

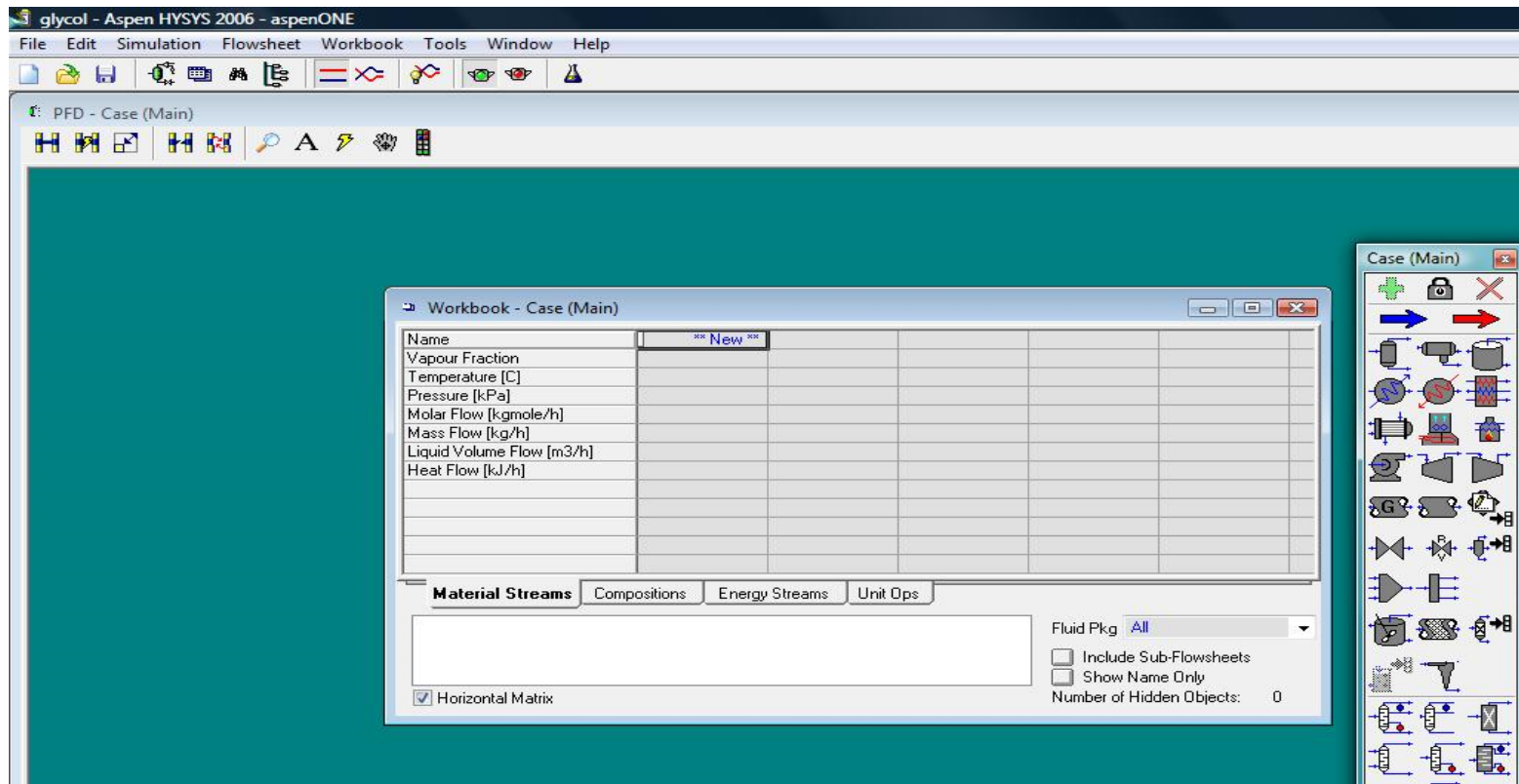
What is Aspen?

7 Basic Steps

- 1 – Setting your session preferences
- 2 – Building the simulation
- 3 – Entering the simulation environment
- 4 – Using the workbook
- 5 – Installing Unit Operations
- 6 – Run Your Simulation
- 7 – Viewing and analyzing the results

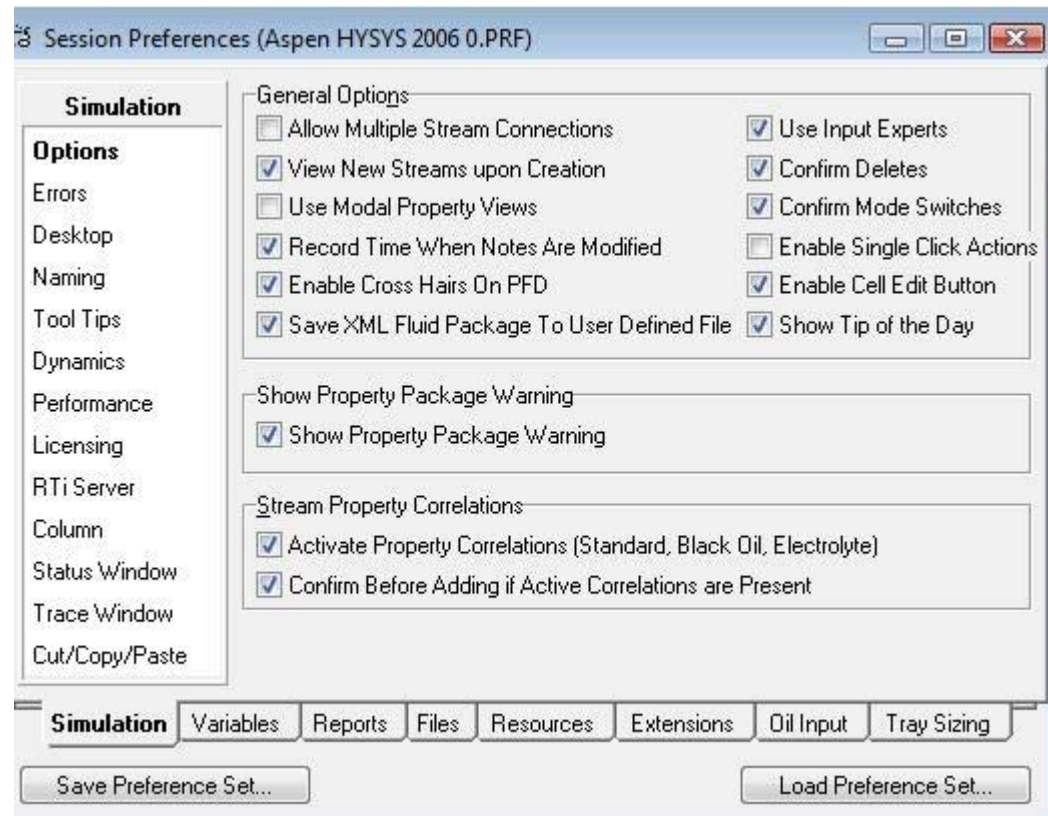
Building Tools

- **PFD**, Process Flow Diagram
- **Workbook**, The Workbook displays information about streams and unit operations in a tabular format, while the PFD is a graphical representation of the flow sheet.



