7.1 What is a Resource?

Pro-Designer considers as resources the following:

- Ingredients (Raw Materials)
- Power
- Heat Transfer Agents
- Labor

During the processing of a batch all of the above resources need to be shared amongst operations. Since all of the above resources are of limited availability and cannot exceed certain consumption limits, it is imperative that we do not violate any of those limits. There can be two types of limitations on the use of resources:

- Rate Limits
- Total Consumption Limits

Pro-Designer currently reports the total consumption of each of the above resources in the reports. Therefore it is easy to identify limit violations of the second type above. In order to verify that the current batch execution plan does not violate any rate limitations (or to see how close we come to the limit) Pro-Designer presents a graph that displays the utilization of each of the above resources as the batch progresses. Since in practice, the initiation of a second batch does not wait until the finish of the first batch is recorded, we must also check that the resource rate and consumption constraints do not get violated when multiple overlapping batches are being executed.

7.2 Ingredients

Components or stock mixtures that are used in feed streams in a design case are considered ingredients or raw materials whose consumption is to be tracked. The consumption and costs associated with raw materials are reported in the economic reports. The list of raw materials is automatically composed by Pro-Designer to reflect the current status of the design case.
To view or edit the data associated with a raw material, bring up the **Ingredients Currently in Use** dialog that appears when you select the **Edit / Flowsheet Options / Ingredient Cost and Inventory Data...** option from the main menu or just the **Ingredient Cost and Inventory Data...** option from the flowsheet context menu. To view or edit the properties of an ingredient, you should click on the ingredient's index column to select it and then press the **Edit...** button. Alternatively you can double-click on the ingredient's index column. The dialog that comes up contains the ingredient's data organized in three tabs.

The **Properties Tab** lets you define the ingredient's cost. Note that the same value is editable through the registered component or stock mixture properties dialog (see Chapter 3.)

The **Availability Limits Tab** lets you define bounds on consumption of this ingredient. There are two types of limits: rate limits (instantaneous or time-averaged over a user-defined time span) and cumulative limits over a user-defined time span. Upon request, these limits will be plotted on the resource consumption charts (see Section 7.6) so that you can compare them against the actual consumption.

The **Inventory Data Tab** lets you define storage and supply data for this ingredient that, in turn, will be used to calculate the inventory chart lines (see Section 7.7.)

7.3 Power

Electric power requirements are defined by the user or calculated by the program for every operation that needs electricity. Auxiliary power can also be specified for each operation and section to account for needs not accounted for by the operations models or is operation-independent. To set the auxiliary power for an operation, go to the **Labor, Etc.** tab of the operation's i/o simulation dialog (see Chapter 5.) When auxiliary power is specified for an operation, the provided value is not used in energy balances. It is only used to calculate the total power consumption and the operating cost of that operation (and the associated equipment.) The cost of power is set on a section basis through the **Utilities Tab** in the Section Operating Cost Adjustments dialog (see Chapter 8.) In the same tab you can specify additional power requirements at a section level for unlisted equipment, general usage etc.

7.4 Heat Transfer Agents

In every operation that involves a heat exchange between the material being processed and its environment, it is assumed that the actual heat transfer is being carried out with the help of a heat transfer agent (cooling agent or heating agent). For example, a coolant flowing in and out of a reactor's jacket typically does the cooling of a reactor where an exothermic reaction takes place. Elsewhere in a design case, a process stream may need to be heated up to a given temperature. Most often, the heater employed to carry out the given task will supply the heat from steam available from the high-pressure steam line of the utility support plant. Of course, such heat transfer agents are available at a limited supply and at given cost. The association of a heat transfer agent with every heating/cooling requirement across the whole design case allows the system to account not only for the cost of such utilities but also to present a table with the requirements of each heat transfer agent (see Chapter 11.)

Auxiliary utilities can also be specified for each operation to account for any cooling or heating consumption that is not currently computed by the simulation model. To set the auxiliary utilities for an operation, go to the **Labor, Etc.** tab of the operation's i/o simulation dialog (see Chapter 5.) When auxiliary heating and cooling are specified, the provided values are not used in heat balances. They are only used in calculating the total utility consumption and the operating cost of that operation (and the associated equipment.)

In selecting a heat transfer agent for an operation, you can choose from a list of generic-type agents defined in the databanks or, for operations belonging to allocated sections (see Chapter 5), from the corresponding site utilities. The Designer databank maintains a (currently limited) list of options for heat transfer agent types. To review the list of such available agents, select **Databanks/Heat Transfer Agents...** from the main menu (or hit **F3** as a shortcut.) The following dialog (Figure 7.1) appears:

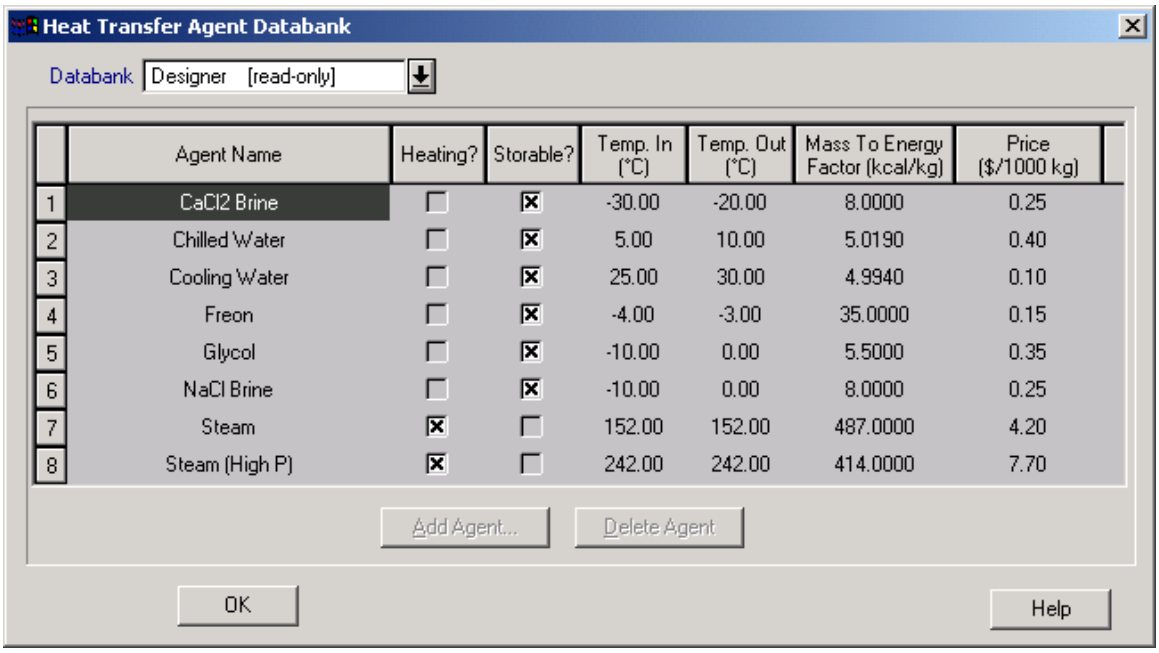

Figure 7.1: The heat transfer agent databank.

In the User databank, you can extend the list of available agents by clicking on the **Add Agent…** button and filling in the information requested about the new agent. Changes made in the heat transfer agent databank do not affect existing design cases or other parts of the databank even if the edited heat transfer agents are used as the basis for utilities declared in a site. Note, however, that you will not be able to delete from the User databank heat transfer agents used as site utilities; the site utilities will have to be removed first. If you want to apply changes to your current design case, you can use the **Heat Transfer Agents Currently in Use** dialog (see section 7.4.2).

