanding worldwide. Model your process using Aspen HYSYS to get the full benefits of using molecular modeling. This includes higher accuracy, minimal information loss, thousands of reactions and more. Take it one step further and use molecular modeling on your streams/reactors. Lastly, improve and calibrate your model.</p>

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 Application: **Sustainability**



Sustainability Solutions in AspenTech Products

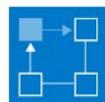
Sustainability is an increasingly important consideration of plant operations. Use AspenTech products, such as Aspen Plus, Aspen HYSYS and Aspen Utilities Planner, to model and optimize your sustainability projects. In this learning path, explore how AspenTech products can be used for sustainability projects such as carbon capture and improving energy efficiency.

Course Name	Knowledge Delivered	Description
Carbon Capture in Aspen HYSYS	<ul style="list-style-type: none"> Discover carbon capture in Aspen HYSYS 	Carbon capture is a promising method to address the environmental impact of greenhouse gas emissions. In this course, we will illustrate the growing need for carbon capture technologies and explain the role of chemical and physical solvents in absorption processes. You will learn how to compare and contrast equilibrium-based distillation and rate-based distillation; run absorption columns in both Efficiency and Advanced Modeling modes; model carbon capture processes in Aspen HYSYS using chemical and physical solvents; and identify supported solvents in Aspen HYSYS. In addition, we will demonstrate how to change solvents and investigate the effects.
Carbon Capture in Aspen Plus	<ul style="list-style-type: none"> Discover carbon capture in Aspen Plus 	Carbon capture is an increasingly important process. Learn how carbon capture works and how Aspen Plus is used to model these processes.
Aspen Utilities Planner: Energy Efficiency	<ul style="list-style-type: none"> Learn about energy efficiency in Aspen Utilities Planner 	Understand the importance of sustainability. Learn how Aspen Utilities Planner helps process and plant engineers evaluate the impact of carbon dioxide allowance and the availability of green power on plant operation.
Sustainability Solution: Carbon Emissions Calculation and Pricing	<ul style="list-style-type: none"> Learn about tracking, reducing, and costing carbon emissions in Aspen HYSYS 	With global warming initiatives growing, tracking and reducing carbon emissions is more important than ever. Aspen HYSYS calculates the amount of carbon emissions in a process and the cost associated to them.
Sustainability Solution: Introduction to Digital Twins	<ul style="list-style-type: none"> Learn the basics of Digital Twins 	Digital twins are useful tools to model, optimize, predict and control the production of a plant, including both saleable products and emissions. This module will introduce the overview of using digital twins for

		emissions modeling and reduction, and how to create a digital twin with Aspen OnLine.
Sustainability Solution: Deploying Digital Twins for Emissions Reduction	<ul style="list-style-type: none"> Use Digital Twins to reduce emissions 	Learn to connect to a data source and condition data, calibrate the model against conditioned data, and publish the Aspen OnLine project.
Sustainability Solution: Introduction to Hydrogen Economy	<ul style="list-style-type: none"> Learn about Aspen HYSYS can be deployed to address hydrogen economy, energy transition, and the factors that drive sustainability. 	Digital technologies are being used increasingly to accelerate the commercialization of sustainable solutions such as clean hydrogen production. AspenTech's digital tools give users the power to model several types of hydrogen processes and make a lower carbon energy economy more economically feasible. This module describes the hydrogen economy, the energy transition and the factors that drive sustainability. See how AspenTech products could be deployed throughout the hydrogen value chain with a demonstration of a blue ammonia production process in Aspen HYSYS.
Sustainability Solutions: Concurrent Engineering for Design of Carbon Capture	<ul style="list-style-type: none"> Use a wide range of Aspen products to design a carbon capture facility 	The AspenTech Concurrent Engineering solution is a holistic strategy for feasibility evaluation and development of FEED packages. It incorporates process simulation and modeling, economic estimation, 3D layout, risk analysis, and management of engineering data and deliverables. It allows multiple stakeholders to access the common project data repository, facilitating collaboration across disciplines. You can make earlier decisions to avoid risks, ensure cost savings and accelerate time to market.
Sustainability Solutions: Aspen Fidelis Examples	<ul style="list-style-type: none"> Use Aspen Fidelis to model sustainable processes 	Aspen Fidelis can be used to model many different sustainable processes. We present in-product demonstrations for multiple such systems in this course. Topics include green hydrogen production, carbon capture and wind power generation.

aspenONE® Engineering

Energy, Chemicals, Engineering and Construction

 Application: **Energy Management**


DESIGN



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Aspen Utilities Planner™: Energy Management Solution

Aspen Utilities Planner is a tool used to solve utility optimization problems. Complete this learning path to implement Aspen Utilities Planner. Model the required utility system for a process and specify the quantities and timeframes for utility demands. Learn and identify the AspenTech Energy Management solutions, explore the basics of Aspen Utilities Planner and build and optimize energy management solutions in both the Aspen Utilities Planner environment and Microsoft Excel interface.

Course Name	Knowledge Delivered	Description
Aspen Utilities Planner: Overview of AspenTech Energy Management Solution	<ul style="list-style-type: none"> Recognize the AspenTech energy management solution with Aspen Utilities Planner 	The AspenTech Energy Management System predicts and optimizes energy usage and executes decarbonization analysis with advanced energy analysis and utility planning tools. Aspen Utilities Planner is an essential energy supply planning tool developed to address the issues of critical business processes in the utility system. Aspen Utilities Planner can integrate with Aspen PIMS, Aspen Petroleum Scheduling and Advanced Process Control or APC.
Aspen Utilities Planner: Introduction to Aspen Utilities Planner	<ul style="list-style-type: none"> Discover Aspen Utilities Planner 	Aspen Utilities Planner (AUP) is a modeling and optimization tool designed to address energy and utility issues. This module introduces the capacities, features, applications and benefits of AUP and the general simulation and optimization workflow within the AUP application.
Aspen Utilities Planner: Developing a Flowsheet in Aspen Utilities Planner	<ul style="list-style-type: none"> Develop a flowsheet 	Aspen Utilities Planner (AUP) is a tool used to solve utility optimization problems. By analyzing the usage of utilities in the actual process, users can build a corresponding flowsheet in AUP. This course introduces the AUP interface basics and how to develop an AUP flowsheet from scratch.
Aspen Utilities Planner: Developing an Excel Interface via Aspen Utilities Excel Add-In	<ul style="list-style-type: none"> Develop an Excel interface with the Aspen Utilities add-in 	Using Microsoft Excel with an activated Aspen Utilities add-In can be an alternative to the Aspen Utilities Planner (AUP). All the functionality of AUP can be accessed from Microsoft Excel by loading the Aspen Utilities Excel add-In. This course introduces how to open AUP profiles in the Excel interface, run the simulation and verify results.
Aspen Utilities Planner: Optimizing Utilities Usage and Generation	<ul style="list-style-type: none"> Optimize utilities usage 	Optimize the utilities in a project through the Utilities Optimization tool by determining the most cost-effective utilities strategy and implementing the results. First, identify common use cases and the

		<p>types of questions that can be investigated through utilities optimization. Learn the structure of the tool's input forms and prepare multiple profiles if needed. Execute the tool within the Aspen Utilities Planner application or establish a connection to Microsoft Excel through the Aspen Utilities add-In.</p>
<p>Aspen Utilities Planner: Implement Custom Constraints</p>	<ul style="list-style-type: none"> • Discover custom constraints 	<p>Specify custom constraints to expand the types of limits placed on optimizations for Aspen Utilities Planner projects. Utilize block, stream, contract and other project information within the constraints to employ criteria that cannot be specified within the standard forms of Aspen Utilities Planner.</p>

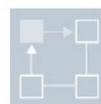


ELEARNING CLASSES BY LEARNING PATH — MANUFACTURING & SUPPLY CHAIN

aspensONE® Manufacturing and Supply Chain

Chemicals, Energy, Engineering and Construction

Application: **Advanced Process Control**



DESIGN



OPERATE



MAINTAIN



AIoT



Aspen DMC3™: Advanced Process Control

This learning path is designed for new or experienced process engineers and operators who need to learn how to use the available APC tools to create APC applications. Follow the sequence of courses ranging from basic concepts, like the APC fundamentals, to more advanced features like APC controller modeling, tuning and deployment.

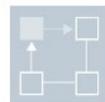
Course Name	Knowledge Delivered	Description
Advanced Process Control: Benefits, Deployment, and Sustainment	<ul style="list-style-type: none"> Learn the fundamentals of advanced process control including tools to deploy and maintain an APC application 	Explore the fundamentals of Advanced Process Control. You will learn what APC is, its benefits when implemented and where it is typically applied. You will then get an overview of useful control terminology and the implementation methodology for a new APC project. Learn about the importance of sustaining APC benefits over time. Finally, you will learn about the different software tools that are used to deploy and maintain an APC application.
Advanced Process Control Server System Architecture: Learn the Basics	<ul style="list-style-type: none"> Learn recommended network configurations for a typical APC deployment 	Identify recommended network configurations for a typical Aspen Advanced Process Control (APC) deployment. You will also discover the interactions between APC and Distributed Control Systems (DCS). Learn to identify the different hardware and software requirements for APC, explore the importance of virtualization in APC and discover the Software License Manager (SLM) Server setup.
APC Implementation: DCS Interfaces	<ul style="list-style-type: none"> Learn about DCS types and guidelines for implementing DCS and Aspen DMC3 	You will be introduced to various DCS types and presented guidelines to interface between the DCS and Aspen DMC3.
PID: Configure and Tune PID Loops	<ul style="list-style-type: none"> Improve PID tuning parameters using Aspen PID Watch application 	Learn how to improve the PID tuning parameters using Aspen PID Watch applications. Gain insight into the configuration of PID Loops in the online system and how to tune a PID loop using Aspen PID Watch Desktop.
Aspen DMC3 Builder: Learn How to View and Process Vector Data	<ul style="list-style-type: none"> Learn how to visualize, interpolate and plot data 	Learn about the main features available in the datasets. View the ribbon elements in Aspen DMC3 Builder™. We will start with the dataset actions ribbon group. We will then explore the available