Setting your session preferences

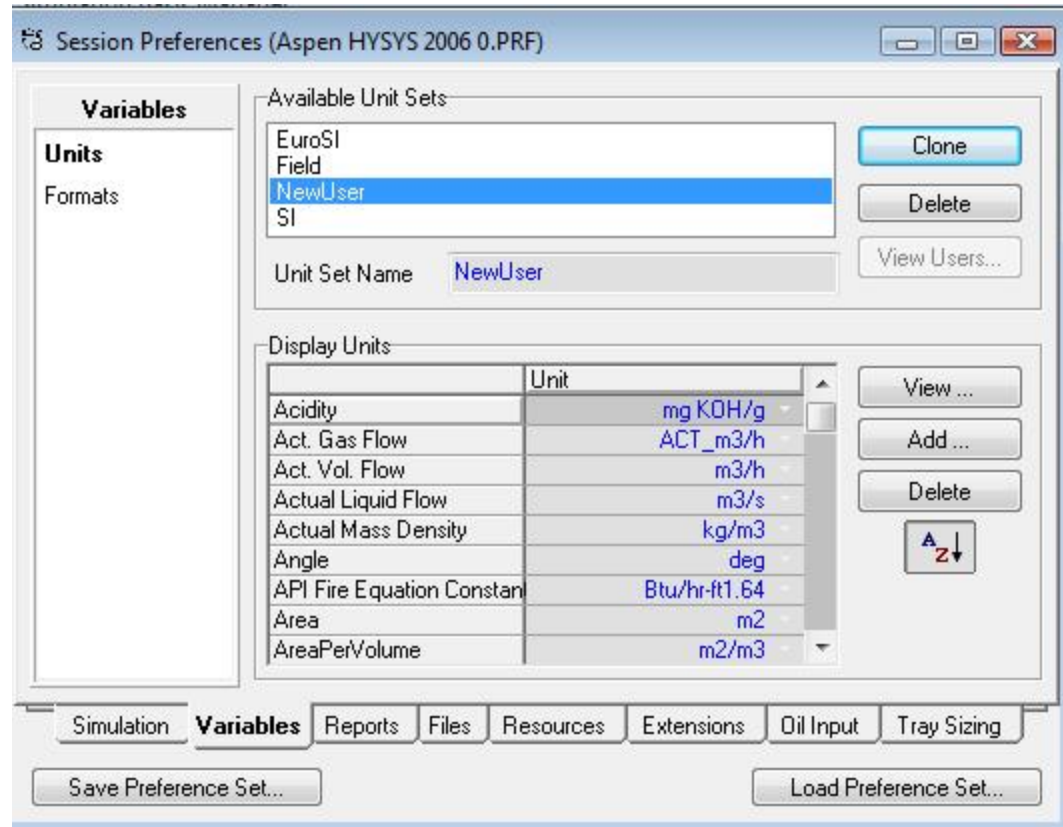
Start Aspen Hysys and create a new case. From the tools menu, select preferences. The session preferences property view appears. The simulation Tab, option page should be visible. Ensure that the Use Model Property Views checkbox is clear.



Creating a new unit set

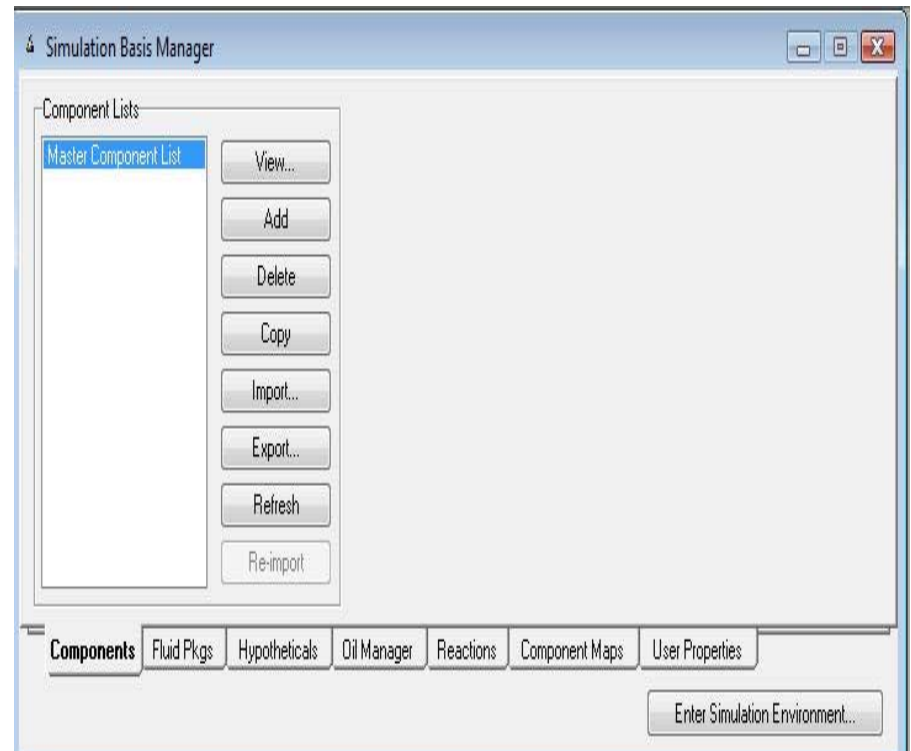
Click the Variables tab, then select the Units page.

The first task you perform when building the simulation case is choosing a unit set. Aspen HYSYS does not allow you to change any of the three default unit sets listed, however, you can create a new unit set by cloning an existing one.