7.4.1 Site Utilities

To add, edit or delete heat transfer agents declared as utilities in sites, select **Databanks/ Sites and Resources...** from the main menu. The dialog that comes up is the one described in Section 5.4.4. With the help of context-specific pop-up menus that get activated when you right-click on the relevant tree node, you can edit the site utility list as follows:

➔ To add a new site utility...

After selecting the desired site from the site tree, right-click on the **Utilities** node in the resource tree and from the menu that pops-up select the **Add Utility…** item. You will be presented with the dialog shown in Fig. 7.2.

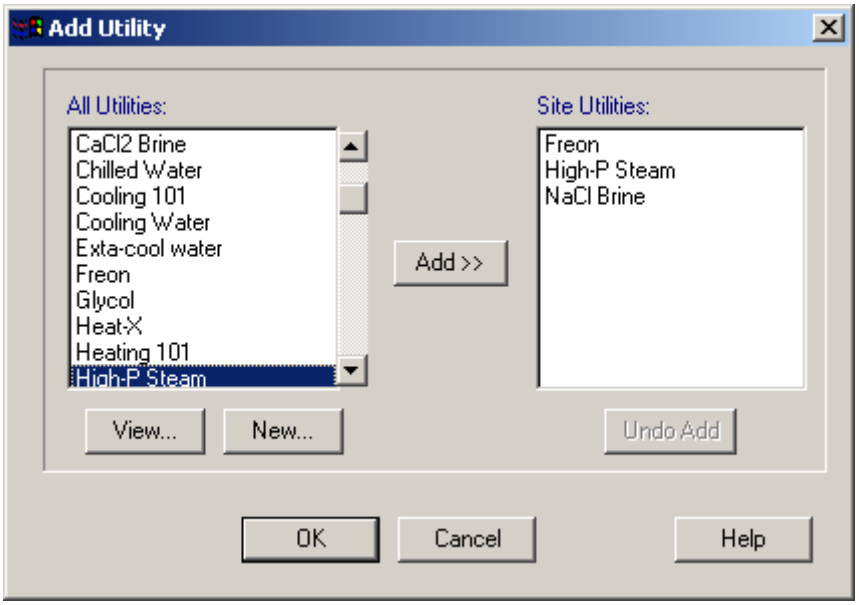

Figure 7.2: Dialog for adding a new site utility.

The left-hand-side list in this dialog contains all generic heat transfer agents as declared in the Designer and User databanks. The right-hand-side list contains the ones defined for the edited site. You can use the **Add >>** button to add a new utility in the site or the **New…** button to introduce a new utility in the User databank and then add it to the site list.

➔ To edit utility data...

After selecting the desired site from the site tree, right-click on the desired utility in the resource tree and from the menu that pops-up select the **Edit Utility Data…** item. A description of the dialog that comes up and the data it contains is given below in the next Section.

If a section is allocated to a site then available to operations of this section are not only utilities of this site but of its parent sites as well. This implies that if there is a central utility plant in a site then all produced utilities are available to all sub-facilities within that site.

Changes made in site utilities affect existing design cases (opened or closed at the time of the modification) that contain sections that use them. Pro-Designer requires that open design cases are consistent with the currently available databanks. Therefore, all

changes done in the site utilities databank will automatically be propagated to open design cases even if de-allocation (i.e. substitution with generic-type utilities) is needed to maintain consistency. Such changes could affect both material balances as well as economic results so re-solving might be needed for all affected design cases.

7.4.2 Agent Properties

The parameters of a heating/cooling agent as shown in the heat transfer agent databank are the default parameters that are used the first time any of the processing steps in your design case employs that heating/cooling agent. If you decide to use different values for your specific design case, then you can adjust those parameters *without affecting the default values of the agent in the databank*, by bringing up the **Heat Transfer Agents Currently in Use** dialog that appears when you select the **Edit / Flowsheet Options / Heat Transfer Agents...** option from the main menu, or just the **Heat Transfer Agents...** option from the flowsheet context menu. . The dialog that pops up displays a list with all heat transfer agents currently employed by the design case (Fig. 7.3).

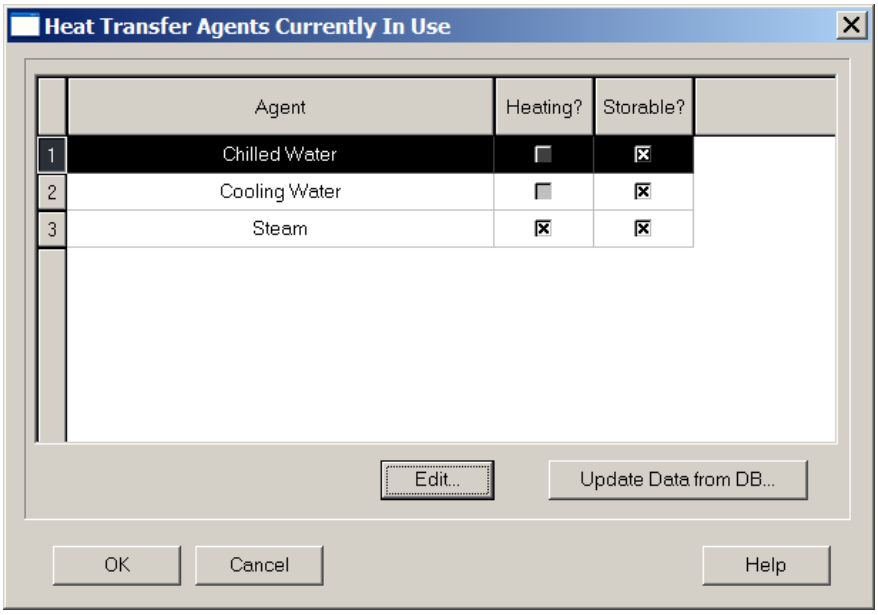

Figure 7.3: The heat transfer agents in use dialog

To view or edit the properties of a heat transfer agent, you should click on the agent's index column to select it and then press the **Edit...** button. Alternatively you can double-click on the agent's index column. The dialog that comes up contains the agent's data organized in three tabs. Changes made in the heat transfer agent through this dialog will only affect this design case, they will not be stored in the Heat transfer Agents Databank. If you want the agent in this design case to take up the properties of the agent in the databank (in case they are different) select the agent by clicking on the agent's index column and press the **Update Data from DB…** button.

The **Properties Tab** lets you define the type of the agent (heating or cooling), the temperature at which the agent is available from the utilities support plant and the temperature at which it should be returned to the utilities plant and the cost charged for

the use of this agent in ¢/1000 kg. Note that only through the databank you can change the type of an agent and, as mentioned before, even if you do that, that change will not affect design cases that make use of this agent.

The **Availability Limits Tab** lets you define bounds on consumption of this agent. There are two types of limits: rate limits (instantaneous or time-averaged over a user-defined time span) and cumulative limits over a user-defined time span. Upon request, these limits will be plotted on the resource consumption charts (see Section 7.6) so that you can compare them against the actual consumption.

The **Inventory Data Tab** lets you define storage and supply data for this agent that, in turn, will be used to calculate the inventory chart lines (see Section 7.7.) This Tab is displayed only when the heat transfer agent has been defined to be storable. This is done by editing the corresponding check box in the **Heat Transfer Agents Currently in Use** dialog. No inventory charts can be created for non-storable agents.