		features for vectors and plot types to visualize data. We will learn how to slice and interpolate data. Finally, we will explore the plot actions features.
Learn How to Convert Existing Aspen DMCplus® Controllers to Aspen DMC3	<ul style="list-style-type: none"> Optimize data migration from Aspen DMCplus to Aspen DMC3 Builder 	Explore the optimal workflow for migrating data from an Aspen DMCplus project to Aspen DMC3 Builder. Learn how to rebuild cases and compare the model results between the original and new models before updating the master model. In addition, get familiar with the deployment workflow and how to map IO connections to tags before the controller deployment.
Advanced Concepts for Ramp Variables	<ul style="list-style-type: none"> Explain advanced concepts for ramp variables in Aspen DMC3 Builder 	Discover ramp variables, identify various types of ramp variables and the ramp attributes used in an APC controller, and learn how imbalance limits are calculated for a ramp variable.
Aspen DMC3 Builder: Model Identification Workflow	<ul style="list-style-type: none"> Master the identification workflow in Aspen DMC3 	Learn the complete model identification workflow in Aspen DMC3 Builder, starting with the basics of model identification. Learn the modeling workflow, create cases, and run model identification. From each identified case, select models to be copied and build the master model. Finally, repair the collinearity of the fully built master model.
Aspen DMC3 Builder: Maestro Models for DMC3	<ul style="list-style-type: none"> Walk through the main steps in creating a seed model using Maestro Models. 	Maestro Models is a part of Aspen DMC3 Builder that allows you to build and deploy DMC3 controller applications more quickly. It is an automated process that creates seed models from historical data. Seed models can be used as a basis for creating DMC3 controller models. This reduces the manual work to set up and deploy controllers since similar processes can be developed from the same seed model.
Aspen DMC3 Builder: Setting Up Calculations	<ul style="list-style-type: none"> Create custom calculations in Aspen DMC3 Builder 	We show how to create custom calculations in Aspen DMC3 Builder. We introduce calculations, and their place in the workflow. We explain the features available in the calculations view and the purpose of calculations. We demonstrate how to add user entries and how to connect variables in the calculations to the built-in entries and user entries, then test the calculation. Finally, we demonstrate how to create a formula and how to call it from a calculation.
Aspen DMC3 Builder: Nonlinear CVs for DMC3 Controllers	<ul style="list-style-type: none"> Learn about the features for nonlinear controllers in Aspen DMC3 Builder 	Discover nonlinear CVs in Aspen DMC3 Builder and learn the features of how to create one. Walk through an example and analyze an existing nonlinear controller.
Aspen DMC3 Builder: Future Feedforward Trajectories	<ul style="list-style-type: none"> Discover the future feedforward trajectories feature in Aspen DMC3 Builder 	Discover a new feature in Aspen DMC3 Builder for V11. Future feedforward trajectories allow engineers to specify future trajectories for feedforward variables. Learn about future feedforward trajectories

		and why they are important. Walk through an example of how to set up a future feedforward trajectory in Aspen DMC3 Builder.
Aspen DMC3 Builder: Deep Learning Inferential	<ul style="list-style-type: none"> Discover deep learning in Aspen DMC3 Builder 	Discover the basic deep learning workflow, describe the evolution of model identification for APC and explain deep learning model identification in Aspen DMC3 Builder and Aspen IQ. Learn about the workflow options and parameters for creating a deep learning inferential in Aspen DMC3 Builder. Finally, identify a nonlinear model using Deep Learning TensorFlow model identification in Aspen DMC3 Builder. This version is for V12 only.
Aspen Deep Learning for Aspen DMC3	<ul style="list-style-type: none"> Expand your knowledge of deep learning in Aspen DMC3 Builder 	Explore the workflow to build a Deep Learning control variable for an existing DMC3 application. Walk through the process of creating a Deep Learning control variable for an existing DMC3 controller. This module is for version 12.1 and beyond.

aspenONE® Manufacturing and Supply Chain

Chemicals, Energy, Engineering and Construction

 Application: **Advanced Process Control**


DESIGN



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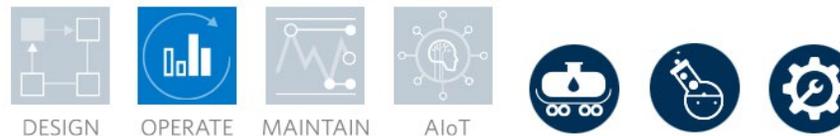

Aspen DMC3: Operating and Maintaining Controllers Online

This learning path was designed to explain the basic concepts of Aspen Advanced Process Control DMC3 Technology and demonstrate how to operate and maintain DMC3 controllers. You will build and interact with DMC3 using Aspen Production Control Web Server (PCWS). You will become familiar with modeling test methods and procedures, and learn how to troubleshoot a DMC3 controller.

Course Name	Knowledge Delivered	Description
Advanced Process Control: Benefits, Deployment and Sustainment	<ul style="list-style-type: none"> Learn the fundamentals of advanced process control including tools to deploy and maintain an APC application 	Explore the fundamentals of Advanced Process Control. You will learn what APC is, its benefits when implemented and where it is typically applied. You will then get an overview of useful control terminology and the implementation methodology for a new APC project. Learn about the importance of sustaining APC benefits over time. Finally, you will learn about the different software tools that are used to deploy and maintain an APC application.
Advanced Process Control Server System Architecture: Learn the Basics	<ul style="list-style-type: none"> Learn recommended network configurations for a typical APC deployment 	Identify recommended network configurations for a typical Aspen Advanced Process Control (APC) deployment. You will also discover the interactions between APC and Distributed Control Systems (DCS). Learn to identify the different hardware and software requirements for APC, explore the importance of virtualization in APC and discover the Software License Manager (SLM) Server setup.
Operating and Maintaining Controllers Online: Modeling Terminology	<ul style="list-style-type: none"> Review the modeling terminology used in Aspen DMC3 Builder. 	Review the basic definitions required to model an online controller in Advanced Process Control. Classify Advanced Process Control models and learn about DMC3 controller characteristics. Finally, learn the basics of constraining and optimizing an Advanced Process Control model in Aspen DMC3.
Operating and Maintaining Controllers Online: Using PCWS	<ul style="list-style-type: none"> Learn to manage online controllers 	Learn to use Production Control Web Server, or PCWS, to manage controllers Online.
Operating and Maintaining Controllers Online: DMC3 Engine Overview	<ul style="list-style-type: none"> Learn the three main modules of the DMC3 engine 	The DMC3 Engine has three main modules: prediction, steady-state optimization and dynamic control. Prediction focuses on where the process is going, steady-state optimization finds the optimum operating point, and dynamic control determines how the process can move to that optimum. Recognize how these modules work and tune

		<p>them to adjust the process to your necessity. Tuning affects which variables are prioritized and their response curves.</p>
<p>Operating and Maintaining Controllers Online: Online Troubleshooting</p>	<ul style="list-style-type: none"> • Learn to troubleshoot online controllers 	<p>Use process logs, controller specifications, controller objectives, and knowledge of Aspen Process Control behavior to troubleshoot online controller issues. Investigate issues regarding controller deployment and operation as well as problems arising from server communications. Predict the controller's and the Aspen Process Control server's responses to various scenarios, including receiving bad data from tags, losing analyzer data due to freezing or timing out, the DCS crashing, and losing the Production Control Web Server. Then, identify the required steps to restore the system.</p>

aspenONE® Manufacturing and Supply Chain
 Chemicals, Energy, Engineering and Construction
 Application: **Dynamic Optimization**



Aspen GDOT™: Dynamic Optimization

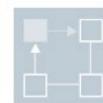
Aspen GDOT (Generic Dynamic Optimization Technology) is optimization software that can coordinate multiple different units to optimize operation of a plant. In this learning path, you will learn basics of GDOT and its capabilities, application of GDOT in refining and olefins, and how to use GDOT to improve operation of your plant.

Course Name	Knowledge Delivered	Description
Aspen GDOT: Applications Overview	<ul style="list-style-type: none"> Discover Aspen GDOT 	Learn what GDOT is and the capabilities of GDOT. Examine applications of GDOT to refineries and ethylene production plants.
Aspen GDOT: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen GDOT 	Learn how to use GDOT including navigating the interface, creating and building a flowsheet, and implementing DMC and custom blocks in the model flowsheet. Finally, learn how to analyze the models for results.
Aspen GDOT: Synergies with Unified PIMS	<ul style="list-style-type: none"> Use Aspen GDOT to improve Aspen PIMS 	Learn how to use GDOT to improve the accuracy of your PIMS models. Learn how to create GDOT trends.
Aspen GDOT: Generate a GDOT Model from Aspen Unified	<ul style="list-style-type: none"> Build a GDOT model from Aspen Unified 	Learn how to build a full GDOT model from a blank flowsheet, including how to add DMC models.
Aspen GDOT: Reduced Order Models	<ul style="list-style-type: none"> Discover reduced order models in Aspen GDOT 	Learn how to create, configure and use reduced order models in Aspen Unified GDOT.
Aspen GDOT: Olefins Modeling and Configuration	<ul style="list-style-type: none"> Model and configure olefins with Aspen GDOT 	Learn to use Aspen GDOT to optimize your olefin plant production. Configure the furnace block within Aspen GDOT.

aspenONE® Manufacturing and Supply Chain

Energy

Application: Refinery Blending



DESIGN



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Aspen Refinery Multi-Blend Optimizer™ (MBO): Blend Scheduling

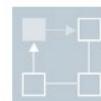
This learning path is designed for new or experienced blend schedulers and model administrators who need to learn how to build a model for seamless scheduling and optimization of daily blend activities. Follow the sequence of courses in this learning path to learn how to configure and build an MBO model with all the necessary components to run the optimizer process. You will learn how to import data from Orion, set baseline conditions for the simulation, define all the MBO event types necessary to develop a blend schedule, run both the MBO and SBO, use a number of different MBO reports to interpret results and troubleshoot infeasibilities, and use cases and states to run “what if” scenarios.

Course Name	Knowledge Delivered	Description
Aspen Refinery Multi-Blend Optimizer (MBO): Learn the Basics of Blending	<ul style="list-style-type: none"> Overview of the components of refinery blending 	Learn the importance of a Blend Specific Optimization Tool, the features and system structure of Aspen Refinery Multi-Blend Optimizer, data table and Excel Integration Utility, along with the different components and modes that are part of the Aspen Refinery Multi-Blend Optimizer user interface.
Model Building: Learn the Blending Model Elements in Aspen Refinery MBO	<ul style="list-style-type: none"> Basics in blending models 	Get familiar with the concepts relevant to modeling, working with models and dynamic data.
Model Settings: Basic Setting Configurations in Aspen Refinery MBO	<ul style="list-style-type: none"> Basics in setting configurations of refinery blending models 	Find out all about the Settings menu tabs and look at the frequently used options in the Settings.
Event Applications: Leverage Blend Events in the Refinery Scheduling Process with Aspen Refinery Multi-Blend Optimizer	<ul style="list-style-type: none"> Learn how to work with blend events 	Understand the concepts relevant to events and how to work with events in Aspen Refinery Multi-Blend Optimizer.
Aspen Refinery Multi-Blend Optimizer: Rundown Blending	<ul style="list-style-type: none"> Discover rundown blend events in Aspen Refinery Multi-Blend Optimizer 	Learn how to create rundown blend events in Aspen Refinery Multi-Blend Optimizer and how to optimize blend campaigns involving rundown blends.

aspensONE® Manufacturing and Supply Chain

Energy and Chemicals

Application: **Refinery Scheduling**



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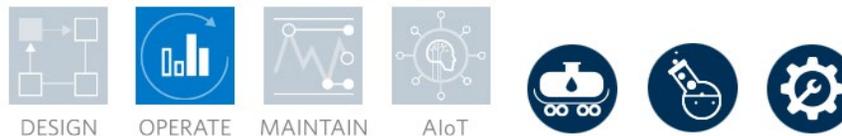


Aspen Petroleum Scheduler™ (APS): Refinery Scheduling

This learning path is designed for new or experienced schedulers who need to learn how to use APS effectively for daily scheduling operations. Complete this learning path to learn how to use key APS database and interfaces, practice building and simulating a refinery model, perform exercises in scheduling a variety of event types, simulate/publish a schedule to the results database and discover how APS facilitates the overall planning and scheduling work process.