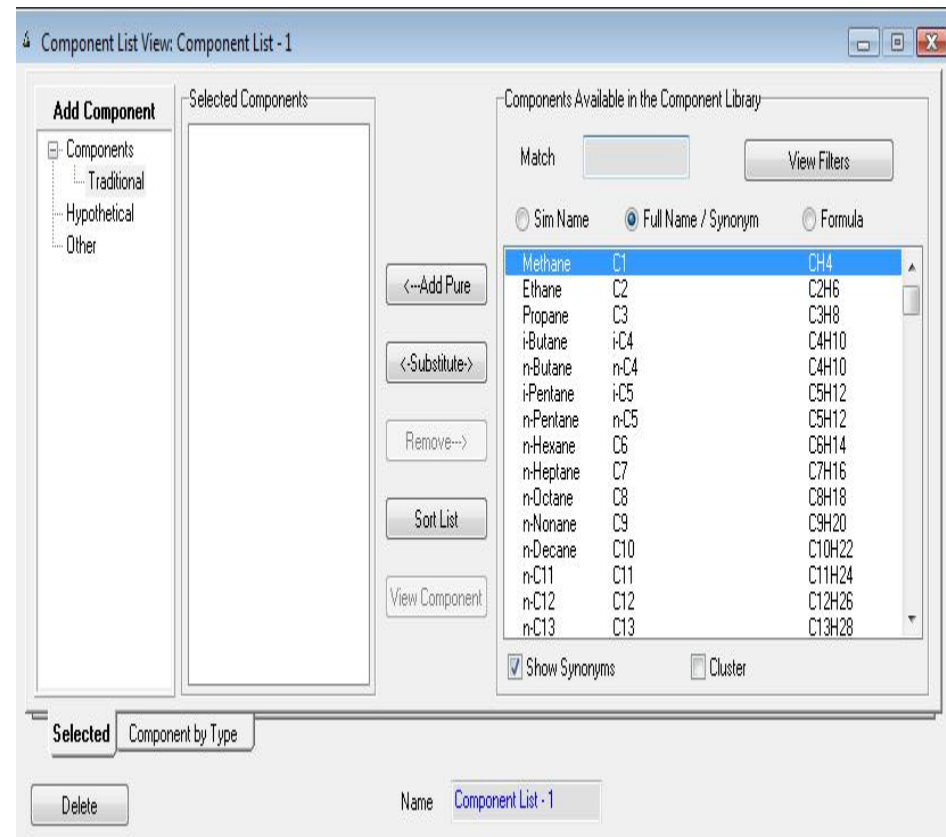
Building the Simulation

1. Click the New Case icon. The Simulation Basis Manager appears.
2. Create a Fluid Package. A Fluid Package, at minimum, contains the components and property method that Aspen HYSYS will use in its calculations for a particular flow sheet.



Selecting Components

On the Components tab of the Simulation Basis Manager property view, click the Add button in the Component Lists group. The Component List property view appears.



Selecting components

Each component can appear in three forms, corresponding to the three radio buttons that appear above the component list. When you add a component, it then appears in the Selected Components list.

To view the properties of one or more components, select the component(s) and click the View Component button. Aspen HYSYS opens the property view(s) for the component(s) you select.

Feature	Description
Sim Name	The name appearing within the simulation.
Full Name/Synonym	IUPAC name (or similar), and synonyms for many components.
Formula	The chemical formula of the component. This is useful when you are unsure of the library name of a component, but know its formula.

The screenshot shows the 'Component Identification' dialog box for H2O. It contains the following information:

Component Identification	
Component Name	H2O
Family / Class	Miscellaneous
Chem Formula	H2O
ID Number	19
Group Name	
CAS Number	

Below this is the 'UNIFAC Structure' section, which contains the text 'H2O'.

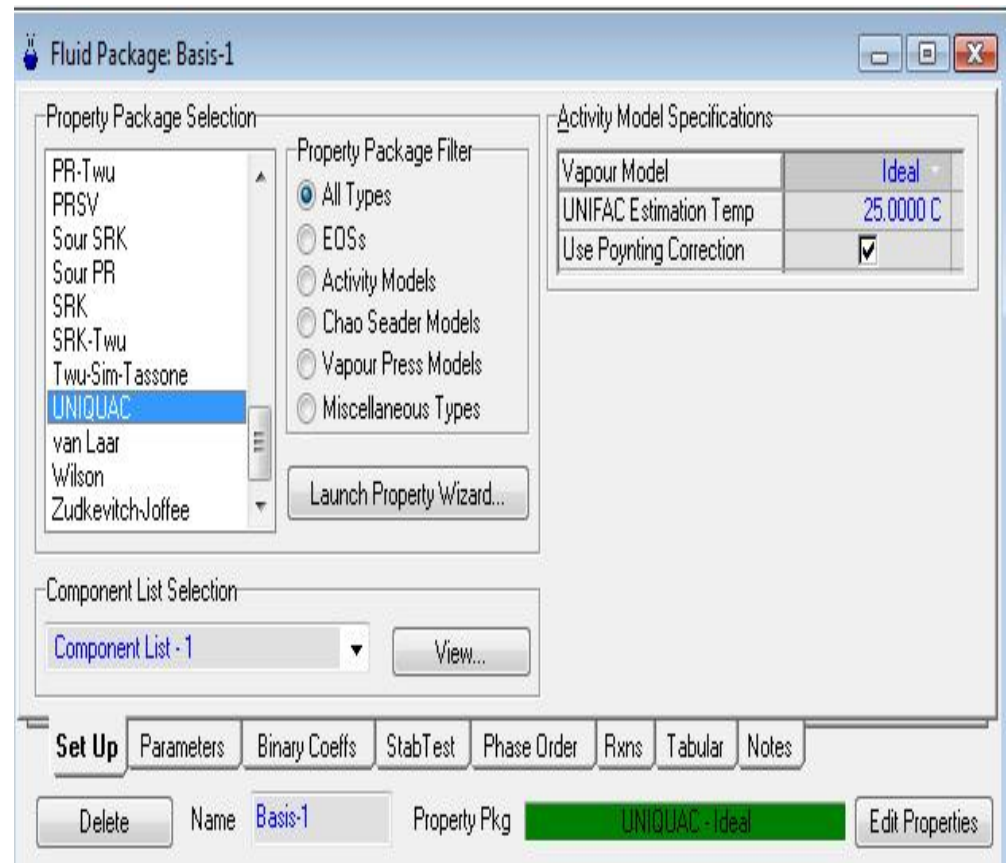
The 'User ID Tags' section contains a table:

	Tag Number	Tag Text
1	<empty>	Not Spec'd

At the bottom, there are several buttons: 'ID', 'Critical', 'Point', 'TDep', 'UserProp', 'Delete', 'Edit Properties', and 'Edit Visc Curve'.

