



## Jump Start: Getting Started with Aspen Plus<sup>®</sup> V8

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*A Brief Tutorial (and supplement to training and online documentation)*

*Jennifer Dymont, Product Marketing, Aspen Technology, Inc.  
Vidya Mantrala, Product Management, Aspen Technology, Inc.*

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## Introduction

Aspen Plus® is the market-leading chemical optimization software used by the bulk, fine, specialty, and biochemical industries, as well as the polymer industry for the design, operation, and optimization of safe, profitable manufacturing facilities. With an extensive array of unit operations, several specialized work environments, and a robust solver, modeling in Aspen Plus V8 enables users to:

- Optimize processing capacity and operating conditions
- Ensure model accuracy with best-in-class physical properties
- Monitor safety and operational issues in the plant
- Identify energy savings opportunities and reduce GHG emissions
- Perform economic evaluation to realize savings in the process design
- Improve equipment design and performance
- Work more collaboratively with peers with tighter integration with adjacent products
- Reduce costs and improve product quality and throughput of process involving solids

Aspen Plus V8 builds upon the legacy modeling environment, adding increased value with integrated products and an improved user experience. The ease of use and flexibility of model calculations have been preserved, while new capabilities have also been added.

### Scope of this Document

This document is intended as a simple “getting started” guide. It will cover the process of creating a new case, setting up component lists and property methods, and working in the simulation environment to build the model. Integrated features and specific topics such as energy analysis, economic evaluation, and EDR integration will be discussed at a high level. For a more in-depth understanding of these topics, we provide links to further documentation and training materials developed specifically by the AspenTech experts in those areas.

We encourage you to take advantage of our full range of training resources including:

- The AspenTech support website ([support.aspentech.com](http://support.aspentech.com))
- AspenTech online training modules which can be accessed from the Resources ribbon
- AspenTech courses
- AspenTech business consultants

## Overview of the New User Interface

Aspen Plus V8 uses the new common “shell” component to manage the windows and forms in the user interface. This is the same shell that has been adopted by many other AspenTech products. The shell provides an interactive work environment that offers the user full control over the screen display.

Floating forms, flowsheets, the model palette, and other objects can now be docked inside of a window, or tabbed as a separate window, as shown in Figure 1.

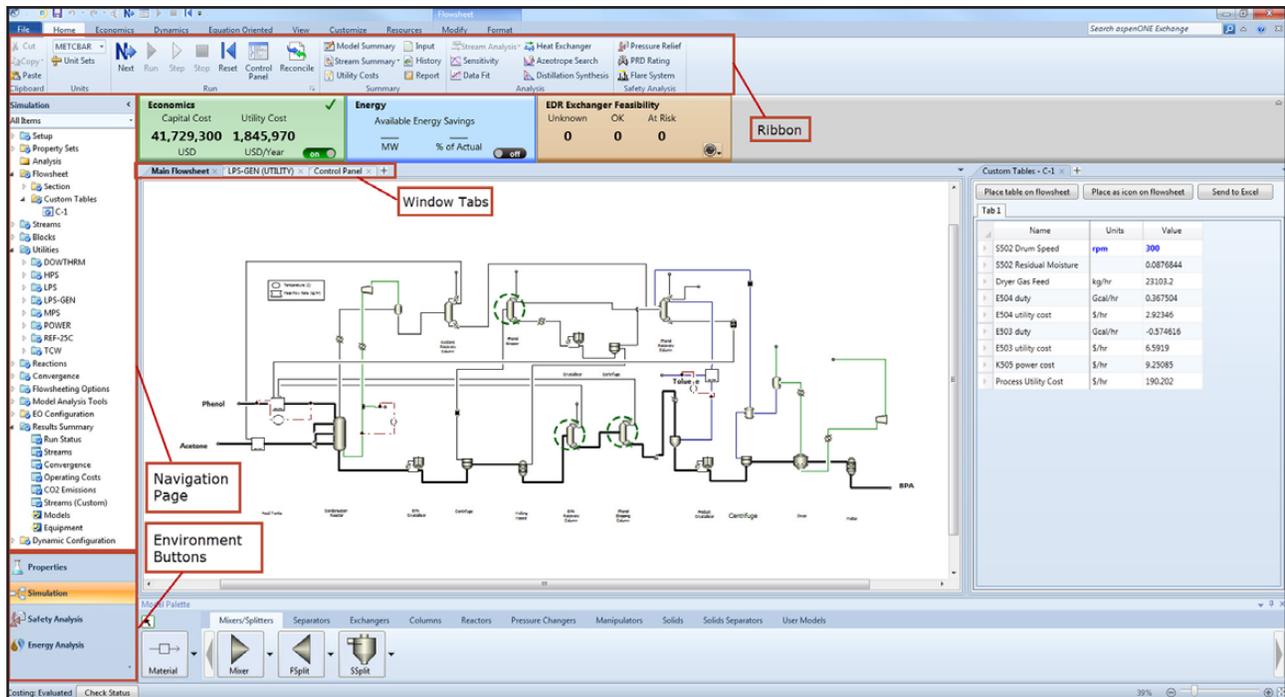


Figure 1: Overview of Aspen Plus V8

The navigation pane shows the hierarchy of and provides access to all available forms. Environment buttons allow for easy navigation between case properties, simulation, safety analysis, and energy analysis. Contextual ribbons bring the most commonly used commands to the surface of the workspace.

### Window and Form Controls

Forms can be organized in a variety of ways. When you open a new form (by clicking its address in the Navigation Pane or the appropriate button), it appears as a new tab in the workspace.

Multiple tabs can be open at once; clicking on a tab will make it the active window and will reveal contextual ribbons and objects. Each tab displays the name of the form it contains (Figure 2).

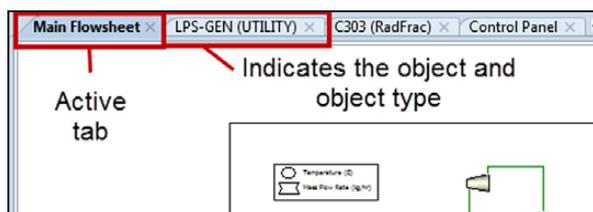


Figure 2: Tabbed Windows

To view forms side-by-side, choose one and right-click on its tab and choose “New Vertical Tab Group”. To move this tab to the lower half of the workspace, select “New Horizontal Tab Group.”

To manage the number of tabs, you can right-click on a tab and select “Close” or “Close Other Tabs.” If you click and drag the tabs off of the row or right-click and select “Floating,” they turn into freestanding forms. To create separate window groups within the workspace, place the pointer over a window tab, then hold down the left mouse button while dragging the pointer into one of the boxes superimposed on the workspace, as shown in Figure 3. Forms can be dragged out of the Aspen Plus window entirely, even to a second monitor.

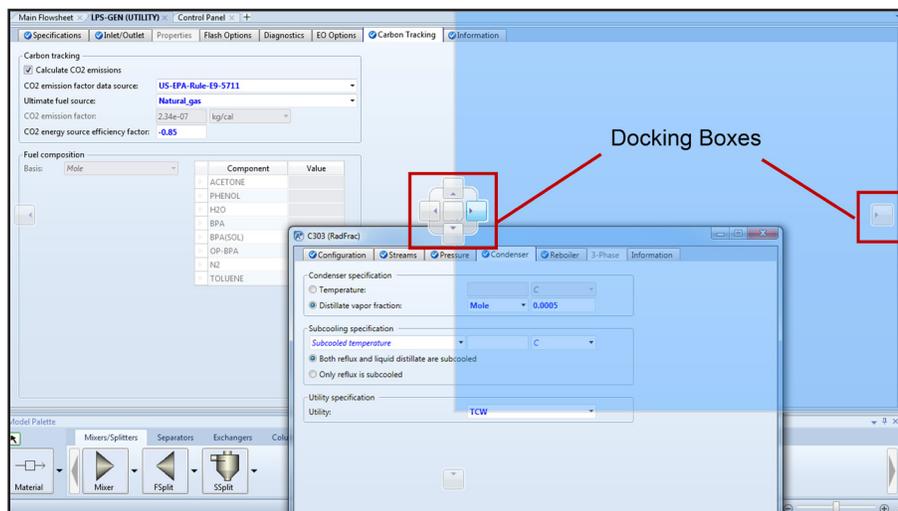


Figure 3: Dock a Window

## Overview of the Ribbon

In Aspen Plus V8, options and operations are displayed in convenient, workflow-oriented ribbons. As in earlier versions of Aspen Plus, the File menu contains commands for opening and saving files. The most frequently used commands are together on the Home tab (Figure 4). To find the current location of any of the commands from previous versions, see “Mapping of Commands to the Ribbon” in the Aspen Plus help.



