IDEAS Simulation Software

IDEAS BRONZE PULP & PAPER GENERIC TUTORIAL

ENGINEERED SUCCESS

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SECTION 1. INTRODUCTION

The IDEAS™* Bronze P&P Generic Tutorial has been designed to give the user an overview of the key concepts of the IDEAS simulation software. Step-by-step exploration of these concepts allows the user to move confidently from the tutorials to designing new high-fidelity models utilizing IDEAS objects from those at the Bronze (Steady-State) level to those at the Gold (Fully Dynamic) level. The various levels of the basic IDEAS application are named and described as:

- IDEAS Bronze: Steady-state modeling (also called 'macro' level modeling)
- IDEAS Silver: Partially dynamic modeling (includes tank residence time and controller dynamics)
- IDEAS Gold: Fully dynamic modeling (includes full pressure-flow dynamics)

1.1 CREATING A FOLDER

On the hard drive of your PC, create a new folder (e.g., IDEAS Tutorial) that will be used whenever any file is saved throughout this tutorial.

1.2 THE PROBLEM

The IDEAS Simulation Software is used in a wide variety of industries including general chemical, oil and gas, pulp and paper, oil sands, mining and minerals, and pharmaceuticals. This tutorial covers a pulp and paper process example that does not require industry-specific licenses or libraries.

In this tutorial, we are going to model a **De-inking Plant**. The Process Block diagrams and specifications are given below. This tutorial is a step-by-step guide for the modeling process.

Based on the process flow diagram and specifications given below, the modeler is expected to calculate the amount of recycled paper required to produce 100 BDT/d, the required amount of dilution water to the blend tank and amount of make-up water required by the whitewater chest.

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1.3 PROCESS OUTLINE

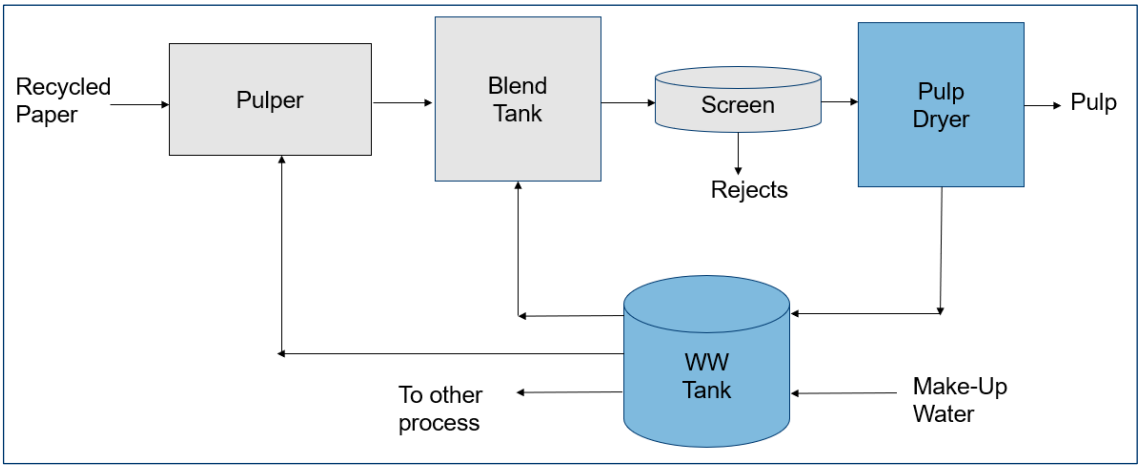


Figure 1: Block Diagram of De-inking Plant

1.3.1 GENERAL PROCESS GOAL

Process and remove contaminants from recycled paper and turn it into pulp.

1.3.2 PROCESS SPECIFICATION

- Recycled paper composition: 3% water, 94% recycled paper, 3% contaminants
- Dilution flow to pulper is 200 gpm
- Target production is 100 BDT/d
- White water flow to other process is 250 gpm
- Inlet to screening stage must be 2% consistency (mass percentage of all solids in stream)
- Product pulp has a consistency of 48% (assume recovery values of 99% fiber and 50% for all others)
- Separation efficiencies for screen area are: 0.95 water, 0.90 fiber, 0.05 ink, 0.50 recycled paper, 0.10 contaminants

SECTION 2. STARTING THE IDEAS APPLICATION

Section Concepts:

- Start IDEAS Application
- Open the Worksheet
- Save the Model

2.1 OPENING IDEAS

First, locate the IDEAS application using the Windows Start Menu. From the Windows Start Menu, choose All Programs → Andritz → IDEAS.exe (this path may differ slightly depending on the installation). Launch the application by clicking on the IDEAS icon. Alternatively, the user can navigate to C:\Andritz\IDEAS 2024 to launch the application using “IDEAS.exe” shortcut.

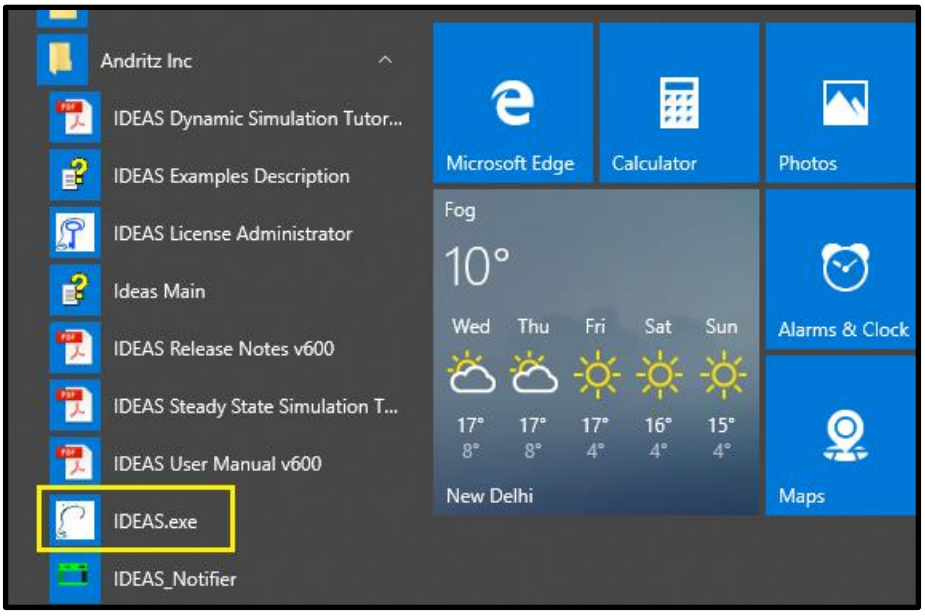


Figure 2: IDEAS XXX Location

2.2 OPENING WORKSHEETS

Once the IDEAS window opens, a blank worksheet named **Model-1.mox** appears. Enlarge the worksheet to fill the entire screen if desired (see Figure 3).

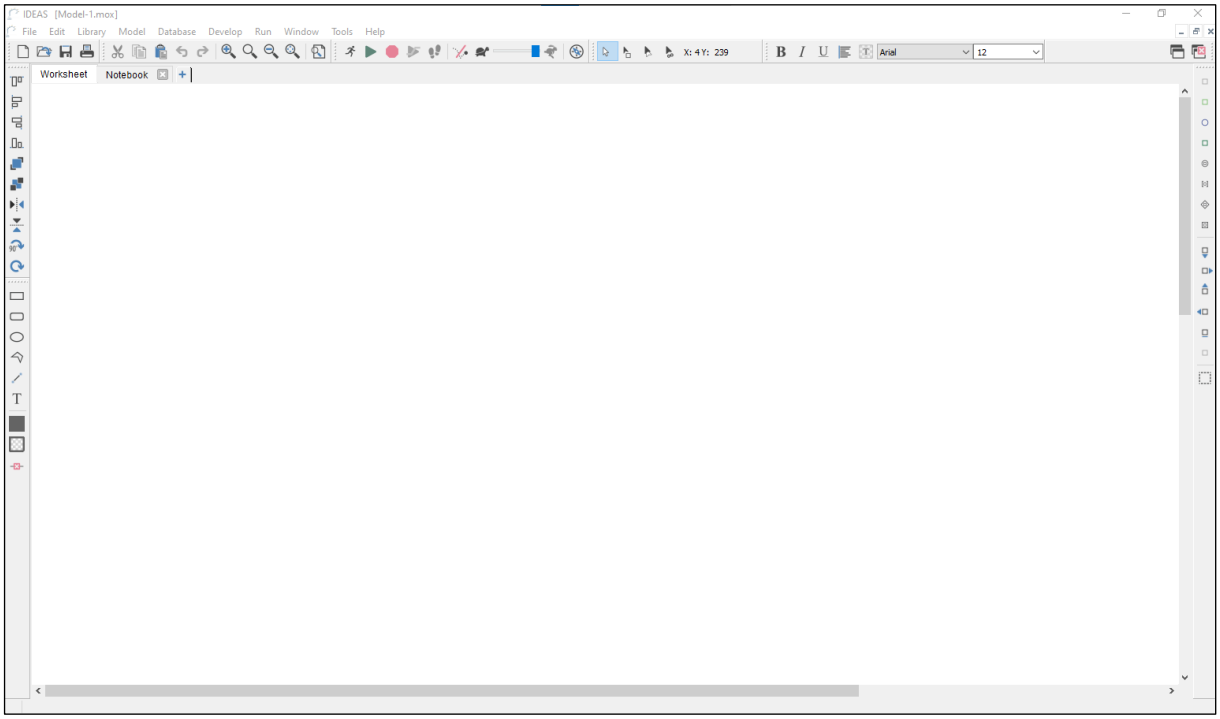


Figure 3: Model-1

2.3 SAVING THE MODEL

Select '**Save Model as**...' under the **File** menu. When the **Save Model As** dialog box appears, navigate to the folder created at the beginning of this tutorial (e.g., IDEAS Tutorials). In the **File name** field, replace *Model-1.mox* with *Bronze_Pulp_and_Paper* and click on the **Save** button (Figure 4). If a dialog box opens asking *Replace existing 'Macro Worksheet?* click on the **Yes** button.

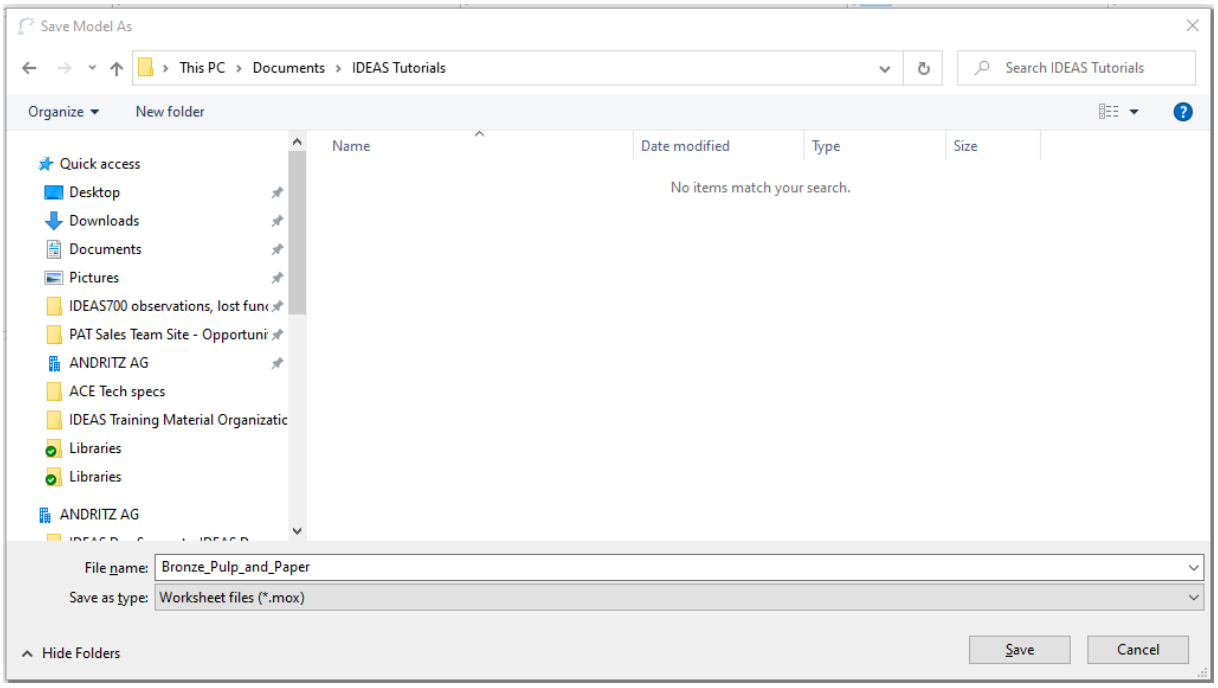


Figure 4: Save As

Note: Make sure to save the model often throughout this tutorial. You may not be reminded again to save your model during the tutorial.

SECTION 3. OPENING LIBRARIES

Section Concept:

- Opening Libraries

3.1 PROCESS FOR OPENING LIBRARIES

On the IDEAS Menu bar, go to **Library** and **Open Library** (Ctrl +L) as shown below. When the **Open Library File** dialog box appears, navigate to the folder containing the libraries; typically, this folder will be **IDEAS XXX\Libraries**. This folder will display all the available libraries (as shown in Figure 5 below). Depending on the IDEAS product you have purchased, your list of libraries may vary from the list shown in Figure 6).

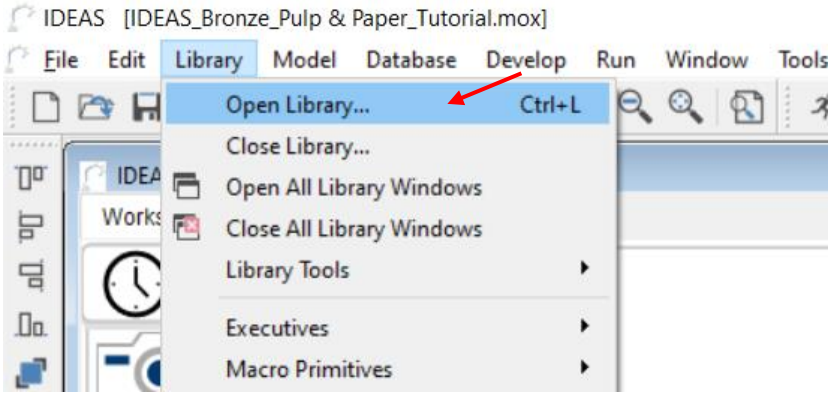


Figure 5: Opening Libraries from Menu

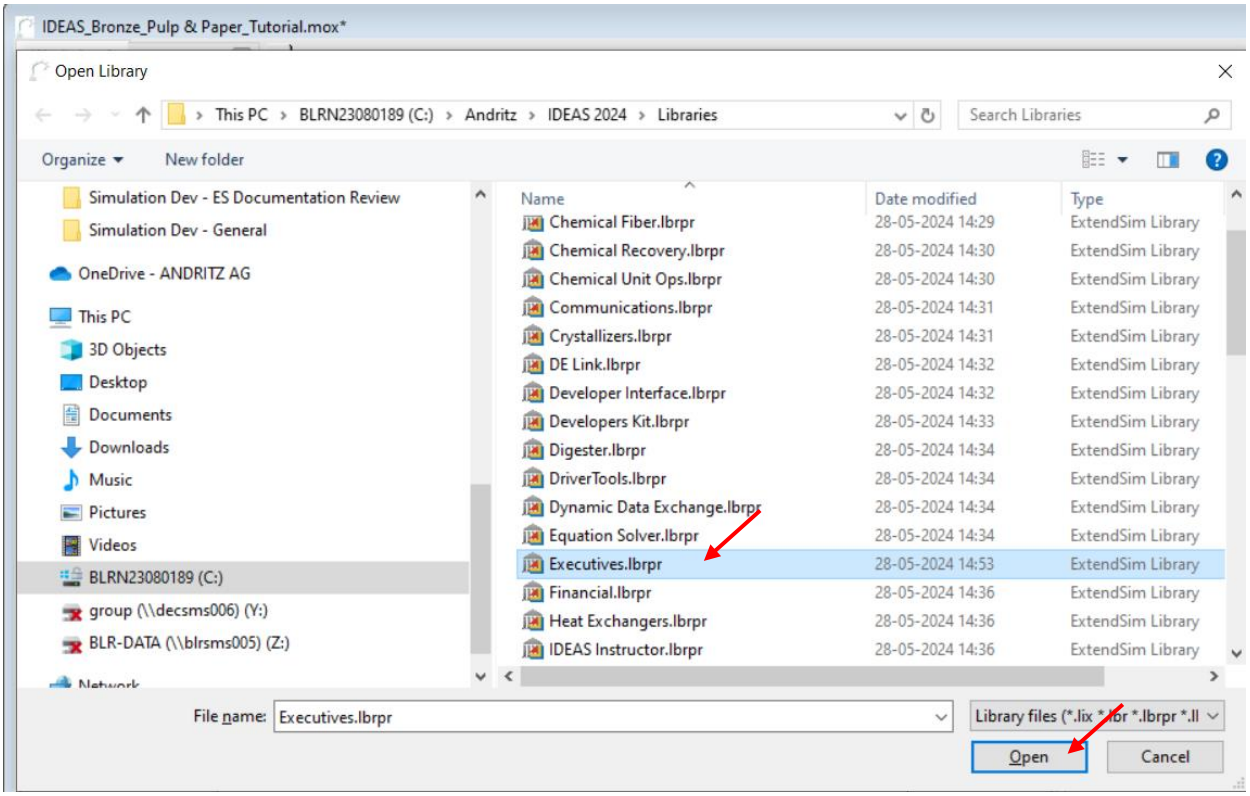


Figure 6: Location of Libraries

To open a particular library, select the library name and click on the **Open** button or double-click on the selected library name.

Open the following libraries using the steps mentioned above, which will be used in this Tutorial.

- EXECUTIVES
- MACRO PRIMITIVES
- MACRO UNIT OPS
- MATERIAL PROPERTIES
- TRANSMITTERS

SECTION 4. ADDING IDEAS ADMINISTRATIVE OBJECTS TO THE MODEL

Section Concepts:

- Placing Administrative Objects
- Setting Global Units

4.1 PLACING DISCRETE/CONTINUOUS EXECUTIVE OBJECT ONTO THE WORKSHEET

Place the **Discrete/Continuous Executive** object from the EXECUTIVES library onto the worksheet by selecting the EXECUTIVES library from **Library** on the menu bar. This is done by moving the mouse over to EXECUTIVES and clicking on **Discrete/Cont. Executive** when the submenu opens to the right of the main menu (Figure 7).

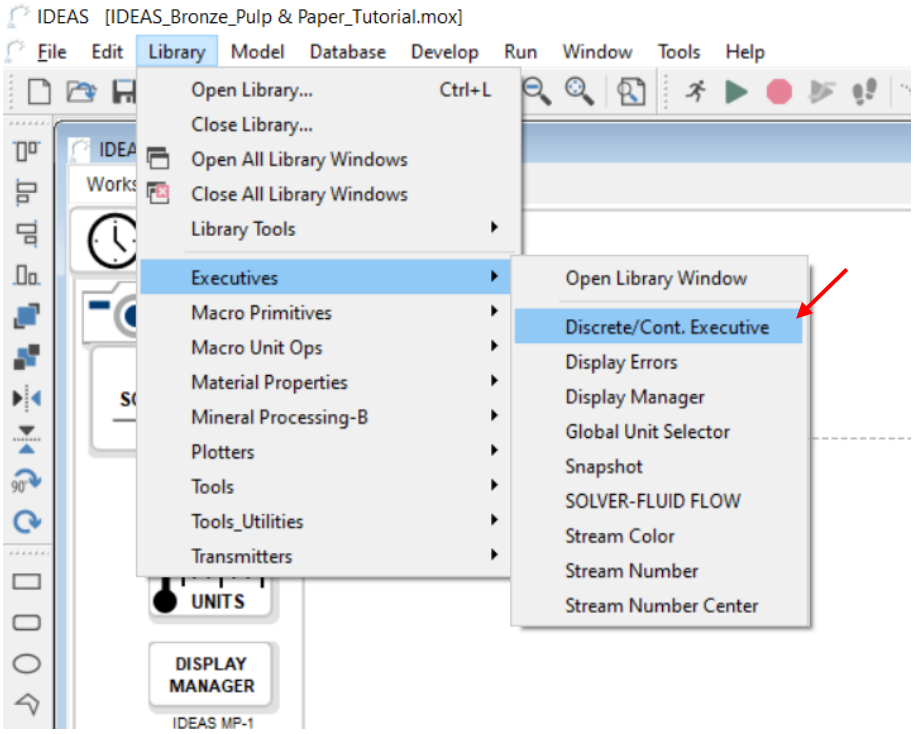


Figure 7: Placing Objects on the Worksheets

An alternative method for adding objects to a model: Click on ***Open Library Window*** (Figure 7) on the submenu. A new window opens up on the worksheet containing all objects of that particular library (Figure 8). This library window shows each object's name, icon, and possibly additional details.

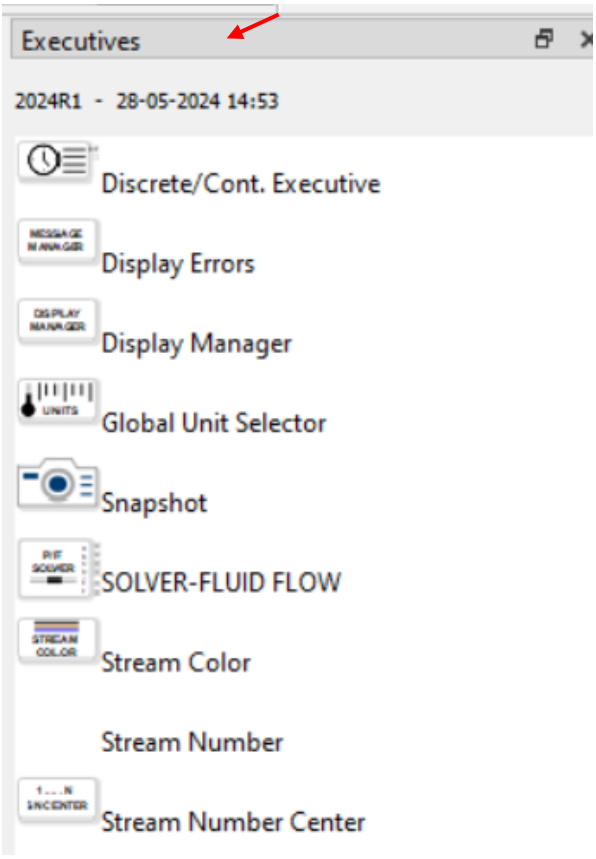


Figure 8: Alternative Method for Object Addition to Model

To select an object from this window, click-and-drop the object to the desired location on the worksheet. The object will move to a default location – all administrative objects have a default location and should not be moved from this location.

To view all the open libraries from the Library Window, under the Library menu select Open All Libraries Windows. All the open libraries will show as tabs on the right side of library windows (see Figure 9). A quick option in the top-right of the application screen are two buttons to open all library windows for open libraries or close all library windows (see Figure 10).

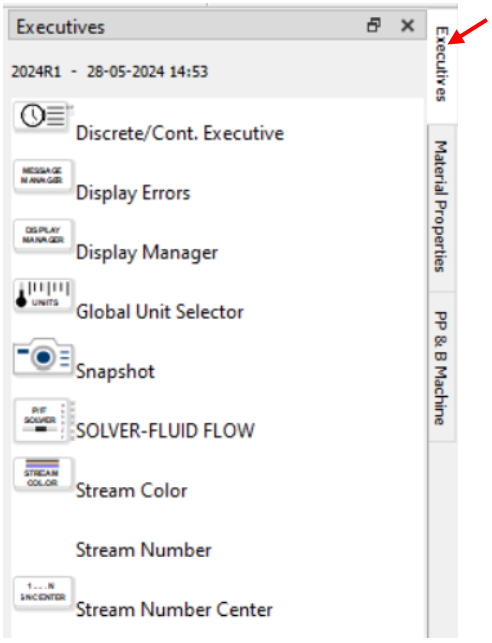


Figure 9: Aligning Library Windows on the Worksheet

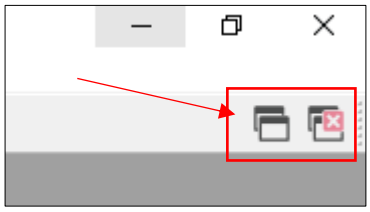


Figure 10: Open (Left) or Close (Right) Library Windows for Open Libraries

All such menus as shown in Figure 10 with dotted lines are tear-away menus that can be relocated, so top right is only the default location, and only if the menu is made visible from the Tools menu selection – under Tools this menu is “Library Window”. The Tools menu recommended selection is depicted in Figure 11.

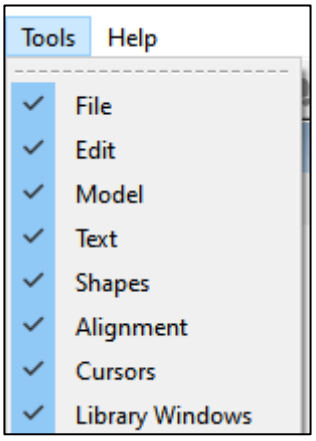


Figure 11: Tools Menu Recommended Selection for Visible Menus

Users can check and uncheck menus as needed; Icon menu is needed during Hierarchical Block creation (further discussed in the IDEAS 7.0.0. User Manual).