Course Name	Knowledge Delivered	Description
Aspen Petroleum Scheduler: Learn the Basics of Petroleum Scheduling	<ul style="list-style-type: none"> Learn the basics of petroleum scheduling 	Explore the main features of Aspen Petroleum Scheduler (APS) including its structure and main functionality. We will present ways you can use APS in your daily scheduling activities and the benefits of APS interfaces and functions. Finally, we will introduce you to the general APS interface to help you quickly get started.
Aspen Petroleum Scheduler Events Interface: Discover Key Scheduling Elements	<ul style="list-style-type: none"> Learn about the events interface and other key components 	Events are the foundation of Aspen Petroleum Scheduler. Learn about the general events interface and specific key components, such as the Gantt and Trend charts.
Aspen Petroleum Scheduler: Leverage Scheduling Events	<ul style="list-style-type: none"> Basics of scheduling events 	Learn the basics of the different types of events available, as well as their primary function in Aspen Petroleum Scheduler.
Scheduling Workflows: Leverage Scheduling Best Practices	<ul style="list-style-type: none"> Learn to use the scheduling process workflow 	The scheduling workflow provides high-level steps used by schedulers to accomplish their scheduling tasks. Learn how to use Aspen Petroleum Scheduler (APS) by mapping APS features to each main step of the scheduling process workflow.
Publishing: Data Publishing and Creating Reports	<ul style="list-style-type: none"> Develop reports and outputs 	Learn about the outputs of Aspen Petroleum Scheduler at a high level, the specific output tables, unit operating parameters, workflow involved in the scheduled process and different output dialog boxes.

aspenONE® Manufacturing and Supply Chain
 Energy, Chemicals, Engineering and Construction
 Application: **Refinery and Olefins Planning**



Aspen PIMS™: Refinery & Olefins Planning

This learning path is designed for new or experienced planners who need experience in planning operations in refineries and olefins plants. Complete this learning path to learn model building and solution analyzing techniques and tools in order to make the most profitable decisions for acquiring feedstocks, producing and blending products, and operating the processes.

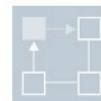
Course Name	Knowledge Delivered	Description
How Refinery Optimization and Economics Determine and Improve Profits	<ul style="list-style-type: none"> An introduction to maximizing refinery profitability 	Learn how Aspen PIMS is used to quantify and optimize refinery economics. Get an overview of using Aspen PIMS as a tool for maximizing refinery profitability and take a quiz to test your knowledge. At the end of the training, you will take a quiz to test your knowledge of the material covered.
How Aspen PIMS Improves Refinery Profits	<ul style="list-style-type: none"> The basics of linear programming driving refinery profit improvement 	Understand the basics of linear programming and how it is applied to the economics of refineries and petrochemical plants. Some common LP issues such as infeasibilities and global versus local optima are also discussed.
Aspen PIMS: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of how refineries and petrochemical plants use Aspen PIMS 	Discover Aspen PIMS and how industry uses it to add value. Review the options available within Aspen PIMS and basic features of the application. At the end of the training, you will take a quiz to test your knowledge of the material covered.
Workflows: How to Model Blends to Optimize Refinery Profits	<ul style="list-style-type: none"> Explore the fundamentals of blending in planning 	Explore the fundamentals of Blending in Aspen PIMS, including the basics of blending and the structures of various blending input tables. Get an overview of advanced blending method structures and learn about Aspen Blend Model Library — a portfolio of advanced linear and nonlinear blending correlations.
Workflows: Scenarios, Crude Indifference Values and Break Even Values	<ul style="list-style-type: none"> Learn about basic process economics and how to evaluate new crudes 	Learn the fundamentals of valuing process streams in Aspen PIMS, including basic process economics concepts such as marginal costs, marginal revenues, marginal values and workflows to calculate these values using Aspen PIMS. Find out how to evaluate new crudes and calculate their break-even values using the Spot Crude Evaluation feature in Aspen Assay Management™. Finally, you will see an example of the Parametric Analysis feature in Aspen PIMS-AO™ to

		<p>visualize the sensitivity of crude purchases with variation in purchase costs.</p>
<p>Workflows: How to Model Crude and Manage Assays</p>	<ul style="list-style-type: none"> • Master the basics of crude assays in refinery planning 	<p>Explore the basics of crude assays, their importance in refinery planning and the fundamentals of creating and managing crude assay data in Aspen PIMS. Learn how to define logical crude units in a refinery model using the crude distillation tables, as well as how to set up and use Aspen Assay Management™ within Aspen PIMS to characterize crudes and manage assay data. Finally, you will learn how to update existing Aspen PIMS assay tables using Aspen Assay Management.</p>

aspenONE® Manufacturing and Supply Chain

Energy, Chemicals

Applications: Performance Management, OEE, Centralized Performance Monitoring



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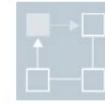


Aspen Process Recipe Management: Aspen Recipe Explorer and Transition Management

This learning path is designed for new engineers who need to learn how the Recipe Explorer and Transition Management can help store and download recipe parameters to the process and manage product transitions. Aspen Transition Management is designed to work with Aspen Recipe Explorer and makes the management of grade changes easy. Operators stay informed and synchronized with transition plans, timed instructions, progress indicators, confirmation of manual readings and monitoring of abnormal conditions that require alternative actions.

Course Name	Knowledge Delivered	Description
Aspen Process Recipe Management: Learn the Basics	<ul style="list-style-type: none"> Installation and configuration 	Learn the requirements to install and configure Aspen Process Recipe. Discover the six fundamental concepts of Aspen Recipe Explorer, view recipe data, and download recipe data to Aspen InfoPlus.21 using Recipe Explorer. Develop a new control recipe from scratch and create a new master recipe from an existing template.
Aspen Process Sequencer: Deploying a Transition	<ul style="list-style-type: none"> Discover Aspen Process Sequencer 	Aspen Process Sequencer is an extension to Aspen Process Recipe. Use Aspen Process Sequencer to transition a process from one recipe to another while accommodating sophisticated logic and constraint limits. Build a transition strategy from nodes and links. Use Aspen Calc scripts to implement custom behavior and expand these scripts with the TransitionLib library for modular code. Define security roles to assign secure access to Aspen Process Sequencer functions. Create and run a transition package, then monitor this package from Production Control Web Server (PCWS) or Aspen Process Sequencer.

aspensONE® Manufacturing and Supply Chain
 Energy, Chemicals and Pharmaceuticals
 Applications: Weigh and Dispense



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Weigh & Dispense Execution

This learning path is designed for weighing operators to learn and apply the Weigh and Dispense process of issuing the right materials and their right proportioning to production. Learn how to use Aspen Weigh and Dispense Execution to check for scale accuracy, dispense source materials and group the dispensed materials into an order kit.

Course Name	Knowledge Delivered	Description
Aspen Weigh & Dispense: Equipment Management	<ul style="list-style-type: none"> Learn to manage equipment in Aspen Weigh & Dispense 	We will illustrate how to execute Booth Cleaning and Scale Checking using the Aspen Weigh and Dispense Execution client.
Aspen Weigh & Dispense: Weighing Methods	<ul style="list-style-type: none"> Learn the different weighing methods in Aspen Weigh & Dispense 	We will explain the difference between seven weighing methods and demonstrate how to dispense materials using each of them.
Aspen Weigh & Dispense: Order kitting	<ul style="list-style-type: none"> Learn about order kitting in Aspen Weigh & Dispense 	After all the materials are dispensed, they should be placed on pallets and sent to manufacturing if required. Understand the prerequisites and operations for order kitting.

aspensONE® Manufacturing and Supply Chain

Energy, Chemicals and Pharmaceuticals

Applications: Weigh and Dispense



Weigh & Dispense for Administrators

Aspen Weigh and Dispense is a fully configurable Manufacturing Execution Systems (MES) application that manages major dispensing methods. It provides comprehensive management of recipes and orders in collaboration with ERP systems. This learning path is designed for administrators and covers the basic configurations in the Aspen Weigh and Dispense web client. Along with integrating Aspen Weigh and Dispense with the equipment and APEM, this learning path includes configurations for defining cleaning rules, managing orders, and more.

Course Name	Knowledge Delivered	Description
Aspen Weigh & Dispense: Software Interface Management	<ul style="list-style-type: none"> Learn about major weighing and dispensing methods 	Aspen Weigh and Dispense is a fully configurable Manufacturing Execution System that manages major weighing and dispensing methods. Summarize the four software interfaces for Aspen Weigh and Dispense.
Aspen Weigh & Dispense: General Configuration	<ul style="list-style-type: none"> Master the configuration of Aspen Weigh and Dispense 	Aspen Weigh and Dispense is a fully configurable manufacturing execution systems application that manages major dispensing methods. It provides comprehensive management of recipes and orders in collaboration with Enterprise Resource Planning (ERP) systems. Learn how to set up general configurations, including material handling information, equipment, deviations, signatures, user exits, and more.
Aspen Weigh & Dispense: Hardware Interface Management	<ul style="list-style-type: none"> Master the Aspen Weigh and Dispense hardware interface management 	Aspen Weigh and Dispense provides standard solutions to connect the execution client to the label printer, bar code scanner, and weighing scales. These three components are the main components of the Aspen Weigh and Dispense hardware interface. Demonstrate each component and touch upon common elements of the hardware interface. Apply useful tips, configure the printer, test the connection with and without a real printer, and create a simulator scale.
Aspen Weigh & Dispense: Cleaning Rules	<ul style="list-style-type: none"> Learn how to define and use cleaning rules in Aspen Weigh and Dispense 	Aspen Weigh and Dispense allows users to define and use cleaning rules. Modify, test and commit new rules after importing them. In some cases, cleaning is not required to weigh two specific materials, and configuring cleaning rules is needed.

Aspen Weigh & Dispense: Scale Management	<ul style="list-style-type: none"> • Manage scales in Aspen Weigh and Dispense 	Aspen Weigh and Dispense allows users to manage scales to better accomplish weighing. Understand scale resolution, precision and accuracy. Learn how to manage the scales, including scale state transition and automatic scale selection in Aspen Weigh and Dispense.
Aspen Weigh & Dispense: Order Management	<ul style="list-style-type: none"> • Manage orders, campaigns and deviations in Aspen Weigh and Dispense 	Introduce the Orders, Campaigns, and Deviations Management sub-tabs of the Order tab. Explain the status for order and deviation transitions, illustrate how to manage orders and campaigns, and resolve deviations.
Aspen Weigh & Dispense: Reports	<ul style="list-style-type: none"> • Generate reports in Aspen Weigh and Dispense 	Aspen Weigh and Dispense is a component of Aspen Production Execution Manager and is able to generate a great variety of reports for the user. Reports show the results from weighing orders or campaigns, and audit reports summarize changes made to any of the configurations.

aspensONE® Manufacturing and Supply Chain

Chemicals

Applications: Refinery Planning



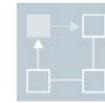
Aspen PIMS Advanced Optimization: Introduction to PIMS-AO for Refinery Planning

This learning path is designed for a new planner who needs to know the basics. Complete this learning path to learn how to modify an existing PIMS-AO model, setup and run cases, understand reports, and be able to do some troubleshooting so business cases can be quickly run and evaluated.