Figure 4: Aspen Plus Home Ribbon

Click any of the tabs on the ribbon to access a set of related commands. These commands are split into groups by common functionality. Some groups have a small arrow button, the dialog box launcher (Figure 4), located at the bottom right corner of the group. Clicking this button opens a dialog box with additional commands.

Some of the ribbon tabs are contextual. These tabs are only shown when the commands they contain are relevant. For instance, the Flowsheet/Modify tab is only visible when the flowsheet is the active window. The environment ribbons themselves are also contextual. Switching between the Properties and Simulation environments will switch to the associated ribbon.

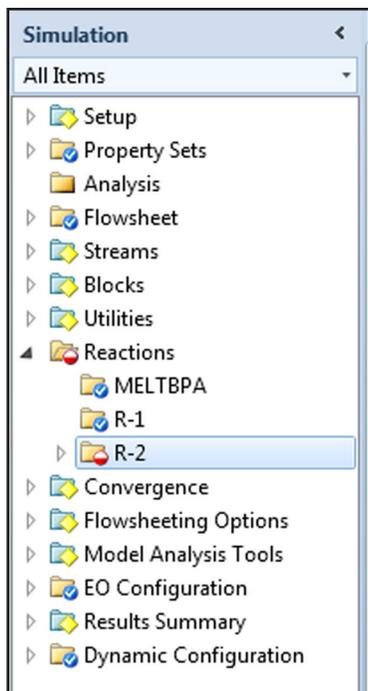


Figure 5: Navigation Pane

### The Navigation Pane

The navigation pane resides on the left side of the main window (Figure 5). It can be collapsed using the “<” control on the upper right side of the panel to create more viewable space in the main window.

You can double-click on a folder in the navigation pane to open its form in the active window tab. Alternatively, you can right-click an item and select “Open in new tab.” The navigation pane also shows the status of each form. When input is incomplete, the circle below the folder is red and half-filled. When input is complete, a blue circle with a white checkmark is visible. Not all folders have required inputs and some have neither indicator.

The dropdown menu below the environment heading allows you to sort contents in the Navigation Pane by Input or Results to easily identify objects, unit operations, and streams of interest (Figure 6). *If you cannot find a form, you are likely in the wrong environment.*

### Quick Access Toolbar

The Quick Access Toolbar (QAT) appears on the left side of the title bar (Figure 7). The Undo, Run, Reset, and Next commands are located here, along with other customizable options. The QAT makes it easy to get to the commands you use most frequently, because this toolbar remains visible at all times. To add other commands, right-click on any ribbon icon and select “Add to Quick Access Toolbar.” For example, adding the “change layout” button to the QAT will make the option to change layouts readily available without having to navigate to the Home ribbon tab.

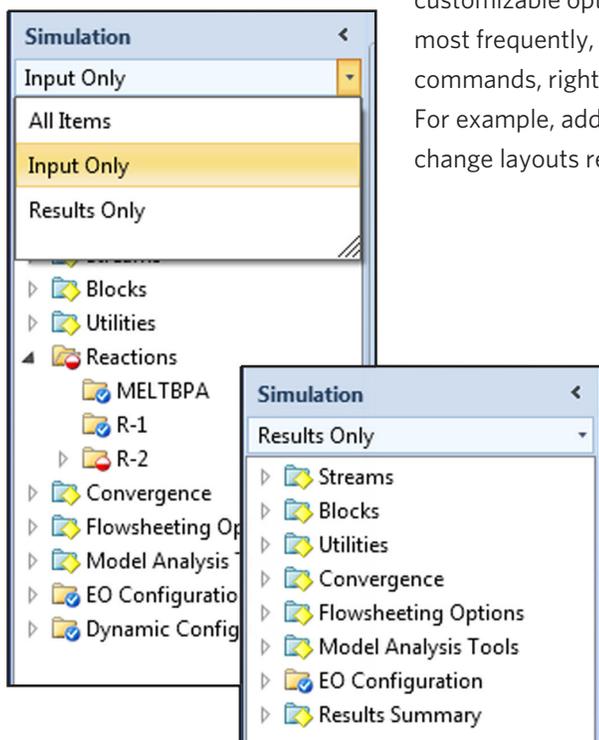


Figure 6: Sort the Navigation Pane

## Setting Preferences

To set preferences, open the File menu and click on “Options” in the bottom right corner, as shown in Figure 8.

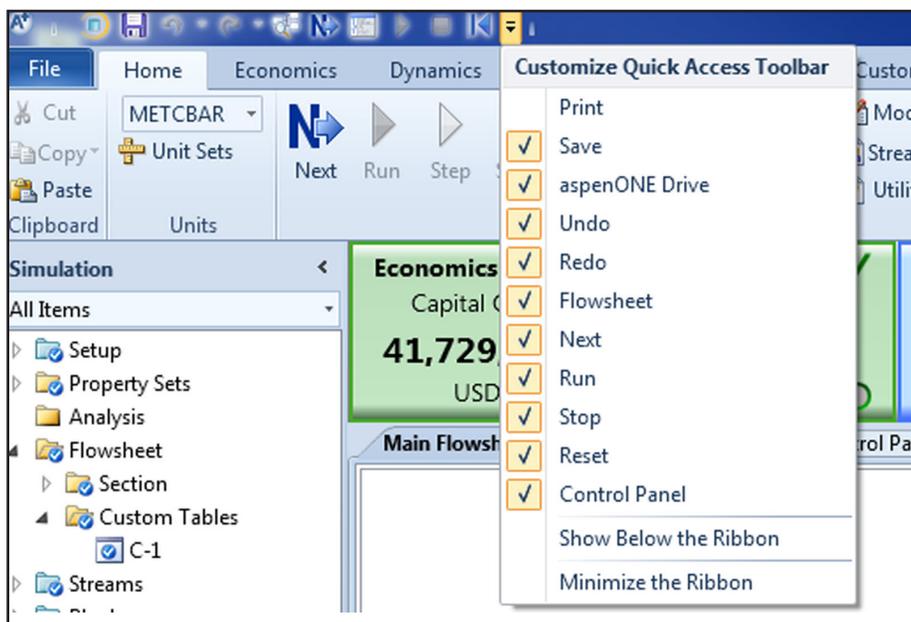


Figure 7: Quick Access Toolbar

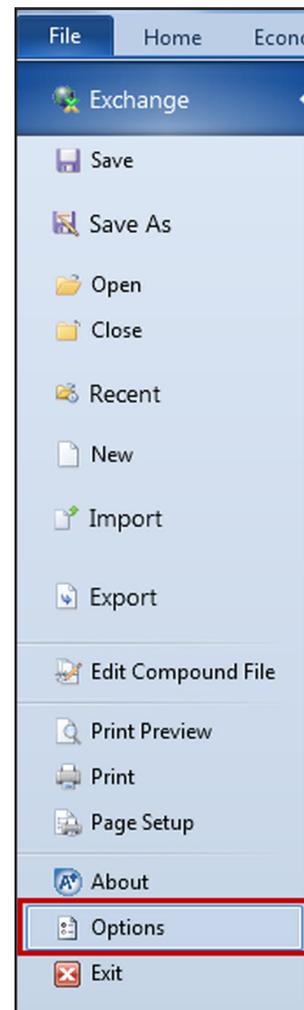


Figure 8: Setting Preferences

## The Zoom Controls

There are a set of Zoom controls on the lower right side of the main window. Moving the slider adjusts the zoom level. Click the “(+)” or “(-)” buttons to zoom the active window in or out by 10%, click the “zoom fill” button to maximize the view in the available space, or click the zoom factor to select a preset zoom level. The zoom bar acts on the process flowsheet, most forms, and on plots (Figure 9).