4.2 PLACING OTHER ADMINISTRATIVE OBJECTS ONTO THE WORKSHEET

Using the same procedure, place the **Display Errors** and **Solver-Fluid Flow** objects from the EXECUTIVES library onto the worksheet. The **Display Errors** object defines how errors and other messages will be reported to the user. The **Solver-Fluid Flow** object performs flow calculations throughout the model for many of the objects with process stream flow. As noted earlier, allow these objects move to their default location and do not move them from that default location.

4.3 SETTING THE GLOBAL UNIT SELECTOR OPTIONS

Using the same procedure, place the **Global Unit Selector** object from the EXECUTIVES library onto the worksheet. Double-click on the **Global Unit Selector** object to open the **Global Unit Selector** object's dialog box.

Under the **Primary Selection** tab, select **Imperial/American**, and change the **Select Industry** dropdown selection from **Generic** to **Pulp & Paper**. Select Flow Units as *mass* units and *Tons (Long T)* per *Day (d)* with the help of pull-down menus listed next to **Flow Units** description. Click on the **Accept Primary Units** button (see Figure 12 and Figure 13). Go to the **Secondary Selection** tab. Click on the box to the right of the words **Flow Units** and change the setting from *Mass* to *Volume*. Proceed to the next two boxes and change them to *Gallons (USgal)* and *minutes (min),* respectively (see Figure 12 and Figure 13). Click on the **Accept Secondary Flow Unit** button. Click **OK** to close the dialog box.

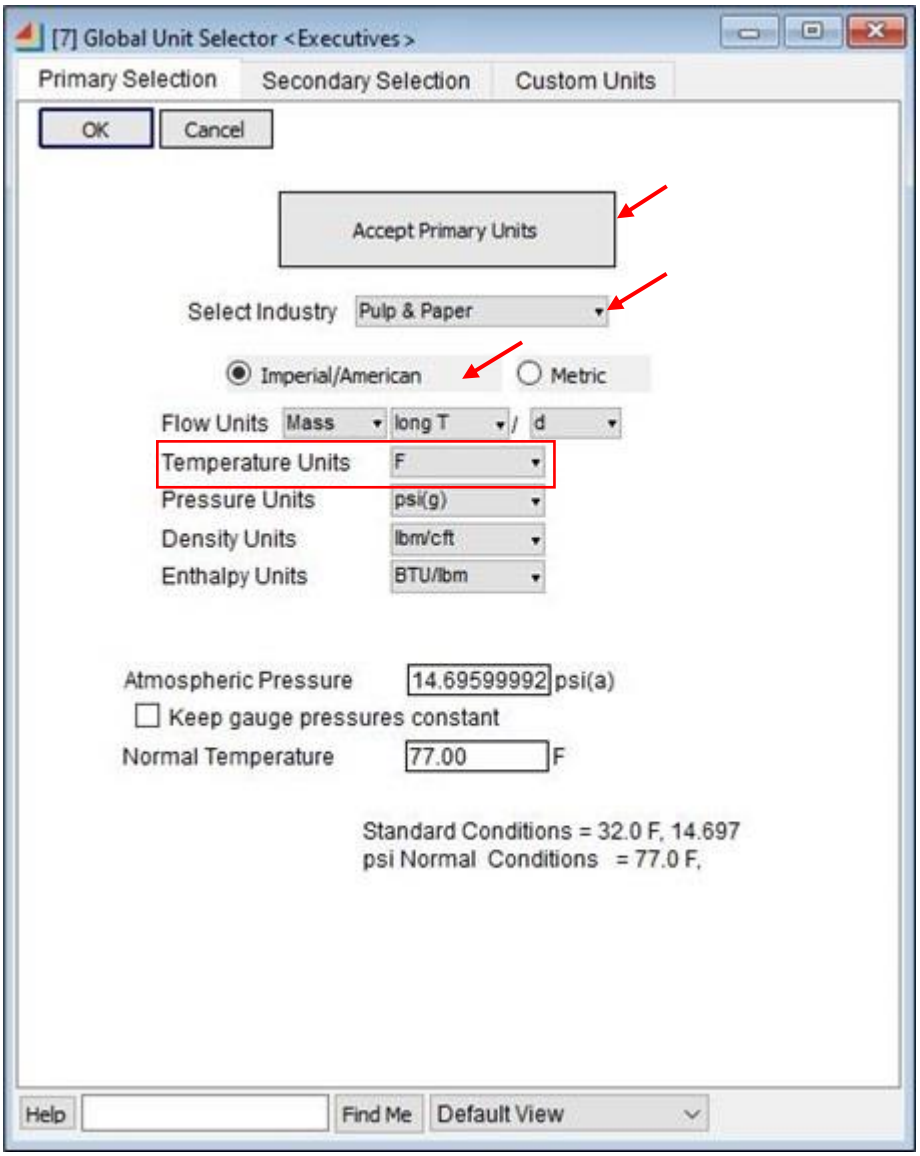


Figure 12: Global Unit Selector Primary Units

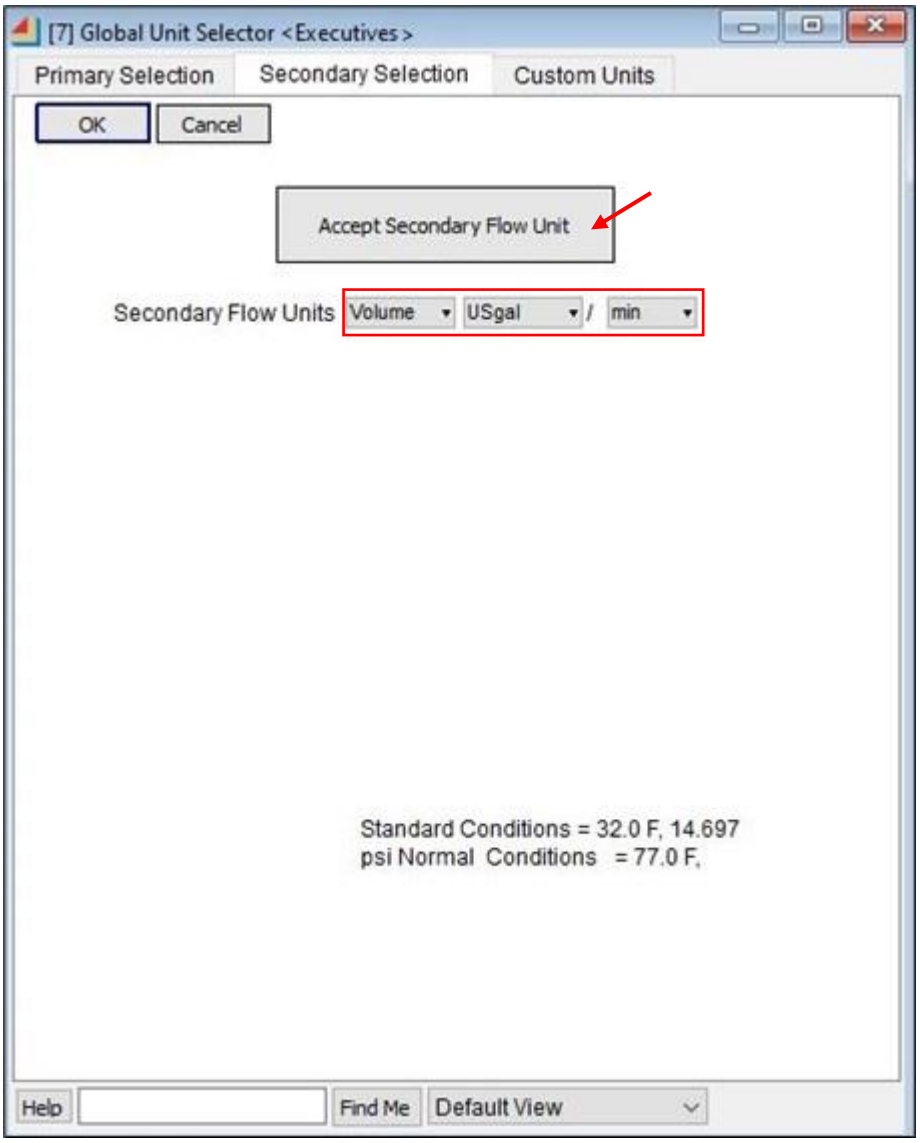


Figure 13: Global Unit Selector Secondary Units

SECTION 5. ADDING A MATERIAL PROPERTIES OBJECT TO THE MODEL

Section Concepts:

- Placing Material Properties Object
- Selecting Components
- Defining Default Liquid and Gas Components to the Model

5.1 MATERIAL PROPERTIES OBJECT

Next, we will select the materials/chemicals/components for this model. Select the **Material Properties** object from the MATERIAL PROPERTIES library. When the **Material Properties** object is placed onto the worksheet, its dialog box automatically opens. Also, the **Select IDEAS Components** window opens prompting you to select the components that you would like to load. Loading a component loads the physical properties of that component into the **Material Properties** object, making that component available for use in the model. Navigate through the **Select IDEAS Components** window to see the available components (see Figure 14). *Water* and *Steam* are selected by default. Press **OK** in the **Select IDEAS Components** window. Then press **OK** in the **Material Properties** object dialog box.

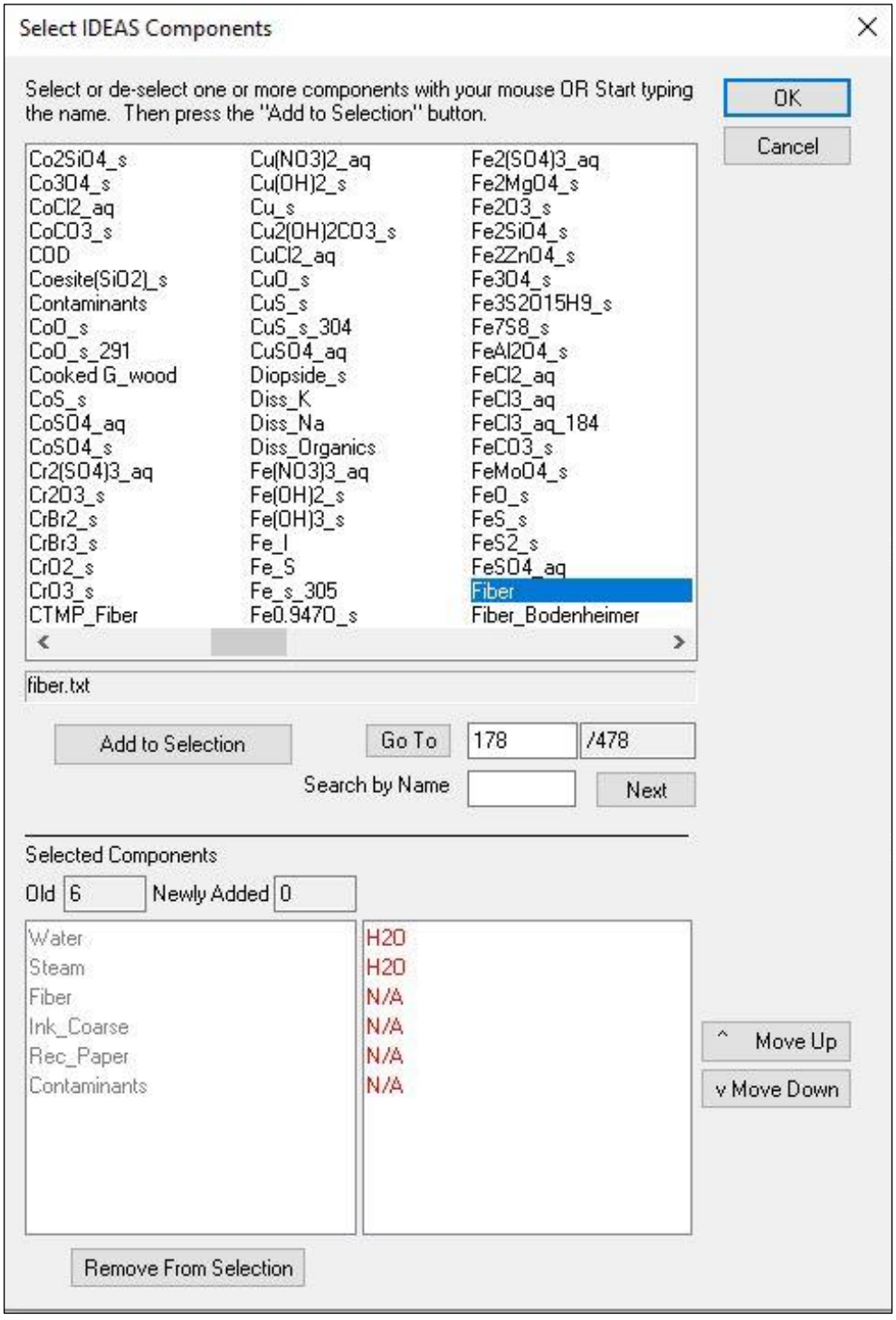


Figure 14: IDEAS Component Section Window

5.2 ADDING A MATERIAL PROPERTIES COMPONENT

Open the dialog box for the **Material Properties** object. Click on **Load IDEAS Components** button. It will open IDEAS component selection window. The user can select the component from the **Select IDEAS components** window and make it available to the streams by double-clicking on the component or by pressing **Add to Selection** button. The user can search for the components by entering full or part of a name in the **Search by Name** field. We now want to add the *fiber* component. Enter *F* in the *Search by Name* field (see Figure 15). This will take you to the components starting with the letter *F*. Double-click on *Fiber* to add it to the selection. The user will automatically see this component in the selected components table. Similarly, add the following components: *Ink_Coarse, Rec_Paper, Contaminants.*

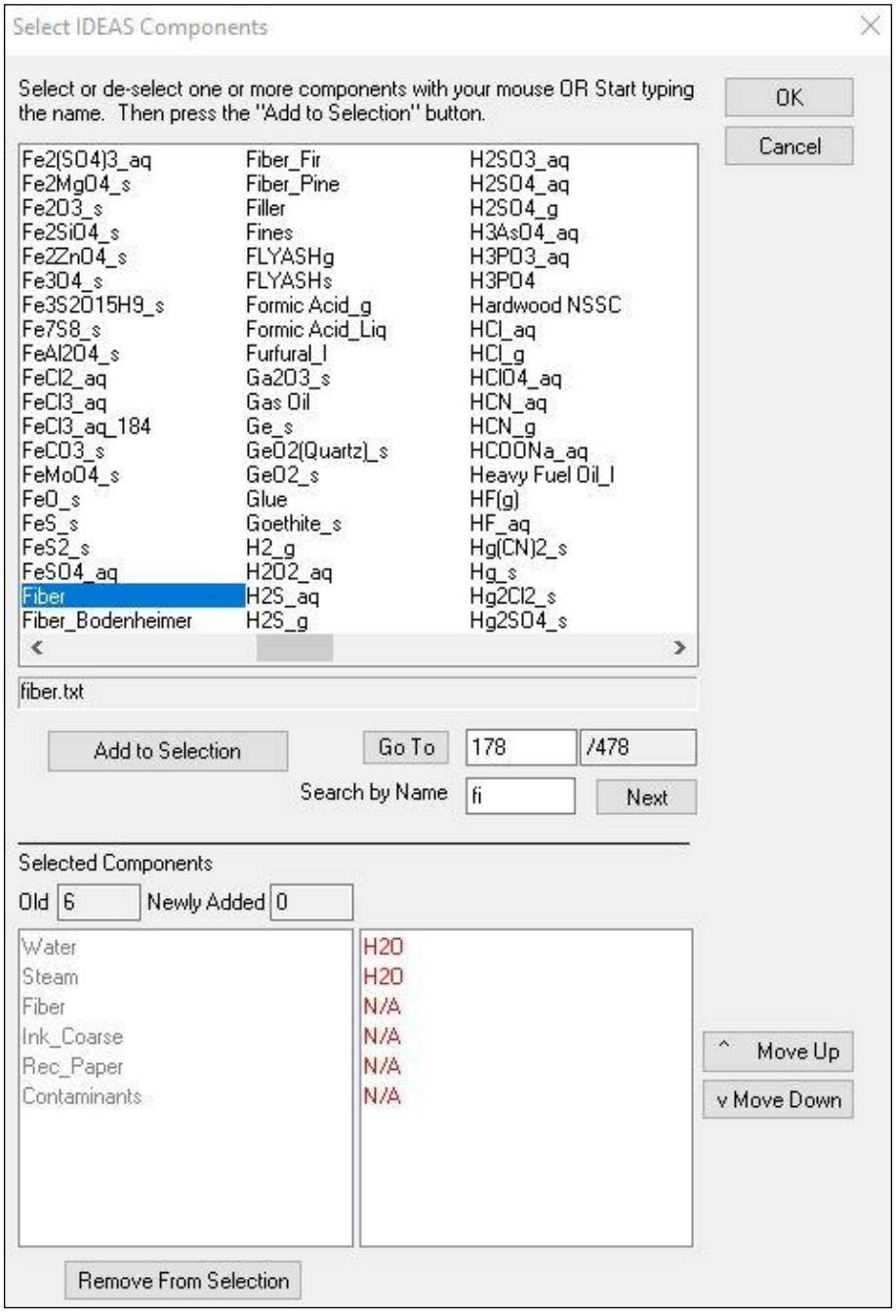


Figure 15: IDEAS Component List Search by Name

Click **OK** button in the **Select IDEAS Components** window to accept the selection. The user will see all the selected components in the **Stream Component Assignments** table under the **Components** tab of the **Material Properties** object. The bottom of the final **Stream Component Assignments** table is shown in Figure 16 below.

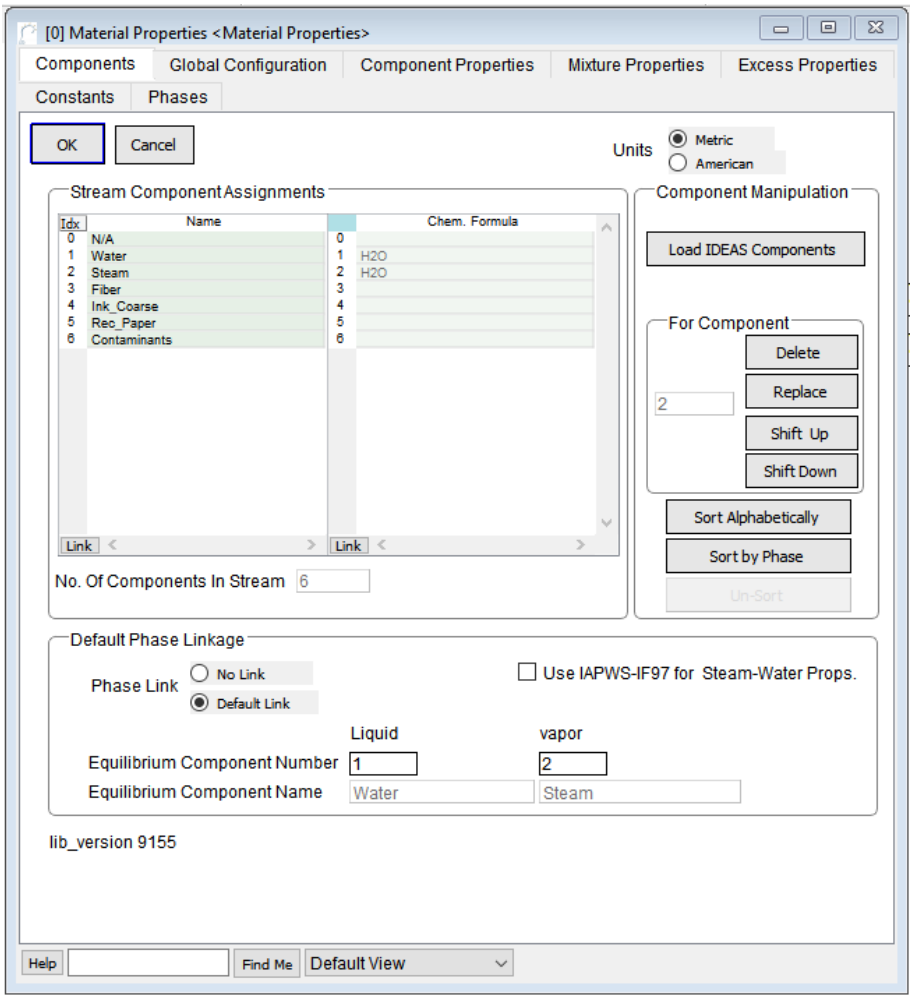


Figure 16: Material Properties (Components Tab)

You will notice that *Water* is the default liquid component and *Steam* the default gas component as these were the first liquid and first gas components that were loaded into this **Material Properties** object. If any of these components is out of order, you can select it and press the **Shift Up** or **Shift Down** button to move it up or down, one-step at a time.

5.3 DEFINING THE DEFAULT LIQUID AND GAS EQUILIBRIUM COMPONENTS

As mentioned earlier, when *Water* and *Steam* were loaded as the first liquid and first gas components, *Water* component number (1) was automatically entered into the field ***Liquid*** "**Equilibrium Component**

Number" and *Steam* component number (2) into the field ***Gas*** "**Equilibrium Component Number.**" In some cases, the user may want to change the default liquid to be some other component by changing the value in the ***Liquid*** "**Equilibrium Component Number**" field below to match that of the desired default liquid component. The component number is the number to the left of the component name in the Stream Component Assignments table.

Select the Default Link option next to Phase Link enable Water/Steam Vapor-Liquid Equilibrium. If left as No Link, the flash calculations to convert water to steam or vice-versa will not occur.

Click on the **OK** button to close the dialog box. Be sure to always click on the **OK** button to close a dialog box if you wish to accept the changes or entries that you have made within the dialog box. Pressing the **Close** button (upper right corner "X") is equivalent to pressing **OK**.

If you wish to discard the changes, press the **Cancel** button.

5.4 SETTING ANIMATION OPTIONS

Under **Run** on the menu bar, select **Show 2D Animation**. When selected, this option has a check mark (✓) next to it (see Figure 17). (Animation takes more CPU time, so if model speed is important, deselect **Show 2D Animation**. In this case, we will leave the animation option enabled.)

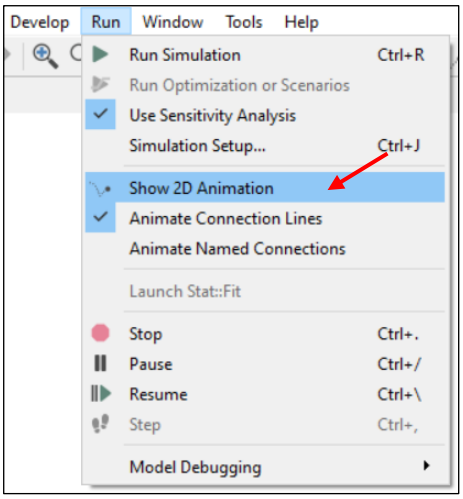


Figure 17: Selecting Animation Option

SECTION 6. BUILDING THE MODEL

Section Concepts:

- Placing Stream Source Object
- Defining Composition for Source

The next step is to build a steady-state model of a simplified acid leach facility (see Figure 1) using IDEAS steady-state or “macro” objects to represent an Autoclave, Preheaters, Flash Tanks, and Thickeners. This tutorial has been designed to explain various features of IDEAS steady state objects; it is not meant to be an exact model for any real process.

6.1 PLACING A STREAM SOURCE OBJECT ON TO THE WORKSHEET

Place a **Stream Source** object from the MATERIAL PROPERTIES library onto the worksheet. Move the object so that it is on the left side of the worksheet (see Figure 18). However, reserve the far left edge of the worksheet for administrative objects only, and DO NOT move the administrative objects from their default locations. Additional administrative objects should be placed to the left also, but no further left than the **Material Properties** object.

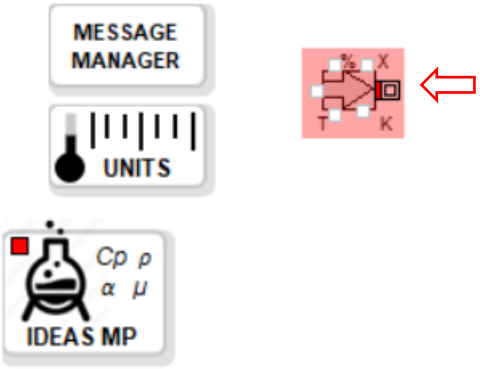


Figure 18: Placement of Source Object

The objects can be reoriented by using the dropdown menu at the bottom of the dialog box (see Figure 19).