Creating a Fluid Package

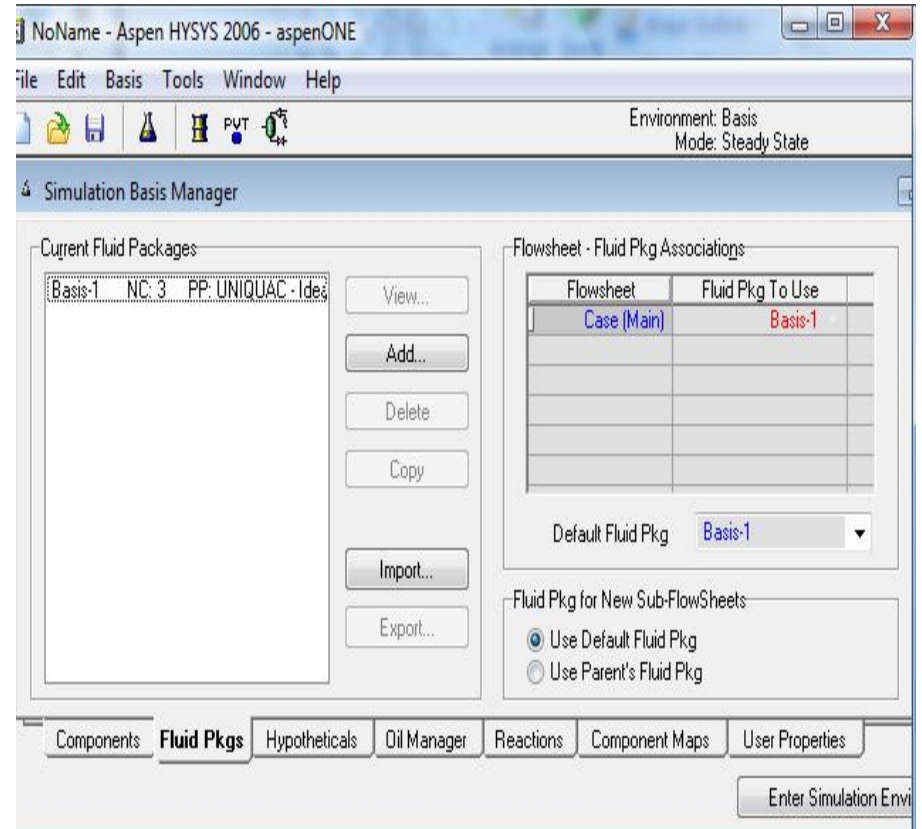
1. Click the Fluid Pkgs tab of the Simulation Basis Manager.
2. Click the Add button. The Fluid Package property view appears.



Summary view

Click the Fluid Pkgs tab to view a summary of the completed Fluid Package.

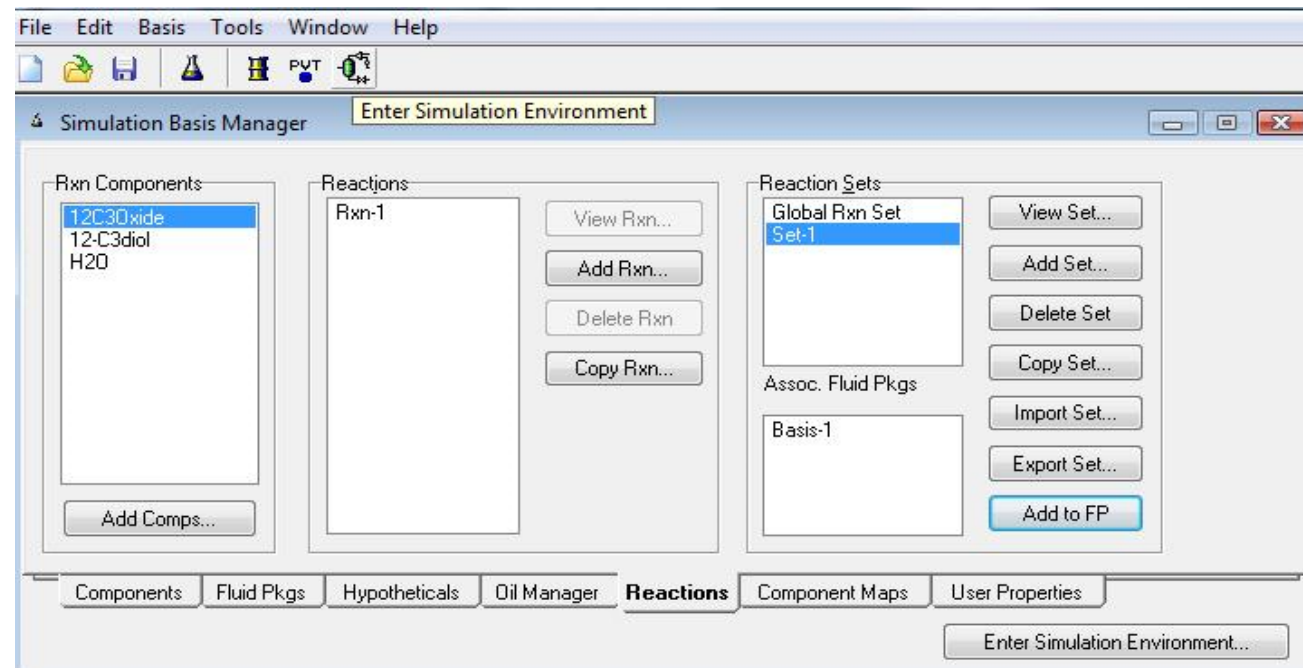
The list of Current Fluid Packages displays the new Fluid Package, Basis-1, showing the number of components (NC) and property package (PP).