Figure 9: Zoom Controls

## Copy and Paste, Drag and Drop

Grid forms in the new Aspen Plus user interface support copy/paste and drag and drop functions for variables from the workbook and object worksheets, to forms that require input variables such as sensitivity studies, and custom tables. Copy/paste can be done by right-clicking or using the Ctrl-C and Ctrl-V shortcuts or a “paste” button may be present on the form you are pasting the variable to. To drag and drop, click and hold the mouse button over the white tile of the variable you wish to transfer, and drag to the white tile of the location you wish to add it. When dragging and dropping to an unfilled white box, there will be no change in the mouse, but if a drop into a particular box is not possible, a will appear. A red dotted line will appear where you can drop a variable into a table (Figure 10). For certain forms, you may need to click the “Add” button before you can drop a variable.

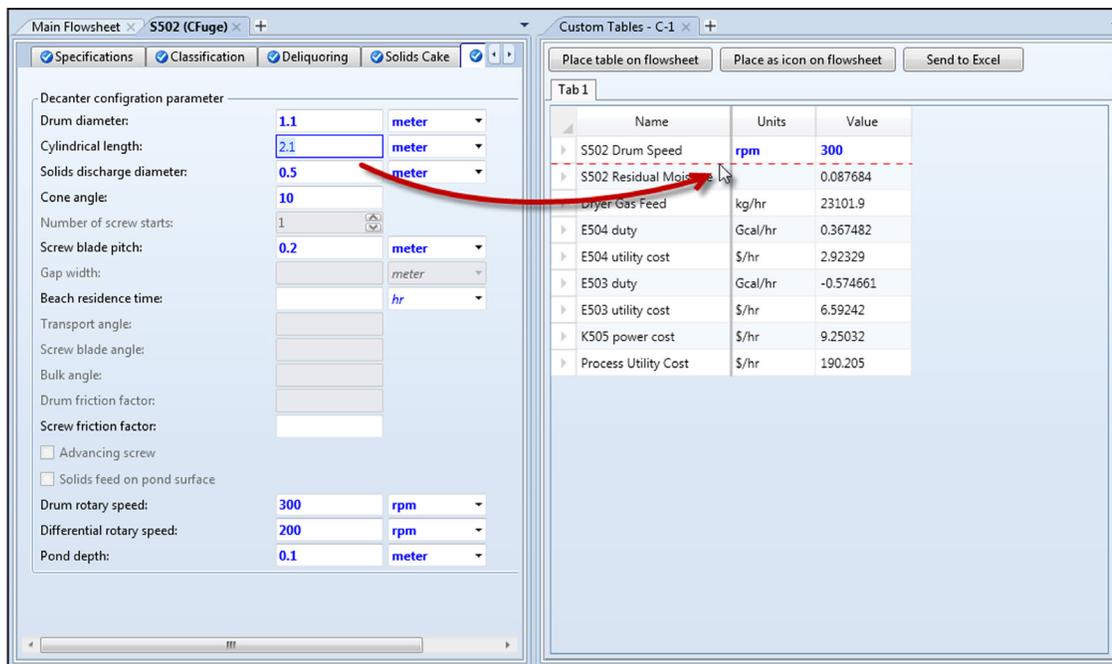


Figure 10: Drag and Drop

## Environment Buttons

Aspen Plus has four user environments: Properties, Simulation, Safety Analysis, and Energy Analysis. The environments have specialized user interfaces for performing different tasks. The Properties environment displays all of the tasks related to configuring the underlying physical properties associated with a model. This environment includes workflows related to finding property data, regressing and estimating property data, and customizing the methods and models used to calculate properties. The Simulation environment is focused on tasks related to building and using process models. It includes everything needed to create and edit a process flowsheet, analyze a process, etc.

The Safety Analysis environment, available in V8.6 and above, is used for performing and documenting overpressure protection analysis. In this environment, pressure relief devices (PRDs), such as pressure safety valves (PSVs) and rupture disks, can be properly sized while considering all of the necessary emergency scenarios to comply with safety regulations. Here, the flowsheet is frozen and only tools used for overpressure protections are available. To learn more about the safety analysis environment, please see the additional resources for jump start guides related to relief sizing.

The Energy Analysis environment is used for identifying energy saving opportunities and includes everything needed to add and compare different energy saving scenarios. To learn more about the energy analysis environment, please see the additional resources for jump start guides related to activated energy analysis.

When switching between the two environments, the state of each is preserved, including the active ribbon tab and any forms, plots, and other windows that may be open. Some of the forms and folders in the Properties environment have been reorganized for easier access. Find more information on the Properties and Simulation environments in the following sections.

## Starting a New Case

Open Aspen Plus from the Windows start menu by clicking on the AspenTech folder > Process Modeling V8 > Aspen Plus, as shown in Figure 11.

When Aspen Plus opens, you will see the Start Page, as well as Recent Cases (Figure 12). To create a new case, click on New in the top left box, or File > New. Choose either a blank simulation or from a list of installed templates or custom templates. Templates automatically specify the units, the property methods used, and the flow basis for input and reports.

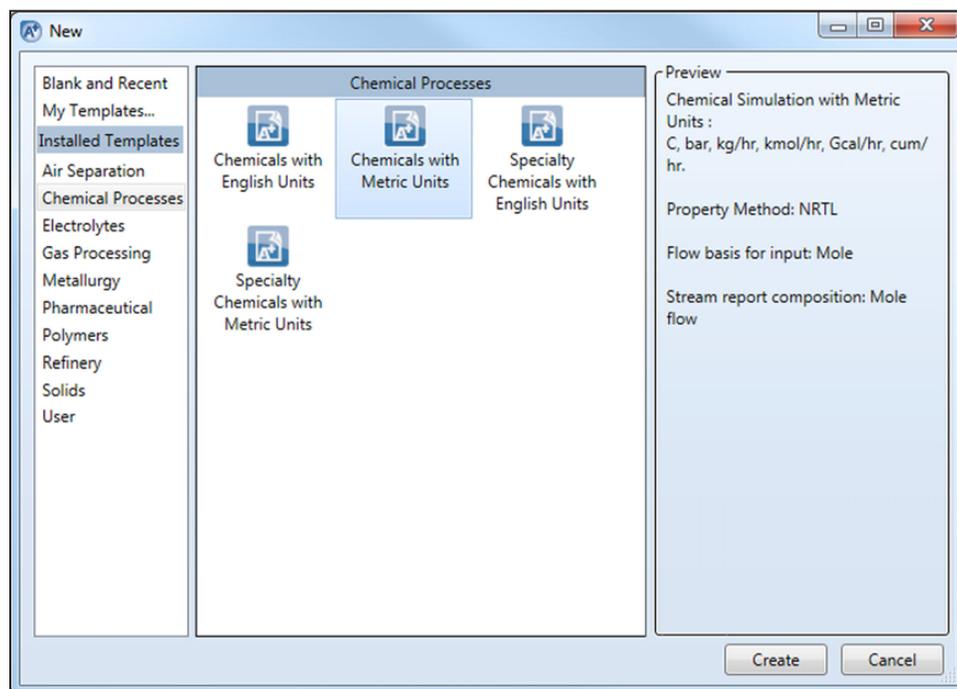


Figure 12: New File Templates

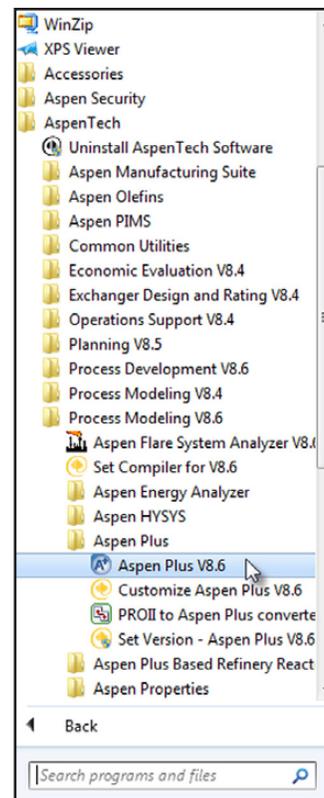


Figure 11: Opening Aspen Plus

## The Properties Environment

All new cases start in the Properties environment. This is where you will select the components to be used in your model and set the calculation methods for physical properties. You cannot enter the Simulation environment until at least one component has been created and a property method has been specified.

### Adding Components

The first step to building a model is to create a list that will contain all of the components that will be used in your process. Later, when you specify a stream in the simulation environment, you will need to choose a component list for that stream. Aspen Plus supports components from Aspen Properties, including the NIST database.