Note that, for site utilities, data in the **Properties** and **Availability Limits Tab** are not editable through the **Heat Transfer Agents Currently in Use** dialog. The reason is that site utilities could be shared by different design cases and only through the site databanks their properties can be modified. To edit those values, you will need to visit the sites databank through the **Databanks/Site and Resources** menu item as explained before.

7.5 Labor

Every operation requires labor to be carried out. The specification of labor requirements for every operation is done through the **Labor etc.** tab. Labor requirements can also be defined on a section basis for operation-independent tasks (see Chapter 8 for details.)

In selecting a labor type for an operation or section, you can choose from a list of generic-type labor defined in the databanks or, for operations or sections carried out in allocated sites (see Chapter 5), from the corresponding site labor.

The Designer databank maintains a (currently limited) list of options for labor types that can be employed in any given processing step. To review the list of available labor types, select **Databanks/Labor...** from the main menu (or hit **ShiftF3** as a shortcut.) The following dialog (Figure 7.4) appears:

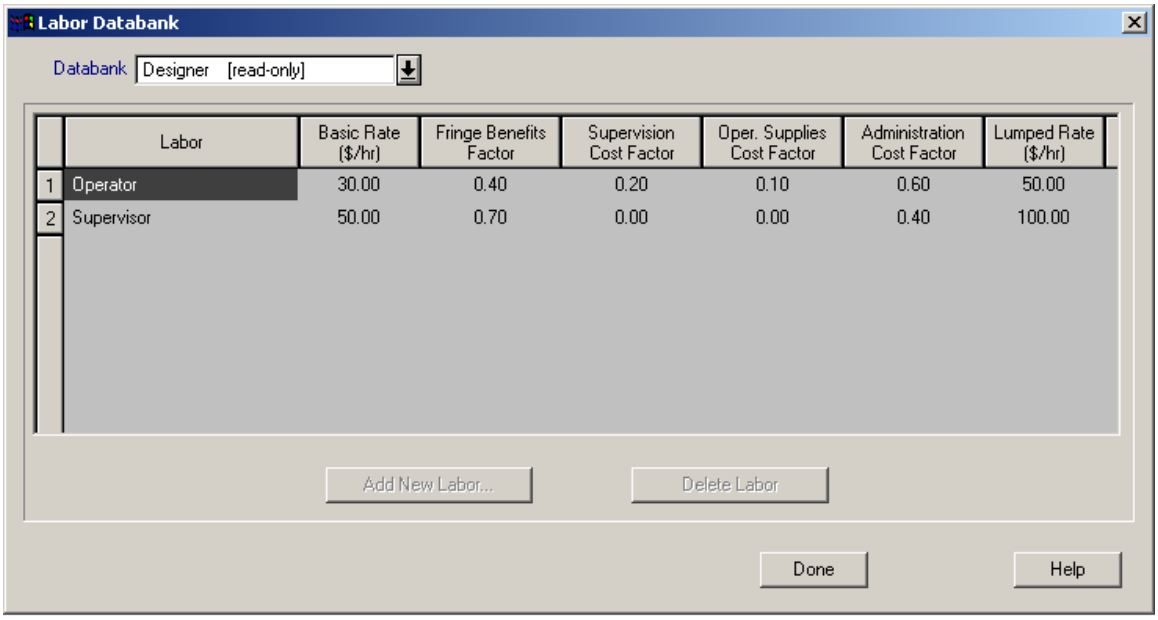

Figure 7.4: The labor databank.

In the User databank, you can extend the list of available labor types by clicking on the **Add New Labor…** button and filling in the information requested about the new type. Changes made in the labor databank do not affect existing design cases or other parts of the databank even if the edited labor types are used as the basis for declaring site labor or staff. Note, however, that you will not be able to delete from the User databank labor types used as site labor; the site labor will have to be removed first.

7.5.1 Site Labor

To add, edit or delete labor declared in sites, select **Databanks/ Sites and Resources...** from the main menu. The dialog that comes up is the one described in Section 5.4.4. Within a site you can define both labor types, collectively referring to a group of people with common responsibilities and cost, or specific *staff* of given type. If site staff is chosen within a design case to perform an operation-specific or section-specific labor task, the interpretation is that this task is to be carried out by a specific person. Staff can only be defined inside the site databank (and not the generic-type labor databank.)

With the help of context-specific pop-up menus that get activated when you right-click on the relevant tree node, you can edit the site labor list as follows:

➔ **To add a new site labor type...**

After selecting the desired site from the site tree, right-click on the **Labor** node in the resource tree and from the menu that pops-up select the **Add Labor…** item. You will be presented with the dialog shown in Figure 7.5.

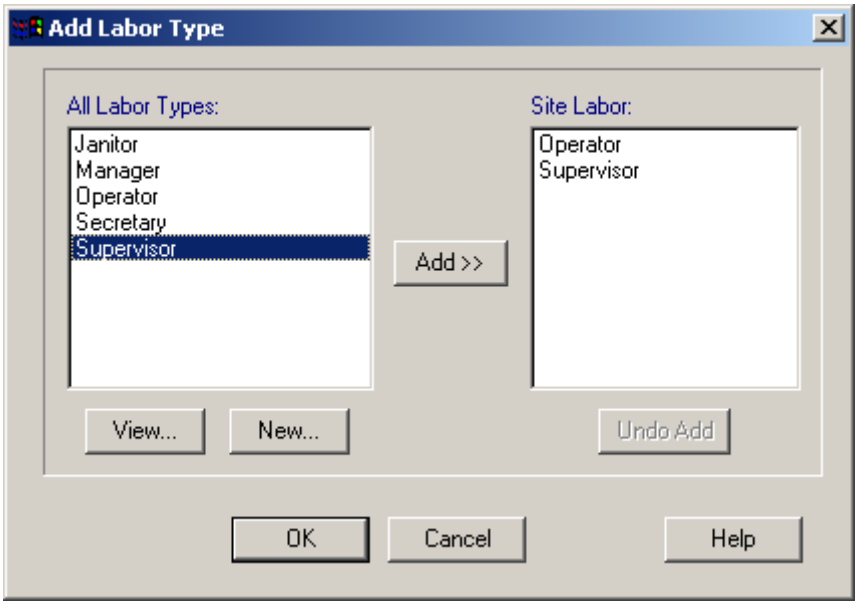

Figure 7.5: Dialog for adding a new site labor type.

The left-hand-side list in this dialog contains all generic labor types as declared in the Designer and User databank. The right-hand-side list contains the ones defined for the edited site. You can use the **Add >>** button to add a new labor type in the site or the **New…** button to introduce a new labor type in the User databank and then add it to the site list.

➔ To edit site labor data...

After selecting the desired site from the site tree, right-click on the desired labor type in the resource tree and from the menu that pops-up select the **Edit Labor Data…** item.

➔ To add new site staff...

After selecting the desired site from the site tree, right-click on the labor type where the new staff will belong and from the menu that pops-up select the **Add Staff…** item.

➔ To edit staff data...

After selecting the desired site from the site tree, right-click on the desired staff and from the menu that pops-up select the **Edit Staff Data…** item.

If a section is allocated to a site then available to operations of this section are not only labor types and staff of this site but of its children sites as well.