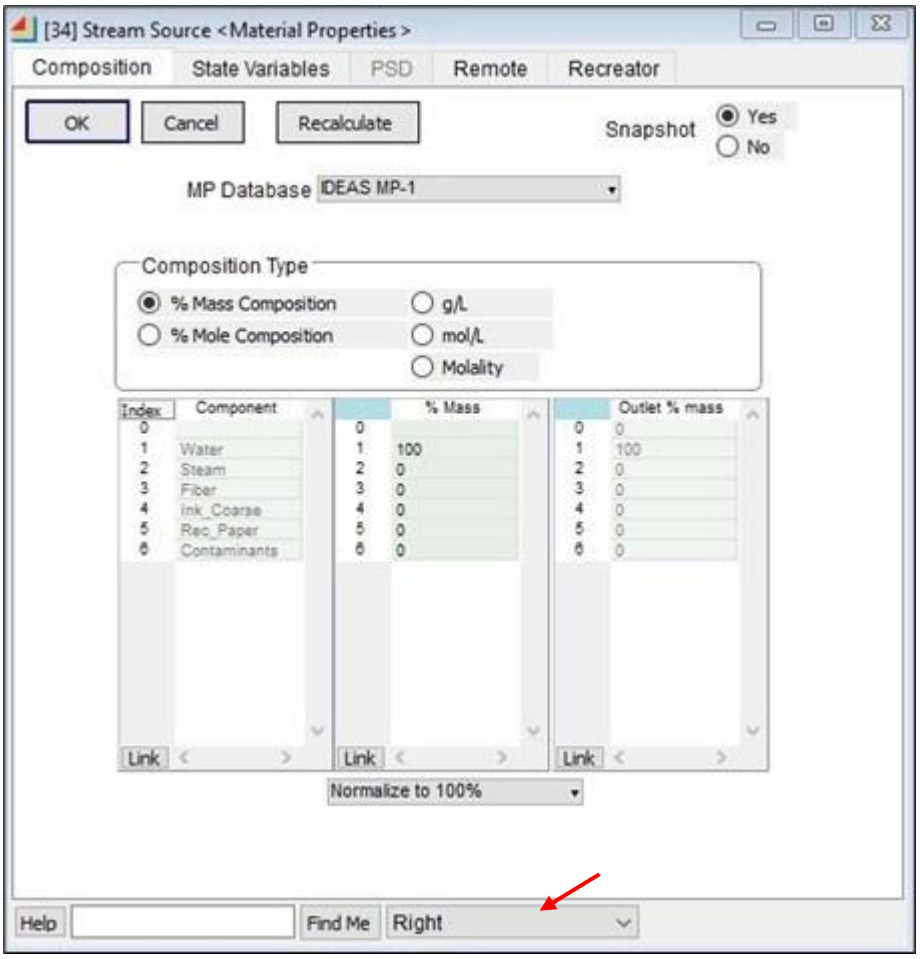


Figure 19: Object Orientation

6.2 DEFINING THE MASS % COMPOSITION OF THE STREAM

Open the **Stream Source** object's dialog box. In the Composition tab, notice that the component list is identical to the component list in the **Material Properties** object. The **Material Properties** object is the storage center of information about each component used within the model. The **% Mass Composition** radio button should be selected. In the **% Mass** table, notice that the composition is 100% water at this point. This is true because water is our default liquid for this model. We will now change the composition of this stream source. Type the following information under **%Mass** column in the fields corresponding to the components (see Figure 20).

This is the composition of the Recycled Paper being fed to the process. Type *Recycled_Paper_Feed* in the **Block Label** box next to the **Help** button to give a name to this object. Click on the **OK** button to close the dialog box.

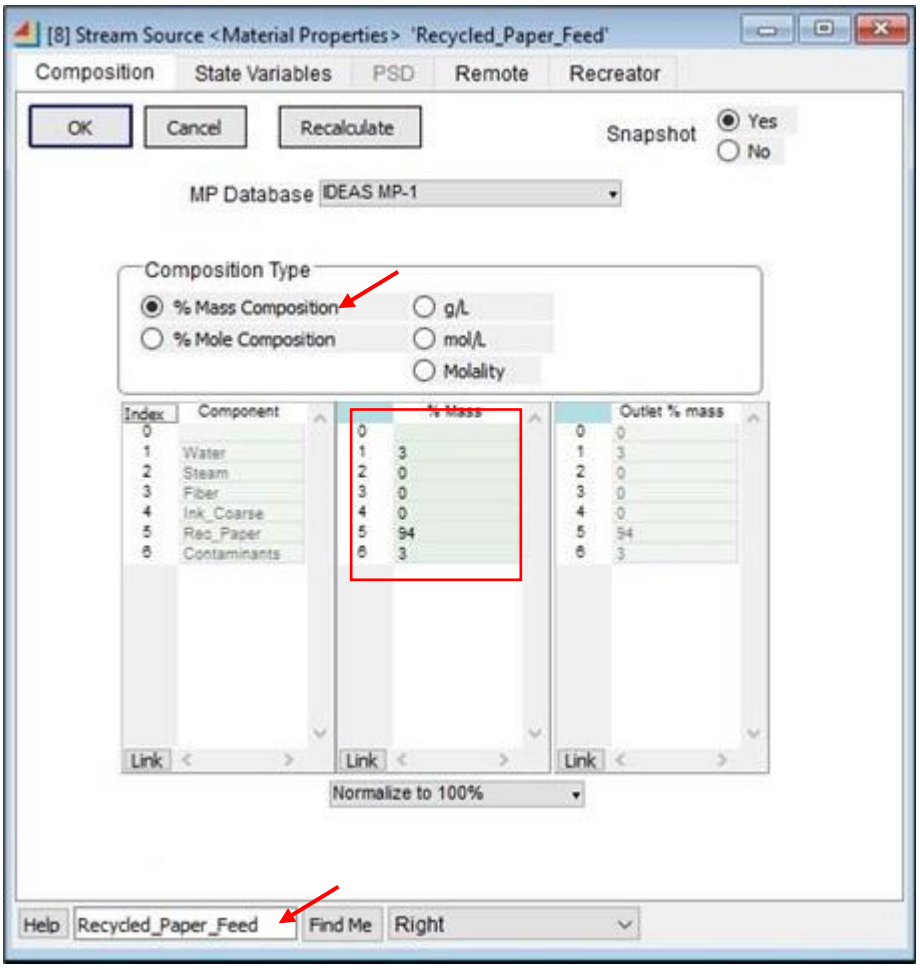


Figure 20: Stream Source Dialog Box Entries

SECTION 7. SELECT CONNECTION LINE CHOICES

Section Concept:

- Selecting Connection Lines

7.1 CONNECTION LINE SETTINGS

Select Connection Lines under **Model** on the menu bar. When you move the mouse button to *Connection Lines*, a submenu opens to the right of the main menu. Select and de-select items until your menu choice for connection lines is identical to the one shown in Figure 21. (Your default selections may match those already shown in the figure).

Notice that we have selected the connection lines to be perpendicular and double thickness with defaults, solid line and grey. With these choices, whenever we connect objects on the worksheet, the connection lines will be formed with perpendicular sections of solid lines.

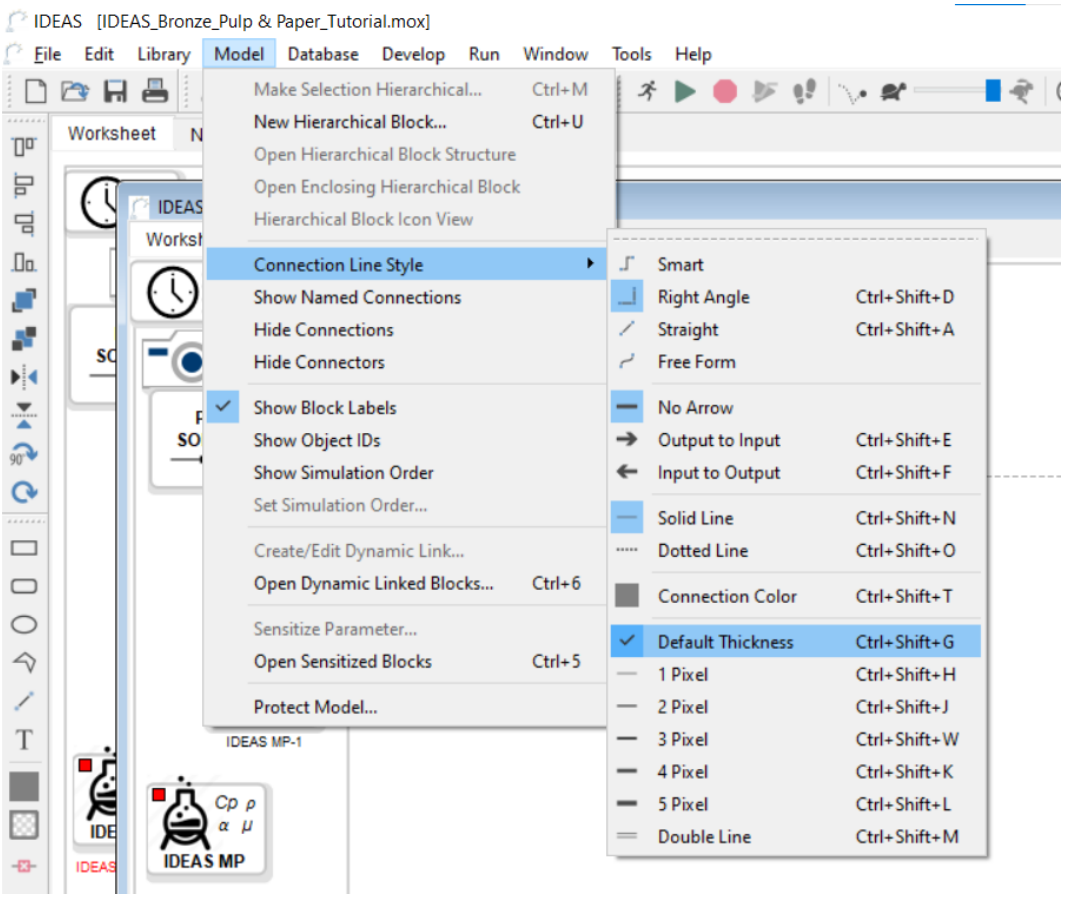


Figure 21: Choice of Connection Line Style

SECTION 8. CONNECTING OBJECTS

Section Concept:

- Connecting Objects

8.1 CONNECTORS

To make connections between two objects, place the cursor over a connector. The cursor changes from an arrow to a new double-headed or head and tail arrow  . Click on the first connector to start the line. Move the mouse to the destination connector and make sure the arrow changes again before clicking to complete the line. If you miss the connector, the mouse will still be in the connection line mode. Double-click to release the connection line without connecting to a final connector - if the connection is successful, the line is solid (inlet connector  outlet connector), if not, the line is dashed (inlet connector  outlet connector).

SECTION 9. BUILDING THE MODEL

Section Concepts:

- Place Objects for Each Area
- Connect all Objects

While adding and connecting objects in this section, some of the object settings will need to be changed to ensure the correct type of connection is made. The specifics of the object settings will be discussed in Section 11.

9.1 BUILDING DE-INKING PROCESSES

9.1.1 PLACING OBJECTS FOR PULPER

Next to the stream source, place a **Mixer** object from the Macro Primitives library and a **Reactor RX** from the Macro Unit Ops library. Connect the stream source to input 1 of the Mixer (the second will be used for dilution which we will connect later) and connect the mixer to the Reactor RX (see Figure 22).

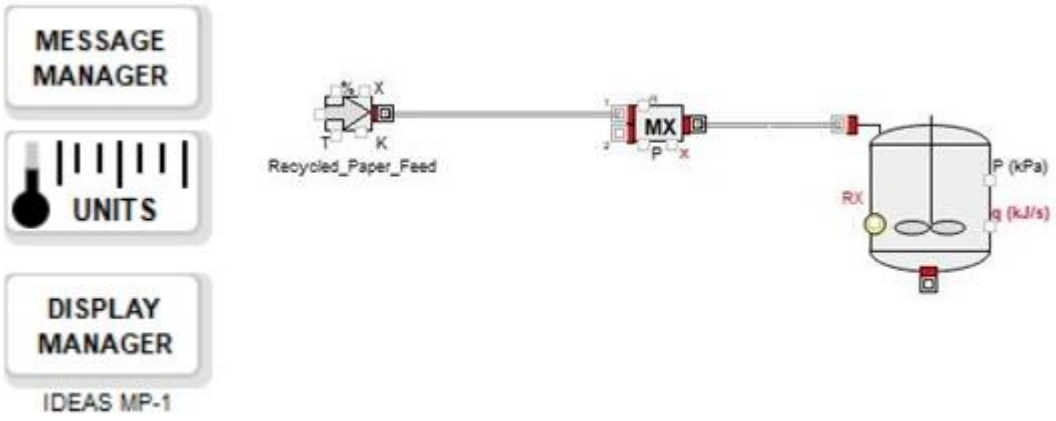


Figure 22: Placing and Connecting of Mixer and Reactor RX

9.1.2 PLACING OBJECTS FOR BLEND TANK AND SCREEN AREA

For the Blend Tank, add another Mixer, a Separator from Macro Primitives and a Sink from Material Properties. Connect the output from the Reactor RX to the first input of the Mixer (again the second input will be used for dilution and connected later). Next, connect the output of the Mixer to the Separator and connect the second output from the Separator to the sink (this will be the rejects from the screen). Open the Mixer for the Blend Tank and go to the inputs tab and select the OUTLET CONTROL MIXER (B) and Mass% of Phase radio buttons (this changes the second input connector to green (see Figure 23 and Figure 24).

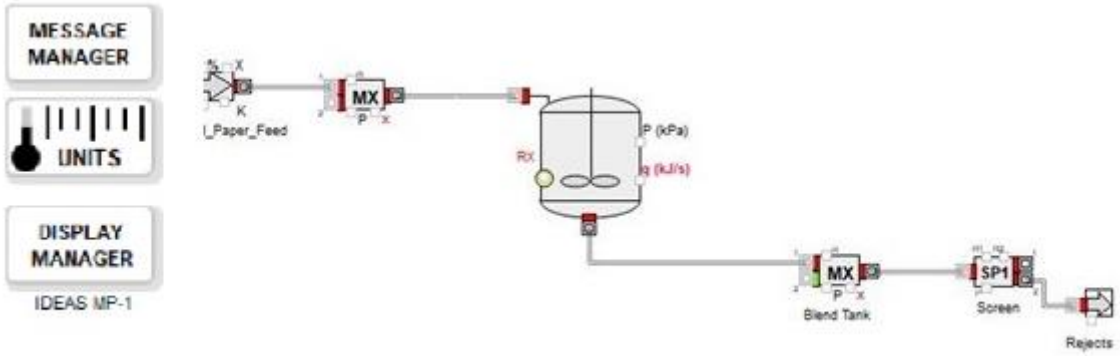


Figure 23: Placing and Connecting Blend Tank and Screen

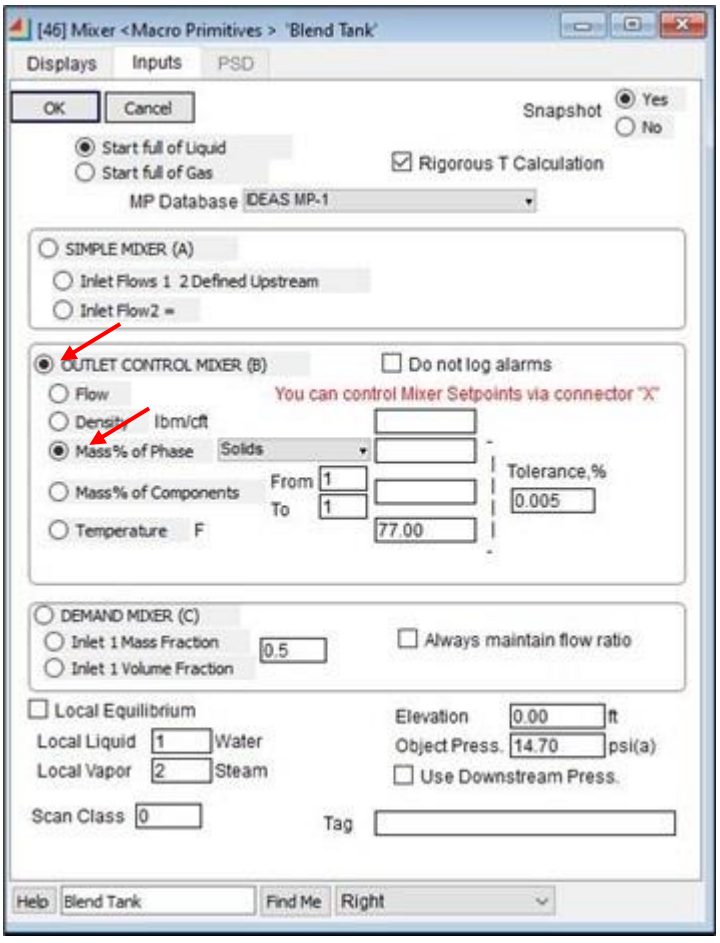


Figure 24: Mixer OUTLET CONTROL MIXER (B) Mass% of Phase

9.1.3 PLACING OBJECTS FOR PULP DRYER

For the pulp dyer, add a **Phase Separator** from Macro Primitives and another **Sink**. Connect he first output from the Separator to the input of the Phase Separator and the first output of the Phase Separator to the sink (this is the final product stream).

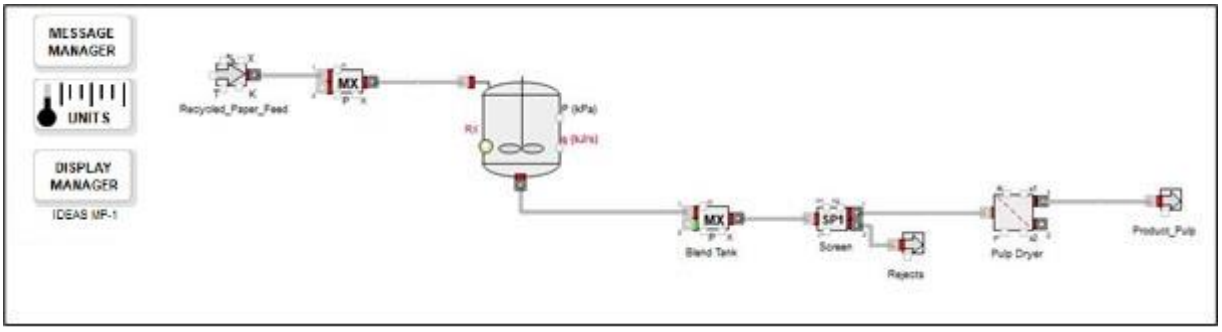


Figure 25: Placing and Connecting Pulp Dryer

9.1.4 PLACING OBJECTS FOR WHITE WATER TANK

For the White Water Tank add a **Header** from Macro Primitives, a **Mixer** and a **Stream Source** from Material Properties. Place these objects below the objects placed previously and change the orientation of these objects so that they are facing left. Open the Mixer and on the Inputs tab select the **OUTLET CONTROL MIXER (B)** and **Flow** radio buttons (this changes the first input and output connectors to green, see Figure 26). Open the Stream Source and on the State Variables tab select the **Pressure** radio button (this changes the output connector to green, see Figure 26). Open the Header and on the Inputs tab click the **Demand Header** check box (changes the input connector to green, see Figure 30). Now connect the Stream source to the first input of the Mixer and the output of the Mixer to the Header. Next, connect the second output from the Phase Separator to the second input of the Mixer.

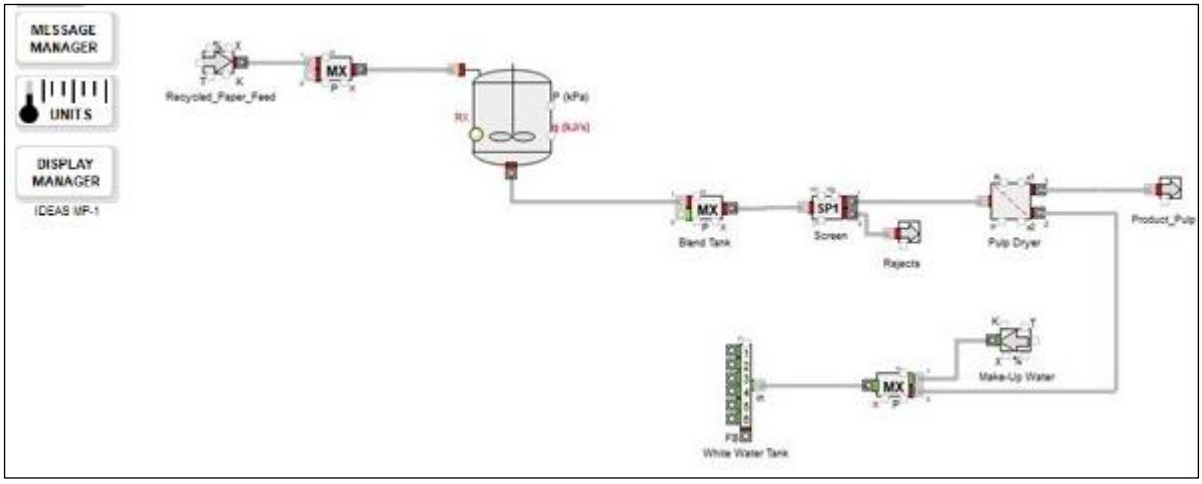


Figure 26: Placing and Connecting Objects for WW Tank

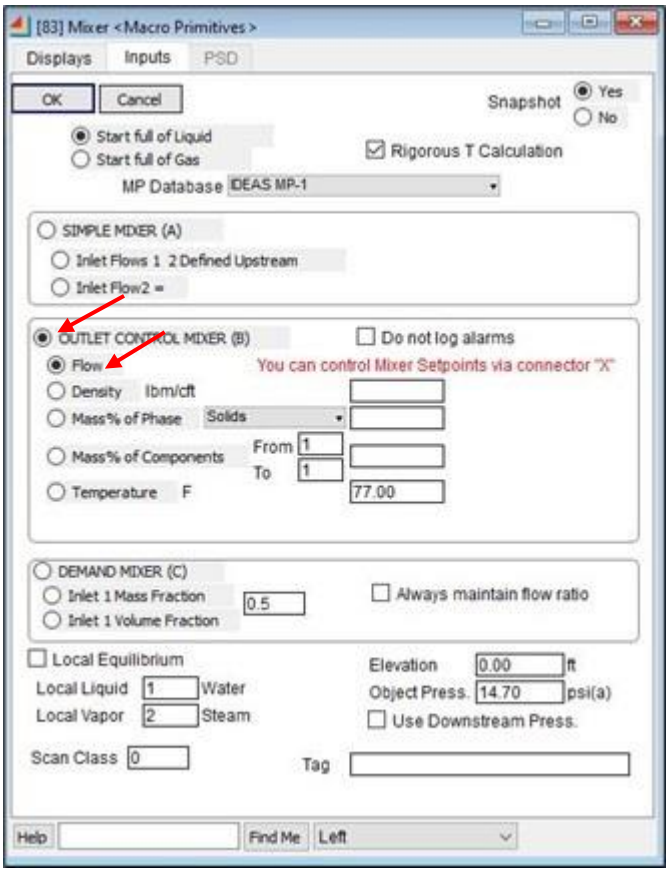


Figure 27: Mixer OUTLET CONTROL MIXER (B) Flow

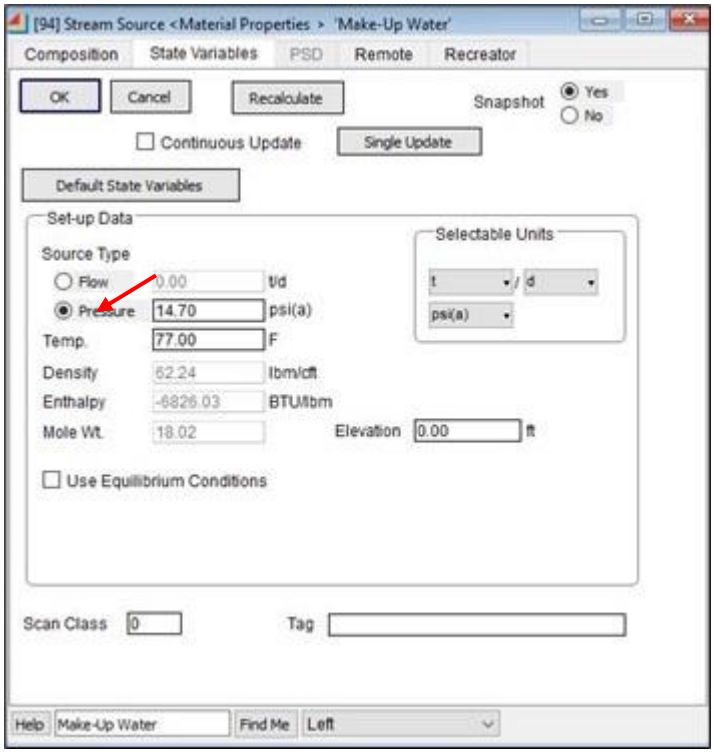


Figure 28: Stream Source Pressure

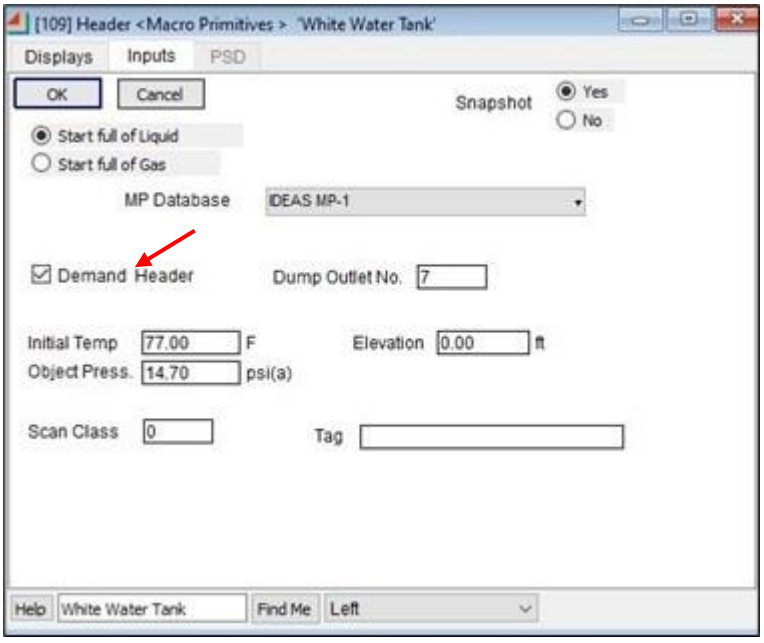


Figure 29: Demand Header

9.1.5 FINISHING CONNECTIONS FROM WHITE WATER TANK

Place a **Flow Set** from Macro Primitives and a **Sink**, both oriented to the left. Open the Sink, and on the Sink Data tab select the Flow radio button (this changes the input connector to green, see Figure 30). Connect the first output of the Header to the second input of the Blend Tank Mixer. Next, connect the second output of the Header to the input of the Flow Set and the output of the Flow Set to the second input of the Mixer next to the Recycled_Paper_Feed Stream Source. Finally, connect the sixth output of the Header to the Sink. For Header objects, any output connector can be used (for example, using connectors 1, 3 and 5 would give the same results as using 1, 2 and 6 shown in Figure 30).