To add a component, click the Find button and use the search form to select which type of components to add to the list. When you type in the box for the name or alias and press Find Now, Aspen Plus will automatically populate matches in the grid below. Double-clicking on the compound or clicking Add Selected Compounds will add the selected component to the list (Figure 13).

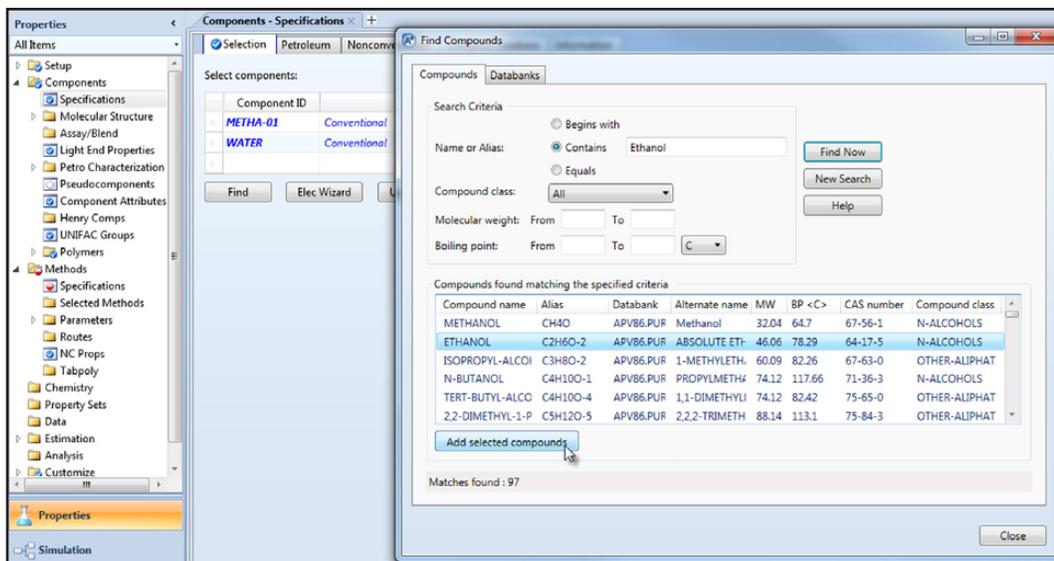


Figure 13: Add Components

## Selecting a Property Method

You must choose a Property Method for your simulation. Click on the Methods folder in the navigation pane or on the Methods icon from the Home ribbon.

Click on Method Filter dropdown to choose a process type. Next, click on the Base Method dropdown to choose a property method to use and add Henry Components as necessary. Alternatively, choose from the Method Name dropdown which displays all of the available property methods. If unsure of the property method to use, click on the Method Assistant for help. Hovering over the property method will give a short description (Figure 14).

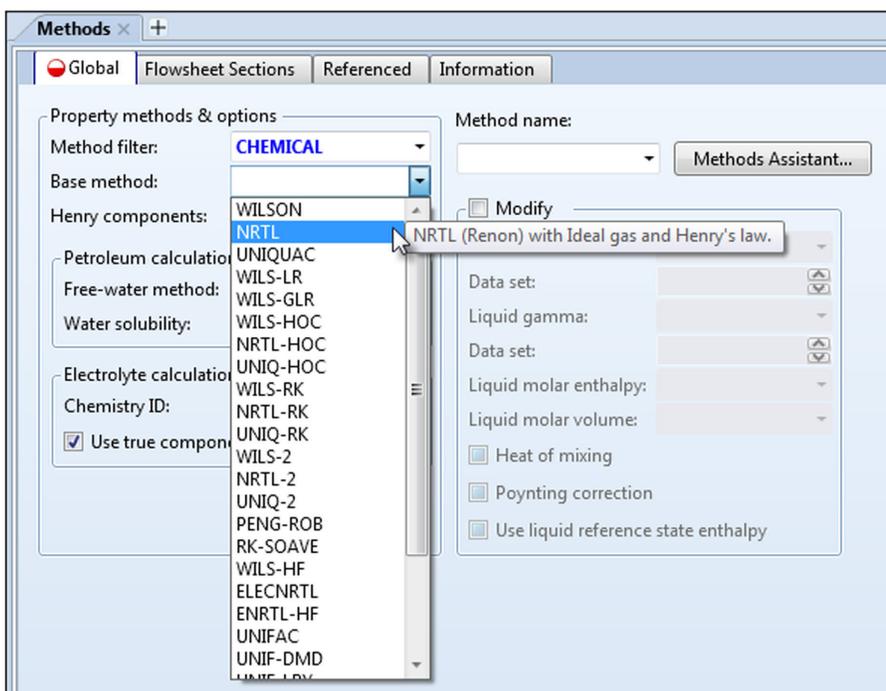


Figure 14: Select a Method for the Property Calculations

## Properties Controls

While you are setting up your properties, you may find it helpful to use the controls provided on the Properties Home ribbon (Figure 15). With the properties environment, there are different run modes with different uses including specifying properties and analyzing model accuracy (Analysis), estimating missing property data (Estimation), or determining parameters using experimental data (Regression).

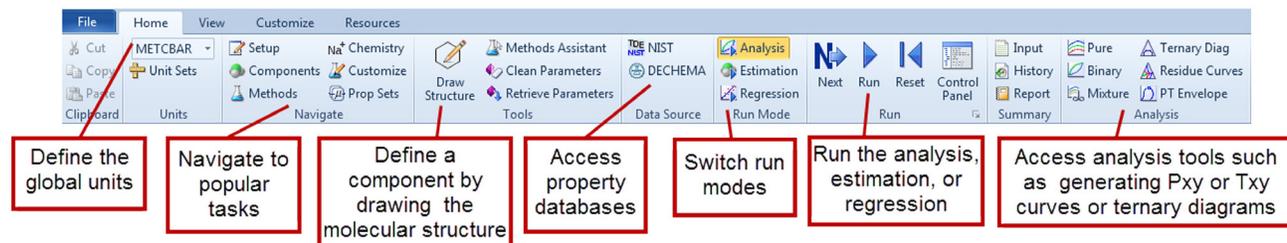


Figure 15: The Properties Ribbon

## The Simulation Environment: Building the Flowsheet

With the components and the property methods specified, you are now ready to begin creating your model. Click on the Simulation environment button on the bottom left panel. A new contextual ribbon for the Simulation Environment was designed to be workflow-oriented (Figure 16).

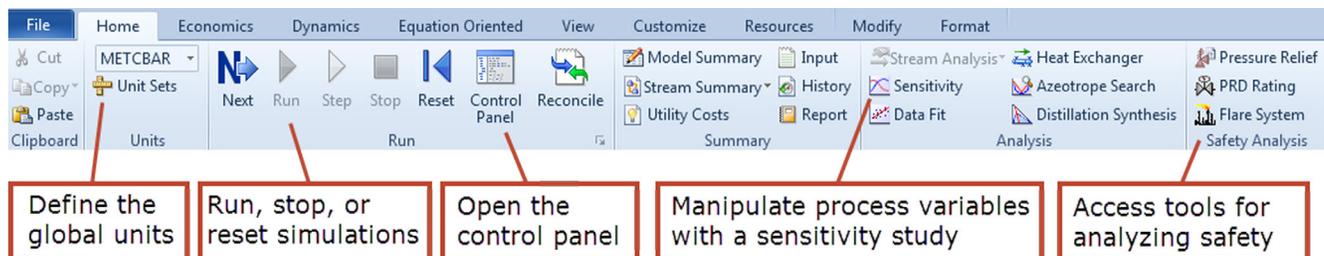


Figure 16: Simulation Environment Home Ribbon

You will see the Model Palette appear on the bottom of a blank flowsheet. You can start by adding flowsheet objects (material streams or unit operations) from the palette.

## Adding Flowsheet Objects: The Model Palette

Unit operations on the model palette are organized into ten tabs, with more common tabs on the left and less common tabs to the right (Figure 17). The more common tabs include the mixers/splitters, separators, exchangers, reactors, and pressure changers. The less common tabs include the manipulator objects, solids unit operations, and user models. To learn more about the solids unit operations and specifying solid properties, please see the additional resources for jump start guides related to solids modeling.