Changes made in site labor affect existing design cases (opened or closed at the time of the modification) that contain sections that use them. Pro-Designer requires that open design cases are consistent with the currently available databanks. Therefore, all changes done in the site labor databank will automatically be propagated to open design cases even if de-allocation (i.e. substitution with generic-type labor) is needed to

maintain consistency. Such changes could affect economic results so re-solving might be needed for all affected design cases.

7.5.2 Labor Properties

The parameters for labor as shown in the labor databank are the default parameters that are used the first time any of the processing steps in your design case employs that labor type. If you decide to use different values for your specific design case, then you can adjust those parameters *without affecting the default values in the databank*, by bringing up the **Labor Currently in Use** dialog that appears when you select the **Edit / Flowsheet Options / Labor...** option from the main menu. The dialog that pops up displays a list with all labor types currently employed by the design case. To view or edit the properties of a labor type, you should click on the corresponding index column to select it and then press the **Edit...** or **View...** button. Alternatively you can double-click on the labor's index column. The dialog that comes up contains the labor data organized in two tabs. If you want a labor in this design case to take up the properties of the same labor in the databank (in case they are different) select the labor by clicking on the labor's index column and press the **Update Data from DB…** button.

The **Properties Tab** lets you specify economic data that will be used to calculate the labor cost per hour. These data include a basic rate (in $/hr) along with benefits, supervision, operating supplies and administration factors, or a comprehensive lumped rate (in $/hr). The selection of what option (itemized or lumped) to use is done at the section level of every design case so it is recommended that you provide meaningful values for all cost data.

The **Availability Limits Tab** lets you define bounds on the availability of this labor type. There are two types of limits: rate limits (instantaneous or time-averaged over a user-defined time span) and cumulative limits over a user-defined time span. Upon request, these limits will be plotted on the resource consumption charts (see Section 7.6) so that you can compare them against the actual labor need. Note that for staff there is an inherent availability rate limit of 1 labor-hr/hr and a cumulative limit that cannot exceed its defined time span, e.g. a person cannot deliver more than 24 labor hours within a day.

Site labor and staff data are not editable through the **Labor Currently in Use** dialog. The reason is that site labor could be shared by different design cases and only through the site databanks their properties can be modified. To edit those values, you will need to visit the sites databank through the **Databanks/Site and Resources** menu item. As with site utilities, if site labor data are modified, changes are propagated to all open design cases that use them in order to maintain consistency with the databank.

7.6 Resource Charts

Resource tracking refers to the plotting in time (during the execution of a batch) of the consumption rate of any resource (see previous sections). For resources, such as raw materials heat transfer agents, which are received and stored and used by the process the inventory of the resource can also be tracked. This chart can be viewed by selecting

View / Resource Consumption Tracking Chart / <a Resource> or **View / Resource Inventory Chart / <a Resource>**.

The visual attributes of any resource-tracking chart depend on its style. You can edit any of the style's features:

a. Before you view the graph: From the flowsheet's context menu, select **Preferences / Default Styles / <a type of resource chart>** …
b. While the chart is up: From the chart's context menu, select **Edit Style…**

Either way, you will be presented with the Resource Style Dialog. Note that besides visual attributes, you can also select in that dialog the units of measure that you wish to see the resource rate (from a set of available options). For more on the resource chart dialog see next section.

Any chart can be copied and pasted into another Windows application using the clipboard or using the metafile format. If a more detailed view along the time axis is important, you can switch out of the 'Fit-to-Mode' option and specify your own time minor / major increments. Finally, you may also use the zoom-in and zoom-out feature to further inspect the details of a resource tracking chart.

You can choose to display the resource tracking chart for a single batch or multiple consecutive batches. The second option may be of interest when there is batch overlapping (i.e., the second batch starts before the first is finished, or in other words, when the cycle time is less than the batch time). To display the resource tracking chart for multiple batches, select **View / Resource Tracking Chart / <aResource> (Multiple Batches)…**.

Tip

The number of batches that Pro-Designer displays when the multiple batches Gantt Chart first comes up is determined so that all future batch starts will show a pattern that is already included in the chart (shifted by some time offset). This number is computed from the following formula:

Nbatces = [BT / CT] + 1 , where

BT is the batch time of the recipe,

CT is the cycle time of the recipe and

[ ] indicates taking the next integer value of the number in the brackets

You may, of course, change the number of batches shown at any time, by selecting the **Set Number of Batches** from the context menu of the chart.

7.6.1 Exporting the Chart as a Picture

You can export the chart (as a picture) from Pro-Designer into another Windows applications (e.g. a word processor like MS-Word, or a graphics package like MS-PowerPoint). The export can happen with one of two ways:

To copy the Resource Tracking Chart using the Clipboard…

1. Bring up the resource tracking chart
2. Select **Copy...**
   From the chart's context menu, select **Copy**. Note that the resource chart's interface does not have a main menu so the only way to issue the Copy command is from the context menu.
3. **Go to target application and select Paste**.
   Activate the application that you would like to paste the chart picture. From the application's **Edit** menu select **Paste**. Note that **Paste Special...** and the options available to OLE items does not apply to charts; they can only be pasted (not paste-linked) as pictures.

To copy the Resource Tracking Chart as a Metafile ('wmf' file)…

1. Bring up the chart.
2. **Select Export as Metafile**
   From the chart's context menu select **Export Chart as Metafile…**.The usual **Save As...** file dialog will appear, prompting you to type the name of a file. Type in the filename that you wish to contain the description of the flowsheet in ´wmf´ format. By convention, all such files should have a ´wmf´ extension. The file need not already exist. In fact, if the program discovers that a previous file exist with the same name and in the same location on your hard disk, it will ask for your permission to overwrite it
3. **Go to target application and import the picture**
   After you have typed in the file name and clicked **OK**, wait a few seconds as the program will be creating the file and writing in it the necessary metafile-formatted description of the chart. When this process is done, you can go to the target application and import the file you have just created. For details on how to do that consult your applications manual or browse through their help utility.

7.6.2 Exporting the Scheduling Data into Excel

You can export all the scheduling information contained in a chart (i.e. all information around every procedure and/or equipment) into a file that can be read immediately by Excel (or other leading spreadsheets). Select **Export Scheduling Data to Excel...** from the chart's context menu; in the ensuing dialog specify the pathname of the file that will contain the scheduling data. Then click on **OK**. You can now start Excel and open this file directly from Excel. When you open the file from Excel you may have to adjust the widths of the columns slightly in order to view all contents of the file (without overlapping).

7.6.3 Printing the Chart

All charts can be printed directly print from Pro-Designer by right-clicking on the chart and selecting "Print Chart". Alternatively, you can simply copy and paste the chart into

a word processing application (like MS-Word) or any other application and print it from there.

7.6.4 Zooming In and Out

When the a chart interface first comes up, it is set into **'Fit-to-Window'** mode, which means that the entire time horizon needed to describe the whole chart has been scaled down appropriately in order to fit into your window's width. If the maximum time that needs to be displayed is very large, or if the settings for minor/major scale and tickmark frequency for the time line are very small, the timeline may NOT display all minor and major tickmarks as expected. Therefore, some details along the time axis may have been omitted. In order to see the timeline spread out as expected you must switch out of 'Fit-to-Window' mode. Simply right-click on an unoccupied area of the graph and invoke the context menu for the chart. Notice that the **Fit-to-Window** entry has a checkmark in front of it, indicating that currently the contents of the chart are scaled down so that they can fit your window's width. If you select **Fit-to-Window** option once more, then it will turn the Fit-to-Window mode off and will display the timeline according to the timeline specifications. This may result in pushing the right end of your graph off the visible area of your window, so you may need to scroll to the right in order to see the rest of the graph. If further details need to be viewed in a chart, you may further expand the time scale by issuing a **Zoom In** command. Again, from the chart's context menu, select **Zoom In**. This will scale up the timeline and will present more details along the time line but less of the total graph will be visible within your window's area. The opposite effect happens when you issue a **Zoom Out** command. You may continue zooming in or out as needed (up to maximum / minimum scale).