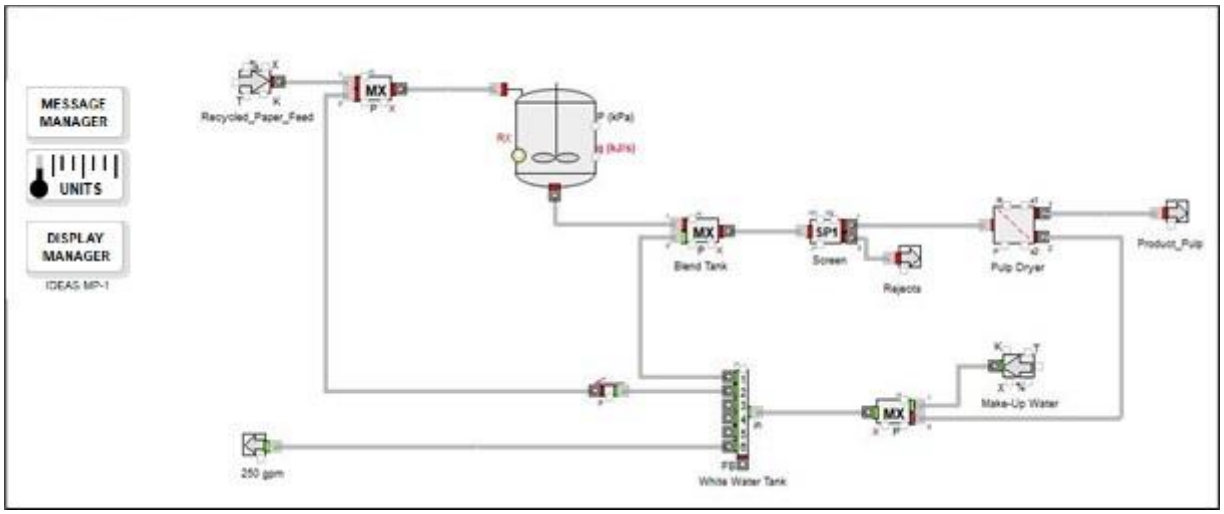


Figure 30: All Objects Placed, and Stream Connections Made

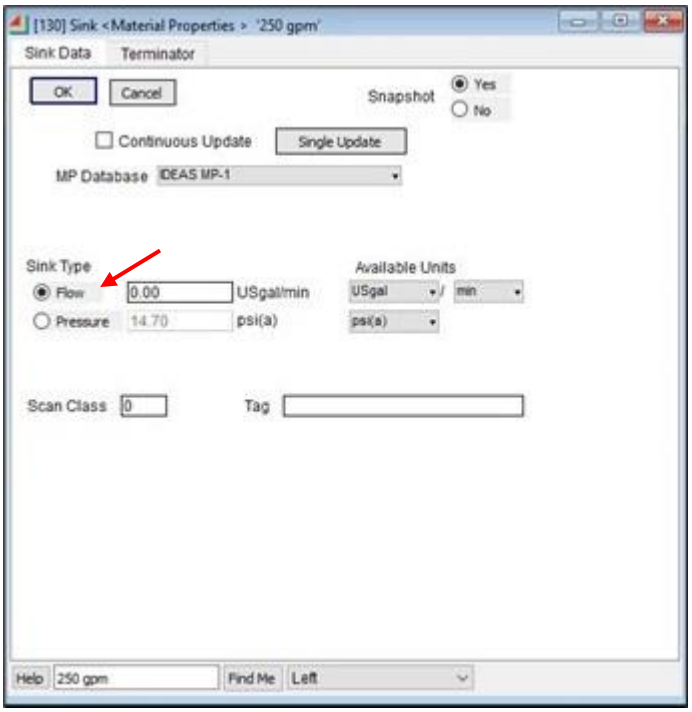


Figure 31: Sink Flow

9.2 PLACING TRANSMITTERS

Place two **Transmitter-Flow** objects from the Transmitters library. Put one near the Recycled_Paper_Feed Stream Source and the other near the Product_Pulp Sink. Connect one to the Stream Source and the other to the Sink. Transmitters can be connected at either end of a stream and will show the same values (i.e., connecting to the outlet of the Recycled_Paper_Feed Stream Source or input 1 of the following Mixer will be the same). The Transmitter-Flow connected to the Stream source can be left as the default settings, but for the Transmitter-Flow connected to the Sink, open the object and go to the Inputs tab to change the Flow Units to Bone Dry Tons (BDT) and the Time Units to day (d) (see Figure 32).

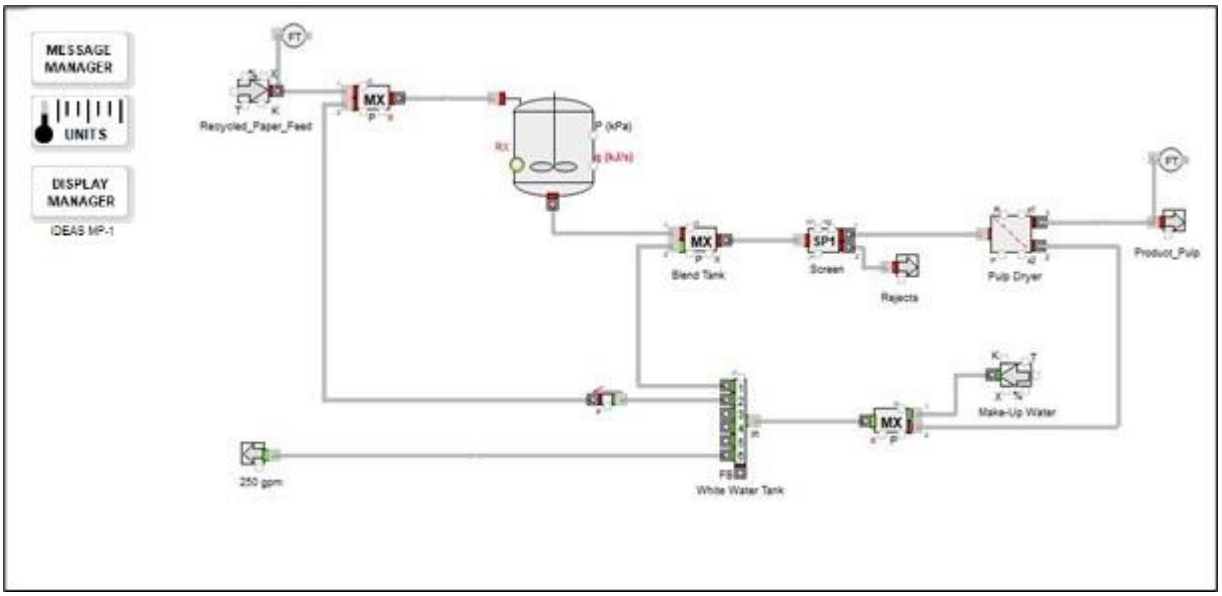


Figure 32: Transmitter Addition

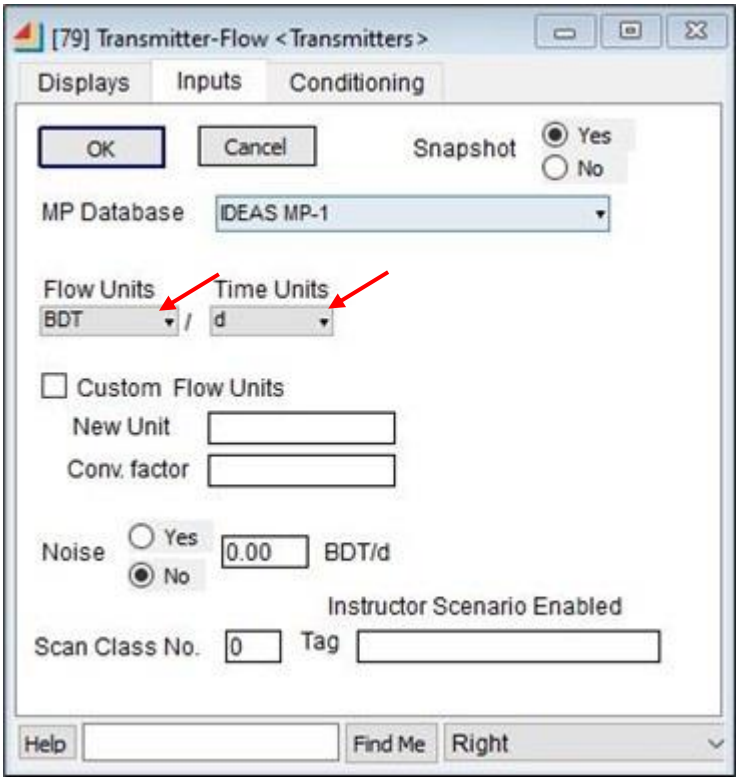


Figure 33: Transmitter-Flow Unit Change

9.3 PLACING A SUPERVISOR OBJECT

Place two **Supervisor** objects from the MACRO PRIMITIVES library near the Product_Pulp Sink. Connect the output of the Transmitter-Flow to the bottom input of the Supervisor.

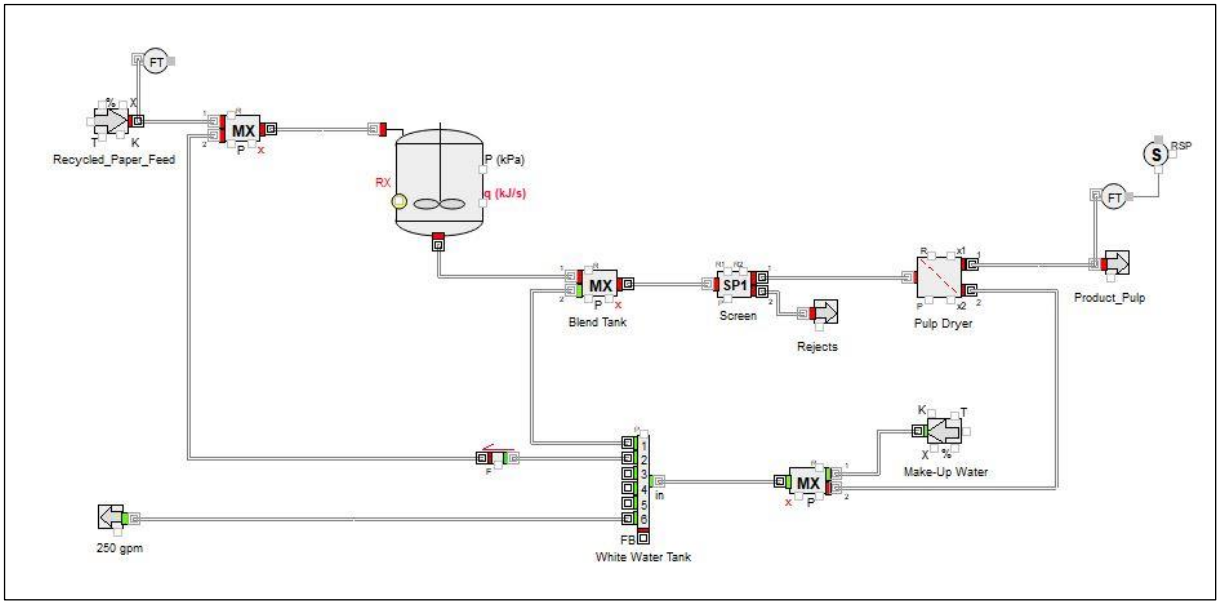


Figure 34: Placing a Supervisor

SECTION 10. CONNECTING OBJECTS VIA NAMED CONNECTIONS

Section Concepts:

- Creating Labels
- Connecting via labels

10.1 NAMED CONNECTIONS

Create a name label by double-clicking the mouse on the worksheet near the **Supervisor** object that is connected to the **Transmitter-Flow** outlet by the Product_Pulp Sink. A text box will appear.

Create a text block called *Feed Flow t/d* near the first supervisor object. Create a similar label near the Recycled_Paper_Feed Stream source and connect them as shown in Figure 35. When doing so, the connection may be made from a connector to anywhere on the text name itself. This makes a connection that is equivalent to a direct connection (When connecting from the text to an object's connector, start the connection at the left or right end of the text—the cursor will change to a double-sided arrow when you are in an appropriate location to begin a connection.).

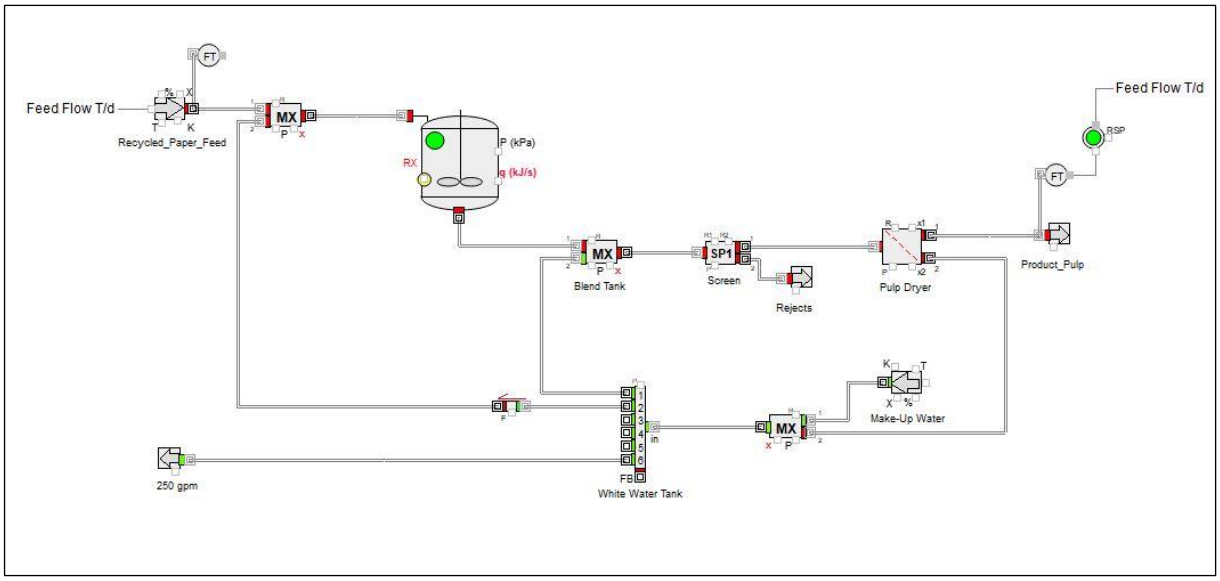


Figure 35: Connecting Objects via Labels/Named Connections

10.2 PLACING 2 CONSTANT_C OBJECTS

Place two **Constant_c** objects from the Tools library, one near the Flow Set object and the other by the Sink representing Other Process and connect them to their respective value input connectors (Figure 36). Open the Constant_c objects and set the value of the one connected to the Flow Set as 200 and the one connected to the sink as 250 (per the process values given in Section 1.3).

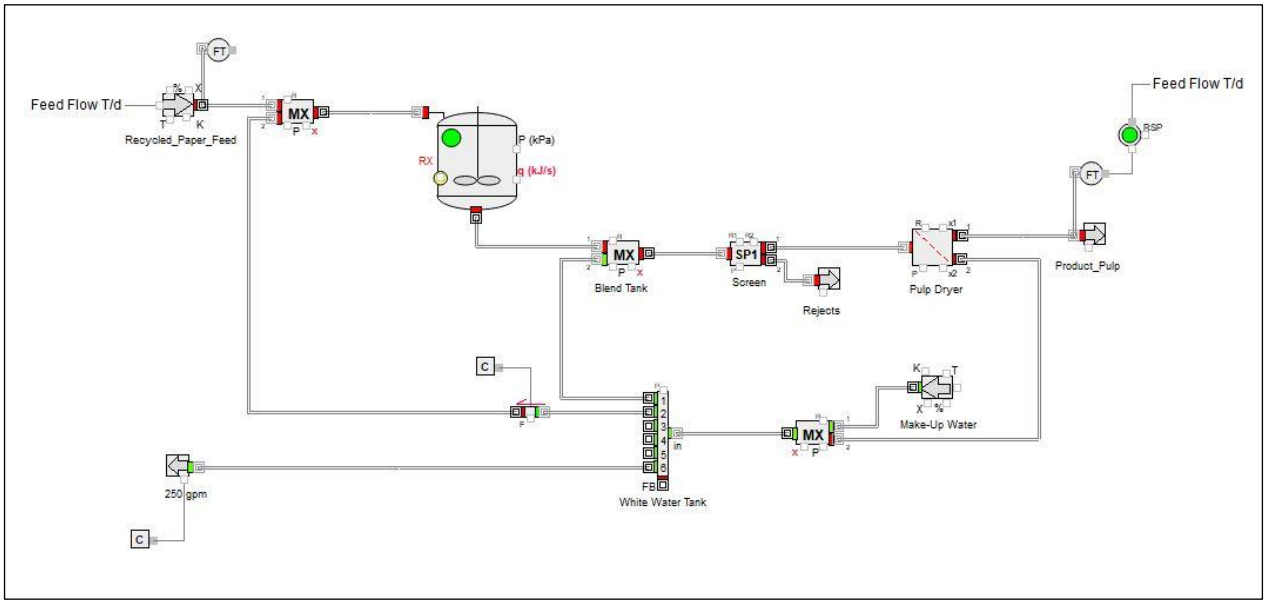


Figure 36: Adding Constant Blocks

SECTION 11. SETTING OPTIONS FOR OBJECTS

Section Concepts:

- Set Options for Stream Source Objects
- Set Options for Separator and Phase Separator Objects
- Define Reactions

11.1 SETTING OPTIONS FOR STREAM SOURCE OBJECTS

Notice that the outlet color of the *Recycled_Paper_Feed* **Stream Source** object is Red. Opening this Stream Source the Flow dialogue box can have a value entered, while the Pressure dialogue box is greyed out. A Red output connector means that the flow rate is set there and the pressure is determined by the stream (for this Stream Source no flow value needs to be input because it will be determined by the Supervisor, which will be discussed more in Section 12). Looking at the other Stream Source acting as Make-up Water, it has a Green output connector and allows for Pressure to be defined while the Flow dialogue box is greyed out (color meaning at inputs and outputs can be seen in Table 1).

Table 1: Red and Green Connector Descriptions

	Red	Green
Inlet	Sets Pressure	Sets Flow Rate
Outlet	Sets Flow Rate	Sets Pressure

11.2 SETTING OPTIONS FOR THE REACTOR RX OBJECT

The Reactor RX object is representing a pulper and in this case will be used to convert the Rec_Paper component to the Fiber and Ink_Coarse components. Double-click on the **Reaction RX** object. The user will see the **Display Parameter** and **Input Parameter** sections. The user can also see its configuration.

In the **Input Parameter** section, there are options for the order in which or rate at which reactions will occur (in this case, with only one reaction, the option won't impact the reaction so leave it as the default). Next, choose the **Enter/Edit Reactions** button and enter the reactions given below:

1 Rec_Paper = 0.95 Fiber + 0.05 Coarse_Ink

When adding a reaction, enter the stoichiometric value and then the component can be added by double clicking the component in the right hand column or by typing the component name. Use **+** to separate components on the same side of the reaction, then use **=** to separate the two sides of the reaction.

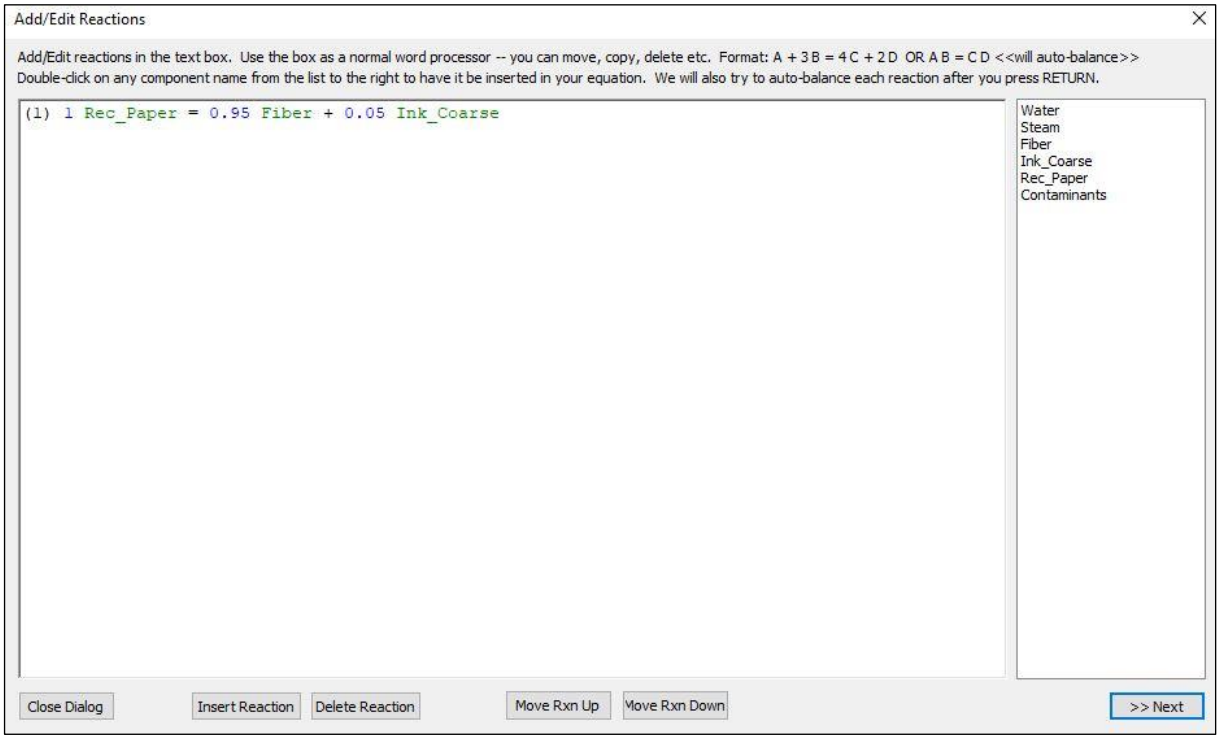


Figure 37: Entering Reaction

After all the fields are entered, press the **Next** button. The ***Specify Parameters for Reactions*** window opens. Enter the value that appear in Figure 38 under *RXN Target* column for the reaction. Press **OK** to accept the changes.

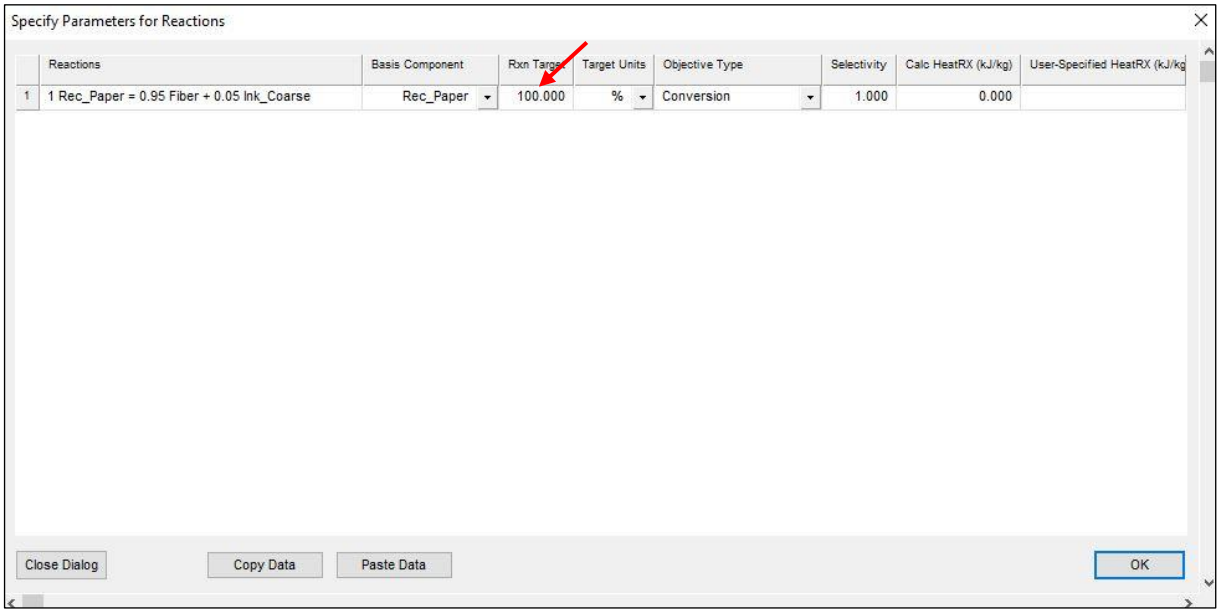


Figure 38: Specifying Parameters for Reactions

11.3 SETTING SEPARATOR OPTIONS

Open the **Separator** object being used as the Screen area. Go to the **Inputs** tab and make sure it is set to Separator Type A and the dropdowns in the **Dynamic Separation Efficiencies** area are set to by SEP.EFF. and Output 1. Then add the separation efficiencies in the right-side column labelled SEP. EFF. (see Figure 39).