Entering the Simulation Environment

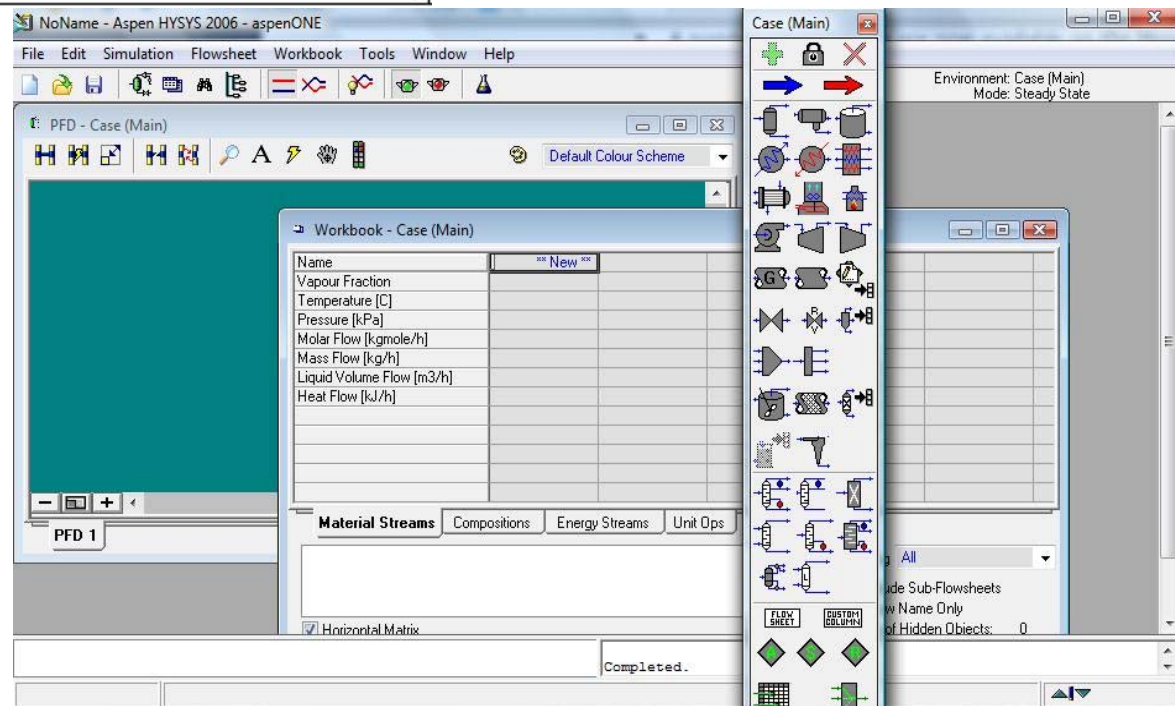
To leave the Basis environment and enter the Simulation environment, do one of the following:

- Click the **Enter Simulation Environment button on the Simulation Basis Manager.**
- Click the **Enter Simulation Environment icon on the toolbar.**



Simulation Environment

Features	Description
Workbook	<p>A multiple-tab property view containing information about the objects (streams and unit operations) in the simulation case.</p> <p>By default, the Workbook has four tabs, namely Material Streams, Compositions, Energy Streams and Unit Ops. You can edit the Workbook by adding or deleting tabs and changing the information displayed on any tab.</p>
Object Palette	<p>A floating palette of buttons that can be used to add streams and unit operations.</p> <p>You can toggle the palette open or closed by pressing F4, or by choosing Open/Close Object Palette from the Flowsheet menu.</p>



Installing the feed Streams

you will install feed streams using either the Workbook or using object palette.

1. Click the **Workbook icon on the toolbar to make the Workbook active.**
2. On the **Material Streams tab, click in the ****New**** cell in the **Name row.****
3. Type the new stream name, then press **ENTER** Aspen HYSYS automatically creates the new stream.

Next you will define the feed conditions for temperature and pressure and flow.

Installing the feed Stream

The screenshot shows the Aspen HYSYS 2006 interface. The main window is titled 'Workbook - Case (Main)' and displays a table of stream properties. The 'Molar Flow [kgmole/h]' for the 'prop oxide' stream is highlighted with a black border. Below the table, there are tabs for 'Material Streams', 'Compositions', 'Energy Streams', and 'Unit Ops'. The 'Material Streams' tab is active, showing a list of streams: 'ProductBlock_prop oxide' and 'FeederBlock_prop oxide'. The 'FeederBlock_prop oxide' stream is selected. To the right of the list, there are options for 'Fluid Pkg' (set to 'All'), 'Include Sub-Flowsheets' (unchecked), 'Show Name Only' (unchecked), and 'Number of Hidden Objects' (set to 0). The 'Horizontal Matrix' checkbox is checked.

Name	prop oxide	Water Feed	** New **
Vapour Fraction	0.0000	0.0000	
Temperature [C]	23.89	23.89	
Pressure [kPa]	111.5	111.5	
Molar Flow [kgmole/h]	68.04	277.0	
Mass Flow [kg/h]	3952	4990	
Liquid Volume Flow [m3/h]	4.730	5.000	
Heat Flow [kJ/h]	-8.234e+006	-7.893e+007	

Material Streams | Compositions | Energy Streams | Unit Ops

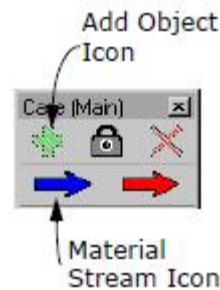
ProductBlock_prop oxide
FeederBlock_prop oxide

Fluid Pkg: All
 Include Sub-Flowsheets
 Show Name Only
Number of Hidden Objects: 0

Horizontal Matrix

Installing the Feed Stream

There is an alternative method for adding a stream. Double-click the **Material Stream icon on the Object Palette**.



When you create the new stream, the stream's property view also appears, displaying the **Conditions page of the Worksheet tab**