7.6.5 The Time Line

When drawing a Gantt Chart, Pro-Designer must decide on the characteristics of the time line against which all activity bars will be drawn. The attributes that determine how the time line is drawn are the following:

- The maximum time displayed (defaults to as large as necessary)
- The unit of time used to draw the minor tickmarks (defaults to hours)
- The unit of time used to draw the major tickmarks (defaults to days)
- The minor tickmark frequency (defaults to 1)
- The major tickmark frequency (defaults to 1)

By default, the maximum time is calculated to provide a window of time large enough to accommodate the display of all activity bars. However, if you wish, you may set your own fixed maximum time, by visiting the Gantt Chart's Style (see next). If you do so, you must take care that the limit set is large enough to accommodate all data otherwise some activity bars will not be shown on the chart (Pro-Designer will warn you if that turns out to be the case).

7.6.6 The Visual Style

The visual appearance of a Gantt Chart (Operations or Equipment Occupation Time), depends on the following:

1. The units of measurement that the y-variable (rate of consumption) is displayed
2. The maximum value displayed (could be set to match data or fixed)

3. The style of the line shown in the graph (thickness and color
4. The time line attributes (minor / major time units and tickmark frequency, gridline visibility, maximum time displayed); choose between using the default time line (common to all time charts, or use a customized time line for that particular resource chart)

There are as many resource graph styles as types of resource graphs (Power Consumption, Labor Utilization, Ingredient Consumption and Heat Transfer Agent Utilization). To edit the style for any of the above chart types, select **Preferences / Default Styles / <aResourceType>…** from the context menu of the flowsheet. Alternatively, once the chart interface is active, you can bring up the resource chart's style dialog by selecting **Edit Style…** from the chart's context menu. Both ways, you will be interacting with the Resource Chart's Visual Style dialog.

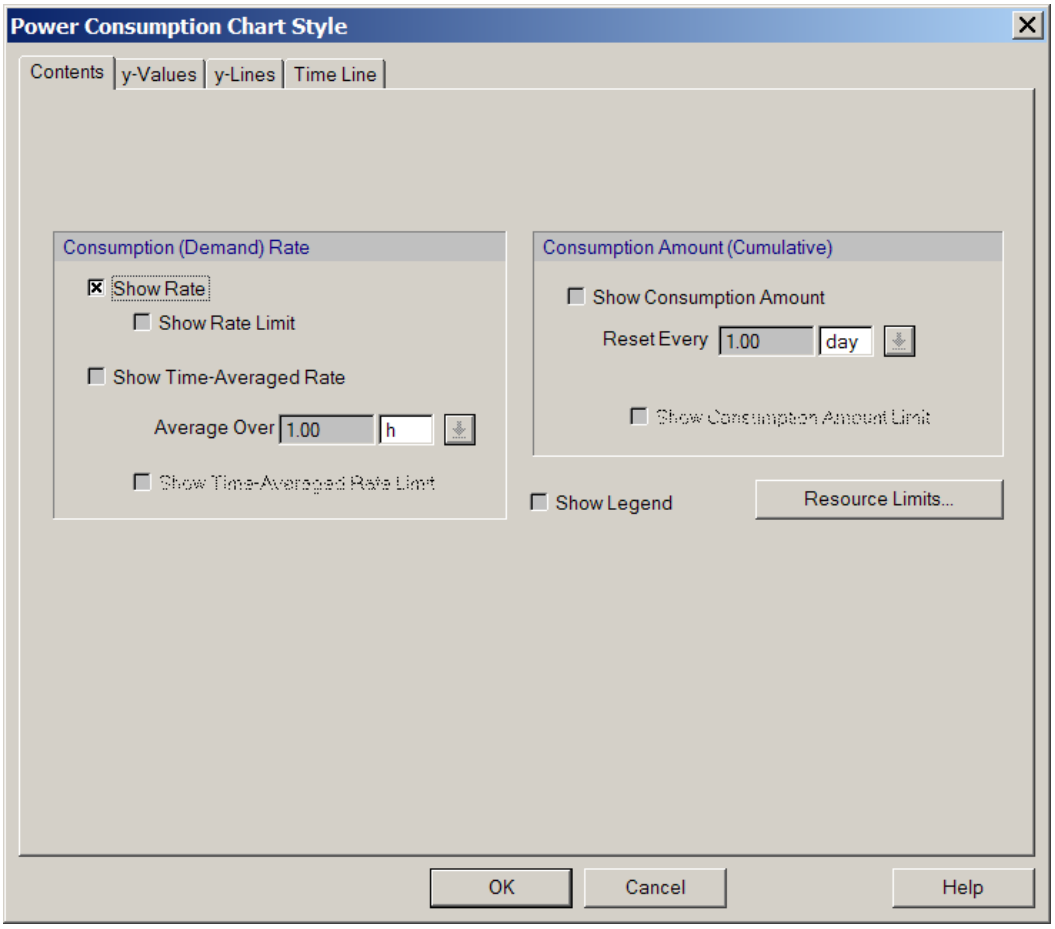

Fig. 7.6: The resource chart's visual style dialog.

7.7 Resource Inventory Tracking

In cases where resources such as raw materials are received and stored and used by the process, SuperPro can track the inventory capacity required. SuperPro can do this for

materials (ingredients) or heat-transfer/energy resources. See also the tutorial section 2.1.7.

Select the menu item **View \ Resource Inventory Chart \ Ingredient (Multiple Batches.** Single batch tracking is also available.

The following applies equally to heat-transfer resources.

7.7.1 Setting the Supply Schedule

Select the menu item **View \ Resource Inventory Chart \ Ingredient (Multiple Batches.** Single batch tracking is also available.

The following applies equally to heat-transfer resources.

Select the **Supply Info** button.

- Storage capacity: you may set it or have SuperPro calculate it.
- Initial contents (the opening inventory).
- Contents to capacity ratios. These are the minimum and maximum inventories desired. (The minimum indicates an emergency inventory and the maximum indicates available capacity.)
- Supply rate is the charge rate to inventory.
- The supply time may be set to a fixed schedule or timed with the first draw.

The refill schedule may be fixed or triggered at a particular inventory level. *Note if inventory is triggered by a level, then the storage capacity must be set by the user.*

7.7.2 Configuring the Chart

Select the **Chart Style** button and choose the items to be display

- Select the **contents tab** to choose the units and the lines to be displayed as a function of time.
- Supply data: rate (charge rate) and/or charge amount
- Inventory data: amount, rate of change, limits
- Consumption rate: show consumption rate (instantaneous or time-averaged) and its limits
- Cumulative consumption: show consumption amount and its limits.
- Select the **y-values tab** to set the scale for the y-axis (the defaults are usually acceptable) and consumption limits
- Select the **y-lines tab** to edit the line style for the various values. The edits apply to the last-selected line.
- Select the **Time Line tab** to change the time units.

- Select OK and OK again on the ingredient selection dialog to view the chart.

The chart may be printed and exported as described in 7.6.