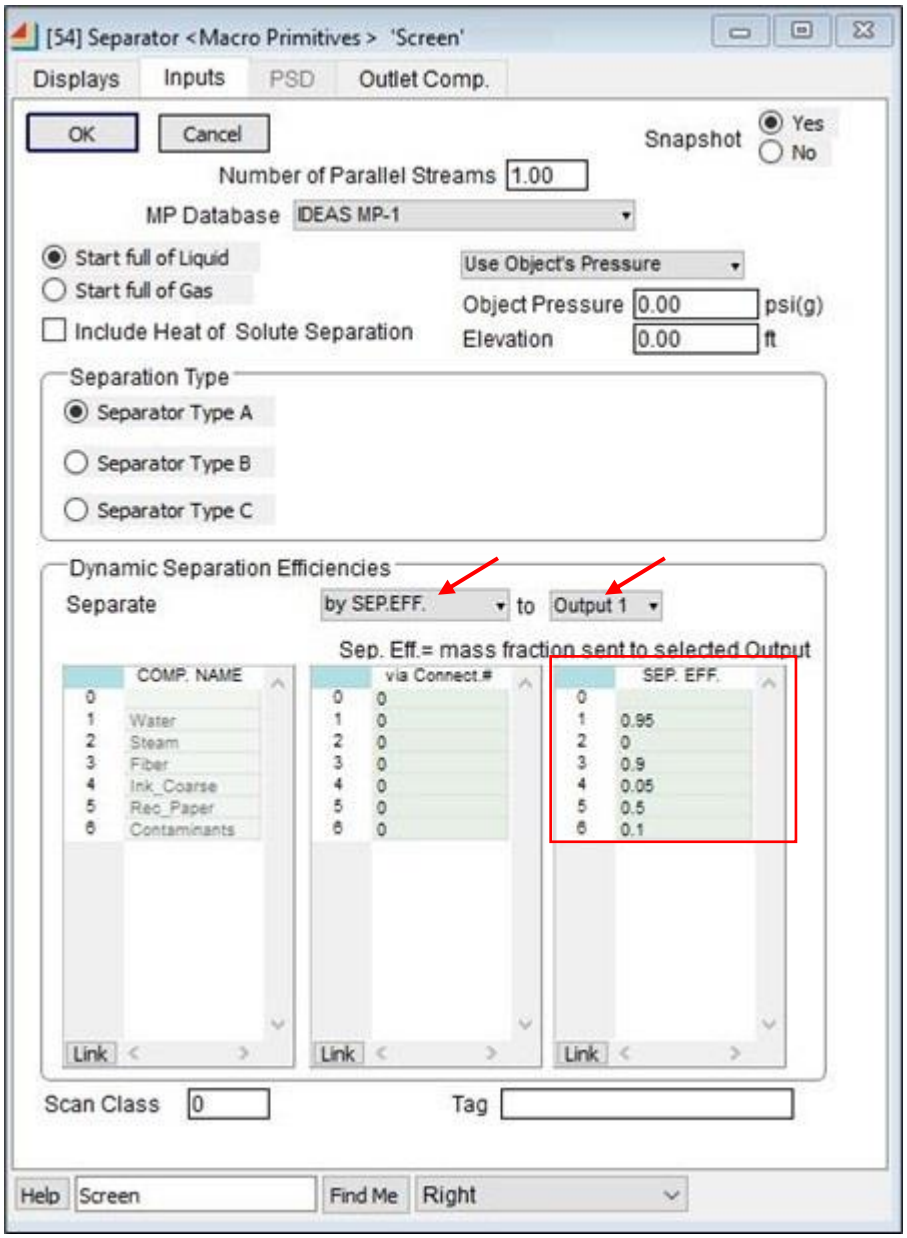


Figure 39: Separator Settings

11.4 SETTING PHASE SEPARATOR OPTIONS

Open the **Phase Separator** object being used as the Pulp Dryer. Go to the **Inputs** tab and set the **Separator Type Selection** to Type C, **Define Comp. as** % Mass, **Phase to Separate** as Solids, **Phase in Outlet 1** enter 48%. Then set the values in the **%Rec to Out** to match the values in Figure 40. With the settings used here, no % Recovery needs to be set for water as the object will determine how much water needs to be in outlet one to reach the target consistency.

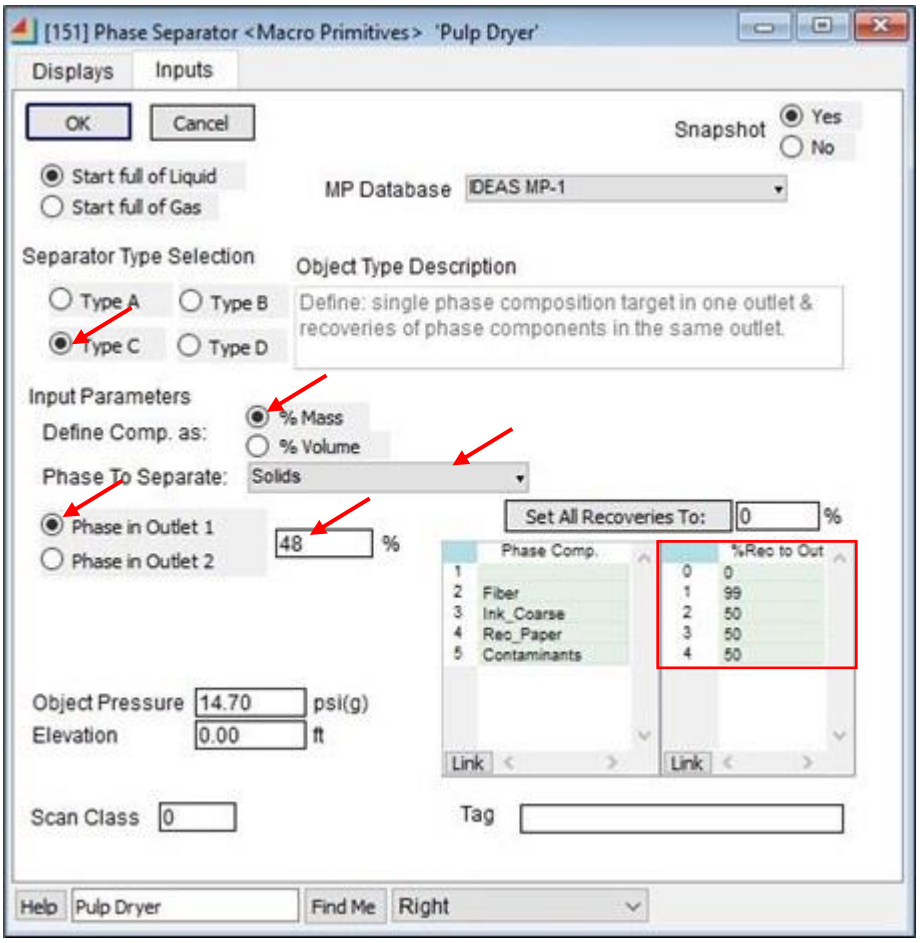


Figure 40: Phase Separator Settings

11.5 SETTING MIXER OPTIONS

There three mixers in this example, each of which has different settings. The first mixer by the Recycled_Paper_Feed Stream Source will use the default settings.

Open the Mixer used as the Blend Chest and go to the **Inputs** tab. Earlier, it should have already been set to **OUTLET CONTROL MIXER(B)** and **Mass% of Phase** and **Solids** in the dropdown. In the dialogue box next to the dropdown, enter 2%, which is the target consistency out of the blend chest. This setting is what changed the second input connector to green and the object will determine how much water it needs to reach 2% consistency.

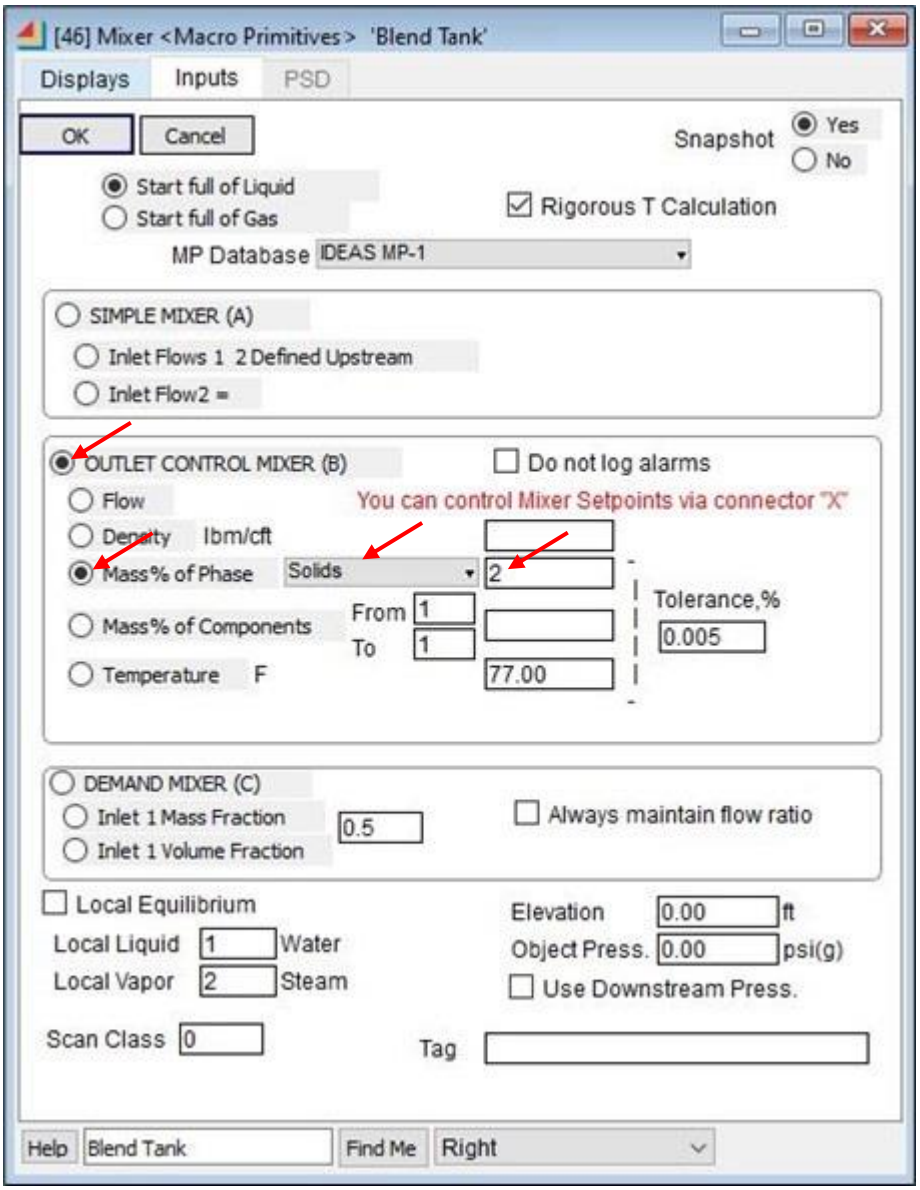


Figure 41: Mixer Type B Solids

Open the Mixer before the Header and go to the **Inputs** tab. Earlier the settings should have been changed to **OUTLET CONTROL MIXER(B)** and **Flow**. No other settings here need to be changed. By using these settings the Mixer will look downstream to determine what flow rate it should be outputting and if it is greater than what the Mixer is getting through input 2, then the rest will be made up through the Stream Source connected to input 1.

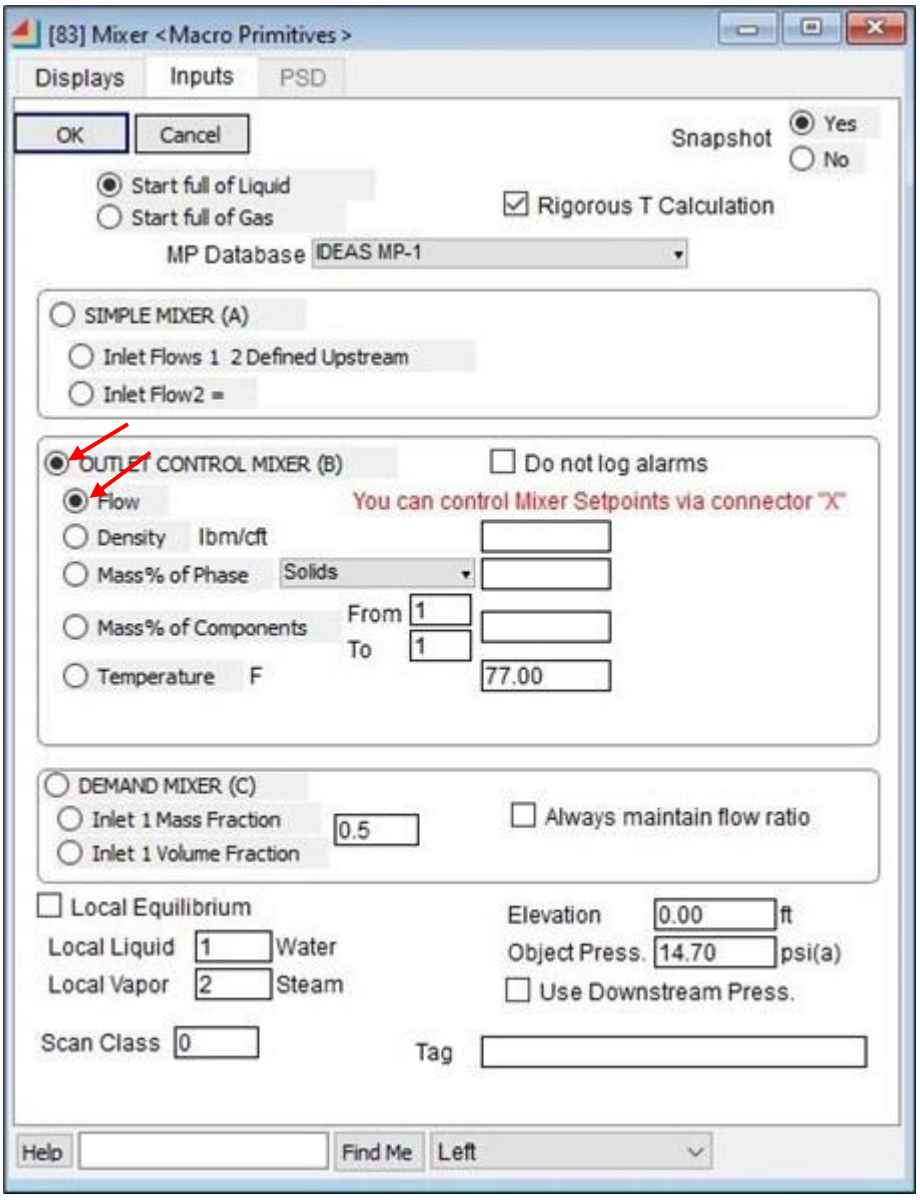


Figure 42: Mixer Type B Flow

SECTION 12. INTRODUCING PROCESS CONTROL VIA SUPERVISORS

Section Concept:

- Set Options for Supervisors

In this model, the Supervisor will be used to achieve the desired production rate by controlling the recycled paper feed.

12.1 SETTING THE SUPERVISOR OBJECT OPTIONS

Open the **Supervisor** dialog box. Make sure the **Operation Mode** is set to **Auto** and the **Decrease its Output** radio button is selected. For the **Expected Ranges** area, since the Setpoint here is 100 BDT/d, +/- 25 would be reasonable for the Max. and Min. values. For the Output, a greater upper range should be used since some mass will be lost through screening and the pulp dryer (the values shown in Figure 43 came from an estimate of 120 T/d feed being needed and used a +/- of 30). The **Initial Output** value is where the output that will be used when the model is started. Finally, the **Setpoint** can be changed by using either the Slider or typing a value into the dialogue box below the slider.

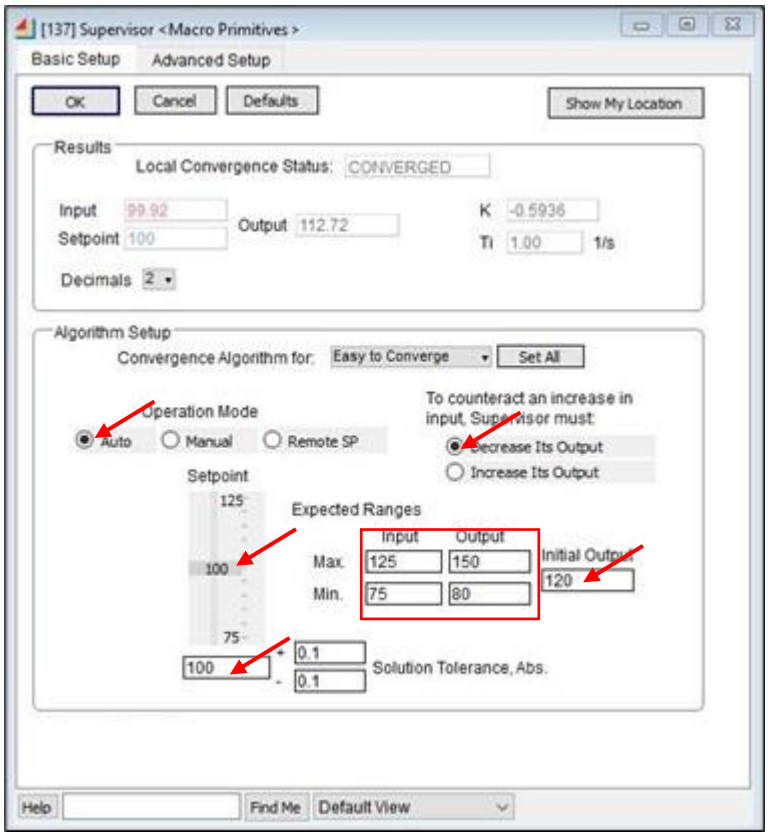


Figure 43: Supervisor Settings

Notes:

1 The Supervisor does not use any units. Scalar quantities within IDEAS are very flexible and may be used to represent any possible units. It is the privilege and responsibility of the model builder to ensure that the value of a scalar and its units, as associated with its connected objects, are in agreement. An object receiving a signal from the Supervisor will use that value. For example, if the Supervisor sends the value 400 to a Stream Source, it could mean 400, or 400 liters per minute, or 400 m^3/hour, or several other possibilities, depending on the units specified in that object.

2 The ranges for the input and output variables are easy to estimate in case of consistencies or flow rates. However, in many other cases, they may be hard to predict. In these situations, use relatively wide ranges that are based on experience. Keep in mind that the closer the ranges are to the actual operating values, the faster the solution. One recommended technique for estimating these ranges is to first run a simulation with very wide ranges for 20 to 50 steps. The ranges can then be narrowed based on the operating values determined by the Supervisors, even if the worksheet has not completely converged. This operation may be repeated to further refine the ranges.

SECTION 13. WORKING WITH PLOTTERS

Section Concepts:

- Place Plotter Object
- Set Plotter Options

13.1 PLACING A PLOTTER, I/O-SCAN OBJECT ONTO THE WORKSHEET

Place a **Plotter, I/O-scan** object from the PLOTTERS library onto the worksheet and move it to the right of the worksheet. Create a label with the name *Product BDT/d* near the outlet of the **Transmitter-Flow** object near the Product_Pulp Sink, and connect to it. Now, copy the label and paste it near the *inlet1* of the **Plotter** object. Copy the *Feed Flow T/d* label and paste it near the *inlet2* of the **Plotter** object. Connect both labels to the corresponding plotter inlets. The scalar values from each of the transmitters will be sent to the **Plotter**. We are now able to track the values of both variables while the simulation is running (see Figure 44).

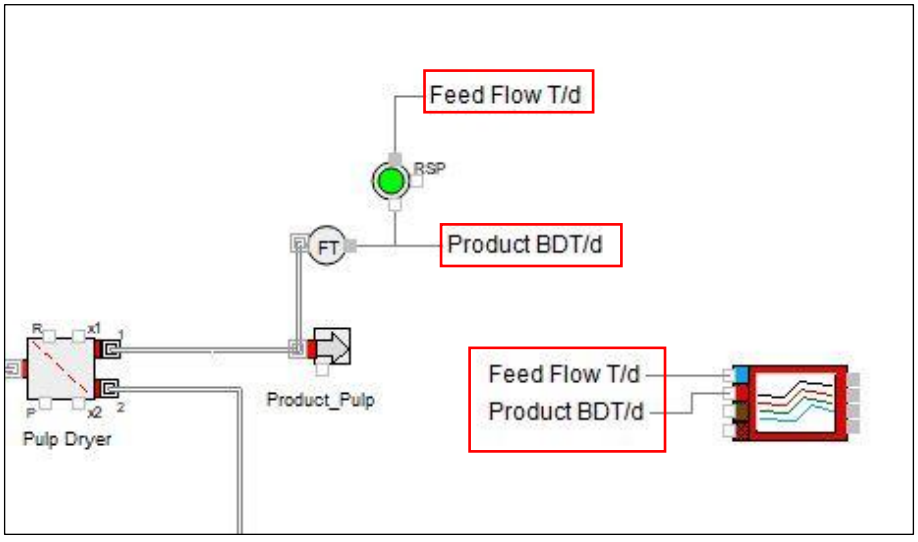


Figure 44: Plotter I/O-scan Placement and Label Connections

13.2 SETTING PLOTTER, I/O-SCAN OPTIONS

Open the **Plotter, I/O-scan** dialog box. Right-click anywhere in the window and select the first option, Trace Editor. A second sub-window opens. In the first field (to the left of the blue square), type *Feed Flow T/d*. In the second field (to the left of the red square), type *Product BDT/d*. These labels now coincide with the two labels connected to the **Plotter, I/O-scan**.

Figure 45: Plotter, I/O Scan Sub Dialog Box with Inlet Names

SECTION 14. RUNNING THE SIMULATION

Section Concepts:

- Setting Simulation Setup Options
- Running the Simulation
- Understanding the Results

14.1 SETTING OPTIONS FOR THE MATERIAL PROPERTIES OBJECT

Open the **Materials Properties** object and click on the **Global Configuration** tab in the dialog box. Click on the **Continuous Update** button to the right of the text that reads *Dialog Box Displays*. This button ensures that every object is set to update continuously. In large or complex models, it might not be time-effective to have each object updating continuously because of computer processing constraints. Our model, however, is relatively small.

14.2 SETTING THE OPTIONS FOR SIMULATION SETUP

Select **Simulation Setup** from the **Run** menu. Choose the **Continuous** tab. Type 200 in the **End time** field. The **Time per step (dt)** radio button is selected and the number *1* is in the **Time per step (dt)** field. This setting makes each step of the simulation represent one (1) second of real time. The time per step can be altered but 1 second works for the vast majority of models. Make sure that the **Left to right** radio button, indicating simulation order, is selected. Click on the **Run Now** button. (The simulation can also be run by clicking on the **Run Simulation** button—the green arrow—on the toolbar, or by choosing **Run Simulation** from under the **Run** tab on the menu bar). See Figure 46 for details.

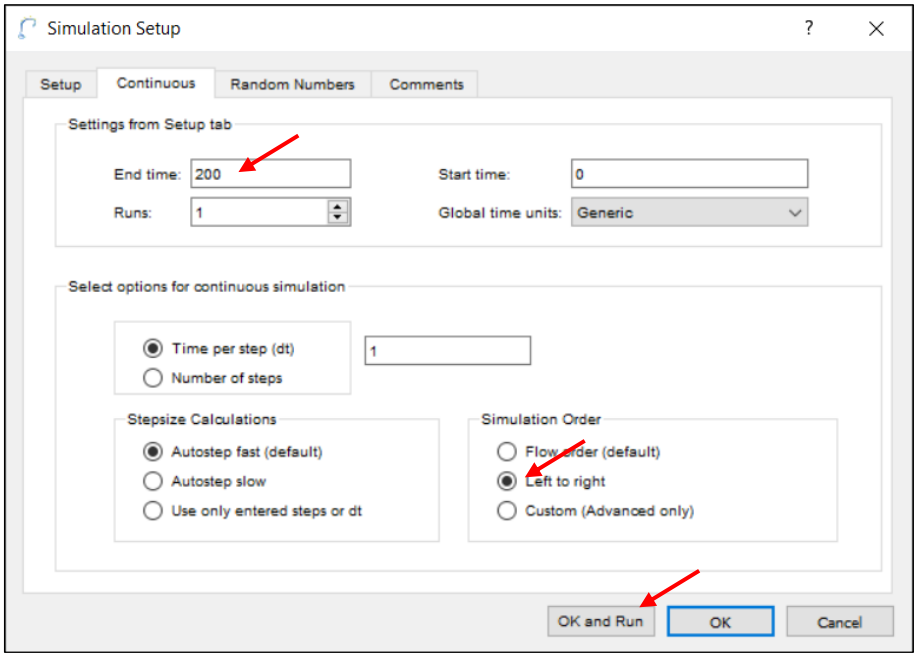


Figure 46: Simulation Setup, Continuous Tab

14.3 VIEWING THE SIMULATION VALUES

After a short initialization period, the simulation begins. Open the **Plotter, I/O-scan** window and notice the plots of the values of *Feed Flow T/d* and *Product BDT/d*. With the **Plotter, I/O-scan** display still open, click on **Run Simulation** under the **Run** tab on the menu bar. Watch how the values of the *Feed Flow T/d* and *Product BDT/d* are updated when the simulator runs. Scroll down through the iterations and notice how these values cease to change after approximately 5 iterations. This is an indication that the mass and energy balance for this flowsheet has been solved.