Course Name	Knowledge Delivered	Description
Aspen PIMS AO: Understanding Existing Model Basics	<ul style="list-style-type: none"> Master existing model basics in Aspen PIMS-AO 	This course is designed for users with no experience with Aspen PIMS. Learn the basics of PIMS that will allow you to get up and running with existing models. Topics covered include a general overview of the PIMS interface, reports, case stacking, the BUY and SELL tables, table CAPS and PROCLIM, and the fundamentals of submodels. Overall, after watching these videos users will be able to accurately modify PIMS models.
Aspen PIMS-AO: Running Cases	<ul style="list-style-type: none"> Run cases in Aspen PIMS-AO 	Creating cases in Aspen PIMS allows users to simultaneously evaluate a multitude of variations of a base model. Learn to create and compare cases, explore the spot crude evaluation feature for evaluating new crudes and use the parametric analysis feature of Aspen PIMS Advanced Optimization that allows planners to visualize model behavior over a range of constraint values.
Aspen PIMS-AO: Understanding Results	<ul style="list-style-type: none"> Understand results in Aspen PIMS-AO 	Aspen PIMS can produce different reports that detail the results of an executed PIMS model and its cases. Focus will be on the solution reports such as the Full Solution report. Learn how to enable reports, edit report settings and view reports. PIMS also allows for custom reports to be generated with Aspen Report Writer or other third-party tools, such as Microsoft Power BI, using PIMS solution data in an output database.

Aspen PIMS-AO: Basic Troubleshooting	<ul style="list-style-type: none"> • Learn basic troubleshooting techniques in Aspen PIMS-AO 	Learn how to troubleshoot errors and warnings, and infeasible models in Aspen PIMS Advanced Optimization. Learn about a new feature to automatically insert infeasibility breakers into infeasible models and use the Aspen PIMS XLR viewer to troubleshoot difficult models.
Aspen Hybrid Models: Planning Model Update with AI-Powered Models	<ul style="list-style-type: none"> • Create a model in Aspen AI Model Builder to be used within Aspen PIMS-AO 	Beginning with a single Aspen HYSYS case, walk through the entire workflow of creating a reduced order planning model. Generate a dataset in Aspen Multi-Case to ensure a consistently high-quality model. Then, use Aspen AI Model Builder to consume, clean and build a model from this dataset. Constrain the model under a mass balance, then create, validate and compare multiple versions of the model. Review the statistics used to quantify model accuracy and predictability. Finally, export the model file and use this file to replace an existing submodel within an Aspen PIMS project.

aspenONE® Manufacturing and Supply Chain
 Chemicals
 Applications: Performance Management



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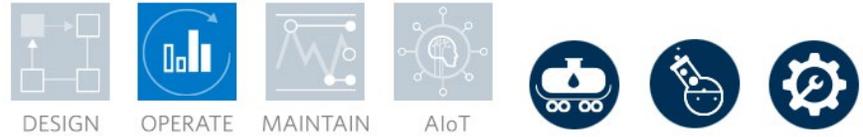


Aspen Process Explorer: Process Data Analysis

Learn how to use the Aspen Process Explorer application to analyze real-time and historical critical process data. Understand how to visualize graphics that display the current process conditions so that users are aware exactly how the plant is operating. This learning path is designed for new or experienced engineers and operators who have a need to visualize process data.

Course Name	Knowledge Delivered	Description
Aspen Process Explorer: Discover Key Capabilities in the User Interface	<ul style="list-style-type: none"> Use the Aspen Process Explorer application and discover the user interface 	Become familiar with Aspen Process Explorer's user interface and view demonstrations showing the creation and manipulation of a trend, XY plot and workspace. Review how to plot various tags on a trend plot, use an XY plot to review correlations between tags and convey large amounts of process data with graphics. Finally, use workspaces to gather multiple trends or graphics into a single view that can be saved and recreated.

aspenONE® Manufacturing and Supply Chain
 Chemicals, Energy, Engineering and Construction
 Application: **Advanced Process Control**

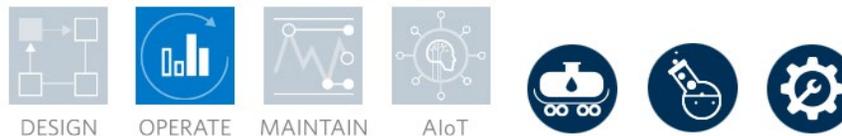


Aspen Watch: Online Monitoring for Advanced Process Control

This learning path is designed for new and experienced users who need to learn how to monitor the performance of Aspen APC controllers, general tags or PID loops.

Course Name	Knowledge Delivered	Description
Aspen Watch: AW Maker in Web	<ul style="list-style-type: none"> Discover Aspen Water Maker online 	Aspen Watch is a performance monitoring and historization tool, specifically designed for monitoring advanced process control applications. Discover the features of Aspen Watch Maker online.
Aspen Watch: Centralized Monitoring of APC Benefits	<ul style="list-style-type: none"> Discover Aspen Watch and monitor Advanced Process Control benefits online 	APC Benefits Monitoring allows users to view a summary of controller status, effectiveness and benefits. Centralized monitoring connects individual, plant-level servers to a central server, which allows for ease of access for monitoring multiple locations at once. KPIs are used to measure controller benefits, and dashboards help visualize that data.

aspenONE® Manufacturing and Supply Chain
 Chemicals, Energy, Engineering and Construction
 Application: **Refinery and Olefins Planning**



Aspen Unified PIMS: Integrated Planning and Scheduling for Refineries and Olefins

Embrace the next generation of Aspen PIMS with Aspen Unified. Integrate the planning and scheduling workflows to simplify operations. Make the most profitable decisions for acquiring feedstocks, selecting, producing, and blending products, and operating the process. Create new models or migrate previously created Aspen PIMS models, then analyze different scenarios to optimize decision making.

Course Name	Knowledge Delivered	Description
Aspen Unified PIMS: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen Unified PIMS 	Aspen Unified integrates planning and scheduling activities into a single environment. It is web-based, fully cloud-enabled, and device agnostic. Aspen Unified allows many novel functionalities including the capability for multiple people to work on the same model, role-based permissions for users, and enabling more collaboration within your organization. You can create Planning, Scheduling, Multi-refinery Petroleum Supply Chain and GDOT models. If you already have an existing PIMS-AO model, you can migrate the model to Aspen Unified with the click of a button. From the homepage, you can access the models, user roles, assay library and price catalogs.
Aspen Unified PIMS: Introduction to Planning	<ul style="list-style-type: none"> Navigate Unified PIMS, create and run cases 	Learn how to use and navigate Unified PIMS including creating and running cases in Unified PIMS.
Aspen Unified PIMS: Analyzing Results	<ul style="list-style-type: none"> Explore model results 	Explore model results from within the flowsheet, or export the results in HTML, Excel or text formats. Execute case comparison reports and parametric case studies to directly contrast different cases or investigate the response of a case to various conditions. Link the model results database to Microsoft Power BI to create enhanced visualizations and conduct ad-hoc analyses. Use work areas within Aspen Unified PIMS to visualize key model results. Finally, publish properties, materials, assets and other objects to a site catalog to use these objects within other Aspen Unified PIMS or Aspen Unified Scheduling models.

Aspen Unified PIMS: Advanced Features	<ul style="list-style-type: none"> • Learn the advanced features in Unified PIMS 	Utilize advanced capabilities of Aspen Unified PIMS to expand model applicability and improve solution times. Review how to expand a model to include non-linear relationships between variables and define new variables for use within these relationships as required. Understand the concurrency levels available for model runs, the associated limits on concurrent tasks and their implications on model run scheduling.
Aspen Unified PIMS: Introducing Hybrid Models	<ul style="list-style-type: none"> • Discover hybrid models in Aspen Unified PIMS 	Hybrid models combine traditional and machine learning modeling methods to improve a model's accuracy and performance. Aspen Unified PIMS utilizes reduced order models, a hybrid model generated from datasets of simulation runs. Explore how Aspen Unified uses these models and create a hybrid model block within an Aspen Unified flowsheet. Use Aspen Multi-Case to generate a dataset containing the results of thousands of simulation runs, then employ Aspen AI Model Builder to generate the reduced order model. Finally, return to Aspen Unified to import the model relationships into the hybrid model block and apply this solution.
Aspen GDOT: Synergies with Unified PIMS	<ul style="list-style-type: none"> • Use Aspen GDOT to improve Aspen PIMS 	Learn how to use GDOT to improve the accuracy of your PIMS models. Learn how to create GDOT trends.

aspenONE® Manufacturing and Supply Chain
 Chemicals, Energy and Engineering
 Application: **Refinery Planning and Artificial Intelligence**



Aspen Verify for Planning: Confirm Operating Plans with Artificial Intelligence

Aspen Verify for Planning (VFP) uses artificial intelligence (AI) and previous operating plans to verify new operating plans against a plant's history. This learning path is designed for planners and will describe how to leverage Aspen Verify for Planning to improve operating plan verification. Aspen Verify for Planning uses cases generated in Aspen PIMS or Aspen Unified PIMS. Capture and present usable insights from previous operating plans; then use these insights alongside AI methods to prevent errors and verify new plans in less time.

Course Name	Knowledge Delivered	Description
Aspen Verify: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen Verify 	Learn what Aspen Verify is and how it improves the plan verification process. Also, learn how multi-variate analysis, a mathematical technique used by Aspen Verify, enables you to streamline plan verification.
Aspen Verify for Planning: How to Use Aspen Verify for Planning	<ul style="list-style-type: none"> Navigate Aspen Verify 	Learn how to use and navigate Aspen Verify for Planning, including how to train models and validate cases.
Aspen Verify for Planning: Best Practices	<ul style="list-style-type: none"> Learn best practices and walk through Aspen Verify 	Walk through key steps in the development and use of an Aspen Verify for Planning model. Describe what conditions to include in the imported dataset and rationalize when to prune cases from this dataset. Assign key variables to influence model generation, then validate these decisions through accurate case clustering. Evaluate the cases and clusters of the model against each other and then employ this analysis against a potential operating plan to validate the plan against past operating plans.

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 Application: **Refinery Planning and Artificial Intelligence**

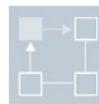


Aspen Unified Reconciliation and Accounting

Aspen Unified Reconciliation and Accounting (AURA) is the next-gen production accounting application available within Aspen Unified. Using AURA's advanced data reconciliation techniques, track daily plant performance and perform accurate yield accounting to make more informed business decisions. In this learning path, you will become familiar with AURA and its capabilities. Along the way, learn how to configure flowsheet objects for model building, add configurable expressions, reduce unknown losses, and utilize customizable visualization options.

Course Name	Knowledge Delivered	Description
Aspen Unified Reconciliation and Accounting: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of AURA 	In this module, you will learn the basic concepts around reconciliation accounting and the capabilities and benefits of using Aspen Unified Reconciliation and Accounting (AURA). You will learn how to modify and navigate AURA models.
Aspen Unified Reconciliation and Accounting: Model Configuration and Flowsheet Building	<ul style="list-style-type: none"> Build flowsheets and configure AURA models 	In this course, learn how to build a yield accounting model in Aspen Unified Reconciliation and Accounting. First, become familiar with the Model Data tab and property, material, and flowsheet object configuration. Then, construct a flowsheet in AURA, input the model data and run a reconciliation case.

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 Chemicals, Energy and Engineering
 Application: **Refinery and Olefins Planning**



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Aspen Unified Multisite: Multisite Model Optimization

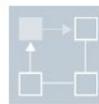
This learning path is designed for new or experienced planners who need to optimize Multisite models in Aspen Unified Multisite. Complete this learning path to learn how to migrate existing M-PIMS and X-PIMS models, work with Aspen Unified Multisite models, and create a globally optimized plan.