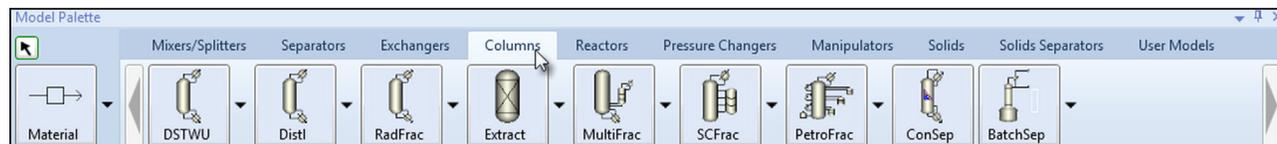


Figure 17: The Model Palette

Material streams can be added using the black arrow, and energy and work streams can be added using the dashed arrows accessed by clicking the dropdown arrow to the right of the material stream. If you close the palette, you can re-open it from the View ribbon or by using the F10 keyboard shortcut.

**Add an Object from the Palette to the Flowsheet**

To place an object (unit operation, material stream, or energy stream) on the flowsheet, click the icon in the palette and move the mouse over the flowsheet to where you would like to place the object. You will see that the mouse has turned into a plus sign, indicating that when you click the mouse again, the object will be added. If you wish to adjust the flowsheet without adding more of the selected objects, right-click on any blank spot on the flowsheet or click the cursor icon on the upper left corner of the model palette to get the normal cursor back.

**Note:** The block placer does not deactivate after you place a single block on the flowsheet, a single block, so you can place as many as you want in a row without having to re-click the icon on the model palette. To deactivate the placer, click on the cursor icon in the upper left corner of the model palette. This is the same for the material streams.

If you hover a material stream over a unit operation, several arrows will appear; some red and others blue. Red arrows indicate required inputs and required outputs for the unit operations. Blue arrows are optional and should be specified after the required inputs or outputs. Hover over any arrow to get a tooltip description of what it represents to the system, for example, "Side Product" for a Distillation Column (Figure 18). To run the model, one of the requirements is that all of the red arrows of each unit operation on the spreadsheet are filled and that each steam has either a source or a destination.

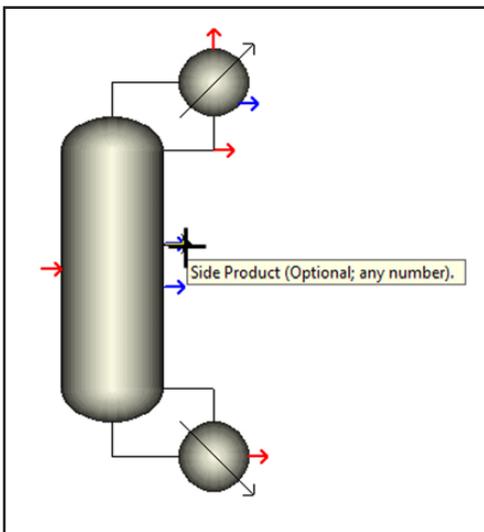


Figure 18: Adding Material Streams to Unit Operations

After a material or energy stream has been created, you can add or change its destination or source by right clicking the stream and then choosing the new destination/source. If you wish to delete an object, select it and then press the Delete key on your keyboard.

The right-mouse click menu allows you to perform all of the standard commands for an object such as cut, copy, and paste. It also contains a number of extended functions such as icon rotation, renaming the object, opening a form as a new tab, and changing the unit operation's icon. Aspen Plus defaults to 3D icons but you can switch to 2D icons by unchecking the 3D Icons box located in the Unit Operations group in the Flowsheet/Modify ribbon.

## Specify Material Streams

Open the material stream form by double-clicking on the stream in the flowsheet or finding it in the navigation pane in the Streams folder. In the stream input form, enter enough parameters to fully define both the stream's composition and its thermodynamic state. You can input information in any order and once a sufficient amount of information has been specified to run the model, the circle (status indicator) at the top of the form will turn from red to blue. (Figure 19).

The screenshot shows the 'S1 (MATERIAL)' form in Aspen Plus. The 'Mixed' tab is selected. The 'Flash Type' is set to 'Temperature' and 'Pressure'. The 'State variables' section includes: Temperature: 50 C, Pressure: 2 bar, Vapor fraction: (empty), Total flow basis: Mole, Total flow rate: 5000 kmol/hr, and Solvent: (empty). The 'Composition' section shows a table with 'Mole-Frac' as the basis. The table contains three rows: METHA-01, WATER (0.7), and ETHAN-01 (0.3). The total is 1.0. The 'Reference Temperature', 'Component Attributes', and 'Particle Size Distribution' sections are collapsed.

Component	Value
METHA-01	
WATER	0.7
ETHAN-01	0.3
Total: 1	

Figure 19: Complete Stream Specification

## Specify Unit Operations

Double-click on any unit to open the form. Add information about the unit operations such as the size/dimensions, pressure drop, duty, and anything else that is required for that particular unit. Some unit operations require additional information in adjacent tabs, such as Yield in the RYield reactor model or Drying Curve in the Dryer model.

Once a sufficient amount of information is specified, all of the status indicators at the top of the form will turn blue. Flash convergence parameters for the specific unit operation can be adjusted in the Convergence tab as needed and notes about the unit operation can be noted in the Information tab.

## Flowsheet Controls

While you are building your flowsheet, you may find it helpful to use the controls provided on the Flowsheet/Modify ribbon (Figure 20). We will cover some of the most commonly used functions here.

### The Flowsheet Modify Ribbon



Figure 20: Flowsheet/Modify ribbon

### Find Object

The Find Object button, located on the Flowsheet/Modify tab, can be used both to locate any object on a large flowsheet and to directly open any object form. Click on the icon from the Flowsheet ribbon to open the Find Object. Scroll through the blocks or streams and select an object to locate. If you click the Zoom View checkbox, pressure find will zoom into the selected object (Figure 21). Center View will not zoom in the object, but just adjust the flowsheet so that the object is at the center. Blocks and streams can also be located in the navigation pane and the opening folder will display all of the forms associated with that object.

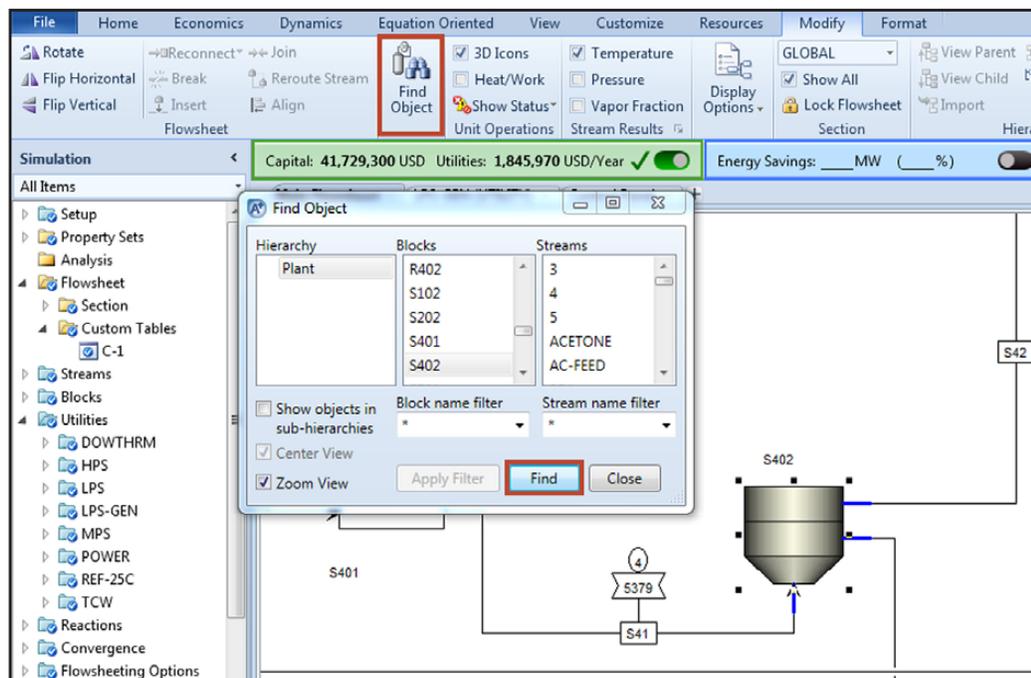


Figure 21: Find Object

### Flowsheet Hierarchy

In large complex flowsheets, it is often useful to organize processes into smaller stages. In this case, blocks represent a particular group of operations. If you double-click on any of these blocks, you will be able to immediately enter the sub-flowsheet environment. You can also right-click on the block and use the “Open Child” selection or click “Open Child” in the Hierarchy group on the Flowsheet/Modify ribbon. Inside the subflowsheet, you will see only objects related to that particular part of the process. Use the “View Parent” Ribbon button to navigate back to the main flowsheet. You can import or export hierarchy blocks using backup files.