Initially, the model searches for the solution and the values change. After the model converges, the values remain constant, which are represented by the straight lines in the plot. If a tighter control is required, change the **Solution Tolerance** field in both supervisors. **Supervisors** are provided with color animation and will turn Green from Red when they are converged.

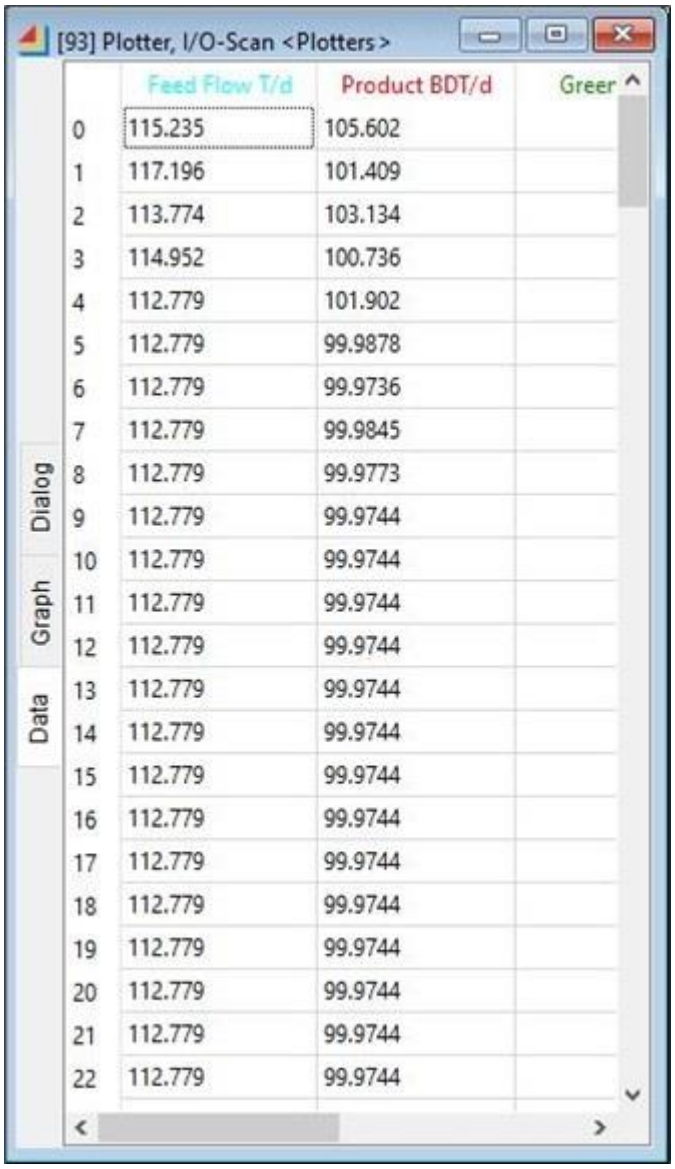


Figure 47: Simulation Results

14.4 UNDERSTANDING THE SIMULATION RESULTS

Please note that your plot may differ from the one shown in Figure 63. The exact numbers at each step depend on the location of the objects and the simulation order. You can move the objects around and observe the slight effect of object location on the initial part of the curve. If you choose the Show Simulation Order menu item under the Model menu, you can see the order in which calculations are performed. (Regardless of the simulation order of objects, the final solved model will have the correct and accurate mass and energy balance if it has been reached, i.e., if the system has reached the solution.)

The objects will have a number imprinted on them that shows the simulation order. On large models with many recycle streams, the design of the worksheet determines the time required for convergence (which may be several minutes).

To aid the solution, a rule of thumb for models using objects from the MACRO PRIMITIVES library is to place upstream objects (that supply the flow) to the left of the downstream objects (that receive the flow). This rule cannot be followed when streams are recycled, so place the objects in the most logical fashion.

SECTION 15. CLONING VARIABLES

Section Concept:

- Cloning the Variables

15.1 CLONING A DIALOG BOX ITEM

Displaying the Flow of make-up water to **White Water Tank** would also be useful. First open the dialog box of the Stream Source object, go to the **State Variables** tab. The flow rate can be added to the worksheet by using the Clone tool. Cloning of ANY dialog box item can be accomplished by following these steps:

1. Select the clone layer tool from the toolbar ( ).
2. Open the dialog box and select the dialog box item to be cloned. You can choose multiple items at once by clicking on an empty space in the dialog box, hold down the mouse button and drag to highlight all the selected entries. Click the highlighted items to the worksheet window, move them to a desired location and drop at that location.
3. Once you are finished, click on the Main Cursor tool (arrow) on the toolbar.

Results are shown in Figure 48.

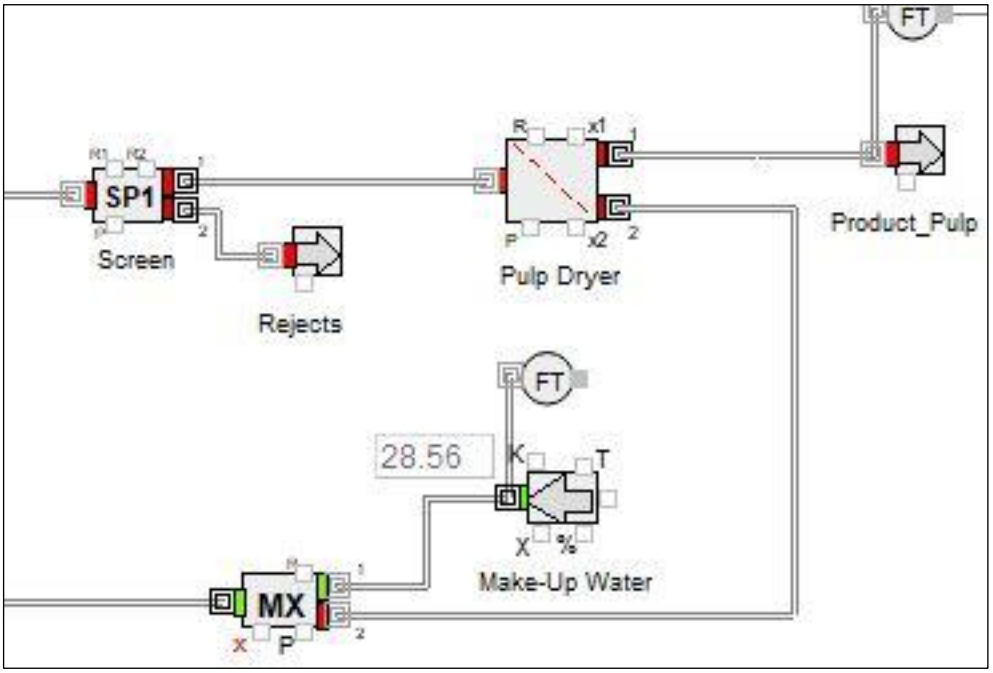


Figure 48: Clone of Flow Transmitter

There are a few important qualities one should know about the Clone tool and cloned displays:

- Cloned objects on the worksheet can only be selected when the Clone Layer Tool or the Select All Layers Tool (the button to the right of the clone tool) is selected from the toolbar.
- A cloned item acts exactly as the item does in the dialog box. If the cloned item is from an input field, changing its value in the clone will also change its value in the dialog box. Be cautious when altering information in a cloned item.
- In order for the display in the clone to be continuously updated, the Continuous Update checkbox inside the dialog box must be checked.

SECTION 16. USING THE S-CLICK FEATURE

Section Concept:

- Using S-Click Features

16.1 S-CLICK FEATURES

Another way to monitor objects is by using the S-Click feature. While the simulation is running, or after it has finished running, hold down the S key on the keyboard and click on an object with the mouse. A table will appear that shows information such as flow into and out of an object and various other data (see Figure 49) which is an S-click on the **Separator** object used as the Screen area). Run the simulation again and try using the S-Click command.

Note: The S-click feature only works while the simulation is running or after it has finished running.

You can also right click in the S-Click table to change the display from Flow Parameters to % Mass/Mole Composition, and to view the flow rates in primary, secondary, or other flow units.

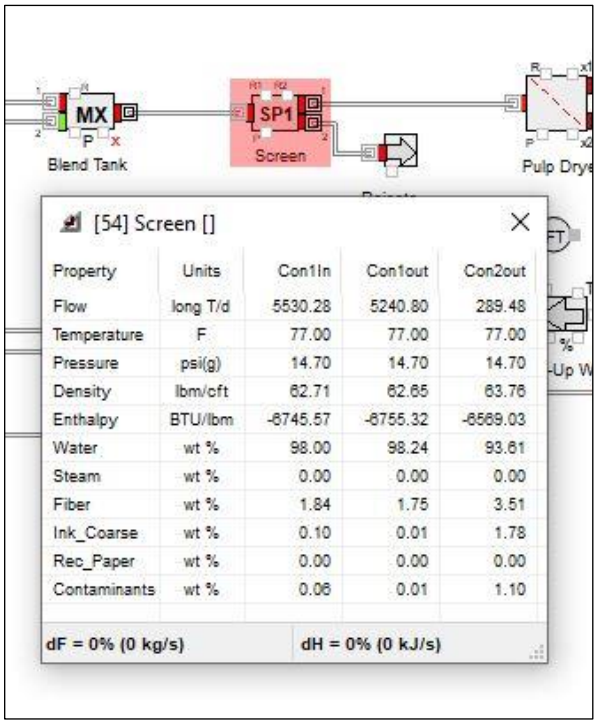


Figure 49: Use of S Click Feature

SECTION 17. MASS/ENERGY BALANCE: MODEL CONVERGENCE ISSUES

Section Concepts:

- Checking Overall Mass and Energy Balance
- Understanding Convergence Issues
- Checking Elemental Balance

So far, we depended on the plotters to figure out the number of iterations required for model convergence. When the plots of *Product Flow* and *Feed Flow* became horizontal lines, we interpreted that observation to mean that all mass and energy balance equations were solved. However, with multiple streams to track on a large model, this approach of plotting all important variables becomes cumbersome. Instead, you can use the **Global Mass Balance** object from the TOOLS library to check for the convergence of the model.

17.1 PLACING A GLOBAL MASS BALANCE OBJECT ONTO THE WORKSHEET

Add a **Global Mass Balance** object from the TOOLS library to your model and place it on the left side of the worksheet under the **Material Properties** object. Run the simulation again and open the dialog box for the **Global Mass Balance** object. Press the **Check Mass Balance** button. This object will report any discrepancies in the global mass balance. See Figure 50 for results.

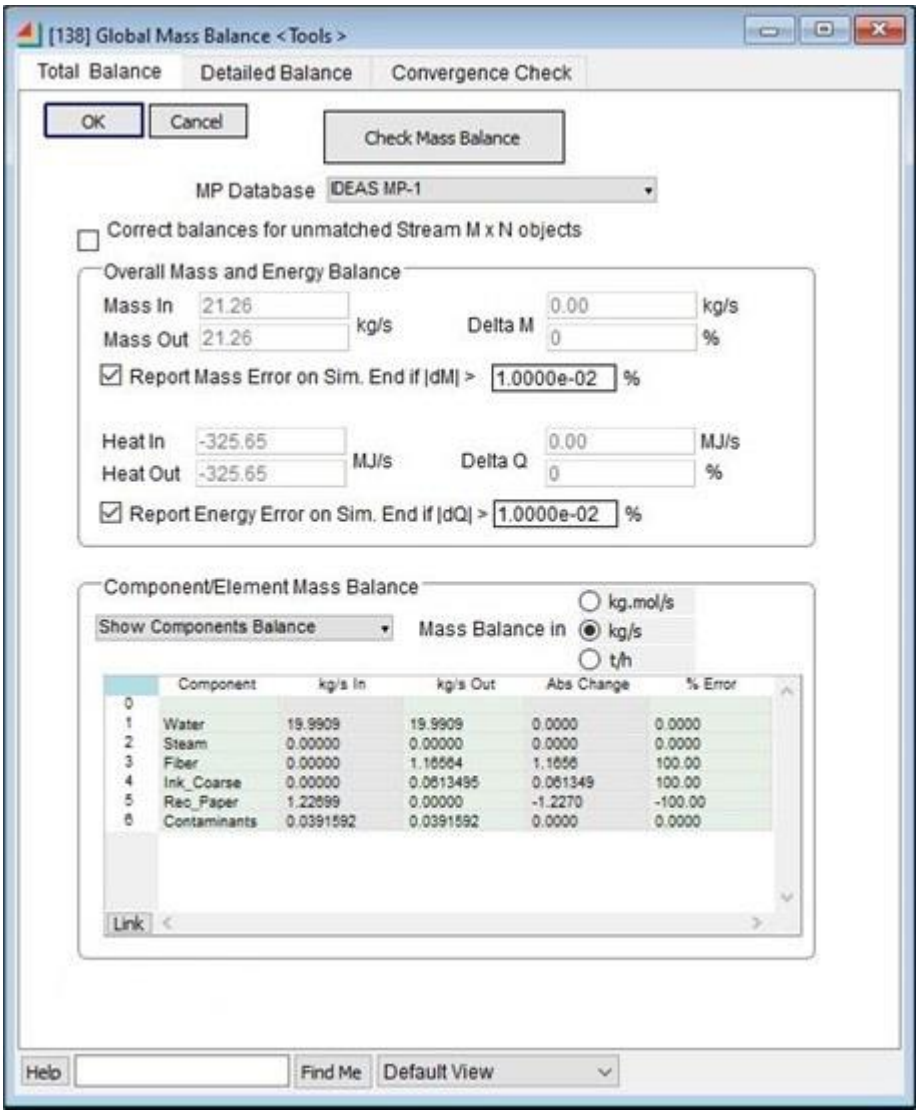


Figure 50: Global Mass and Energy Balance

Remember that a global mass balance is expected to be achieved only after a worksheet converges. If you had tanks on a worksheet that were filling up, you would not expect the **Delta M** % term for the global mass balance to reach zero because the same amount of mass would not be entering and exiting the system (i.e., accumulation—mass would be accumulating in the tank if the tank level is changing). When dealing with dynamic models, you should expect a global mass balance to converge only after steady state operation is achieved. Steady state operation will require the use of controllers and an appropriate control strategy.

Enthalpy (or energy) balance is achieved only when the system has reached steady state. Notice the fields for **Heat In**, **Heat Out**, and **Delta Q** %.

17.2 CHECKING CONVERGENCE

Finally, click on the **Convergence Check** tab and press the **Check Convergence** button when the simulation is running. This button checks all macro objects on the worksheet and reports any convergence problems with the macro objects. Notice the messages that appear in the IDEAS Message Window. Please see the help documentation of the **Global Mass Balance** object for more details.

SECTION 18. USING SNAPSHOT

Section Concept:

- Using Snapshot Object

The **Snapshot** object is a useful tool for saving various conditions in the model. Select **Simulation Setup** from **Run** on the menu bar. Type 200 in the **End time** field. Click **OK** to close the dialog box.

18.1 PLACING THE SNAPSHOT OBJECT ONTO THE WORKSHEET

Place the **Snapshot** object from the EXECUTIVES library onto the worksheet. A window opens asking to specify snapshot file name. By default, the file name is same as the model name. Press the **Save** button (see Figure 51).

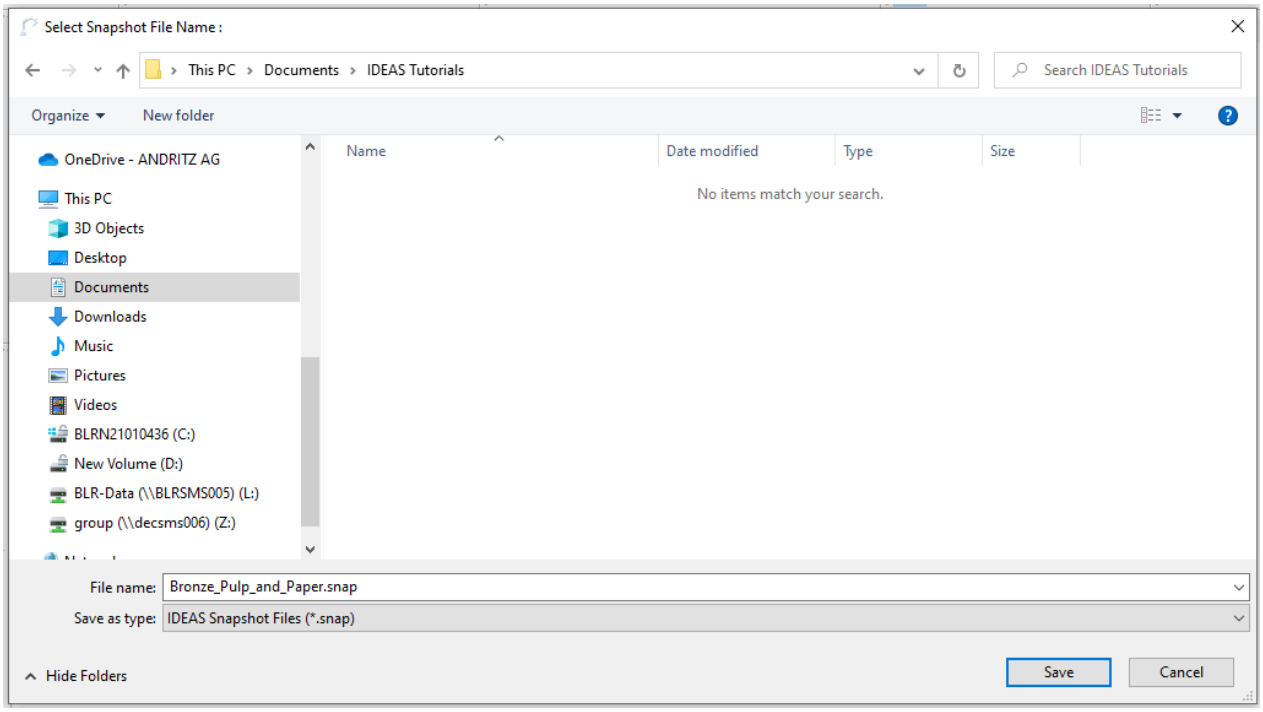


Figure 51: Snapshot File Name Selection

Open the Snapshot dialog box and click the **Turn all 'Yes'** button. A message should appear that reads "Snapshot buttons in all objects have been set to 'Yes'." Click on the **OK** button to close the dialog box. Open the **Plotter, I/O-scan** window and notice the plots of the values of the *Feed Flow T/d* and *Product BDT/d*. With the Plotter, I/O-scan display still open, click **Run Simulation** under the Run tab on the menu bar. As the model runs, watch how the values of the *Feed Flow T/d* and *Product BDT/d* change. Scroll down through the iterations and notice that after about 10 iterations these values become constant. As we

previously learned, this is an indication that the mass and energy balance for this flow sheet has been solved. Initially, the model searches for the solution, and the values change. After the model converges, the values remain constant because a solution has been reached.

18.2 SETTING SNAPSHOT OPTIONS

Open the **Snapshot** dialog box again and click the **Start from CONTINUE** radio button. Click **OK** to close the dialog box. With the **Plotter, I/O-scan** display still open, click on the **Run Simulation** button under the **Run** tab on the menu bar. Notice the values of the *Feed Flow T/d* and *Product BDT/d* even at the very beginning of the run. There was no oscillation at the beginning of the simulation because the **Snapshot** object saved the previous run's solution and used those end values from the previous run as the initial conditions for the current run. Therefore, the simulation had already been solved.

Because it can allow an operator to bypass the initial time it takes the simulator to converge, the **Snapshot** object is particularly useful when running large, steady state models that take a long time to converge. If needed, different snapshots of the same model can be saved and recalled for later use.

18.3 SETTING SNAPSHOT DEFAULTS

Open the **Snapshot** dialog box and click the *Start from DEFAULTS* radio button and the Turn all '**No**' button. Click **OK** to close the dialog box.

SECTION 19. SPECIAL TOPICS

Section Concepts:

- Monitor Object
- Worksheet Inspector Object
- Terminator
- Recreator
- Data Tracker ++

There are some special tools in IDEAS that are particularly useful while running big steady-state models. We will discuss a few of them.

19.1 USING MONITOR OBJECT

This is a very useful tool to display how supervisors approach their convergence during simulation. It can be used when a worksheet contains a large number of supervisors, and we want to monitor all of them remotely.

19.2 PLACING MONITOR OBJECT ON WORKSHEET

Place a **Monitor** object from the MACRO PRIMITIVES library onto the worksheet. Open **Monitor** dialog box and you will find two tabs. One is **Supervisors** and other is **Reactors**. The **Supervisors** tab will show all the Active and Manual supervisors. Check the *Continuous Update* box. The **Reactors** tab will show all the reactors.

Now, set the simulation time equal to 200 and run the simulation. As the simulation runs, watch how the values inside the table (Under Monitor object/Supervisors tab) are changing.

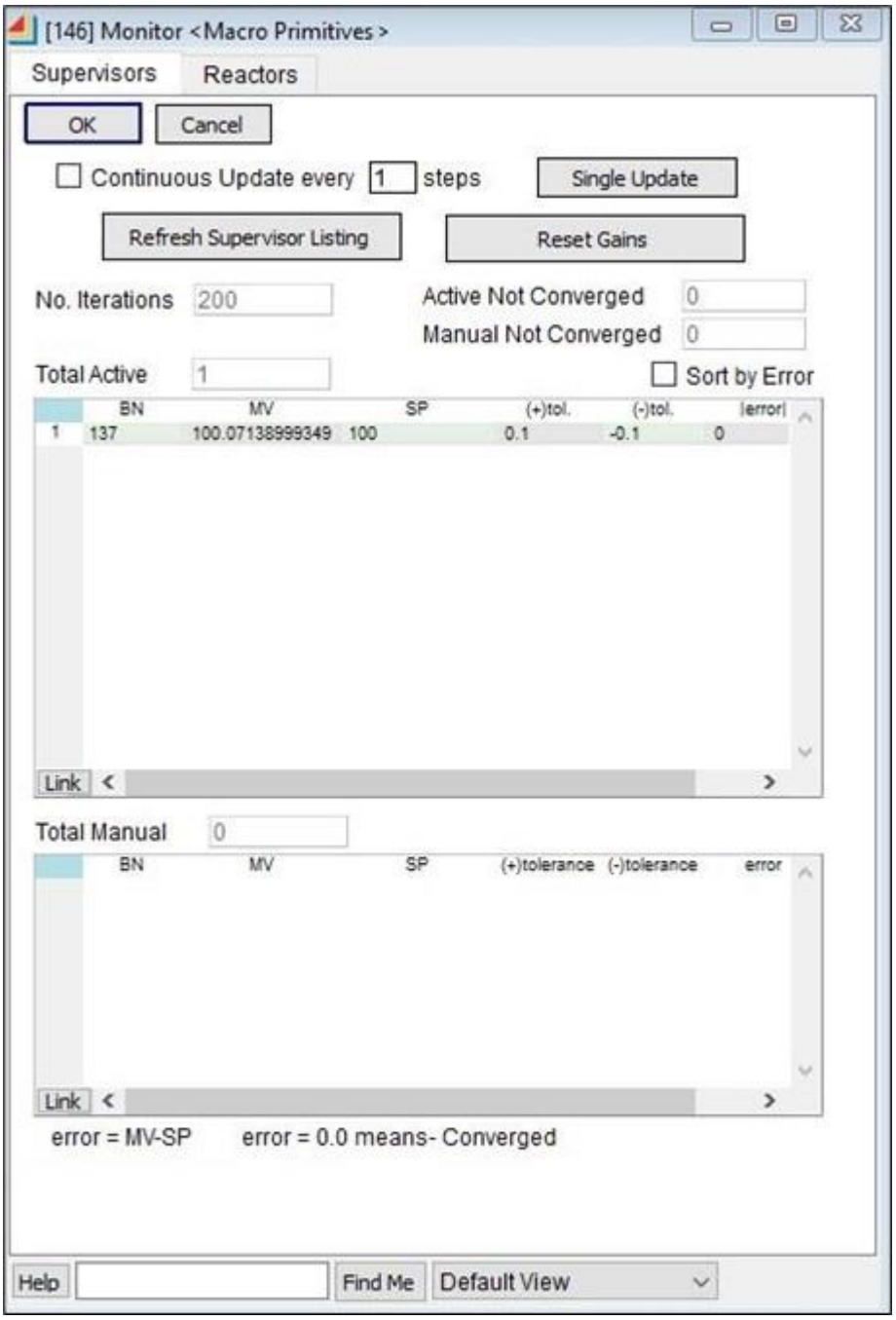


Figure 52: Monitor, Supervisors Dialog

If you click on the Block Number (BN) of any supervisor inside the table, it will open the dialog box of that particular supervisor.