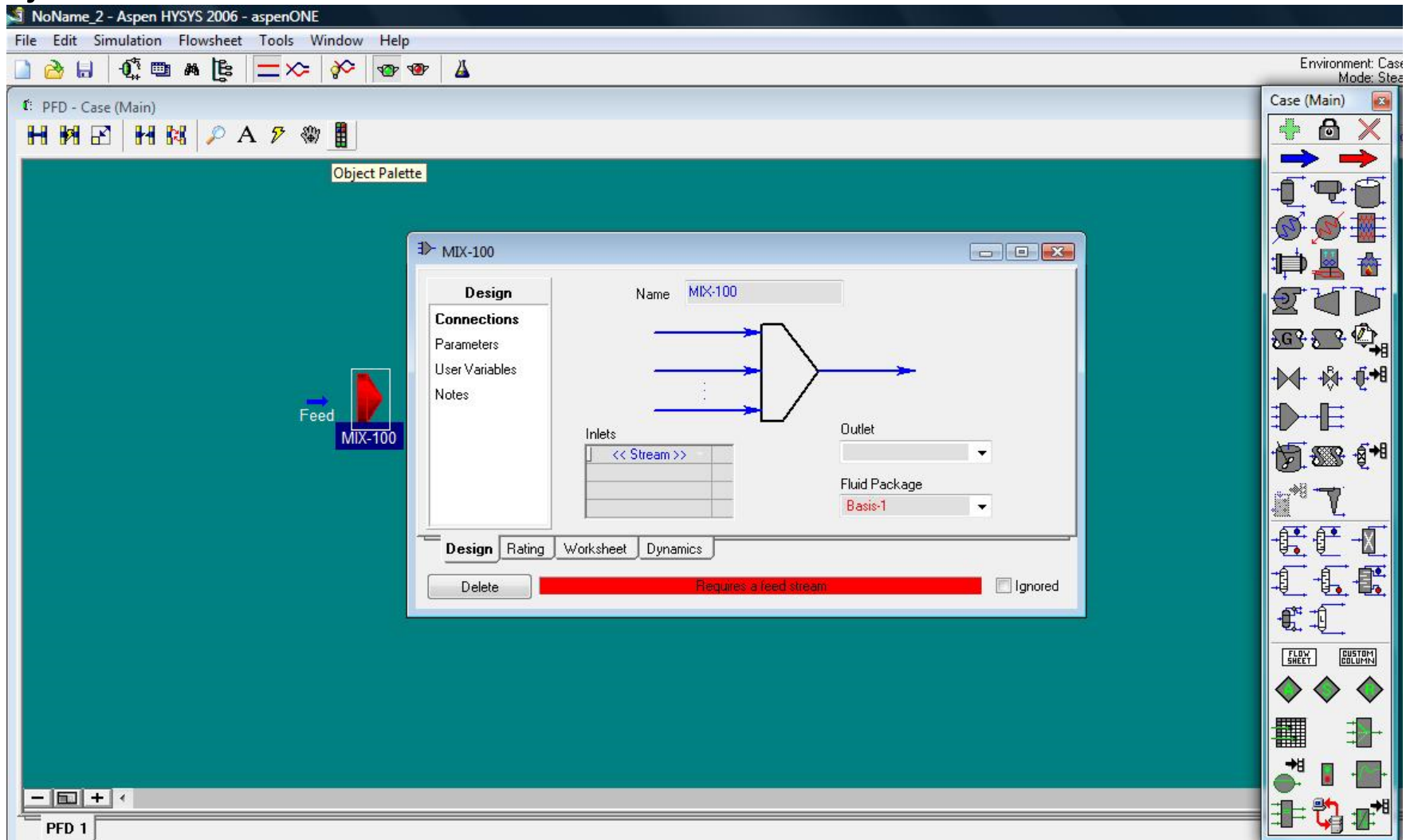
Installing the Feed stream

The screenshot shows the Aspen HYSYS 2006 interface. The main window displays the 'prop oxide' stream properties dialog box. The dialog is titled 'prop oxide' and contains a table of properties. The 'Mass Flow [kg/h]' value is highlighted with a black box. The 'Fluid Package' is set to 'Basis-1'. The 'Worksheet' tab is selected, and the 'Attachments' and 'Dynamics' tabs are also visible. The 'Delete' and 'Define from Other Stream...' buttons are at the bottom of the dialog.

Property	Value	Unit
Stream Name	prop oxide	Liquid Phase
Vapour / Phase Fraction	0.0000	1.0000
Temperature [C]	23.89	23.89
Pressure [kPa]	111.5	111.5
Molar Flow [kgmole/h]	68.04	68.04
Mass Flow [kg/h]	3952	3952
Std Ideal Liq Vol Flow [m3/h]	4.730	4.730
Molar Enthalpy [kJ/kgmole]	-1.210e+005	-1.210e+005
Molar Entropy [kJ/kgmole-C]	-24.15	-24.15
Heat Flow [kJ/h]	-8.234e+006	-8.234e+006
Liq Vol Flow @Std Cond [m3/h]	4.736	4.736
Fluid Package	Basis-1	

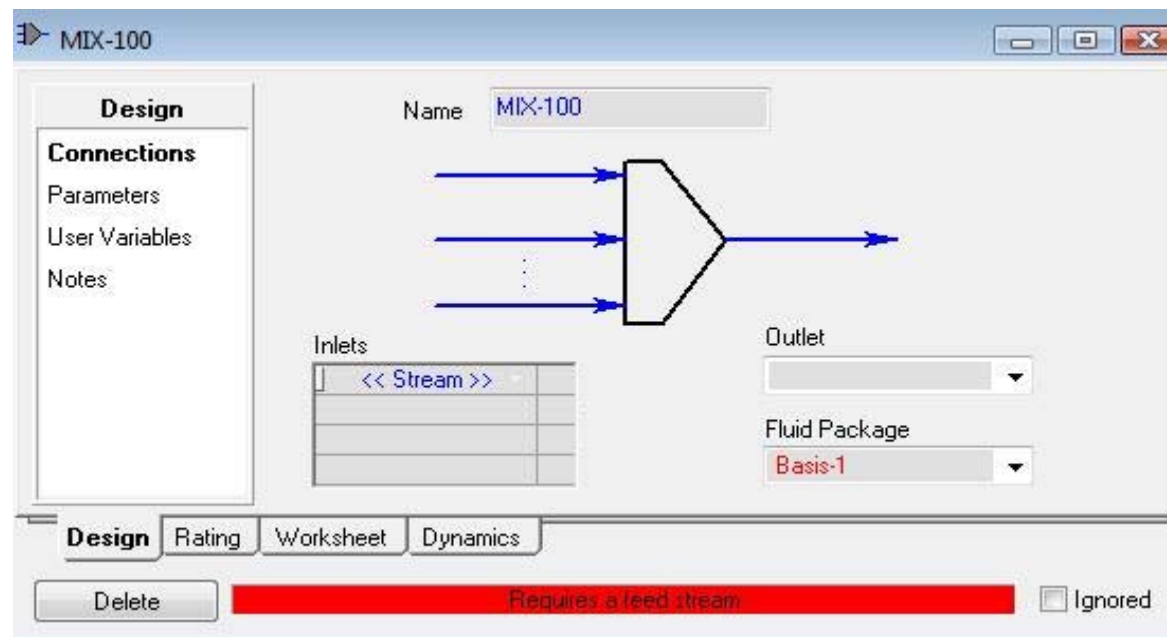
Installing Unit operation (Mixer)

Simply add the Unit Operation by Double-clicking the unit operation from the object Palette.



Installing Unit operation (Mixer)

The property view for the **Mixer** appears. The unit operation property view contains all the information required to define the operation, organized into tabs and pages. The **Design, Rating, Worksheet, and Dynamics** tabs.



Installing Unit operation

For the Mixer you just need to specify the feed streams (Multiple streams) and outlet stream(one stream) by clicking in the related cells and typing a name for the streams, even if this stream does not exist Aspen creates that stream.