Tip

The inventory tracking chart can display up to 12 curves including limits. Keep your chart simple by limiting the number of lines. Inventory level vs. time is often sufficient.

7.8 The Ingredient Consumption Chart

Ingredients (raw materials) are being consumed during different stages of the process. Some materials are being directly charged into vessels (and are shown as ingredients of a process input stream) while other materials are being employed as clean-up agents or buffer solutions and they show as options selected for a particular operation (i.e. they do not appear directly on a stream in the flowsheet). Since some of that material may need to be prepared (as part of another process, e.g., a buffer preparation support process), or need to exist in enough stock to be available when needed, a raw material consumption chart is very important. You can display this chart in a two step process

1. You select the **View / Resource Consumption Tracking Chart / Ingredient …** option from the main menu.
2. The following dialog appears:

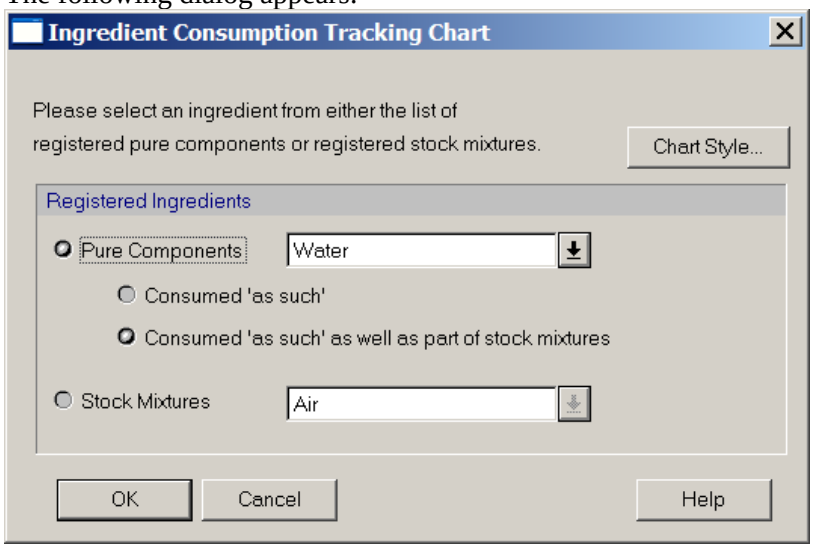

Fig. 7.7: Selecting the ingredient to display in the resource consumption chart.

Press on the **Chart Style** button to get the dialog shown in Figure 7.6 (see section 7.6.6 for information on the visual style). The chart will come up in a separate window. Sometimes this may take a few seconds (depending on the speed and memory of your PC and the size of your recipe).

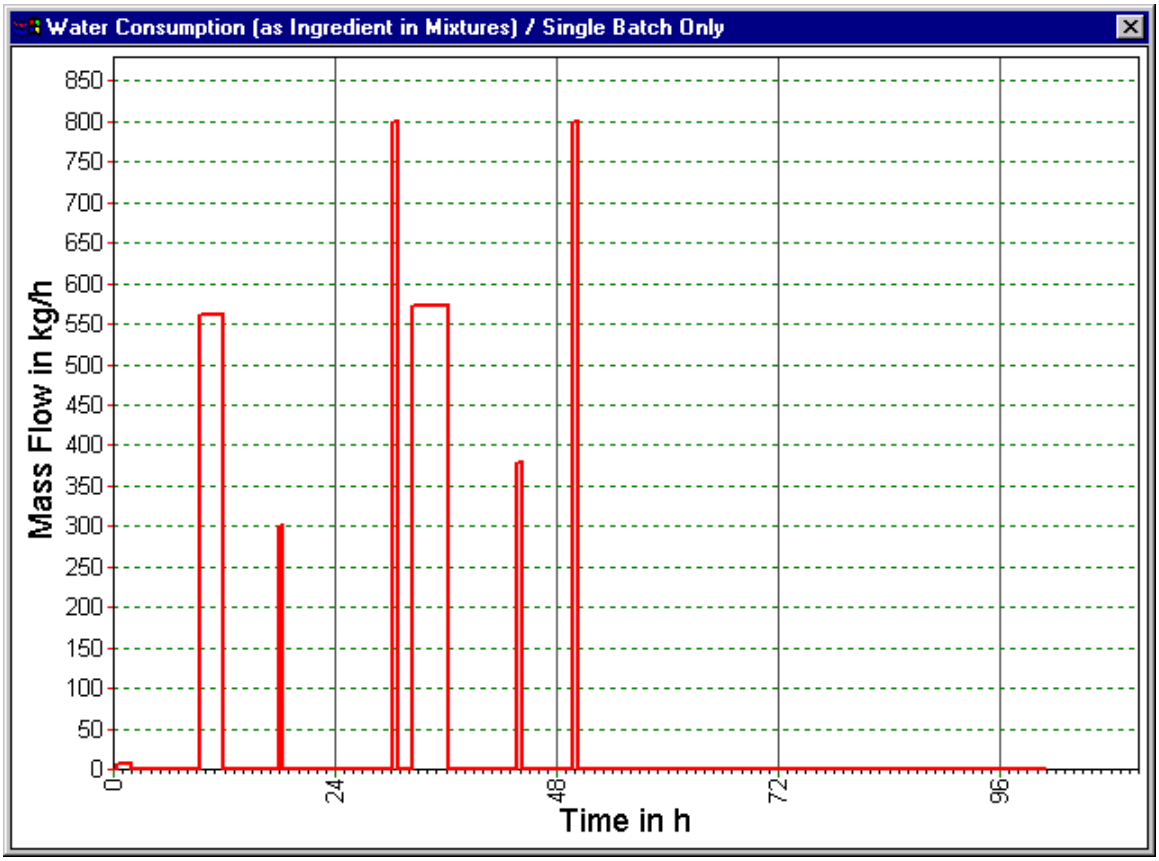

Fig. 7.8: A typical ingredient consumption chart.

The chart will, by default, be in a 'Fit-to-Window' mode: that is, the time line is scaled down to fit the width of the chart window. For more on how to change the 'Fit-to-Window' mode and use the Zoom In and Zoom Out options see section 7.6.4 and 7.6.5. The chart (as a picture) can be easily copied and pasted to another Windows application. Alternatively, it can be saved in graphics vector format (Windows Metafile or 'wmf' format) in a file and later be imported in another application (e.g. a word processor like MS-Word as part of a report). For more details on exporting the chart as a picture see section 7.6.1). Even though you cannot directly print the chart from Pro-Designer, for clues as to how to accomplish that indirectly, see section 7.6.3.

7.9 The Power Consumption Chart

Power is being consumed during different stages of the process. Several operations may need power to be carried out. You can display this chart by selecting **View / Resource Consumption Tracking Chart / Power …** option from the application's main menu. Press on the **Chart Style** button to get the dialog shown in Figure 7.6 (see section 7.6.6 for information on the visual style).

Next, the chart will come up in a separate window. Sometimes this may take a few seconds (depending on the speed and memory of your PC and the size of your recipe).