Course Name	Knowledge Delivered	Description
Aspen Unified Multisite: Migrating Existing M-PIMS and X-PIMS Models	<ul style="list-style-type: none"> Migrate existing models 	Aspen Unified Multisite supports developing a multisite model, which is a multi-plant, multi-market, and multi-deposit supply and demand distribution network. Since all sites in the supply chain are considered, model optimization can significantly increase overall revenue. We can create a new Aspen Unified Multisite model from scratch or migrate an existing PIMS model. Aspen Unified Multisite allows us to create supply chain networks on the map.
Aspen Unified Multisite: Working with Aspen Unified Multisite Models	<ul style="list-style-type: none"> Work with multisite models 	After migrating an existing M-PIMS or X-PIMS model to Aspen Unified Multisite, a Multisite model is created. Learn the Map functionality to better set up the model and understand the solution results.
Aspen Unified Multisite: Creating a Global Plan	<ul style="list-style-type: none"> Create a global plan 	After using the Map functionality to set up a Multisite model, create a global plan for the model.

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Application: **Refinery and Olefins Planning**



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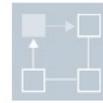


Aspen Unified Scheduling: Crude Scheduling

This learning path is designed for refinery schedulers and model builders to comprehend the basic scheduling workflows in Aspen Unified Scheduling (AUS). Complete this learning path to learn how to create an AUS model from an Aspen Unified PIMS model, populate the AUS work area and understand the Gantt Chart, Scheduling Logics, Case Management and Crude Schedule Optimization.

Course Name	Knowledge Delivered	Description
Aspen Unified Scheduling: Create an Aspen Unified Scheduling Model	<ul style="list-style-type: none"> Discover Aspen Unified Scheduling 	In the crude scheduling process, we start from creating an Aspen Unified scheduling model and then introduce the work area basic functionality and the baseline in Aspen Unified Scheduling.
Aspen Unified Scheduling: Gantt Chart Interactions	<ul style="list-style-type: none"> Learn Gantt Chart interactions 	After creating an Aspen Unified scheduling model, understand the event logic and basic Gantt chart interactions to create the schedule.
Aspen Unified Scheduling: Case Management	<ul style="list-style-type: none"> Manage cases 	After creating the Gantt chart, add some child cases and manage different scenarios in Aspen Unified Scheduling.

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 Application: **Advanced Process Control**



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Aspen Batch APC: Solutions for Batch Processes

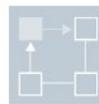
Aspen Batch APC is a closed-loop, model-predictive batch control system that improves product quality and yield, and lowers cycle times. It features a built-in optimization engine that predicts end-of-batch quality attributes at key decision points along the batch process. By automatically adjusting a batch recipe at these decision points, Aspen Batch APC minimizes off-spec products, maximizes efficiencies and reduces the need for manual oversight by operators. Aspen Batch APC enables manufacturers to improve process stability and product consistency for higher margins with a solution specifically designed for batch processes. In this learning path, discover the features of Aspen Batch APC and walkthrough a guided workflow of Aspen Batch APC online.

Course Name	Knowledge Delivered	Description
Aspen Batch APC: Introduction	<ul style="list-style-type: none"> Discover Aspen Batch APC 	Aspen Batch APC is a closed-loop, model-predictive batch control system that improves product quality and yield, and lowers cycle times. Discover Aspen Batch APC and describe PLS Modeling for it. Build a batch process model in Aspen ProMV to be imported into Aspen Batch APC online. Import and deploy an Aspen Batch APC model to the online dashboard.

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Application: **Multivariate Analysis**



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Aspen Unscrambler™: Multivariate Analysis

Aspen Unscrambler is the industry-leading tool for modeling, prediction and optimization using multivariate statistical analysis and interactive visualizations. Develop products faster, improve quality and optimize processes by analyzing large data sets easier than ever. Get faster, better answers to real-world problems by analyzing all types of data to optimize product development, quality and manufacturing processes. Leverage multivariate statistical analysis methods with unique capabilities for spectroscopy and chemometrics. In this learning path, discover multivariate analysis and how Aspen Unscrambler can be used to gain insight into multivariate processes.

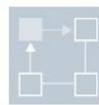
Course Name	Knowledge Delivered	Description
Aspen Unscrambler: Introduction to Multivariate Analysis	<ul style="list-style-type: none"> Discover multivariate analysis in Aspen Unscrambler 	Discover multivariate analysis and how Aspen Unscrambler can be used to gain insight into multivariate processes. Import data, organize it and discover plots in Aspen Unscrambler.
Aspen Unscrambler: Principal Component Analysis	<ul style="list-style-type: none"> Discover principal component analysis in Aspen Unscrambler 	Delve into exploratory multivariate analysis with Aspen Unscrambler. Learn about the principles of projection and prepare a data set for principal component analysis. Set the parameters for and construct PCA models in Aspen Unscrambler. Interpret plots describing sample and variable relationships.
Aspen Unscrambler: Multivariate Regression	<ul style="list-style-type: none"> Discover multivariate regression in Aspen Unscrambler 	Distinguish between exploratory analysis and regression and discuss multivariate regression types. Learn about the inputs and outputs of multivariate regression models and how to select the correct number of components for a given data set. Assess model robustness using both qualitative and quantitative approaches. Demonstrate how to construct a partial least squares regression model in Aspen Unscrambler.
Aspen Unscrambler: Analyze Multivariate Models	<ul style="list-style-type: none"> Analyze multivariate models 	Discover the ways Aspen Unscrambler can be used to detect outliers, build a model and walk through the prediction process, and describe model validation in Aspen Unscrambler.

<p>Python Scripting in Aspen Unscrambler</p>	<ul style="list-style-type: none"> • Discover PyCamo methods and Python scripts in Aspen Unscrambler 	<p>Users can extend the functionality of Aspen Unscrambler to Python scripts. In this course, you will install Python, the PyCamo library and other Python packages to enable scripting in Aspen Unscrambler. Become familiar with PyCamo methods and the Python Scripting window of Aspen Unscrambler, then use a created configuration to run a Python script on an imported dataset. Deploy Aspen Unscrambler's data visualization tools to interpret the results of the example script.</p>
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Application: **Multivariate Analysis**



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Aspen Process Pulse™: Real-time Data Analysis and Process Monitoring

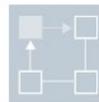
Aspen Process Pulse offers real-time monitoring and feedback to control systems for all types of spectral and process data. Run multivariate models or trend charts developed in Unscrambler or other modelling software, for product quality control, early fault detection, process deviation warnings and continuous improvement. It is a scalable and compliant process analytical technology (PAT) management and monitoring tool that uses powerful analytics to monitor at-line, on-line, and in-line processes for the consistent manufacturing of high-quality products in the most sustainable and cost-efficient manner. In this learning path, discover how Aspen Process Pulse can be used to prevent faulty batches, improve product quality, optimize resource use and reduce waste by closing the gap between R&D and production with PAT and real-time process monitoring and control for data-driven manufacturing.

Course Name	Knowledge Delivered	Description
Process Analytical Technology (PAT): Framework and Quality by Design	<ul style="list-style-type: none"> Discover process analytic technology in Aspen Process Pulse 	Discover process analytical technology and explain its importance. Define Quality by Design and explain its relationship with the PAT framework.
Process Analytics: Multivariate Statistical Process Control	<ul style="list-style-type: none"> Discover the power of multivariate methods for process control in Aspen Process Pulse 	Discover the power of multivariate methods for process control in Aspen Process Pulse. Compare univariate and multivariate statistical process control and recall the basics of principal component analysis. Define an outlier and illustrate the benefits of multivariate SPC through example industry applications. Use Aspen Process Pulse to monitor multivariate data generated in real time for a chemical reaction dataset.
Process Analytics: Real-Time Multivariate Prediction	<ul style="list-style-type: none"> Use process analytical technology (PAT) for real-time multivariate prediction 	Use process analytical technology (PAT) for real-time multivariate prediction. Discover the many capabilities of Aspen Process Pulse and learn about the supported data source types and model formats. Apply that knowledge by generating predictions for a partial least squares regression (PLSR) model in simulated real time.
Process Analytics: PAT in Operations	<ul style="list-style-type: none"> Learn how you can apply process analytical technology (PAT) in operations 	Learn how you can apply process analytical technology (PAT) in operations. Explore advanced settings in Aspen Process Pulse.

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Application: **Production Execution**



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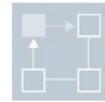


Aspen Production Execution Manager: Order Execution

Aspen Production Execution Manager (APEM) provides automation for workflow, order, and recipe management according to cGMP guidelines. APEM orchestrates and guides the human interaction with the process for consistent, flawless execution. This learning path guides you through the use of APEM, starting with APEM Mobile, the web-based mobile application.

Course Name	Knowledge Delivered	Description
Aspen Production Execution Manager: APEM Mobile	<ul style="list-style-type: none"> Discover APEM Mobile for execution automation. 	Aspen Production Execution Manager Mobile (APEM Mobile) is a web-based application that can be used both on mobile applications and desktop computers. Understand the functionality of APEM Mobile.

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 Application: **Aspen Unified PIMS**



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Sustainability for Production Optimization

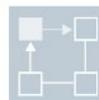
Learn about the scopes of carbon emissions and the methods companies use to meet sustainability targets. Illustrate the Dual Challenge by analyzing how variance in expected emissions for a sample Aspen Unified PIMS refinery affects production and profitability. Schedule and monitor emissions to ensure sustainability goals can be met.

Course Name	Knowledge Delivered	Description
Introduction to Sustainability in Production Optimization	<ul style="list-style-type: none"> Use Aspen Unified PIMS to tackle the Dual Challenge 	Learn about the scopes of carbon emissions and the methods companies use to meet sustainability targets. Illustrate the Dual Challenge by analyzing how variance in expected emissions for a sample Aspen Unified PIMS refinery affects production and profitability. Schedule and monitor emissions to ensure sustainability goals can be met.

ELEARNING CLASSES BY LEARNING PATH — ASSET PERFORMANCE MANAGEMENT

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Aspen Mtell® : Prescriptive Analytics

Aspen Mtell executes prescriptive, predictive and condition-based asset monitoring using an automated, out-of-the-box application that simplifies the deployment of Machine Learning autonomous ‘Agents’. An Agent is an automated software ‘bot’ that continuously monitors the assets and interacts with the users, retraining itself as needed. Mtell performs Prescriptive Maintenance: the software supports the deployment of highly focused Failure Agents that monitor for specific equipment failure modes (e.g. “Wet Gas Compressor North Bearing Failure”), and each Failure Agent goes beyond predictive analytics into prescriptive procedures, by launching work orders with detailed repair instructions pulled from the existing Enterprise Asset Management (EAM) system. In addition, the solution is specifically designed to uncover the patterns associated with erroneous process operations that can cause equipment damage, like liquid carry-over into a centrifugal compressor, and supply prescriptive advice to eliminate the causes, often avoiding the degradation and the ensuing downtime altogether. It is the most sophisticated automated asset monitoring solution available today, and executes with little human involvement, in real-time, automatically learning and adapting to operational changes and new failure conditions. In this learning path you will learn how Aspen Mtell works to provide prescriptive maintenance and be able to create, train, deploy, and monitor the Autonomous Agents.

