Aspen Custom Modeler enables users to quickly create custom models to incorporate their companies’ unique expertise and knowledge, enabling them to fully leverage the benefits of process simulation throughout their company.

The Challenge: High Total Cost of Custom Models
Aspen Technology’s simulation tools, such as Aspen Plus®, HYSYS®, and Aspen Dynamics®, include comprehensive unit operation model libraries that have been used to successfully simulate thousands of processes. While these models provide significant value, they cannot always capture proprietary company knowledge or the latest published innovations.

Custom models have traditionally been developed using standard programming languages, such as Microsoft Visual Basic™, C++ or FORTRAN. Not only can this be very time consuming, but it also carries a high risk of failure, due to the expertise required in programming, numerical methods and process modeling. The outcome is a high cost for development and maintenance, with companies being reluctant to develop new models.

Given increasing global competition and the increasing rate of innovation, how can engineers quickly and easily capture, create and test new process models to fully leverage company knowledge and expertise without generating difficult-to-maintain programs?

The Opportunity: Fully Leveraging Company Knowledge and Expertise
A key source of sustainable competitive advantage comes from rapidly using company knowledge and expertise, as well as external innovations. To do this, companies must have a common and consistent framework for creating, sharing and re-using custom models. A common modeling tool that promotes cooperation and the easy evaluation of new ideas can help shorten the innovation cycle, and enables users to fully leverage the benefits of process simulation throughout their company.

Further, this helps to ensure consistency of custom model development and deployment provides users with faster access to the latest innovations and reduces total cost of ownership for custom models. Other business benefits of using a common modeling tool to capture the latest innovations include reduced time to market and lower capital costs, improved safety and environmental compliance and higher profitability from more optimal operation.

“The Solution: Aspen Custom Modeler
Aspen Custom Modeler™ is designed to enable the quick and easy development and deployment of custom process models. Aspen Custom Modeler models can be used within AspenTech’s other simulation tools, such as Aspen Plus, HYSYS and Aspen Dynamics, making innovation fully available and part of standard process design and operability studies. This enables users to fully leverage their existing models and helps to ensure consistency of their simulation results.

“Aspen Custom Modeler provides an easy-to-use environment for both capturing and validating our process knowledge. As a standard modeling tool it also gives us a common language for sharing and exporting this knowledge across our enterprise.”

Recai Artan
Process Engineer
DSM Services/Engineering Stamicarbon
Benefits Offered by Aspen Custom Modeler

Aspen Custom Modeler improves productivity and profitability by enabling innovative ideas and models to be quickly and easily shared enterprise-wide as part of standard process design and operability studies. It enables engineers to extract the most value and performance from the plant and equipment with improved designs, optimized production and enhanced decision-making. Some of the key business benefits offered by Aspen Custom Modeler are listed below:

- Quickly and easily develop custom unit operation models including your specific expertise or proprietary knowledge
- Build these models into complete simulation flowsheets
- Run both steady-state and dynamic simulations for these flowsheets
- Package and deploy completed simulations for use across your enterprise

Aspen Custom Modeler Applications

Aspen Custom Modeler has provided users with significant benefits, including hundreds of man-hours and millions of dollars. Below are a few examples of Aspen Custom Modeler applications:

- Optimizing grade transitions for a polymer reactor
- Estimation of kinetic parameters for a biochemical reaction
- Simulation of a divided-wall distillation column
- Design of control for a rotary kiln
- Design of a power plant
- Prediction of reaction runaway in a batch reactor
- Optimizing operation of a batch reactor
- Optimizing operation of a batch distillation column
- Design of an automotive catalytic converter
- Inferential measurement in a steel furnace
- Minimizing energy consumption in a sugar refinery
- Simulation of a spray drier
- Design of a trickle-bed reactor

Aspen Custom Modeler Features

Creating Custom Models

At the heart of Aspen Custom Modeler is a powerful, high-level process modeling language. Engineers can use this language to list the equations that describe a unit operation or equipment item, like those found in any chemical engineering textbook or literature. There is no need to create or incorporate solution methods as this is automatically handled by Aspen Custom Modeler. The result is compact, self-contained models that are easy to understand and easy to maintain. Aspen Custom Modeler uses advanced equation-based solution techniques and state-of-the-art numerical methods to ensure fast and reliable solution. Furthermore, it is also integrated with Polymers Plus® for modeling of polymer processes.