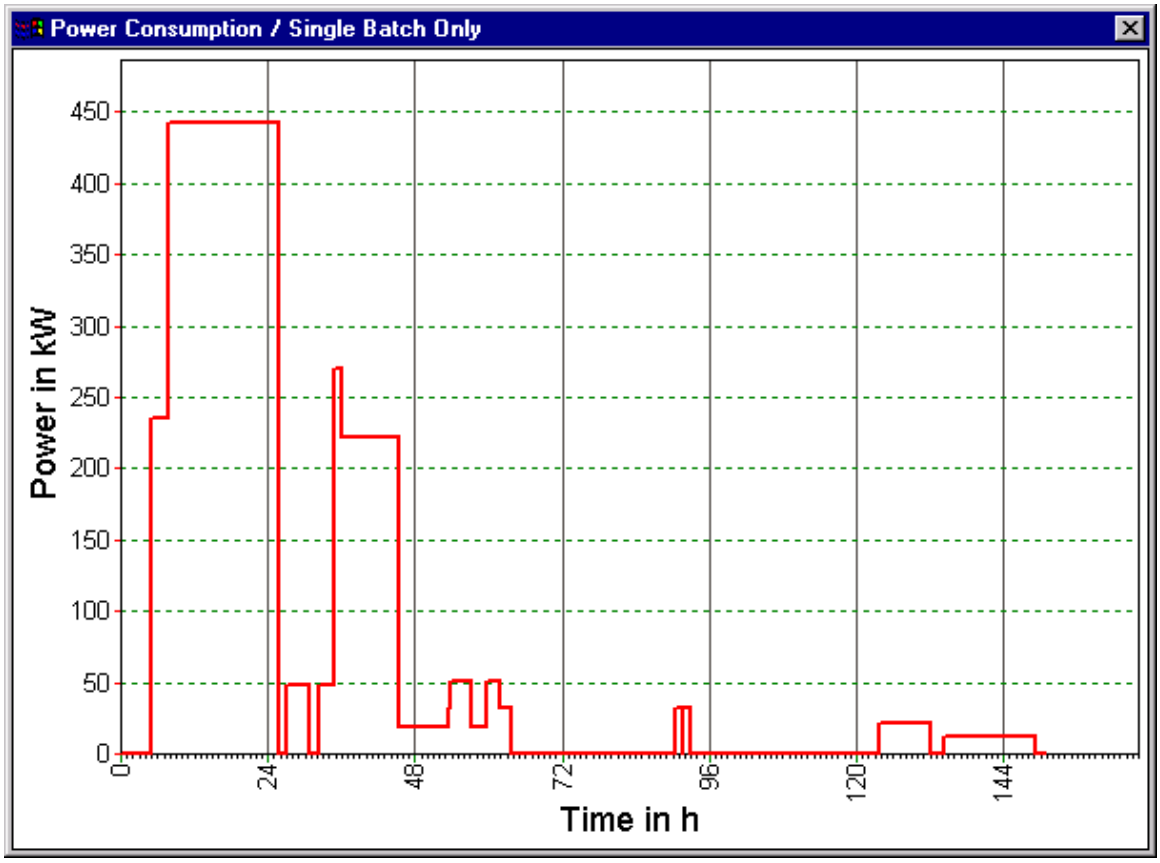

Fig. 7.9: A typical power consumption chart.

The chart will, by default, be in a 'Fit-to-Window' mode: that is, the time line is scaled down to fit the width of the chart window. For more on how to change the 'Fit-to-Window' mode and use the Zoom In and Zoom Out options see section 7.6.4 and 7.6.5. The chart (as a picture) can be easily copied and pasted to another Windows application. Alternatively, it can be saved in graphics vector format (Windows Metafile or 'wmf' format) in a file and later be imported in another application (e.g. a word processor like MS-Word as part of a report). For more details on exporting the chart as a picture see section 7.6.1). Even though you cannot directly print the chart from Pro-Designer, for clues as to how to accomplish that indirectly see section 7.6.3.

7.10 The Heat Transfer Agent Utilization Chart

Heat transfer agents are being utilized to cool down or heat up vessel contents during several operations. The heating and cooling requirement are being calculated by Pro-Designer. Furthermore, you can explicitly associate any other 'Auxiliary Heating and/or Cooling' with an operation to account for amounts of heating and/or cooling that are not been accounted for by an operation's simulation. However, all such utility flows are of limited supply (set by the utility production site, usually servicing more than one process). You can display this chart in a two step process:

1. You select the **View / Resource Consumption Tracking Chart / Heat Transfer Agent …** option from the main menu.

2. The following dialog appears. It allows you to select a heat transfer agent amongst all agents currently involved with your process.
3. Press on the **Chart Style** button to get the dialog shown in Figure 7.6 (see section 7.6.6 for information on the visual style).

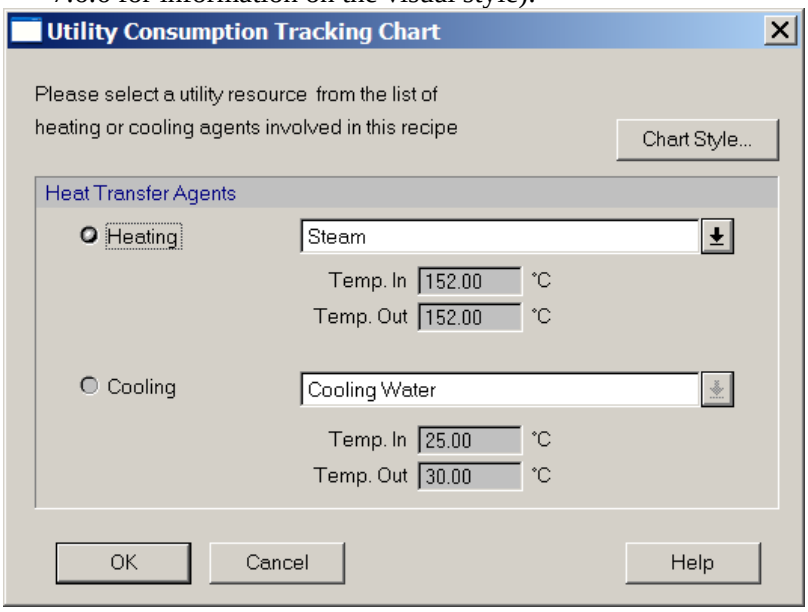

Fig. 7.10: Selecting the heat transfer agent to display in the agent utilization chart.

Next, the chart will come up in a separate window. Sometimes this may take a few seconds (depending on the speed and memory of your PC and the size of your recipe).

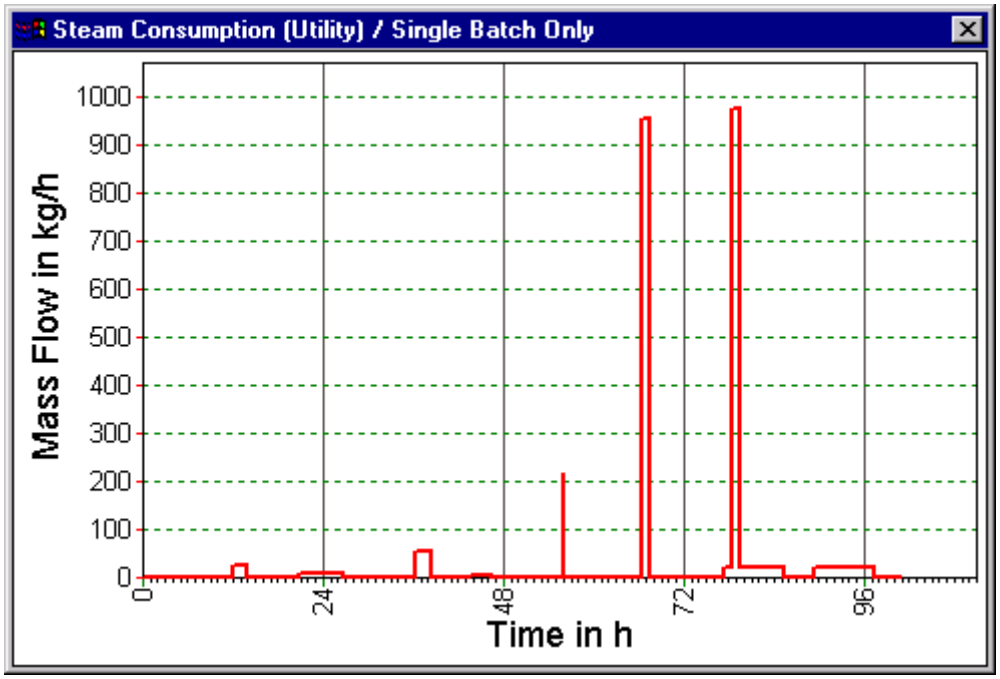

Fig. 7.11: A typical heat transfer agent utilization chart.