Course Name	Knowledge Delivered	Description
Aspen Mtell: Implementing a Project	<ul style="list-style-type: none"> Learn the basics of Aspen Mtell 	Aspen Mtell is composed of two major groups of services. First is SQL server, which stores all of the sensor tag data, agent information, and other data required to run Aspen Mtell. Second are the Mtell core applications. System Manager is used to configure security and notification settings along with establishing connections to plant historians and EAM systems. Agent Builder is used to build and deploy agents. Mtell View is used to manage live agents and take action upon generated alerts. When implementing a project, you will navigate through all these parts of Aspen Mtell.
Aspen Mtell: Creating and Deploying Agents	<ul style="list-style-type: none"> Create and deploy autonomous applications 	Autonomous Agents are created and deployed using the Agent Builder application in Aspen Mtell. Agents can be created quickly and are deployed via a simple procedure, but there are a number of prerequisites steps that must be completed before Agents can be built including defining Equipment Sets, importing and auditing data, and establishing the baseline normal in the probability

		<p>waveform. There are also several different settings that can be altered to tune Agents that will be discussed. Here you will learn how Agents work, how to create, train and deploy Agents, how to ready Aspen Mtell for Agent creation, and how to tune the Agents for optimal alerting.</p>
<p>Aspen Mtell: Create Failure Agents using Maestro</p>	<ul style="list-style-type: none"> • Create failure agents using Maestro in Aspen Mtell 	<p>Create agents using Maestro, understand how to select failures and appropriate training ranges for agents and know what is included in the advanced settings. You will also identify sensor groups to provide Maestro and learn how Maestro selects sensors to create failure agents. Analyze a trained Maestro agent and tune these agents using the advanced settings to optimize their alerting behavior, while discovering the differences between these types of agents.</p>
<p>Aspen Mtell: Advanced Agent Building</p>	<ul style="list-style-type: none"> • Evaluate and tune agents in Aspen Mtell 	<p>Evaluating and tuning agents in Aspen Mtell are necessary steps before deployment to ensure the best performance. Key indicators include the F1 score, false positives and lead time. Such metrics can be improved by adjusting the tuning knobs for each agent.</p>
<p>Aspen Mtell: Custom Agents</p>	<ul style="list-style-type: none"> • Create and deploy custom agents 	<p>Learn to create and deploy custom agents in Aspen Mtell to utilize your own model with the benefits and capabilities of Mtell. Learn how to leverage custom agents to increase operational efficiency and monitor custom agents with the functionalities of Mtell such as Live Agent Builder and Alert Manager.</p>
<p>Aspen Mtell View: Visualize Data</p>	<ul style="list-style-type: none"> • Navigations, finding information and recommended workflows 	<p>We present an overview of Aspen Mtell View, illustrate how to navigate and find information, and demonstrate the recommended workflow for handling alerts.</p>
<p>Aspen Mtell System Manager: Configure and Manage Data Source Connections</p>	<ul style="list-style-type: none"> • Learn how to configure and manage data source connections using Aspen Mtell System Manager 	<p>System Manager is the Aspen Mtell client used to set up and configure how Mtell connects to various data sources, configure the services required to run Mtell and set up notifications for Agent alerts. It is primarily designed for system administrators who manage the data source connections, users, and templates used to generate email and text messages when live Agents generate alerts. System Manager also allows administrators to review and analyze system performance logs to troubleshoot any infrastructure or connectivity related problems.</p>
<p>Aspen Mtell Alert Manager</p>	<ul style="list-style-type: none"> • Track, resolve and quantify the value of Mtell alerts 	<p>Use Mtell Alert Manager to track, resolve and quantify the value of Mtell Alerts.</p>

Aspen APM Insights for Aspen Mtell Solutions	<ul style="list-style-type: none"> Discover APM Insights for Aspen Mtell 	Learn how to use APM Insights to visualize the value created by Mtell through STAR and Catch reports. Use Aspen APM Insights to quickly view and assess alerts created by your agents.
Aspen Fidelis and Aspen Mtell: Support Mtell Deployments and Resolve Alerts with Fidelis	<ul style="list-style-type: none"> Support Aspen Mtell deployments and resolution of alerts with Aspen Fidelis 	Learn to use Aspen Fidelis to optimize Aspen Mtell performance.
Quantifying Business Impact of Aspen Mtell Alerts with Aspen Fidelis	<ul style="list-style-type: none"> Discover the business impact of Aspen Mtell alerts in Aspen Fidelis 	Use Aspen Fidelis, Aspen Mtell, and APM Insights to quantify and visualize the impact of Mtell alerts. Using APM Insights and Mtell, automatically create base Fidelis models with the Mtell assets added.
Using Event Analytics with Mtell	<ul style="list-style-type: none"> Discover how to review and understand key characteristics of alerts in Aspen Mtell using Event Analytics 	Anomaly Agents, as the name suggests, identify anomalous behavior in assets. They are powerful Agents that can blanket a plant rapidly. However, since they are built more generically, there are multitudes of reasons why they might have alerted. Did the pressure drop? Spike? Was there a related upstream impact? Event Analytics empowers users to review alerts and understand more about the key characteristics of that Event.

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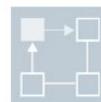
Aspen ProMV®: Batch Data Analysis

Aspen ProMV Batch applies multivariate analysis methods to simplify the complex relationships within Batch process and product data. Employ Principal Component Analysis (PCA) and Partial Least Squares (PLS) methods to quickly discover and optimize the underlying raw material, environmental and operational causes affecting process safety, and product quality, yield and throughput for Batch processes. Utilizing both offline and online tools with Aspen ProMV Batch, optimize your Batch processes for the desired outcomes within real-world constraints and then ensure that these process improvements are monitored and maintained. This learning path targets Batch processes, including the various methods to align batch data within Aspen ProMV Batch.

Course Name	Knowledge Delivered	Description
Aspen ProMV: Learn the Basics	<ul style="list-style-type: none"> Review key capabilities 	Become acquainted with Aspen ProMV, AspenTech's leading multivariate data analysis product. Aspen ProMV's capabilities extend to both batch and continuous plant data. Aspen ProMV can mine historical process data to develop latent variable models and discover causal relationships between variables. These latent variable models reduce the complexity of process. Review the key capabilities of Aspen ProMV and overview the user interface.
Aspen ProMV Offline: Optimize Batch Data	<ul style="list-style-type: none"> Analyze batch data 	Illustrate how Aspen ProMV is used to analyze batch data to empower ongoing process improvement. First, import batch data into the software. Then, align batch data to overcome differences in batch duration. Use the aligned data to build a model for analysis. Troubleshoot a batch process by using the model to discern the patterns of movement in specific variables that had the largest impact on the shift from desirable to undesirable outcomes in product quality, yield or throughput. Finally, use the Model Optimizer tool to explore the tradeoffs between Y-variables that occur at different process conditions.

<p>Aspen ProMV Online Batch: Data Analysis</p>	<ul style="list-style-type: none"> Analyze batch data online 	<p>Monitor batch execution and predict final batch properties using Aspen ProMV Online Batch. Export multivariate models from the Aspen ProMV desktop application, then use these models within the online application. Configure analytics by defining their contained model, tag mappings, control chart presentation, alert limits and deployment settings. Review the Run-Time Dashboard for active analytics to view univariate control charts for key variables or multivariate statistics that holistically monitor the process. Recognize moderate and severe alarms and use the Diagnosis Dashboard to gain more information about key contributing variables.</p>
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Aspen ProMV: Continuous Data Analysis

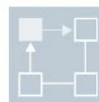
Aspen ProMV applies multivariate analysis methods to simplify the complex relationships within process and product data. Employ Principal Component Analysis (PCA) and Partial Least Squares (PLS) methods to quickly discover and optimize the underlying raw material, environmental and operational causes affecting process safety, and product quality, yield and throughput. Utilizing both offline and online tools with Aspen ProMV, optimize your processes for the desired outcomes within real-world constraints and then ensure that these process improvements are monitored and maintained. This learning path targets continuous processes, making the most of continuous plant data.

Course Name	Knowledge Delivered	Description
Aspen ProMV: Learn the Basics	<ul style="list-style-type: none"> Extending batch and continuous plant data 	Become acquainted with Aspen ProMV, AspenTech's leading multivariate data analysis product. Aspen ProMV's capabilities extend to both batch and continuous plant data. Aspen ProMV can mine historical process data to develop latent variable models and discover causal relationships between variables. These latent variable models reduce the complexity of process. Review the key capabilities of Aspen ProMV and overview the user interface.
Aspen ProMV Offline: Optimize Continuous Data	<ul style="list-style-type: none"> Explore and implement workflows 	Explore and implement the workflow used to handle continuous process data. Start by importing continuous data into Aspen ProMV. Then, demonstrate which tools are available to improve your understanding of product quality relationships in data. Build and refine a model to represent an entire process. Finally, optimize the process of interest with the Model Optimizer tool in Aspen ProMV.
Aspen ProMV Online Continuous: Monitor Process Health	<ul style="list-style-type: none"> Analyze a process in real time or with historical data 	Learn how to utilize an Aspen ProMV Online Continuous model to analyze a process in real time or using historical data. We will view a model for a low-density polyethylene production process to gain insight into process performance. We will also discuss in detail how to create an online model and how to manage the model once it is deployed.
Aspen ProMV: End-to-End Aspen ProMV Optimization for Continuous Processes	<ul style="list-style-type: none"> Implement the workflow to perform online and offline optimization 	Aspen ProMV supports end-to-end optimization for continuous processes. In this course, we will explore and implement the workflow used to perform the online and offline optimization. Start by introducing the general ideal for the end-to-end optimization. Then, demonstrate using the Model Optimizer in Aspen ProMV desktop

		application to optimize a continuous process. Finally, run online optimization on Aspen ProMV Online Continuous.
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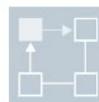
Aspen Fidelis: System Risk and Reliability

Aspen Fidelis is a multi-state, discrete event, Monte-Carlo based simulation tool that can model reliability, availability, and maintainability (RAM) of various systems from simple equipment redundancy to full site and multi-site modeling including equipment failures, process upsets, feed/demand issues, buffering and logistics. Aspen Fidelis allows you to optimize the performance of any system via changes in design or operations, maintenance, and logistics. In the System Reliability Performance learning path, you will learn the fundamentals of system and RAM modeling and how to use Aspen Fidelis to make decisions regarding facility CAPEX and OPEX.

Course Name	Knowledge Delivered	Description
Aspen Fidelis: Learn the Basics	<ul style="list-style-type: none"> Learn the basics 	Introduce the functionalities and capabilities of Aspen Fidelis.
Flow Diagram Building: Learn the Basics	<ul style="list-style-type: none"> Learn the basics 	Specify flow elements by editing their Op forms. Place flow elements in the flow diagram. Analyze the validation visuals for flow elements. Switch between diagrams in the Simulation environment.
Unit Diagram Building: Learn the Basics	<ul style="list-style-type: none"> Learn the basics 	Switch between diagrams in the Simulation environment. Specify unit elements by editing their Op forms. Place unit elements in a unit diagram. Analyze the validation visuals for unit elements.
RAM Data: Analyze Model's Asset Register	<ul style="list-style-type: none"> Edit flow diagram and event elements 	Learn about the general features of the RAM Data environment. We will edit flow diagram elements and event elements. We will also edit non-element RAM Data environment grids, use the export/import functionality, and specifying events in the RAM Data environment.
Reliability Modeling: Use Statistical Distribution	<ul style="list-style-type: none"> Distribution types 	Explore the distribution types available in Aspen Fidelis.
Reliability Modeling: Spare Parts	<ul style="list-style-type: none"> Specify cold-standby 	Discuss how to use spare pools to optimize the number of stocked spares. Review how to specify cold-standby for an event and how to apply a start-up failure probability for events in cold standby. Finish by limiting the number of spares in a simulation and analyzing the effect on the simulated lifecycles.
Reliability Modeling: User Coding Basics	<ul style="list-style-type: none"> Customizing models 	Discover how to take advantage of User Coding in Aspen Fidelis to customize your model and include custom operational logic in the simulation.