19.3 USING WORKSHEET INSPECTOR OBJECT

As the name suggests, this object is used to find objects, display objects' calculated variables, and manipulate these variables. This object is particularly useful when running large steady-state models.

19.4 PLACING WORKSHEET INSPECTOR OBJECT ON WORKSHEET

Place a **Worksheet Inspector** Object onto the worksheet from the TOOLS_UTILITIES library.

19.5 SPECIFYING SEARCH CRITERIA FOR WORKSHEET INSPECTOR OBJECT

Open **Worksheet Inspector** object dialog box and click on **Search Setup** tab. Let us suppose we want to list all the mixers on the worksheet. Simply enter *mixer* in **String in object name** input box and press **List all Matching Blocks** button to accept the search criteria. Now, click on **display** tab to list all the mixer objects present on the worksheet. As in the case of the monitor, clicking on the block # will open that mixer's dialog. Click **Close** dialog button to close dialog box.

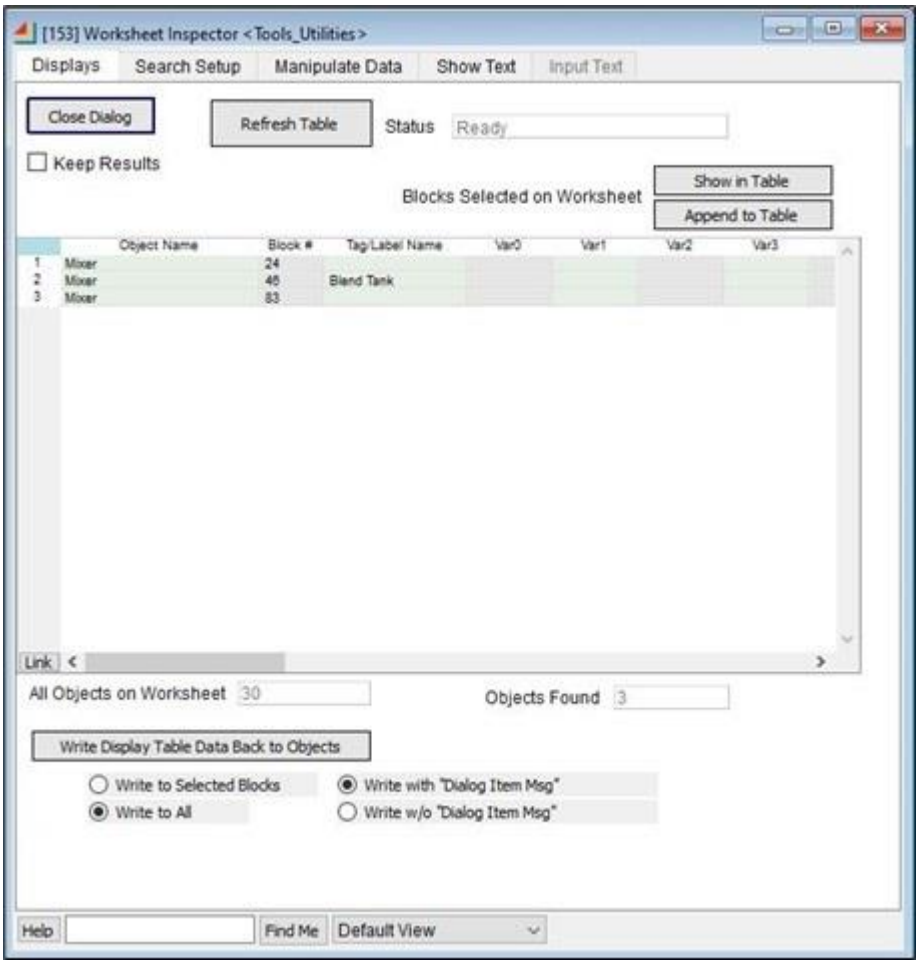


Figure 53: Worksheet Inspector Display

19.6 ACCESSING VARIABLES THROUGH WORKSHEET INSPECTOR

Before specifying variables inside the **Worksheet Inspector**, we are going to see how to view the variable names inside an object. Select **Edit** from the main Menu and select **Options** (see Figure 54).

Figure 54: Opening Options Settings

In **Options**, click on **Misc** tab and select the check box for **Tool for dialog items: Show in block dialogs** (see Figure 55). This will allow you to view the variable names inside any dialog box.

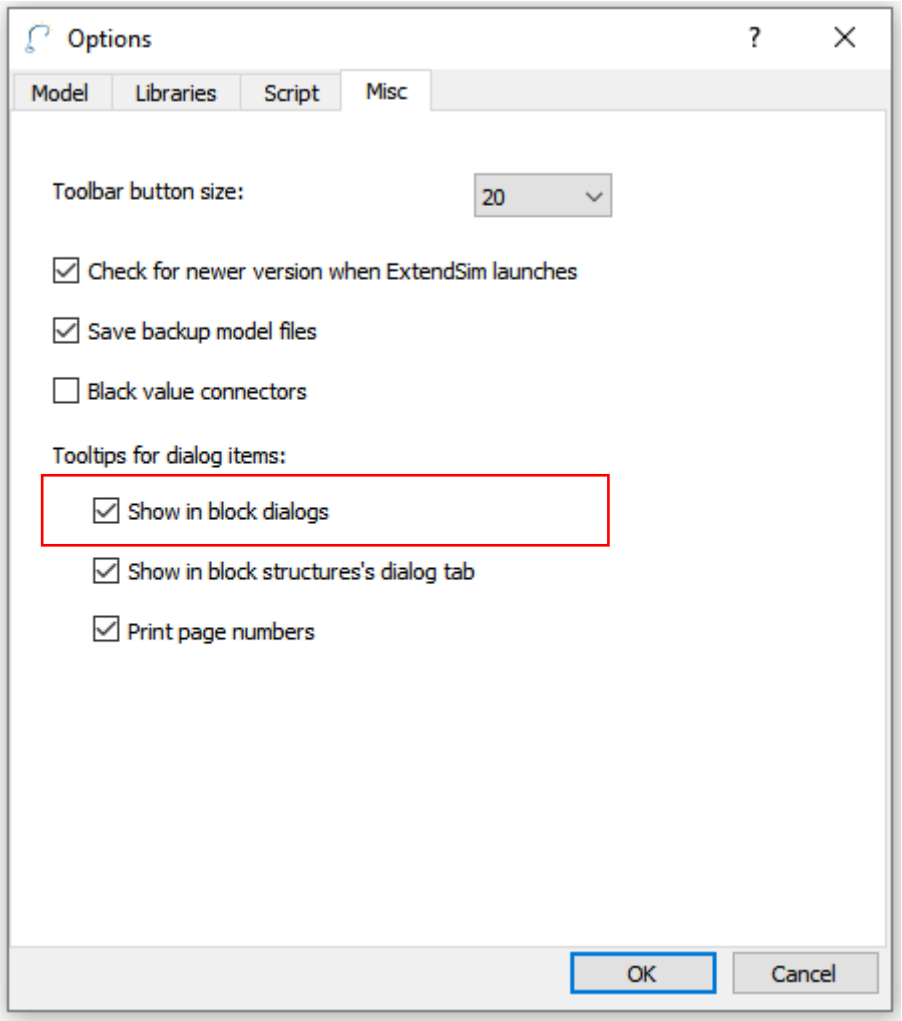


Figure 55: Options, Misc Tab, Tooltips checkbox

For example, open the dialog box for the Blend Tank mixer, go to the **Inputs** tab and place your mouse pointer on **Solids %** input field (as shown in Figure 56). This is show the variable assigned for **Solids%.**

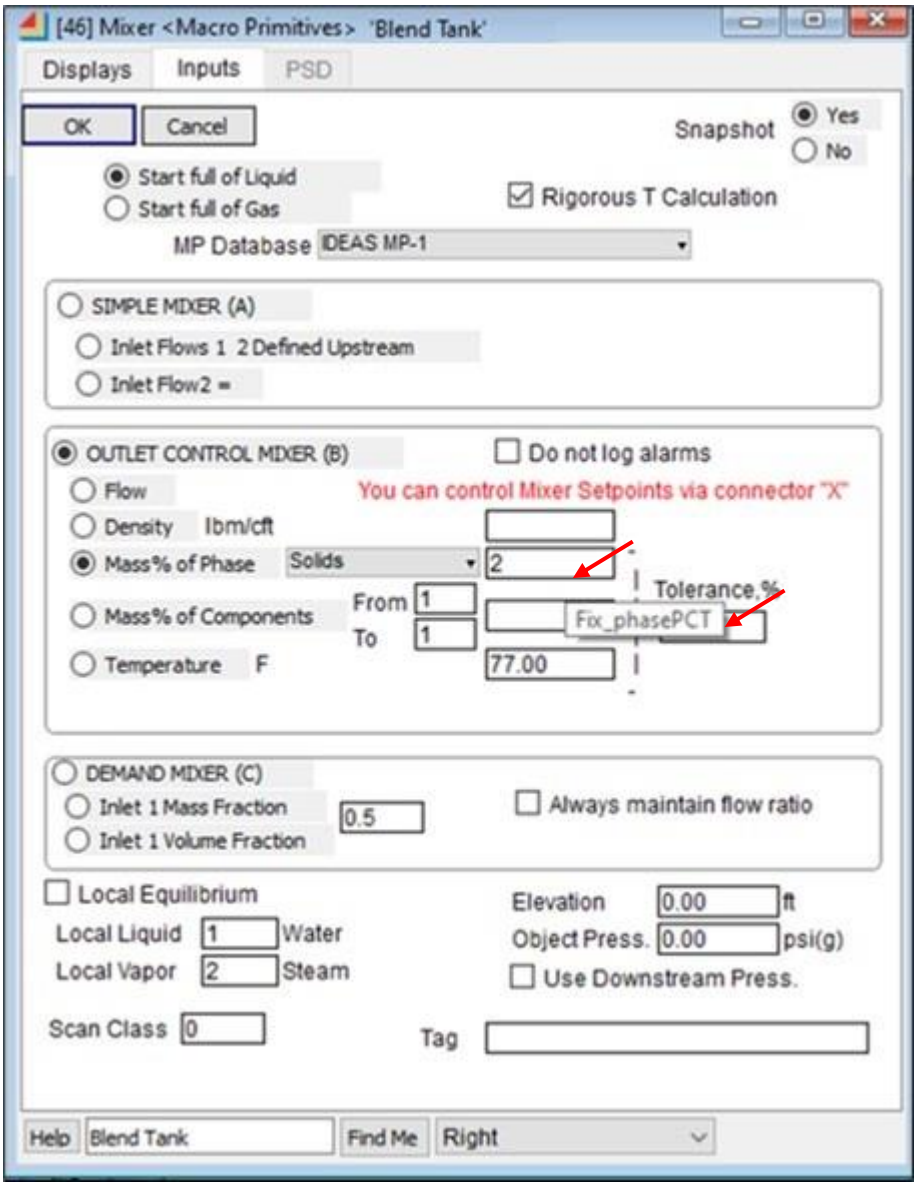


Figure 56: Displaying Variable Name in the Dialog Box

Coming back to access the variables from **Worksheet Inspector**, open the dialog box for the **Worksheet Inspector,** click **Search Setup** tab, and specify the variable name under the **Variable name** column of the table as *Fix_phasePCT* (as shown in Figure 57).

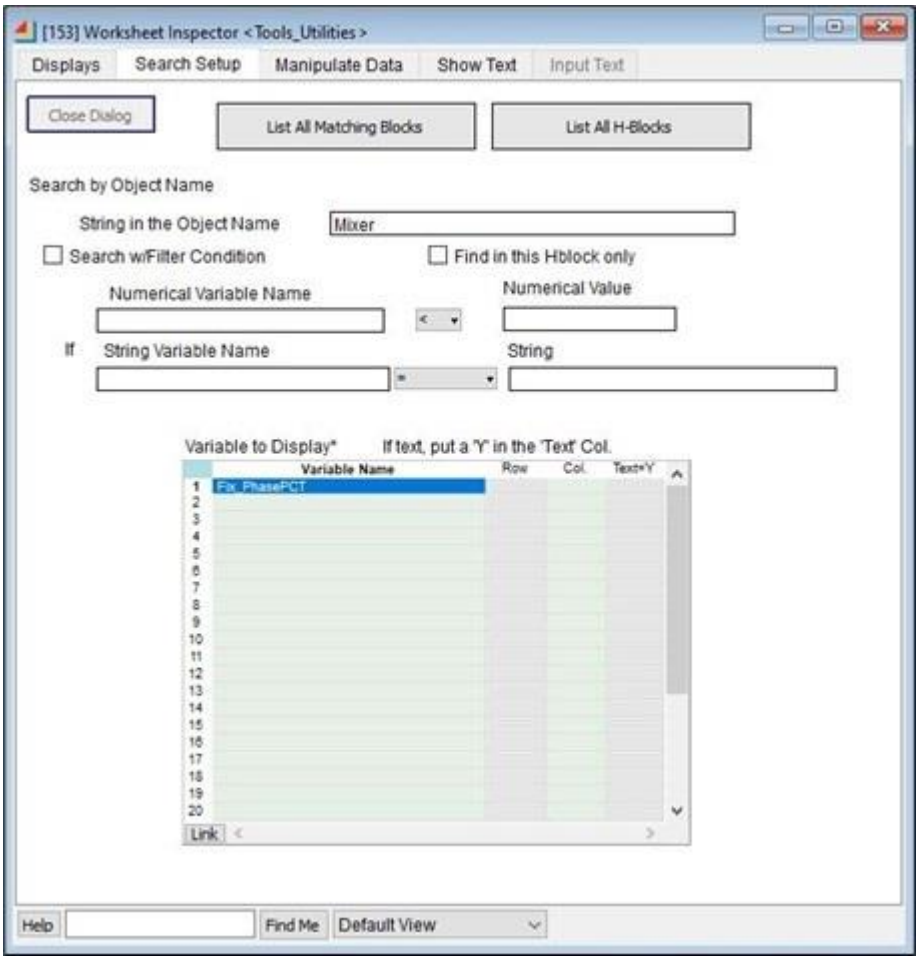


Figure 57: Worksheet Inspector Dialog Box Settings

Click on **List All Matching Blocks** and select the **Displays** tab, and you can see that all the mixer objects with *Fix_phasePCT* variable are listed in a table (see Figure 58).

Note: The other mixers show N/A as they are not using this particular dialog box. In the same way, we can list out any of the variables. Please refer to the **Worksheet Inspector** object *Help* document for further information.

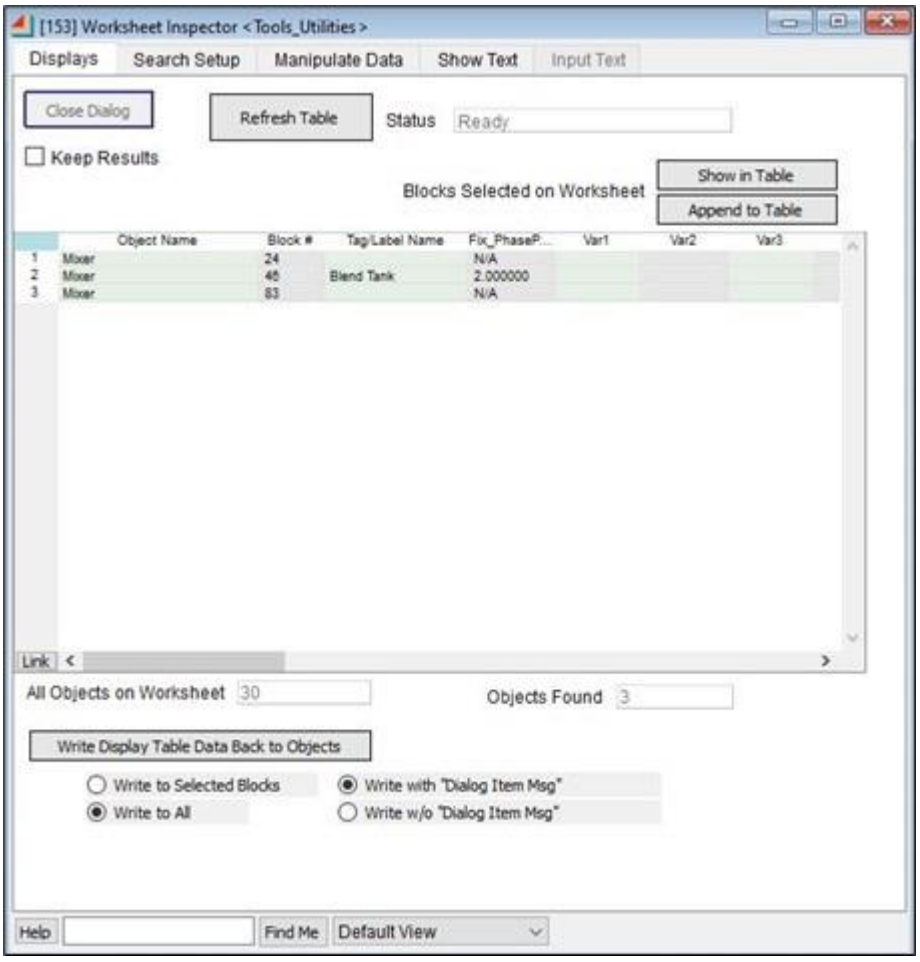


Figure 58: Worksheet Inspector Display Dialog

19.7 USING SCALAR TERMINATOR AND RECREATOR OBJECTS

These two objects are used to pass values to different locations without physical connection. The **Scalar Terminator** object is able write a value to a label and the **Scalar Recreator** object is able to read a value from a label. The **Scalar Terminator** object can be created from the **Scalar Reader** object from TOOLS library and the **Scalar Recreator** object can be created from the **Constant_c** object from the same library. For more details about the usage of **Constant** and **Scalar Reader** objects, refer to the help documentation.

19.8 WORKING WITH SCALAR TERMINATOR AND RECREATOR OBJECTS

Now, let us suppose we are interested to change the white water demand from other process from 250 to 300 gpm. To do this, first place a **Constant_c** object from TOOLS library below the **Sink** object. Open its dialog box and enter a value of *300* in the **Output Value** field under the **Input Data** tab.

Place a **Scalar Reader** object from the same library and place it near the new **Constant_c** object and connect it. Open the dialog box and go to the **Terminator** tab. Enter a label named *Flow_Other_Process* in **My Label** field and check the box *Use As Scalar Terminator*. The user can observe the object showing T upon it. Now, we are able to write a value into the label named *Flow_Other_Process*. See Figure 59 for details.

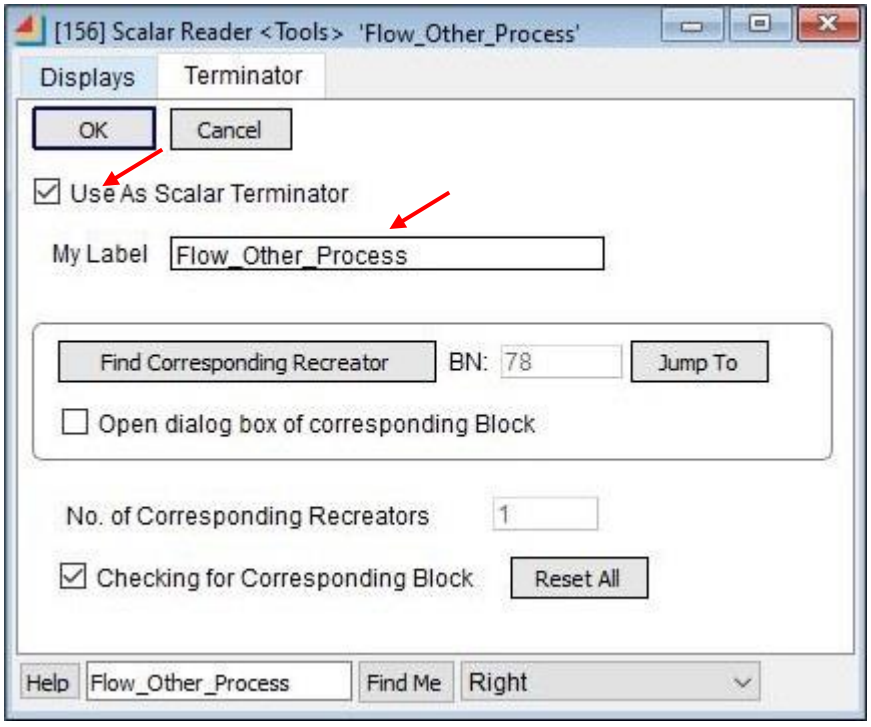


Figure 59: Scalar Reader, Terminator Tab

Now, create the **Scalar Recreator** object to read the value from the *Flow_Other_Process.* Open the other Constant_c dialog box connected to the Autoclave object, go to the **Recreator** tab, and type the same name (*Flow_Other_Process*) as defined earlier in the Scalar Reader's **Terminator** tab. Check the box called *Use As Scalar Recreator*. Observe the object showing R on it. Now, if you click on the button *Find Terminator, BN,* you will see the BN of the **Scalar Reader** object on successful linking. Be careful about the label name. If you mistype the label name, it will not find the BN. See Figure 60 for details.

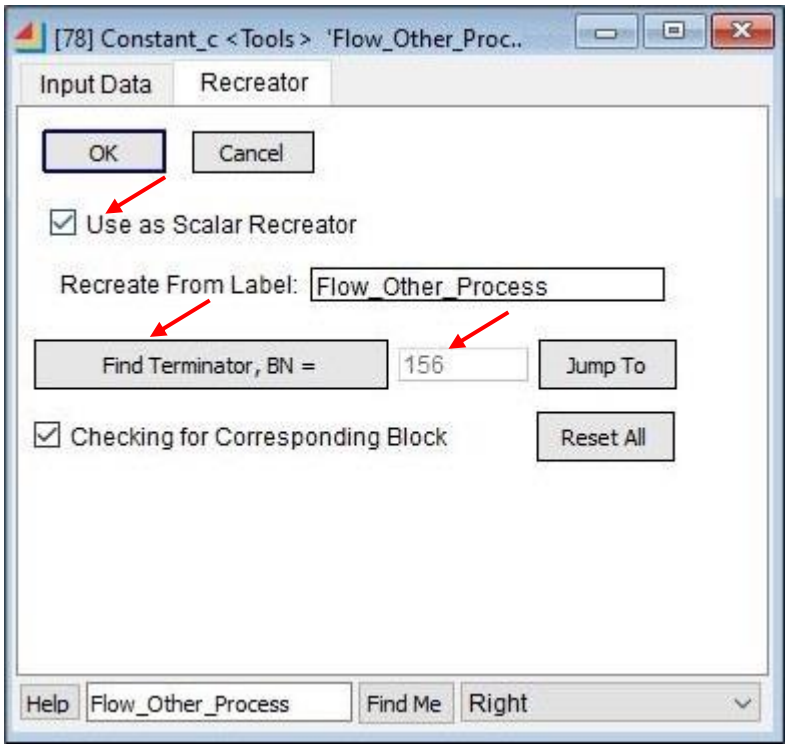


Figure 60: Constant_c, Recreator Tab

Run the simulation now and observe that the value is being reflected on the **Recreator** object, which is next to the **Sink** object. The details of the worksheet are shown in Figure 61.

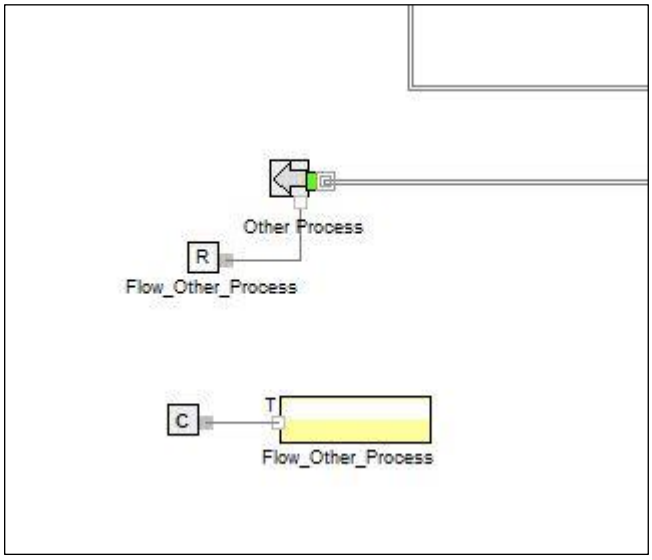


Figure 61: Scalar Terminator and Recreator Objects Usage

19.9 USING DATA TRACKER++ OBJECT

This object allows the user to select block variables to track. The user puts in the block label of the block containing the variable to track. A dropdown menu is generated with a list of variables from which to choose. This is a very useful tool to track the variables from the objects with the help of a plotter.

19.10PLACING DATA TRACKER++ OBJECT ON WORKSHEET

Place Data Tracker++ object from TOOLS_UTILITIES library onto the worksheet below the **Autoclave** object.

19.11WORKING WITH DATA TRACKER++ OBJECT

Let us explore the **Data Tracker++** object. First, we will make sure the separator used as the screening area is labelled “Screen” if it is not already labeled.

Now, open the dialog box of **Data Tracker++** object and go to **Displays** tab. Check the **Continuous Update** box. Go to **Read From** tab and make sure that “Inputs Directly from Objects” is selected in the dropdown, and enter the label name under the first two rows of the **From Block Label** column. A dropdown menu is generated with a list of variables under the **Variable Name** column. Select *F4_dialog* and *F5_dialog in the first and second rows*. Now, we are able to pull the values from the object to **Data Tracker++.** Go to **Displays** tab. It will list you the variable details. See Figure 62 for Read From details.