The chart will, by default, be in a 'Fit-to-Window' mode: that is, the time line is scaled down to fit the width of the chart window. For more on how to change the 'Fit-to-Window' mode and use the Zoom In and Zoom Out options see section 7.6.4 and 7.6.5. The chart (as a picture) can be easily copied and pasted to another Windows application. Alternatively, it can be saved in graphics vector format (Windows Metafile or 'wmf' format) in a file and later be imported in another application (e.g. a word processor like MS-Word as part of a report). For more details on exporting the chart as a picture see section 7.6.1). Even though you cannot directly print the chart from Pro-Designer, for clues as to how to accomplish that indirectly see section 7.6.3.

7.11 The Labor Utilization Chart

Labor is probably the most common shareable resource by all operations. Every operation usually needs the intervention or supervision of one or more operators at some point. Typically, users specify for every operation, the labor hours per equipment operation hour and per equipment type. It is possible to define labor needs for multiple labor types both at the operation as well as the section level. Pro-Designer will sum up the labor requirements per type for every interval during a batch execution and present them in a labor utilization chart. You can display this chart in a two step process:

1. You select the **View / Resource Consumption Tracking Chart / Labor …** option from the main menu.
2. The following dialog appears. It allows you to select a labor amongst all labor types and staff currently involved with your process. The 'All Labor' option allows you to see the total labor requirements independently of type.
3. Press on the **Chart Style** button to get the dialog shown in Figure 7.6 (see section 7.6.6 for information on the visual style).

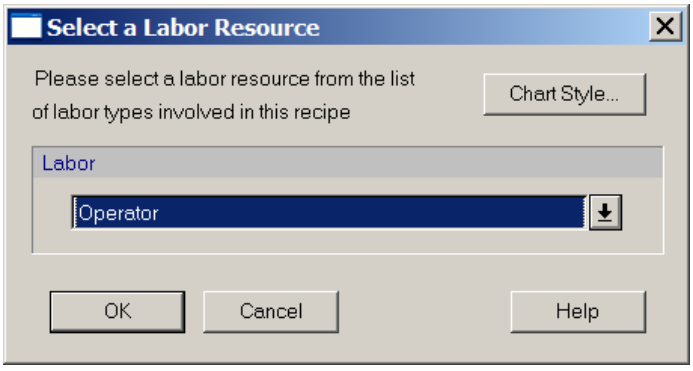

Fig. 7.12: Selecting the labor type to display in the labor utilization chart.

When you make a selection and press OK, the chart will come up in a separate window. Sometimes this may take a few seconds (depending on the speed and memory of your PC and the size of your recipe).

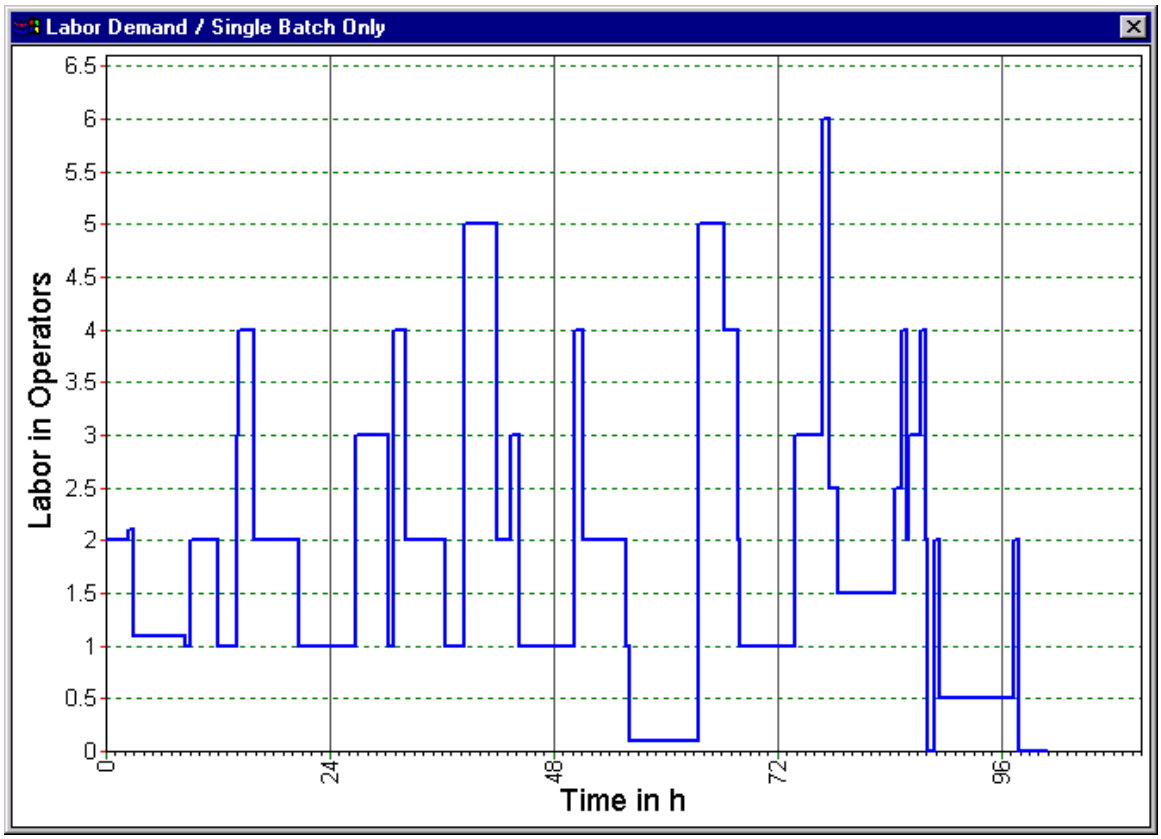

Fig. 7.13: A typical labor utilization chart.

The chart will, by default, be in a 'Fit-to-Window' mode: that is, the time line is scaled down to fit the width of the chart window. For more on how to change the 'Fit-to-Window' mode and use the Zoom In and Zoom Out options see section 7.6.4 and 7.6.5. The chart (as a picture) can be easily copied and pasted to another Windows application. Alternatively, it can be saved in graphics vector format (Windows Metafile or 'wmf' format) in a file and later be imported in another application (e.g. a word processor like MS-Word as part of a report). For more details on exporting the chart as a picture see section 7.6.1). Even though you cannot directly print the chart from Pro-Designer, for clues as to how to accomplish that indirectly see section 7.6.3.

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