Reliability Modeling: Simulate Flowsheet Models	<ul style="list-style-type: none"> Applying objective functions 	Apply objective functions, run a simulation, and interpret and analyze simulation results in Aspen Fidelis. Learn how to define objective functions and evaluate how objective functions change model interactions. Specify run parameters and simulate a model. Lastly, inspect performance by reviewing simulated lifecycles via the Replay Controls window.
Reliability Modeling: Exploring Alternate Cases	<ul style="list-style-type: none"> Key business values 	Discuss the key business values of running alternate cases in Aspen Fidelis. A base case design for a process is established and three alternate cases are developed. These simulations are analyzed to compare the strengths and weaknesses of the cases and to determine how to continue with the design process.
Aspen Fidelis: Equipment Redundancy	<ul style="list-style-type: none"> System improvement through equipment redundancy 	Equipment redundancy is introduced into systems to boost reliability and improve performance. Discover how Aspen Fidelis can better enable you to identify where equipment redundancy is needed in order to reach system performance targets while minimizing costs. In this course we will use a green hydrogen system example. First, run a base case simulation of a green hydrogen production process, then see how introducing equipment redundancy around high-culpability elements leads to better results. Demonstrate the impact of three different redundancy scenarios on performance and decide which option is best for the process using economic analysis. Extend this workflow to a carbon capture system by completing a guided exercise.
Aspen Fidelis & Aspen Mtell: Support Mtell Deployments and Resolve Alerts with Fidelis	<ul style="list-style-type: none"> Support Aspen Mtell deployments and resolution of alerts with Aspen Fidelis 	Learn to use Aspen Fidelis to optimize Mtell performance.
Quantifying Business Impact of Aspen Mtell Alerts with Aspen Fidelis	<ul style="list-style-type: none"> Discover the business impact of Mtell alerts in Aspen Fidelis 	Use Aspen Fidelis, Aspen Mtell, and APM Insights to quantify and visualize the impact of Mtell alerts. Using APM Insights and Mtell, automatically create base Fidelis models with the Mtell assets added.

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Aspen Event Analytics™: Operational Analytics for Process Industries

Aspen Event Analytics is a cloud-native, self-service analytics application that enables all front-line workers to gain rapid insights and respond to daily plant events. It utilizes advanced pattern and trend recognition algorithms to automate the event discovery process, reducing investigation times from hours to minutes. Discover the basics of Aspen Event Analytics and its capabilities. In this learning path, you will learn how to use the application, discover and validate events, and monitor for real-time event occurrences.

Course Name	Knowledge Delivered	Description
Aspen Event Analytics: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen Event Analytics 	Discover Aspen Event Analytics and walk through the overall workflow for analyzing events. Learn how to log in and describe the user interface. Import data and discover how to troubleshoot importing errors. Finally, perform event discovery and event validation in Aspen Event Analytics.
Aspen Event Analytics: Deployment and Monitoring	<ul style="list-style-type: none"> Discover event notifications, deploy agents and resolve events using Aspen Event Analytics 	Set up event notifications, deploy agents and resolve events using Aspen Event Analytics.
Using Event Analytics with Mtell	<ul style="list-style-type: none"> Discover how to review and understand key characteristics of alerts in Aspen Mtell using Event Analytics 	Anomaly Agents, as the name suggests, identify anomalous behavior in assets. They are powerful Agents that can blanket a plant rapidly. However, since they are built more generically, there are multitudes of reasons why they might have alerted. Did the pressure drop? Spike? Was there a related upstream impact? Event Analytics empowers users to review alerts and understand more about the key characteristics of that Event.

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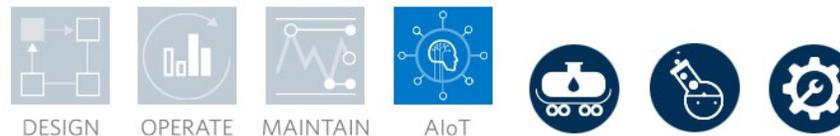
Aspen Enterprise Insights™: Enterprise Visualization and Workflow Management

Learn a flexible and effective way to set up enterprise visualizations and workflow management solutions that deliver real-time decision support across your enterprise. Complete this learning path to enable you to implement Aspen Enterprise Insights. You will be able to create Communities, Pages, Workflows, Pipelines, and KPIs. Use different data upload methods to import data into Aspen Enterprise Insights. Configure your KPI's and set alerts to notify key contributors.

Course Name	Knowledge Delivered	Description
Aspen Enterprise Insights: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen Enterprise Insights 	Aspen Enterprise Insights (AEI) is a unique hybrid-cloud-based software. It provides a flexible enterprise visualization and workflow management solution, which can provide real-time decision support across the entire enterprise. Any user needs only minimal training and can begin to create dashboards, Workflows and configure Pages easily.
Aspen Enterprise Insights: Data Acquisition	<ul style="list-style-type: none"> Discover data acquisition in Aspen Enterprise Insights 	In Aspen Enterprise Insights, there are three ways to upload data, including Aspen Go, Data Uploads, and direct connection. This course introduces the basics of these data upload ways. Go through the Aspen Go home screen, use Aspen Go to publish data from MS Excel and export data to MS PowerPoint. Learn the Data Uploads in AEI, create a Data Upload, and understand how the data updates with an upload.
Aspen Enterprise Insights: Key Performance Indicators	<ul style="list-style-type: none"> Learn about key performance indicators in Aspen Enterprise Insights 	The KPIs in Aspen Enterprise Insights (AEI) is a self-service feature used to track the key performance indicators across the business. Due to different data retrieval mechanisms, KPIs can be categorized as manual KPI and automatic KPI. Manual KPIs need someone to manually enter values at a certain frequency. Automatic KPIs retrieve data automatically from a data source.

Aspen Enterprise Insights: Workflows	<ul style="list-style-type: none"> Discover workflows in Aspen Enterprise Insights 	Workflows is a self-service tool available within the platform to build form-based applications quickly and easily, and incorporate triggers to notify users when criteria are met or exceed defined conditions. Records created in a workflow are easily available to anyone with access to the assigned Workflows Communities. This course introduces the basics of Workflows and how to create a new workflow in Aspen Enterprise Insights.
Aspen Enterprise Insights: Pipelines	<ul style="list-style-type: none"> Discover pipelines in Aspen Enterprise Insights 	Pipelines are report generator tools designed to create tables, charts and widgets from data. Pipelines simplify complex data exploration, report generation and analytics so that you can get value from your data. Pipelines enable you to connect to almost any data source, such as Workflows, Aspen Go and Data Uploads. This course introduces the basics of Pipelines and how to create a new pipeline in Aspen Enterprise Insights.
Aspen Enterprise Insights: Overview of KPO Use Case	<ul style="list-style-type: none"> View a real-world use case of Aspen Enterprise Insights 	Learn how Aspen Enterprise Insights (AEI) can help enterprises improve work efficiency based on the Karachaganak Petroleum Operating (KPO) use case implementation study.

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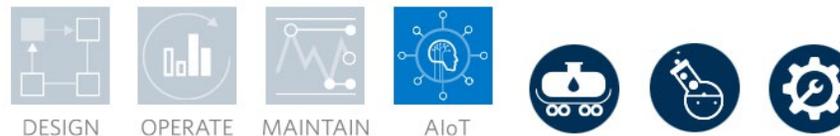


Aspen Connect™: Real-time Production Data Management

Aspen Cloud Connect is server-based, data managing software capable of handling many different data protocols. Cloud Connect can be used to easily clean and publish data to a wide variety of destinations, including IP.21 databases, AWS S3 and IoT Hub. This learning path is designed for novice and experienced users of Aspen Connect where you will learn how to add servers, route data from server to server, condition data, write Lua scripts for manipulating data and more.

Course Name	Knowledge Delivered	Description
Aspen Cloud Connect: Learn the Basics	<ul style="list-style-type: none"> Learn the basics of Aspen Cloud Connect 	Learn the purposes of and differences between Aspen Cloud Connect and Aspen Edge Connect. Learn to add servers, add tags and route data between servers in Aspen Connect.
Aspen Cloud Connect: Data Conditioning	<ul style="list-style-type: none"> Discover data conditioning in Aspen Cloud Connect 	Aspen Connect has many out-of-the-box data conditioning measures available. Moving averages, deadbands and more can easily be added. If the out-of-the-box measures are insufficient, Connect also features a Lua environment where custom scripts can be written to perform all manner of data conditioning. Learn to use both the standard out-of-the-box conditioning measures as well as how to write your own Lua scripted data conditioning measures.
Aspen Connect: Azure IoT Hub Reading and Publishing	<ul style="list-style-type: none"> Discover reading and publishing with Azure IoT Hub 	Understand the reading and writing capabilities of Aspen Connect in Azure IoT Hub.
Aspen Connect: The Relationship between Aspen Cloud Connect and Aspen Cloud	<ul style="list-style-type: none"> Discover how to publish tag data from the IP.21 server to the Cloud 	Understand the relationship between Aspen Cloud Connect and Aspen Cloud, Connect Configuration Service, and how to publish tag data from the IP.21 server to Aspen Cloud.
Aspen Connect: Lua Operations	<ul style="list-style-type: none"> Within Aspen Connect, perform Lua Operations to create custom models 	Use various methods to perform Lua Operations within Aspen Connect. Create custom models using Lua Operations to enable edge computing capabilities.

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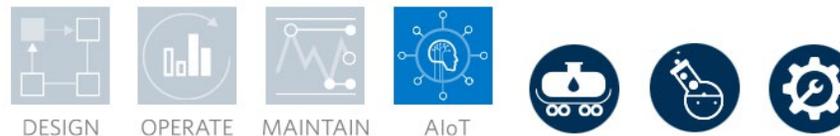


Aspen InfoPlus.21®: Real Time Information Management

Aspen InfoPlus.21 (IP.21) is a real time database that historizes critical plant data and is used across wide range of industries. In addition to the historical data IP.21 also comes with variety of visualizations applications that allows the users to analyze the data as well as to optimize and benchmark the plant performance. This learning path on IP.21 is tailored to administrators or engineers who have the responsibility to maintain the IP.21 database. This can also be of interest to users who wants to have more understanding on how IP.21 works. Complete this learning path to learn about the following IP.21 basics: Features and benefits of IP.21, Visualization tools, Definition records, Navigate repeat areas in IP.21 administrator, Start/Stop the database, multiple ways of creating tags, Maintaining database snapshots.

Course Name	Knowledge Delivered	Description
Aspen InfoPlus.21: Overview	<ul style="list-style-type: none"> • Features and benefits 	Review the features and benefits of Aspen InfoPlus.21. Summarize the core products that integrate with InfoPlus.21 to perform various tasks.
Aspen InfoPlus.21: Learn the Basics	<ul style="list-style-type: none"> • Definition records and tags 	Learn about Aspen InfoPlus.21 definition records and tags. Navigate Aspen InfoPlus.21 Administrator and learn about Fixed and Repeat Areas. Also start and stop the database from Aspen InfoPlus.21 Manager.
Aspen InfoPlus.21: Managing Tags	<ul style="list-style-type: none"> • Creating tags and configuration 	Learn to create tags from scratch and to configure them to store and display data. Review how to easily duplicate previously created tags or create many simultaneously.
Aspen InfoPlus.21: Using Snapshots	<ul style="list-style-type: none"> • Database snapshot • Using Administrator 	Learn about taking a snapshot of the Aspen InfoPlus.21 database. Use Aspen InfoPlus.21 Administrator to learn different ways of taking a snapshot. Also load a saved snapshot using Aspen InfoPlus.21 Manager.