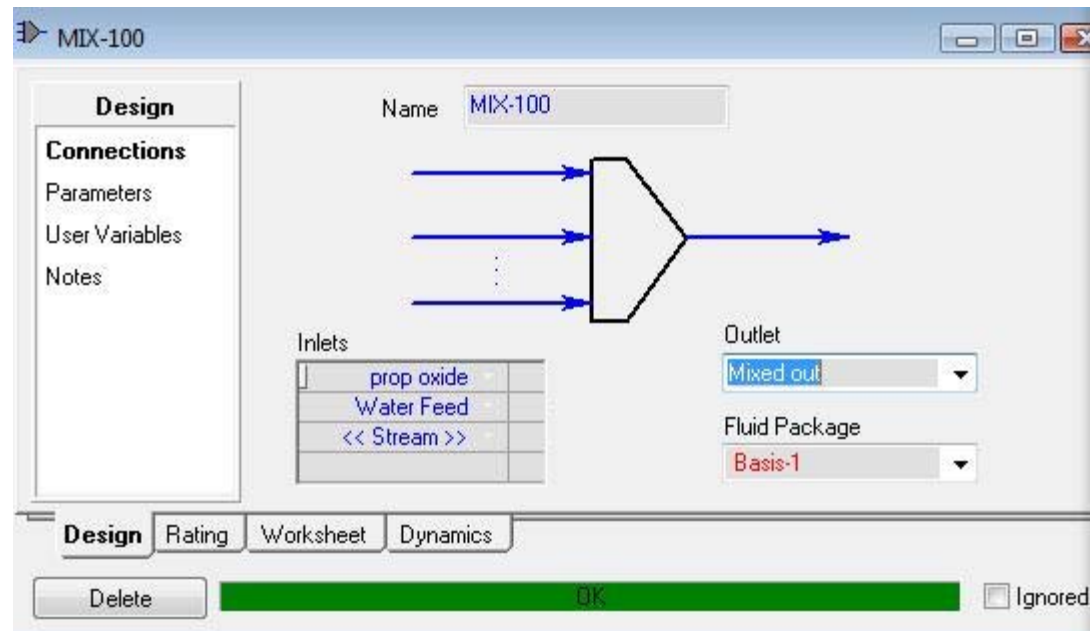
The status indicator displays a green **OK** and is **green**, indicating that the operation and attached streams are completely calculated.

The Connections page is now complete.

Installing Unit operation (Mixer)

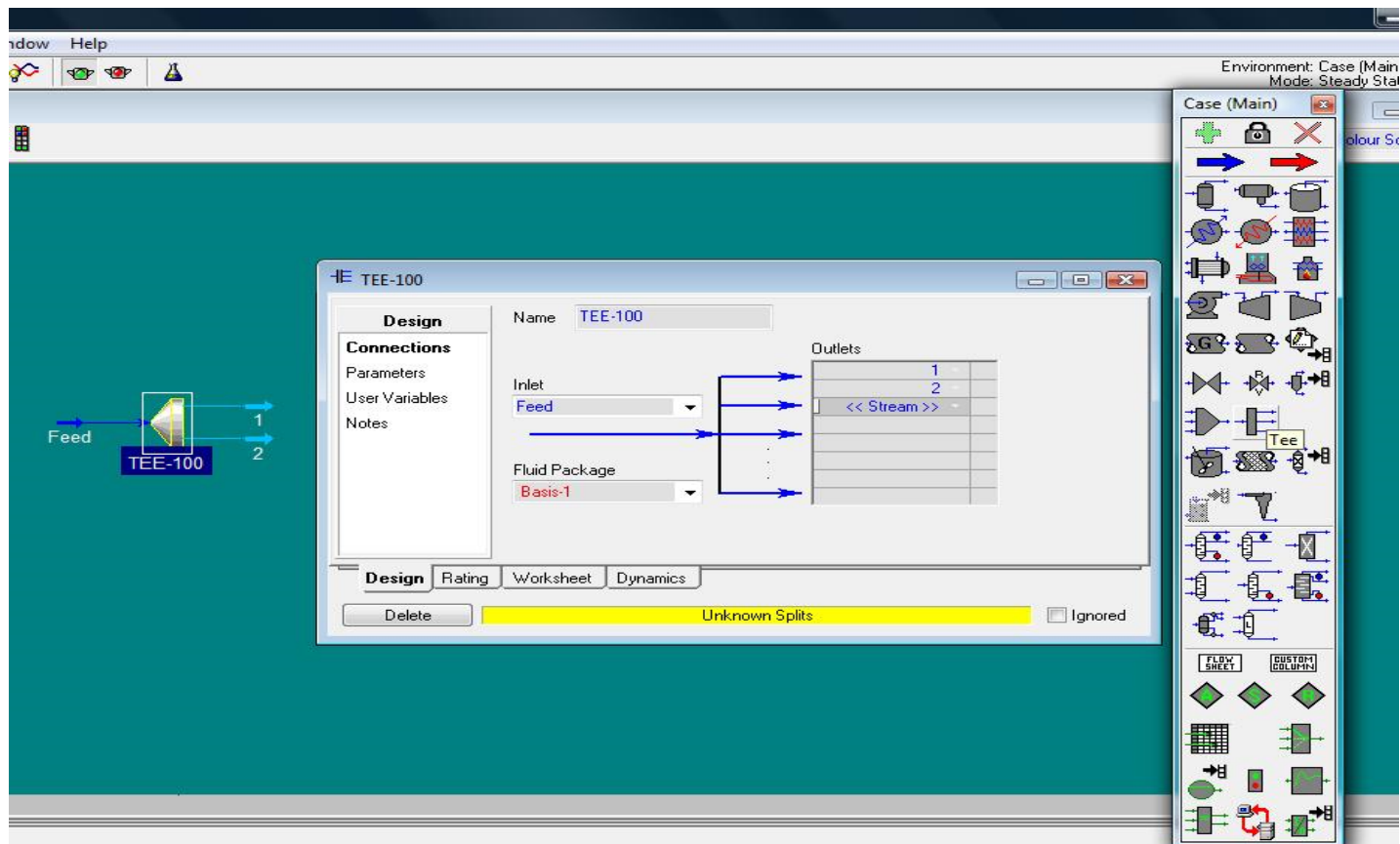
Click the **Parameters** page. In the Automatic Pressure Assignment group, keep the default setting of **Set Outlet to Lowest Inlet**.

Aspen HYSYS calculates the outlet stream by combining the two inlets and flashing the mixture at the lowest pressure of the inlet streams.