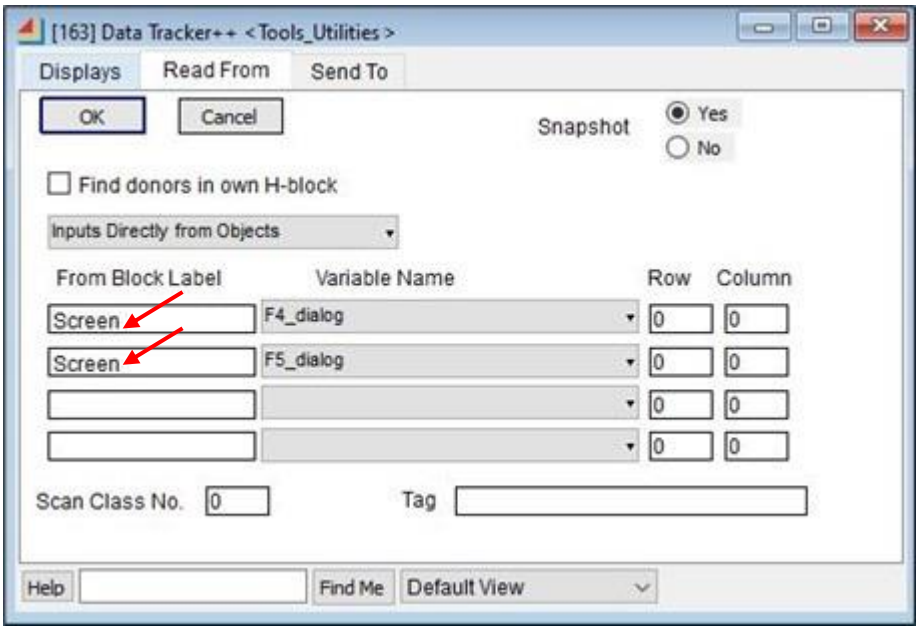


Figure 62: Data Tracker ++ Object Read from Tab

Now, add a **Plotter I/O Scan** object from the PLOTTERS library onto the worksheet near the **Data Tracker++** object. Connect the first *two outputs* of the **Data Tracker++** object to first *two inputs* of **Plotter I/O Scan** object. Run the simulation. Open the Plotter graph and observe (see Figure 63).

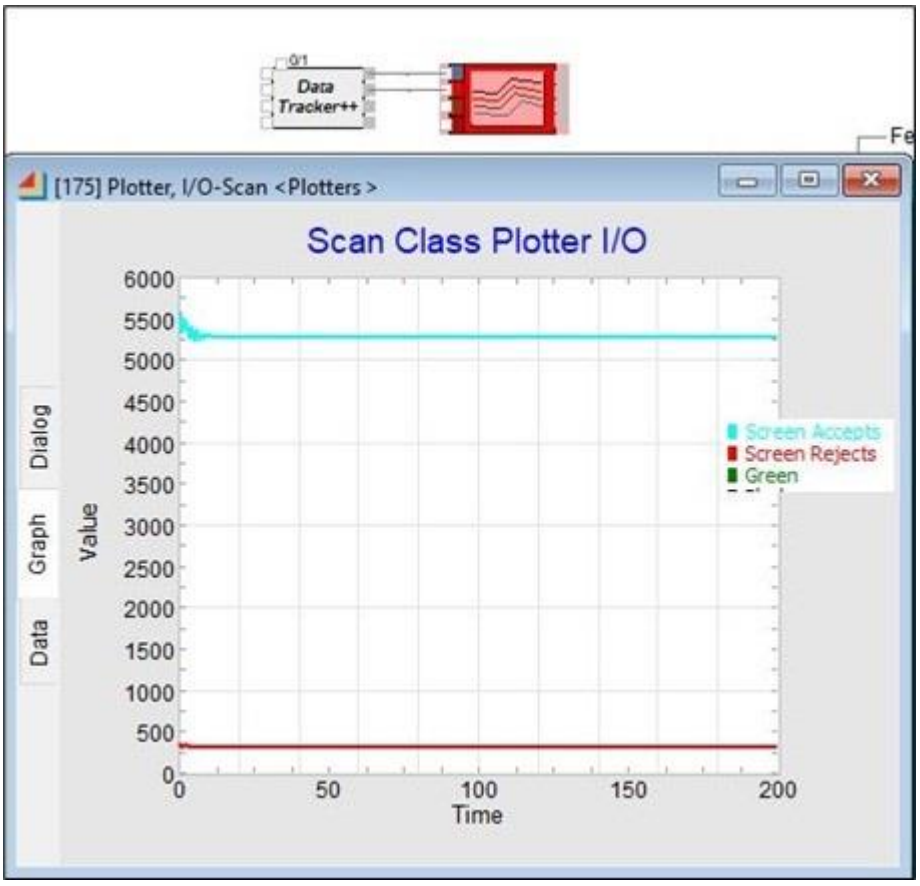


Figure 63: Data Tracker ++ Object Usage

This can also be used to send values directly to objects with or without connectors. For more information on the **Data Tracker++** object, refer to its *Help* document.

SECTION 20. ADVANCED TOPICS

Section Concepts:

There are some advanced tools in IDEAS that are particularly useful while running big steady-state models. We are going to discuss a few of them.

- Stream Exporter
- Scenario Importer

20.1 USING STREAM EXPORTER OBJECT

This object is used to export stream information from IDEAS model to an Excel worksheet. The user can also format the information that needs to be exported.

20.2 PLACING STREAM EXPORTER OBJECT ON WORKSHEET

Place a **Stream Exporter** object from the DYNAMIC DATA EXCHANGE library onto to the worksheet. Open the dialog box. Go to the **Stream Selection** tab and press the **Read available streams** button. It will list all the output streams into the table. Enter 1 in the field next to **Set sheet # to** button. Now press **Set sheet # to** button. The user can see that the rows under column named **sheet#** set to 1. That means all the information is to be exported to the sheet number that is entered in the field next to the button. There are several options available. Refer to the help text documentation for details.

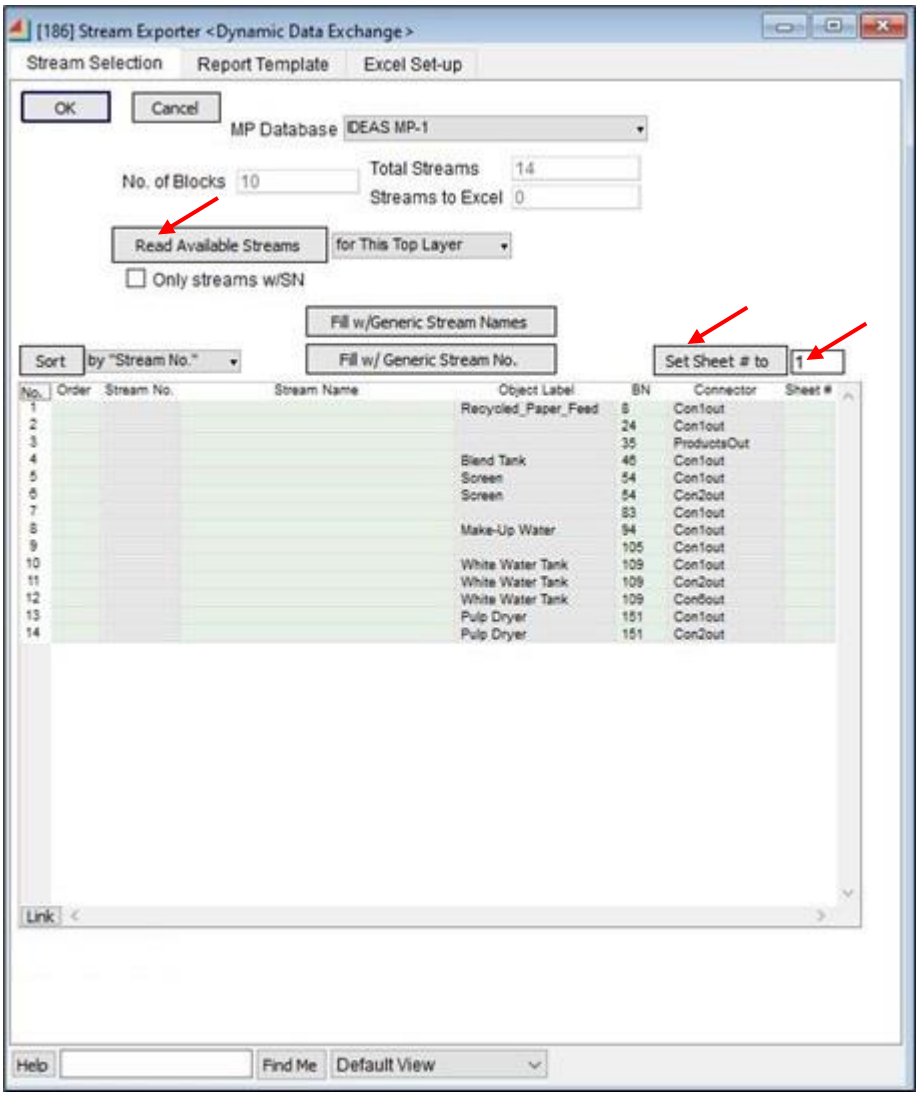


Figure 64: Stream Exporter, Stream Selection Tab

Now, go to **Report Template** tab. There are several options to format the stream information, which need to be sent to an Excel sheet. Leave it as it is. Now, move on to the **Excel Setup** tab. Click on **Select Excel File** button and select an excel file named as *Pulp_Mill_StreamExport* to which the information are to be exported.

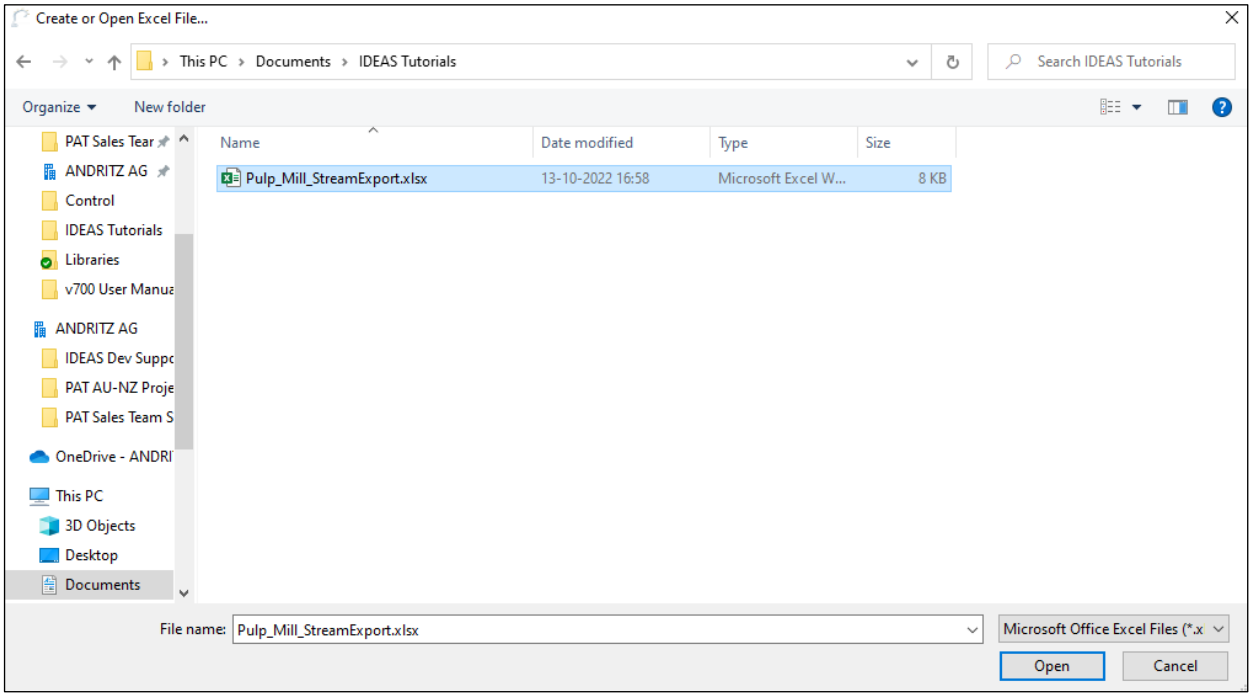


Figure 65: Creating Excel File

There is an option called ***Write Data @ Sim. End***, which when checked the Excel file will be written at the end of the simulation. Press **OK** to accept the changes.

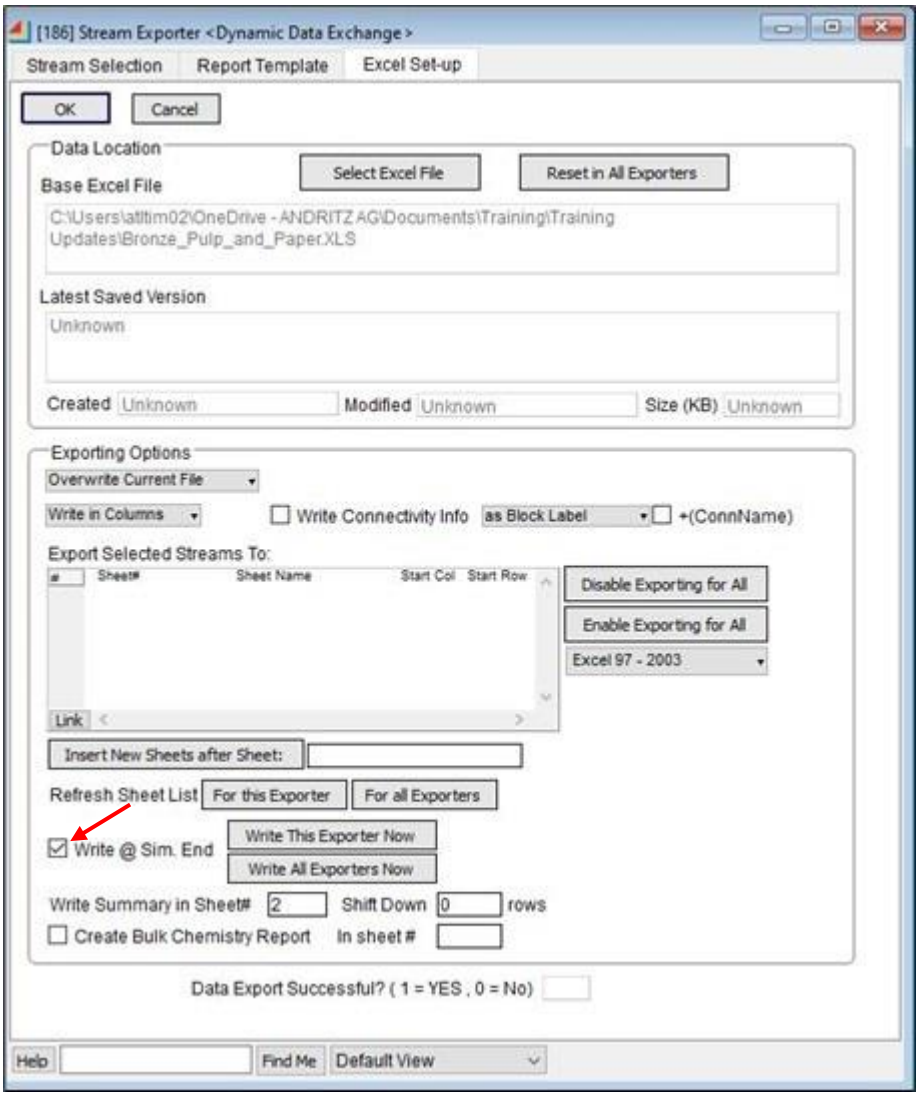
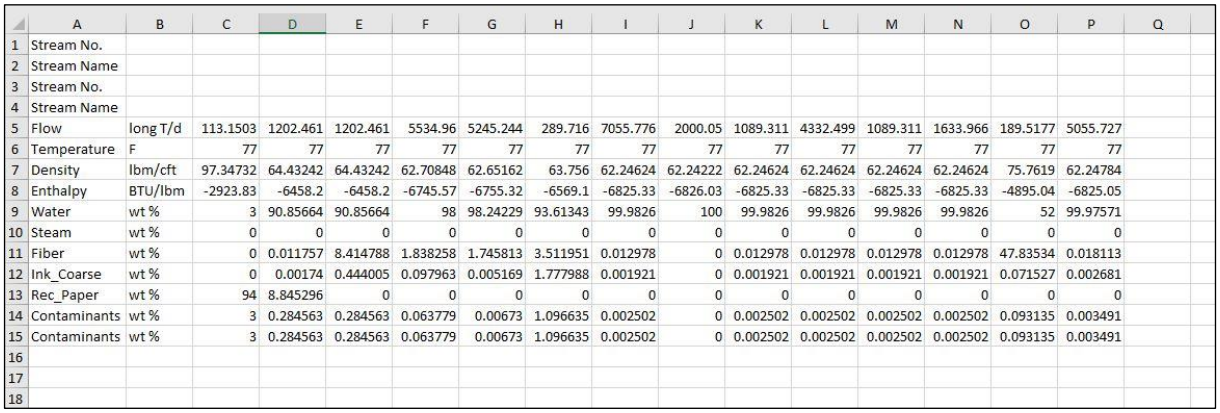


Figure 66: Stream Exporter, Excel Setup Tab

Now run the simulation. After the simulation ends, go to the location of the Excel file and open it. It looks like the one in Figure 67.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Stream No.																
2	Stream Name																
3	Stream No.																
4	Stream Name																
5	Flow	long T/d	113.1503	1202.461	1202.461	5534.96	5245.244	289.716	7055.776	2000.05	1089.311	4332.499	1089.311	1633.966	189.5177	5055.727	
6	Temperature	F	77	77	77	77	77	77	77	77	77	77	77	77	77	77	
7	Density	lbm/cft	97.34732	64.43242	64.43242	62.70848	62.65162	63.756	62.24624	62.24222	62.24624	62.24624	62.24624	62.24624	75.7619	62.24784	
8	Enthalpy	BTU/lbm	-2923.83	-6458.2	-6458.2	-6745.57	-6755.32	-6569.1	-6825.33	-6826.03	-6825.33	-6825.33	-6825.33	-6825.33	-4895.04	-6825.05	
9	Water	wt %	3	90.85664	90.85664	98	98.24229	93.61343	99.9826	100	99.9826	99.9826	99.9826	99.9826	52	99.97571	
10	Steam	wt %	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
11	Fiber	wt %	0	0.011757	8.414788	1.838258	1.745813	3.511951	0.012978	0	0.012978	0.012978	0.012978	0.012978	47.83534	0.018113	
12	Ink_Coarse	wt %	0	0.00174	0.444005	0.097963	0.005169	1.777988	0.001921	0	0.001921	0.001921	0.001921	0.001921	0.071527	0.002681	
13	Rec_Paper	wt %	94	8.845296	0	0	0	0	0	0	0	0	0	0	0	0	
14	Contaminants	wt %	3	0.284563	0.284563	0.063779	0.00673	1.096635	0.002502	0	0.002502	0.002502	0.002502	0.002502	0.093135	0.003491	
15	Contaminants	wt %	3	0.284563	0.284563	0.063779	0.00673	1.096635	0.002502	0	0.002502	0.002502	0.002502	0.002502	0.093135	0.003491	
16																	
17																	
18																	

Figure 67:Stream Export Excel File

20.3 USING SCENARIO IMPORTER OBJECT

This object is used to import data from the Excel sheet to the variables in the objects of the IDEAS model. The user can also define a number of scenarios in the excel sheet and run them in the IDEAS model simultaneously.

20.4 CREATING SCENARIOS IN THE EXCEL SHEET

Let us suppose we would like to run the simulation for three different production rates and other process demands from the white water tank.

Create an Excel sheet and name it as *Pulp_Dryer_ScenarioImporter*. Enter the information as shown in the Excel sheet (see Figure 68). The Column C contains labels. Column E contains IDEAS tags. The starting name should be IDEAS:tags and Ending name is IDEAS:tagsEND to mark the end of tags. In between these two are IDEAS tags. The syntax appears as IDEAS:1;<BN>;<variablename>;0;0. Column F contains Scenario 1 named as SC1. Below SC1, there are some values. These are for the variable tags mentioned in Column E. Save the Excel sheet and close it.

	A	B	C	D	E	F	G	H	I
1									
2									
3					IDEAS:tags	SC1	SC2	SC3	
4			Production Rate BDT/d		IDEAS:1;137;Setpoint_Dialog;0;0	90	110	120	
5			Other Process Demand gpm		IDEAS:1;154;Output_dialog;0;0	200	350	400	
6					IDEAS:tagsEND				
7									
8									

Figure 68: Excel file with Scenarios

20.5 PLACING SCENARIO IMPORTER OBJECT ON WORKSHEET

Place a **Scenario Importer** object from the DYNAMIC DATA EXCHANGE library onto the worksheet. Open the dialog box. Go to the **Setup** tab and press the **Select Excel File** button. Select the file that is created in the previous step. Check the box called *Run series of N scenarios* to run all the scenarios simultaneously and enter a value of 3 in the *Scenarios to Run* field. Now move on to the **Import Variables** tab and click on the **Import All tags** button to get the tag details from the excel file. A dialog box opens. Click **OK** to accept. It will list you the sheet number, name, and the rows and columns that the tags are present. Change simulation time to 500 and Run the simulation. Observe the values for each scenario in the Displays tab of this object. The Displays tab is as shown in Figure 69.

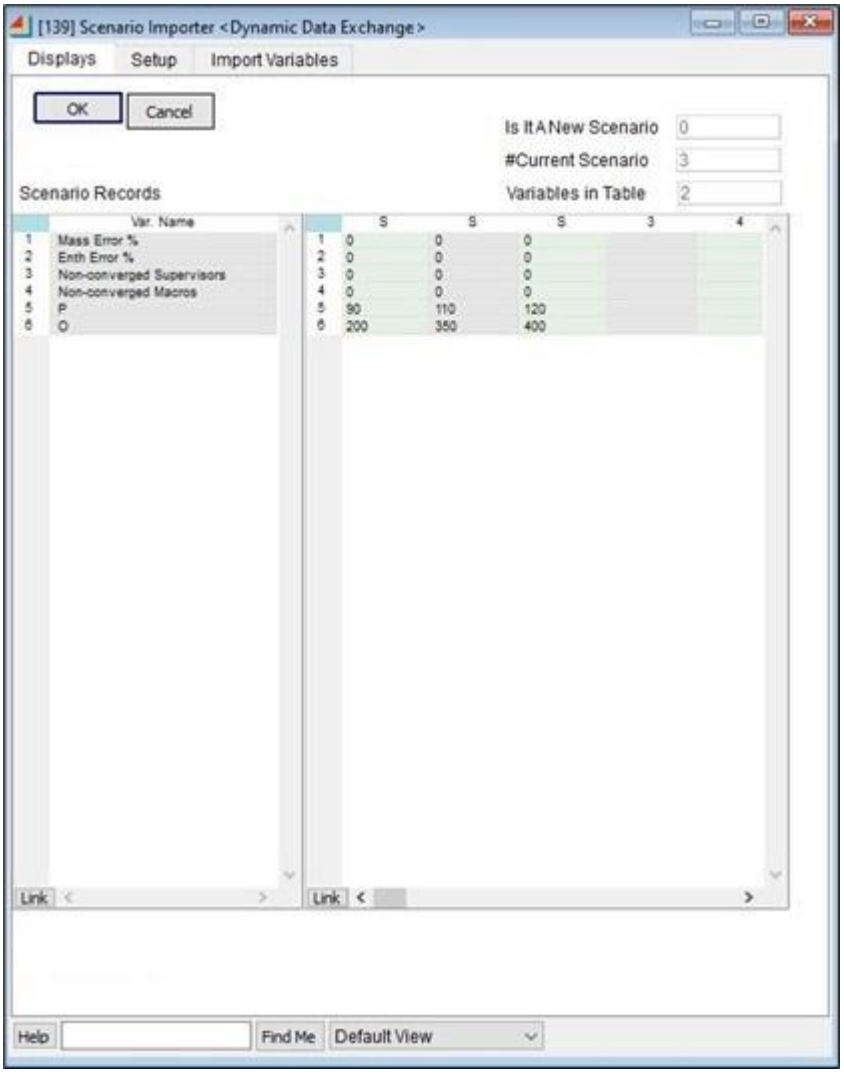


Figure 69: Scenario Importer, Displays Tab

Congratulations! You have finished your first steady-state model using IDEAS. This tutorial was designed to introduce you to IDEAS, not to make you an expert in each of the objects used. Please review the help text for each object as well as the documentation for all of the libraries to understand the various options chosen in the dialog boxes for this tutorial. Remember to set up your models for maximum flexibility as designing models does not simply mean that you copy a process flow diagram. Leave some room on your worksheets for model expansion and document your choices of important dialog box entries (either directly on the model by typing in text or by preparing a separate document). Happy Modeling!

This is the end of IDEAS Bronze P&P Tutorial. We hope you have found this material helpful in learning how to use the IDEAS Simulation Software. Another tutorial, the IDEAS Gold tutorial, is also available to assist you in your learning.

This tutorial is meant to provide a basic introduction to the IDEAS Simulation Software.

ANDRITZ Inc. also offers standard and customized software training classes.
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