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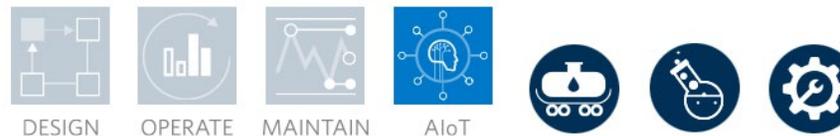
aspensONE Process Explorer™: MES for Batch Processes

The aspensONE Manufacturing Execution Systems (MES) suite offers a full complement of applications to visualize process data in a wide spectrum of formats, analyze the data in manifold ways, execute process orders and monitor progress and performance with automatic alerts when deviations occur. This learning path is designed for new or experienced engineers and operators who work with batch processes. Complete this learning path to learn about Data Visualization, Data Discovery, Data Entry, Analysis and Process Monitoring. Some of the key concepts include the fundamentals of time-series trends, Key Performance Indicators (KPIs), Statistical Process Control (SPC), Alarms and Alerts, Pattern Search, and Overall Equipment Effectiveness (OEE) as applied to batch processes.

Course Name	Knowledge Delivered	Description
aspensONE Process Explorer (A1PE): Learn the Basics	<ul style="list-style-type: none"> Learn the basics of leveraging process data to improve operational excellence 	Learn to navigate aspensONE Process Explorer and review key capabilities of the product. Become familiar with the user interface at both the home page and standard trend environments. Explore a quick two-part demonstration, utilizing the intelligent search function and simple analytical tools such as annotations.
aspensONE Process Explorer (A1PE): Learn How to Use Search	<ul style="list-style-type: none"> Learn how to effectively search for information or content 	Learn how content or information is searched within the aspensONE Process Explorer environment.
aspensONE Process Explorer (A1PE): Learn the Fundamentals of Plot Manipulation	<ul style="list-style-type: none"> Learn the fundamentals of Plot Manipulation 	Explore some simple manipulations of plots in aspensONE Process Explorer, such as X and Y axis scaling, modification of line colors and styles. Learn about alarm states and how annotations can work hand in hand with alarms. Finally, use aggregates, or computed statistics, to modify the presentation of data. Demonstrations explore each topic.
aspensONE Process Explorer (A1PE): Learn the Fundamentals of Trends	<ul style="list-style-type: none"> Learn the fundamentals of Trends 	Learn some of the fundamental features of Basic Trends. This includes the zoom functionality, the plot modes and cart settings, the sharing and saving options for your chart, the time controls and the tag legend.
aspensONE Process Explorer (A1PE): Learn the Advanced Features in Trends	<ul style="list-style-type: none"> Learn the advanced features in Trends 	Discover the interoperability between aspensONE Process Explorer and other tools: Microsoft Excel, Aspen Process Explorer, and AspenTech MES client tools. Get familiar with advanced features built into aspensONE Process Explorer such as pen properties, scaling options, alarms and markers, aggregates and ad-hoc calculations.
Annotations: Create Markers, Notes and Comments on Events and Trends	<ul style="list-style-type: none"> Learn how to use markers, notes and comments in aspensONE Process Explorer 	Explore the different types of markers and how to use them in aspensONE Process Explorer. You will also learn about using Notes and Comments.

Key Performance Indicators (KPI): Learn to Configure Simple and Complex Calculations with KPIs	<ul style="list-style-type: none"> Master the basics of configuring KPIs 	Learn how to configure a KPI using both simple and complex calculations, as well as the steps needed to incorporate Aspen Calc Calculations.
Performance Management: Learn the Basics	<ul style="list-style-type: none"> Configure Aspen Manufacturing Master Data Manager 	Learn key performance management concepts, how they are configured in Aspen Manufacturing Master Data Manager (mMDM) and Aspen InfoPlus.21®, as well as how they are supported in aspenONE Process Explorer to achieve higher levels of performance for your production facility.
Continuous Processes: Set Alarms and Find Events in History	<ul style="list-style-type: none"> Set Alarms and Find Events in History 	Discover how to search for alarm events in History, how to find specific alarm events and how to discover complex types of events in History by parsing through the data history. You will also learn the purpose and use cases for entering comments as events and looking through comment history for analysis.
Learn the Fundamentals of Aspen Production Record Manager	<ul style="list-style-type: none"> Understand the basics of Aspen Production Record Manager 	Learn what the Aspen Production Record Manager (APRM) application is, its benefits, and how to use the aspenONE Process Explorer GUI to construct and configure plots.
Batch Performance Management: Learn the Basics	<ul style="list-style-type: none"> Learn key concepts to achieve higher batch performance 	Understand the key concepts and types of data that can be used to achieve higher levels of performance for batch processes through Aspen Production Record Manager (APRM), Aspen InfoPlus.21 (IP.21), and aspenONE Process Explorer.
aspenONE Process Explorer: Build Overall Equipment Effectiveness Records	<ul style="list-style-type: none"> Configure OEE records, events and analyze impact 	Get familiar with OEE concepts, including how to use the basic functionality of aspenONE Process Explorer to create and configure OEE records and events, as well as analyze the impact of various OEE events on plant asset utilization.
Batch Overall Equipment Effectiveness (OEE): Leverage Batch OEE in your Batch Processes	<ul style="list-style-type: none"> Leverage batch OEE in your batch processes 	Learn how the aspenONE Process Explorer OEE application can be applied to improve the overall effectiveness of your batch process.
aspenONE Process Explorer: Represent Equipment and Assets with Graphics	<ul style="list-style-type: none"> Master the concept of Manufacturing Master Data Manager 	Explore the user interface and fundamental concepts of Manufacturing Master Data Manager (mMDM). Navigate the frequently used components in Manufacturing Master Data Manager and configure the components. Integrate Manufacturing Master Data Manager with other Aspen applications, such as Aspen Process Graphic Studio and aspenONE Process Explorer.

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The aspensONE Manufacturing Execution Systems (MES) suite offers a full complement of applications to visualize process data in a wide spectrum of formats, analyze data in manifold ways, execute process orders and monitor progress and performance with automatic alerts when deviations occur. This learning path is designed for new or experienced engineers and operators who work with batch processes. Complete this learning path to learn about Data Visualization, Data Discovery, Data Entry, Analysis and Process Monitoring. Some of the key concepts include the fundamentals of time-series trends, Key Performance Indicators (KPIs), Statistical Process Control (SPC), Alarms and Alerts, Pattern Search, and Overall Equipment Effectiveness (OEE) as applied to batch processes.

Course Name	Knowledge Delivered	Description
aspensONE Process Explorer (A1PE): Learn the Basics	<ul style="list-style-type: none"> Learn the basics of leveraging process data to improve operational excellence 	Learn to navigate aspensONE Process Explorer and review key capabilities of the product. Become familiar with the user interface at both the home page and standard trend environments. Explore a quick two-part demonstration, utilizing the intelligent search function and simple analytical tools such as annotations.
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aspensONE Process Explorer (A1PE): Learn the Fundamentals of Plot Manipulation	<ul style="list-style-type: none"> Learn the fundamentals of Plot Manipulation 	Explore some simple manipulations of plots in aspensONE Process Explorer, such as X and Y axis scaling, modification of line colors and styles. Learn about alarm states and how annotations can work hand in hand with alarms. Finally, use aggregates, or computed statistics, to modify the presentation of data. Demonstrations explore each topic.
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aspensONE Process Explorer (A1PE): Learn the Advanced Features in Trends	<ul style="list-style-type: none"> Learn the advanced features in Trends 	Discover the interoperability between aspensONE Process Explorer and other tools: Microsoft Excel, Aspen Process Explorer, and AspenTech MES client tools. Get familiar with advanced features built into aspensONE Process Explorer such as pen properties, scaling options, alarms and markers, aggregates and ad-hoc calculations.

Annotations: Create Markers, Notes and Comments on Events and Trends	<ul style="list-style-type: none"> Leverage how to use markers, notes and comments in aspenONE Process Explorer 	Explore the different types of markers and how to use them in aspenONE Process Explorer. You will also learn about using Notes and Comments.
Key Performance Indicators (KPI): Learn to Configure Simple and Complex Calculations with KPIs	<ul style="list-style-type: none"> Master the basics of configuring KPIs 	Learn how to configure a KPI using both simple and complex calculations, as well as the steps needed to incorporate Aspen Calc Calculations.
Performance Management: Learn the Basics	<ul style="list-style-type: none"> Configure Aspen Manufacturing Master Data Manager 	Learn key Performance Management concepts, including how they are configured in Aspen Manufacturing Master Data Manager (mMDM) and Aspen InfoPlus.21® and how they are supported in aspenONE Process Explorer to achieve higher levels of performance for your production facility.
Continuous Processes: Set Alarms and Find Events in History	<ul style="list-style-type: none"> Set Alarms and Find Events in History 	Discover how to search for alarm events in History, how to find specific alarm events and how to discover complex types of events in History by parsing through the data history. You will also learn the purpose and use cases for entering comments as events and looking through comment history for analysis.
aspenONE Process Explorer: Build Overall Equipment Effectiveness Records	<ul style="list-style-type: none"> Learn the basics of OEE 	Get familiar with OEE concepts, including how to use the basic functionality of aspenONE Process Explorer to create and configure OEE records and events, and analyze the impact of various OEE events on plant asset utilization.
Statistical Process Control (SPC): Monitor and Control a Process with Control Charts	<ul style="list-style-type: none"> Learn how to use control charts 	Learn the concepts of Statistical Process Control (SPC) and how to use control charts to monitor and control a process using aspenONE Process Explorer.
aspenONE Process Explorer: Leverage Pattern Recognition and Discovery	<ul style="list-style-type: none"> Learn the fundamentals of pattern matching 	Discover the pattern matching features in aspen One Process Explorer (A1PE). You will learn the applicable uses for pattern recognition and the value of the fit percentage, as well as the parameters that need to be specified for Pattern Discovery and the differences between Pattern Discovery and Patter Recognition. You will also learn how to interpret patterns and analyze process conditions during a specific pattern type.
aspenONE Process Explorer: Represent Equipment and Assets with Graphics	<ul style="list-style-type: none"> Master the concept of Manufacturing Master Data Manager 	Explore the user interface and fundamental concepts of Manufacturing Master Data Manager (mMDM). Navigate the frequently used components in Manufacturing Master Data Manager and configure the components. Integrate Manufacturing Master Data Manager with other Aspen applications, such as Aspen Process Graphic Studio and aspenONE Process Explorer.





About Aspen Technology

Aspen Technology, Inc. (NASDAQ: AZPN) is a global software leader helping industries at the forefront of the world's dual challenge meet the increasing demand for resources from a rapidly growing population in a profitable and sustainable manner. AspenTech solutions address complex environments where it is critical to optimize the asset design, operation and maintenance lifecycle. Through our unique combination of deep domain expertise and innovation, customers in capital-intensive industries can run their assets safer, greener, longer and faster to improve their operational excellence.

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