Aspen Custom Modeler also includes a limited-use license for Aspen Properties®, AspenTech’s industry-leading physical properties package. This enables Aspen Custom Modeler to access the comprehensive property models and data available within Aspen Properties. If required, custom physical properties may also be incorporated.
Aspen Custom Modeler also provides the following features:

- The ability to interface to C++, C or FORTRAN legacy models
- The ability to create pre-configured tables and custom forms for entering input data, or reviewing results. Custom forms can also be created using Microsoft Visual Basic
- The ability to create libraries of custom models
- Language for direct entry of time differential equations for use in dynamic models and partial differential equations for modeling distributed systems
- The ability to create time-series or profile plots for viewing model results, such as example product flow rate over time or pressure drop through a pipe
- Integration with Polymer Plus for modeling of polymer processes

**Adding Custom Models to Flowsheets**

Flowsheets can be built within Aspen Custom Modeler using the graphical flowsheet editor. Simply drag and drop models onto the flowsheet to create blocks. Connect these blocks with streams and use the tables and custom forms to enter required data for the models and streams. Aspen Custom Modeler models can also be exported and used seamlessly within Aspen Plus, HYSYS or Aspen Dynamics flowsheets.

**Running Simulations Using Custom Models**

Once a custom model is added to a flowsheet in Aspen Custom Modeler, it can be used for a variety of simulations, including:

- Steady-state simulation to perform design or rating calculations
- Dynamic simulation to understand the dynamic behavior of your process
- Steady-state or dynamic estimation to fit model parameters to experimental or plant data
- Steady-state or dynamic optimization to optimize the design and operation of continuous or batch processes

To view simulation results, users can use the plots, tables and custom forms that are built into the custom models. New plots and tables can also be added quickly and easily as needed.

For dynamic simulations, users can create tasks to define changes that are time or event driven. For example, to ramp an inlet flow rate at a certain time or turn off a feed when a vessel is full. Tasks can be used to define complex operating procedures, such as how to run a batch cycle for a batch reactor. Users can also take a snapshot of the simulation at any time, which can be rewound to replay a particular scenario or to initialize a new simulation.

**Deploying Simulations**

In addition to distribution of custom models within a simulation, models developed using Aspen Custom Modeler can be deployed enterprise-wide for use by personnel with little or no knowledge of process simulation (such as for planning or operations personnel). This enables non-experts to access the power of the custom model without being exposed to its complexity. Aspen Custom Modeler provides the following features to enable this:

- Extensive support for Windows® automation. This can be used to interface with Windows applications such as Microsoft Excel™, or to construct a customized user interface using Microsoft Visual Basic
• Built-in Microsoft Visual Basic scripting for automating common tasks
• The ability to create pre-defined screen layouts
• An OLE for Process Control™ (OPC) interface to enable easy exchange of data with process control and information management systems for applications such as training or inferential measurement

The Goal: Reduced Costs and Improved Profitability

Aspen Custom Modeler delivers an unrivalled combination of modeling power and ease of use. It can be used to develop models for use and re-use in a wide range of applications including steady-state simulation, dynamic simulation and optimization – enabling companies to design and operate more efficient, safer and more profitable process plants.

Aspen Custom Modeler is more than an isolated point solution. It is an integrated part of the Aspen Engineering Suite™ (AES), a suite of products designed to work together to optimize the engineering and innovation workflow processes. Aspen Custom Modeler is the model development environment for AES. Its technology is used to develop other AspenTech simulation products, including Aspen Dynamics, Aspen Adsim™, Aspen Chromatography™ and Aspen Water™, as well as rigorous polymer process models for Polymers Plus®.

AspenTech: A Tradition of Innovation

Aspen Technology Inc.’s proven, integrated software and rapid implementation services enhance the efficiency and profitability of process companies. AspenTech’s engineering software optimizes process designs to maximize lifecycle returns. Our manufacturing/supply chain software harmonizes production, inventory, demand, and delivery to improve operating margins. Together, these offerings create an integrated solution – enterprise operations management (EOM) – that transforms enterprise-wide operating performance.