### Flowsheet Display Options

Use the features in this category to display stream results, such as Temperature and Pressure on the flowsheet (Figure 22). You can also specify a variable such as vapor pressure or moisture content using the form and change the way that it is displayed on each stream. Here, in the Flowsheet Display Options, you can turn the flowsheet grid or ruler on or off.

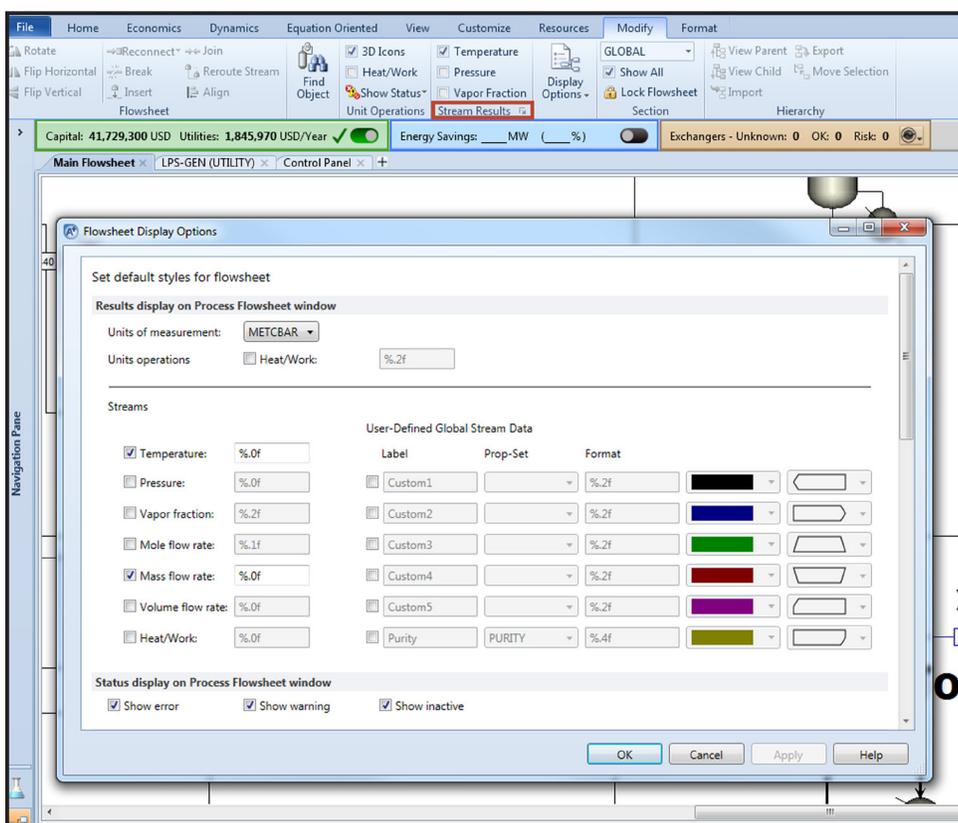


Figure 22: Flowsheet Display Options Form

### Flowsheet Formatting Ribbon

Only visible when the flowsheet is open and selected, the flowsheet/format ribbon allows you to format the flowsheet with text, arrows, boxes, and different stream colors, widths, and styles (Figure 23).

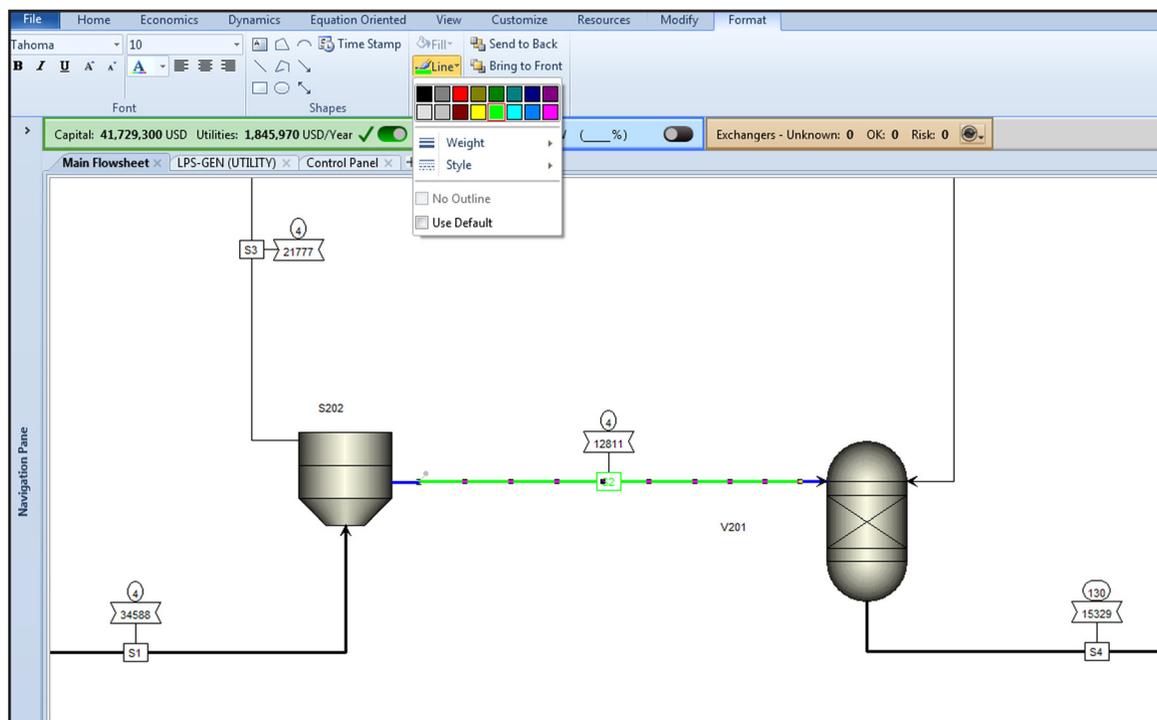


Figure 23: Flowsheet Formatting Ribbon

## Run and Analyze the Model

After all of the inputs are complete, run the model to see the results of the simulation. If your process involves a lot of recycle loops, it is advised to complete the flowsheet and troubleshoot any issues you may have with your inputs before adding the recycle loops.

### Sensitivity Study

Once a model has calculated results, you can investigate how changing one or more variables changes the rest of the model. For instance, you can see how varying the rotary speed of a centrifuge would change the duty of a downstream dryer. Variables can be copied and pasted or dragged and dropped from other forms to ease the input of variables. The sensitivity study tool can be accessed by clicking the Sensitivity icon in the Home ribbon under the Analysis group or through the Navigation Pane under Model Analysis Tools. In the Vary tab, define one or more variables to be changed and a set of values to evaluate for every variable either in a list or using a range and increments. In the Define tab, specify the variables you would like to track with every change in the manipulated variable and in the Tabulate “fill variables” to include all of the tracked variables in the results (Figure 24).