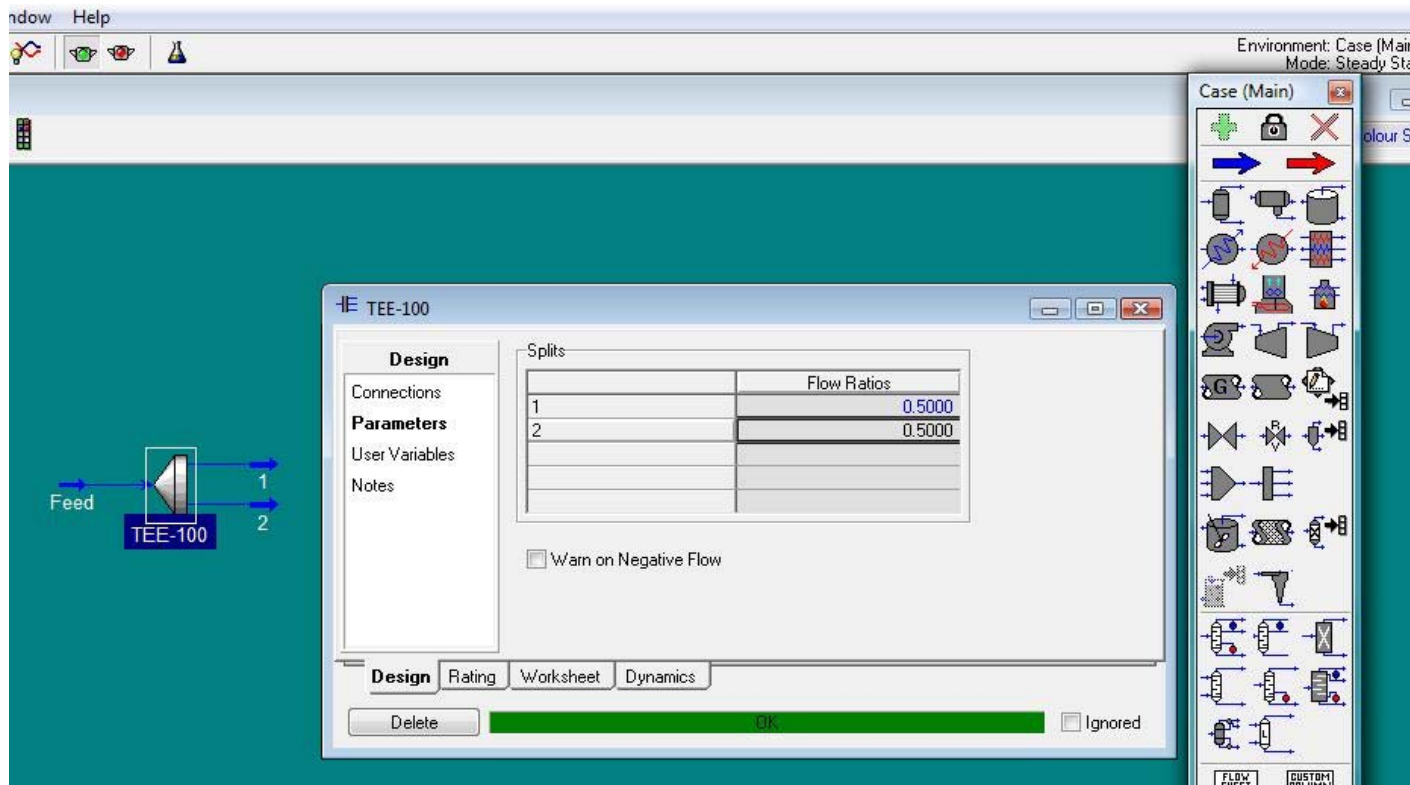
Installing Unit Operation (Splitter/Tee)

- Splitter or Tee splits the feed stream into 2 or 3 or more. Add Splitter to PFD by double clicking the Tee Icon in object Palette.



Installing Unit Operation (Splitter/Tee)

- Aspen Needs some more info to solve the splitter, That would be Flow Ratios of the output stream. In the parameters page of the Design Tab specify the flow ratios.



Calculation Status

Aspen HYSYS uses colour-coding to indicate calculation status for objects, both in the object property views, and in the flowsheet. If you recall, the status bar indicator at the bottom of a property view for a stream or operation indicates the current state of the object.

The following table lists and describes the three colour status:

Indicator Status	Description
Red Status	A major piece of defining information is missing from the object. For example, a feed or product stream is not attached to a Separator. The status indicator is red and an appropriate warning message is displayed.
Yellow Status	All major defining information is present, but the stream or operation has not been solved because one or more degrees of freedom is present. For example, a Cooler whose outlet stream temperature is unknown. The status indicator is yellow and an appropriate warning message is displayed.
Green Status	The stream or operation is completely defined and solved. The status indicator is green and an OK message is displayed.

Calculation Status

Another colour scheme is used to indicate the status of streams.

For material streams, a **dark blue icon** indicates the stream has been flashed and is entirely known.

A **light blue icon** indicates the stream cannot be flashed until some additional information is supplied.

Similarly, a **dark red icon** is for an energy stream with a known duty, while a **purple icon** indicates an unknown duty.

Viewing the Results

Click the **Workbook icon** to access the calculated results for the Main Flowsheet.



Workbook icon

Workbook - Case (Main)

Name	Prop Oxide	Water Feed	Mixer Out	Reactor Vent
Vapour Fraction	0.0000	0.0000	0.0000	1.0000
Temperature [F]	75.00	75.00	75.00	140.0
Pressure [psia]	16.17	16.17	16.17	16.17
Molar Flow [lbmole/hr]	150.0	610.6	760.6	0.0000
Mass Flow [lb/hr]	8712	1.100e+004	1.971e+004	0.0000
Liquid Volume Flow [USGPM]	20.83	22.01	42.84	0.0000
Heat Flow [Btu/hr]	-7.804e+006	-7.481e+007	-8.262e+007	0.0000

Name	Reactor Prods	Ovhd/sep	RecyProds	Glycol
Vapour Fraction	0.0000	1.0000	0.0000	0.0000
Temperature [F]	140.0	159.0	159.0	375.7
Pressure [psia]	16.17	15.00	15.00	17.00
Molar Flow [lbmole/hr]	618.5	1.657e+005	475.8	142.8
Mass Flow [lb/hr]	1.971e+004	7.607e+004	8890	1.092e+004
Liquid Volume Flow [USGPM]	38.75	1.783e+006	17.97	20.78
Heat Flow [Btu/hr]	-8.714e+007	-0.9611	-5.700e+007	-2.803e+007

Material Streams | P,T,Flow | Composition | Energy Streams | Unit Ops

Feeds/Block: Prop Oxide
MIX-100

Fluid Pkg: All

Include Sub-Flowsheets
 Show Name Only
Number of Hidden Objects: 0

Horizontal Matrix