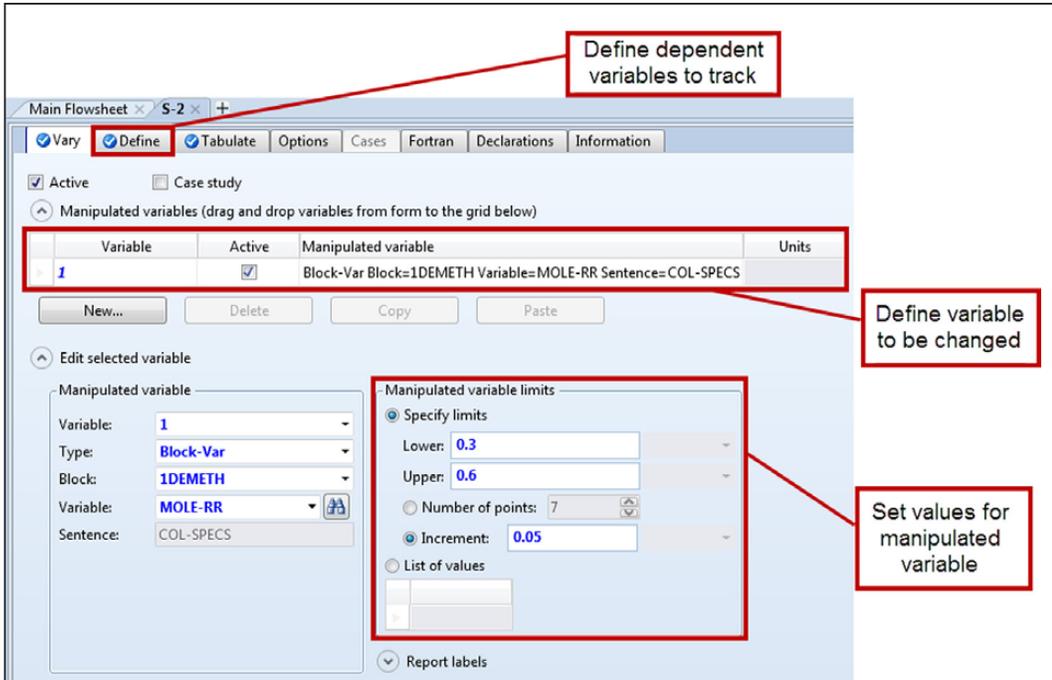


Figure 24: Sensitivity Study Inputs

After setting up and running the sensitivity study (by pressing run again), the results can be examined either in tabular form under Results or visually using the Built-in Plot function, which appears as an option at the top right (Figure 25).

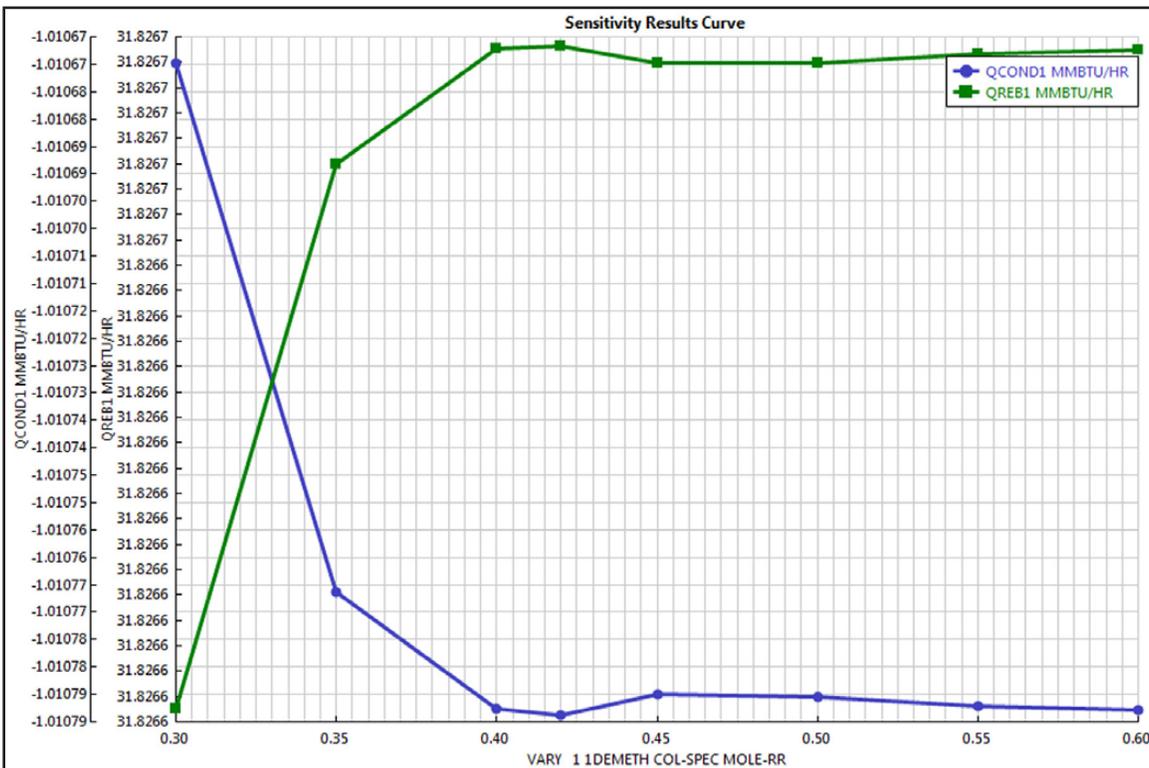


Figure 25: Results from a Sensitivity Study

## Optimization Study

To further improve your process model, an optimization study can be set up to find the optimal value of a variable to minimize or maximize another variable while considering constraint(s) of the former variable. After setting up and running the optimization study (by pressing run again), the results can be examined.

## Layered Products and New Integrated Capabilities

In Aspen Plus V8, there is more seamless integration of layered tools. Dynamics and Equation Oriented Modeling have their own contextual ribbons. Energy Analysis, Economic Evaluation, and Exchanger Design and Rating (EDR) can be activated within the simulation to automatically calculate the energy cost and savings potential and the equipment cost for the flowsheet, and to automatically size heat exchanger designs using rigorous EDR models. An overview of some of the integrated capabilities is provided below. For more information, see the Additional Resources section.

### Activated Analysis

Activated Analysis is intended to guide design decisions through automatic energy analysis, economic analysis, and exchanger design and rating. The Activated Analysis panel displays key performance indicators which are recalculated each time you change or run the simulation case (Figure 26). In Aspen Plus V8.8 and higher, the Activated Analysis panel is expandable to reveal more information to be shown (Figure 26). In Aspen Plus V8.0-V8.6, the Activated Analysis panel is accessible by clicking the “Activated Analysis” button in the home ribbon.

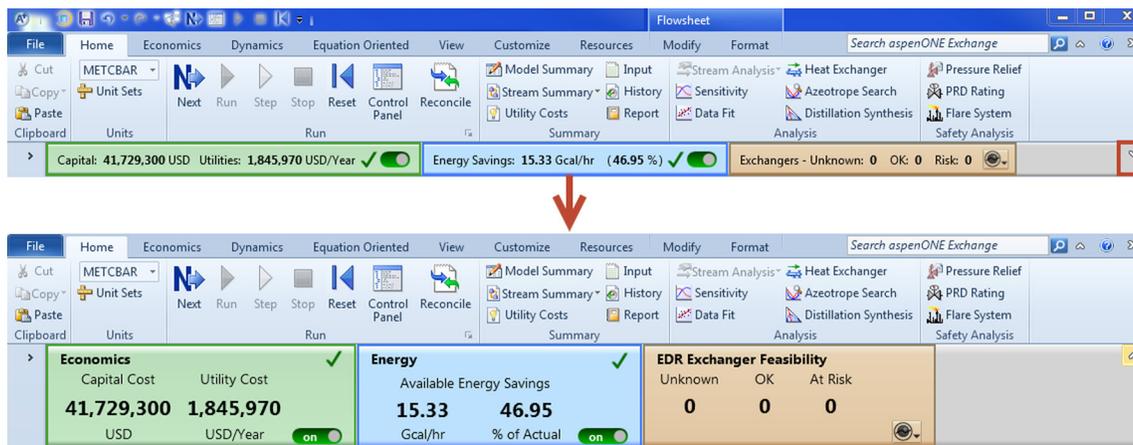


Figure 26: Activated Analysis

### Energy Analysis

Activated energy analysis can be used to calculate current energy costs and potential savings; it can also automatically generate suggestions to improve the heat exchanger network design for the flowsheet. In the Energy Analysis Environment, you can view details of the current heat exchanger network and create custom scenarios for energy saving designs.

### Economic Analysis

The Activated Economic Analysis pane displays the relative capital cost and utility cost for the process. The reported values are based on calculations from Aspen Process Economic Analyzer.

### Exchanger Design and Rating (EDR)

The Activated EDR pane displays the heat exchangers in the flowsheet, and if any operational risks are present, it enables you to easily track which exchangers have been converted to rigorous models. Using Activated EDR, you can automatically convert any simple-end-point or steady-state rating Shell&Tube, AirCooled, or Plate heat exchanger model into a fully rigorous Aspen Exchanger Design & Rating (EDR) model inside Aspen Plus.

### Dynamics

Dynamic simulation mode addresses non-steady-state processes, such as plant start-up and shut-down. It can be used to test control systems, monitor safety considerations, and assess performance problems. In Aspen Plus V8, models can be prepared and sent to Aspen Plus Dynamics for dynamic analysis using the Dynamics button on the Dynamics ribbon. Converting your model from steady-state to dynamic requires additional input on the unit operation forms. Refer to Additional Resources for more information.

### Solids Modeling

Solids process modeling with Aspen Plus provides an integrated solution for simulating processes containing solid phase components. With the tools provided, it is easy to characterize and model these components and obtain reliable results based on the comprehensive property database and proven simulation technology. This functionality bridges the gap between process engineering and particle science by providing the tools to seamlessly integrate rigorous models for solid streams and unit operations with typical fluid process models. Now users can simulate entire multi-phase processes in one program, allowing accelerated production of consistent, conceptual designs. Aspen Plus has 20 unit operations for solids processing that represent over 70 different pieces of equipment (Figure 27).

Formulate Particles	Adjust Moisture	Chemical Reactions	Adjust PSD	Solid/ Liquid Separation		Gas/ Solid Separation	Transport Solids
Crystallizer	Convective Dryer	Fluidized Bed Reactor	Crusher /Mill	Hydro Cyclone	Centrifuge	Gas Cyclone	Single Pipe
Granulator/ Agglomerator	Contact Dryer	PSD in CSTR, RBatch, & RPlug	Classifier	Liquid Filter	Cross Flow Filter	Scrubber	Pipe Network
Spray Dryer (Dryer Block)			Screen	Swash	CCD	ESP & Fabric Filter	

Figure 27: The Aspen Plus Model Library for Solids Processing

## aspenONE® Exchange

aspenONE Exchange provides access to an engineering content marketplace from within Aspen Plus (Figure 28). Click on any of the buttons in the Exchange group under the Resources tab to open aspenONE Exchange. aspenONE Exchange can also be accessed from the File menu. Type queries into the search bar to find equipment selection tools, existing flowsheets and models, training and tech tips from AspenTech’s extensive knowledgebase, and more. See Additional Resources for more information.

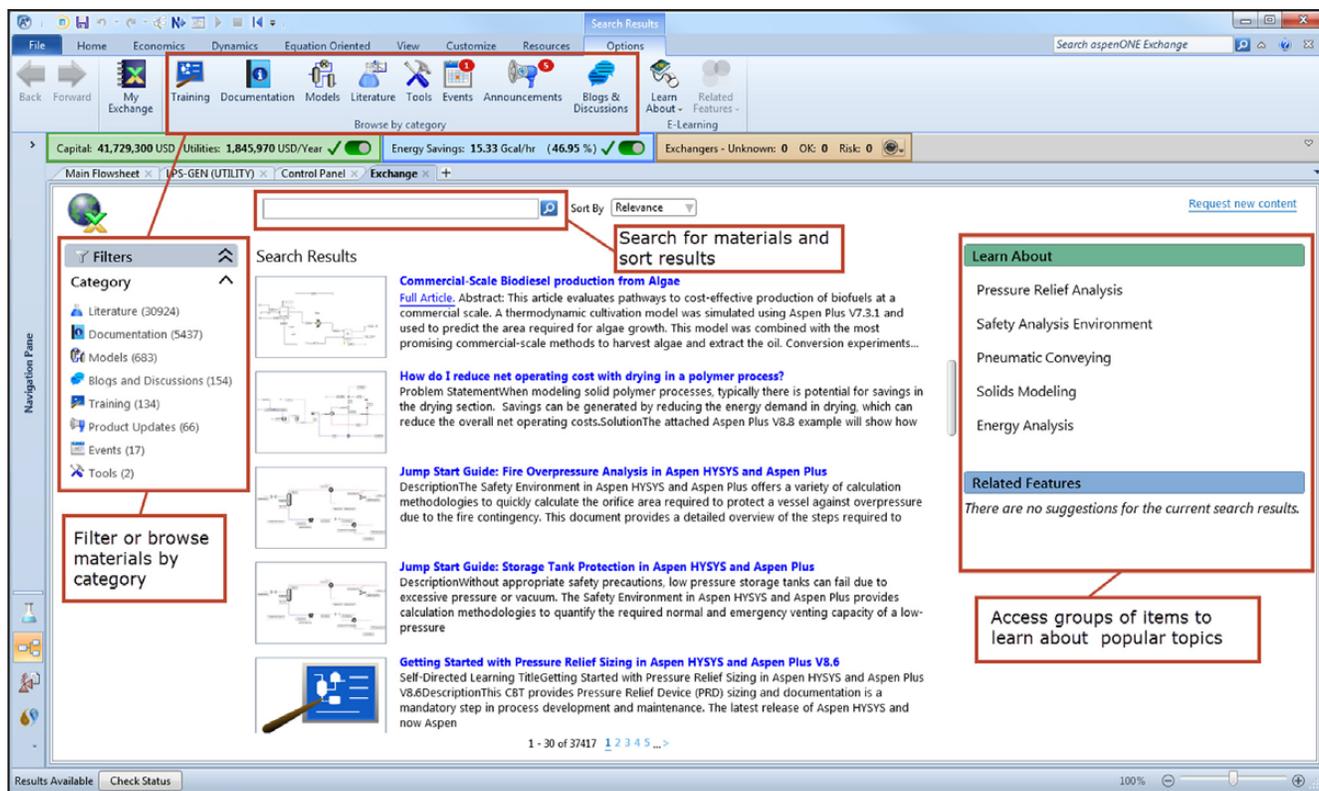


Figure 28: Search for Content with aspenONE Exchange

## Additional Resources

### AspenTech Public Website

<http://www.aspentech.com/products/aspen-Plus.aspx>

### Video Tutorials

[Activated Analysis in Aspen Plus Chemical Process Optimization Software](#)

[Introducing Activated Economics in Aspen Plus Chemical Process Optimization Software](#)

[Introducing Activated Exchanger Design & Rating in Aspen Plus Chemical Process Optimization Software](#)

[Aspen Plus Computer Based Training for Chemical Process Modeling](#)

[Activated Energy in Aspen Plus Chemical Process Optimization Software](#)

[Intro to Solids Modeling in Aspen Plus V8](#)

### Jump Start Guides

[Jump Start: Activation in Aspen Plus](#)

[Jump Start: Sizing Rigorous Shell & Tube Exchangers within Aspen Plus](#)

[Jump Start: aspenONE Exchange](#)

[Jump Start: Solids Process Modeling in Aspen Plus](#)

### White Papers

[White Paper: Overview of Solids Modeling for Chemical Processes](#)

[White Paper: Prepare a Flow Sheet for Energy Analysis in Aspen Plus and Aspen HYSYS](#)

## ||||||| About AspenTech

AspenTech is a leading supplier of software that optimizes process manufacturing—for energy, chemicals, engineering and construction, and other industries that manufacture and produce products from a chemical process. With integrated aspenONE® solutions, process manufacturers can implement best practices for optimizing their engineering, manufacturing, and supply chain operations. As a result, AspenTech customers are better able to increase capacity, improve margins, reduce costs, and become more energy efficient. To see how the world's leading process manufacturers rely on AspenTech to achieve their operational excellence goals, visit [www.aspentech.com](http://www.aspentech.com).



### Worldwide Headquarters

Aspen Technology, Inc.  
20 Crosby Drive  
Bedford, MA 01730  
United States

phone: +1-781-221-6400  
fax: +1-781-221-6410  
[info@aspentech.com](mailto:info@aspentech.com)

### Regional Headquarters

**Houston, TX | USA**  
phone: +1-281-584-1000

**São Paulo | Brazil**  
phone: +55-11-3443-6261

**Reading | United Kingdom**  
phone: +44-(0)-1189-226400

**Singapore | Republic of Singapore**  
phone: +65-6395-3900

**Manama | Bahrain**  
phone: +973-17-50-3000

For a complete list of offices, please visit  
[www.aspentech.com/locations](http://www.aspentech.com/locations)