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User Guide

Kanban Sizing Workbenches

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Chapter 1

Using Kanban Sizing Workbenches

The following topics describe how you use the two kanban sizing workbenches—Kanban Sizing Workbench and Kanban Process Workbench—to size and evaluate kanban loops, evaluate and modify kanban processes, and perform some card management activities.

Note This information is intended to supplement the information in *User Guide: Kanban* that was released for Standard Edition 2008, 2008.1, and 2009. It assumes that you have upgraded your QAD .NET UI installation to use the new Kanban Sizing Workbench and Kanban Process Workbench functions. In that case, this chapter supersedes the *Kanban User Guide* section on Kanban Workbench.

Kanban Sizing Workbenches Overview 2
Describes the capabilities of the kanban sizing workbenches.

Workbench Elements 4
Describes the frames and functions of the kanban sizing workbenches.

Workbench Data 15
Lists and describes the fields available for viewing or updating in the workbenches.

Kanban Sizing Workbenches Overview

The QAD .NET UI offers two menu options—Kanban Sizing Workbench and Kanban Process Workbench—that let you select, view, and modify kanban sizing (calculating the number of cards in the loop and the maximum amount of buffer stock) and process data in two ways:

- Directly in a grid; this is similar to spreadsheet applications such as Microsoft Excel. Modifiable fields are white; blue fields are read-only.
- In individual data frames, in which fields are grouped logically based on their functions. In many cases, the layout of the frames indicates the relationships between calculated fields and source values. Note that the majority of grid fields display on the tabs. However, a limited number of values display only in the grid.

Important Although the workbenches may display as menu items in the character user interface, they run only in QAD .NET UI.

For the most part, the workbenches display the same data. Major differences are:

- The search criteria. In the Sizing workbench, you can search on several criteria related to kanban loops sourced by processes, external suppliers, or inventory supermarkets. The Process workbench provides search criteria to let you drill down to specific kanban processes.
- The information available in the grid. The Process workbench shows process, process-item, and loop sizing data for each process found by the search criteria. The Sizing workbench is limited to the same loop sizing data.
- The values you can update. For example, you can view process information related to a specific loop in the Sizing workbench for reference. However, since the process typically supports several loops, you must use the Process workbench to modify related values. When a field is modifiable in one workbench but not the other, the read-only version is shaded in gray.

Use the workbenches to calculate the number of cards in a kanban loop and the maximum amount of buffer stock. You can manipulate various factors, including the every-part-every interval (EPEI) for the supplying process and the quantity of kanban containers, and have the system calculate the optimum number of cards based on the EPEI.

If the sizing or process activity needs to be done in more than a single workbench session, you can save your work as a simulation, return to it later, continue to make changes, and then finally commit the updates to the database when you are finished.

When you have finalized the workbench activity, you can update process, supermarket, and kanban loop records with the revised detail, then create and print cards using tools on the Kanban Card Management menu. For loops that have already been sized, the system recommends changes in the number of kanban cards. You can then inactivate, activate, delete, create, or print cards as needed.

You also can reconcile cards from within the workbench. The system compares the current number of active cards to the optimum number and displays the number of out-of-balance loops on the Reconcile/Print Cards button. See “Reconcile Cards” on page 9 for information. This feature even lets you print new or reactivated cards from within the workbench.

Note Unless you use the automatic card reconciliation feature, resizing loops does not automatically inactivate or delete unneeded cards, or create new ones. You must do this manually using tools on the Kanban Card Management menu.

Typically, you use the workbenches as a first-time sizing tool for new kanban loops or adjusting processes. Individual menu programs are available for such activities as recalculating EPEI, updating safety stock, and determining buffer and kanban sizes using historical and projected supermarket performance data. Some programs give you the option of automatically updating loop data with the new calculations. However, you can use the two workbenches at any time to resize loops and adjust processes.

The workbenches lets you adjust the following factors to affect kanban sizing for individual items:

- Average daily demand
- Demand percent
- Replenishment time
- FIFO time (internal and external)
- Safety days and safety stock
- Variability factor
- Number of packs per kanban
- Card reporting method
- Fractional kanban setting
- Order quantity multiple (in kanbans)
- Card reconciliation option
- Material run-out option
- Average inventory calculation method

Additionally, in Kanban Process Workbench, you can recalculate, analyze, and update the following attributes of the process:

- Number of resources available
- Minimum process EPEI data
- Lead time calculation method
- Load limit percent
- Minimum item EPEI
- Item EPEI Automatic setting
- Cycle and setup times
- Item yield percentage

The Analyst Data frame displays a variety of information about the selected process or kanban loops to help the planner make decisions about appropriate loop setup and sizing. See “Analyst Data” on page 23.

Prerequisites

Before using these workbenches, be sure you have set up the following data:

- Kanban item records using Kanban Item Master Maintenance (17.1.1)
- Manufacturing process definitions using Kanban Process Maintenance (17.1.3)
- Supermarket definitions using Supermarket Maintenance (17.1.2)

- Kanban item loop definitions using Kanban Master Maintenance (17.1.4)
- Optionally, supermarket demand data either in Kanban Master Maintenance or using Average Demand Calculation (17.2.9) and Safety Stock Calculation (17.2.2)

  Note You can manually enter the demand in the workbenches. However, the recommended method is to first use the Average Demand Calculation.

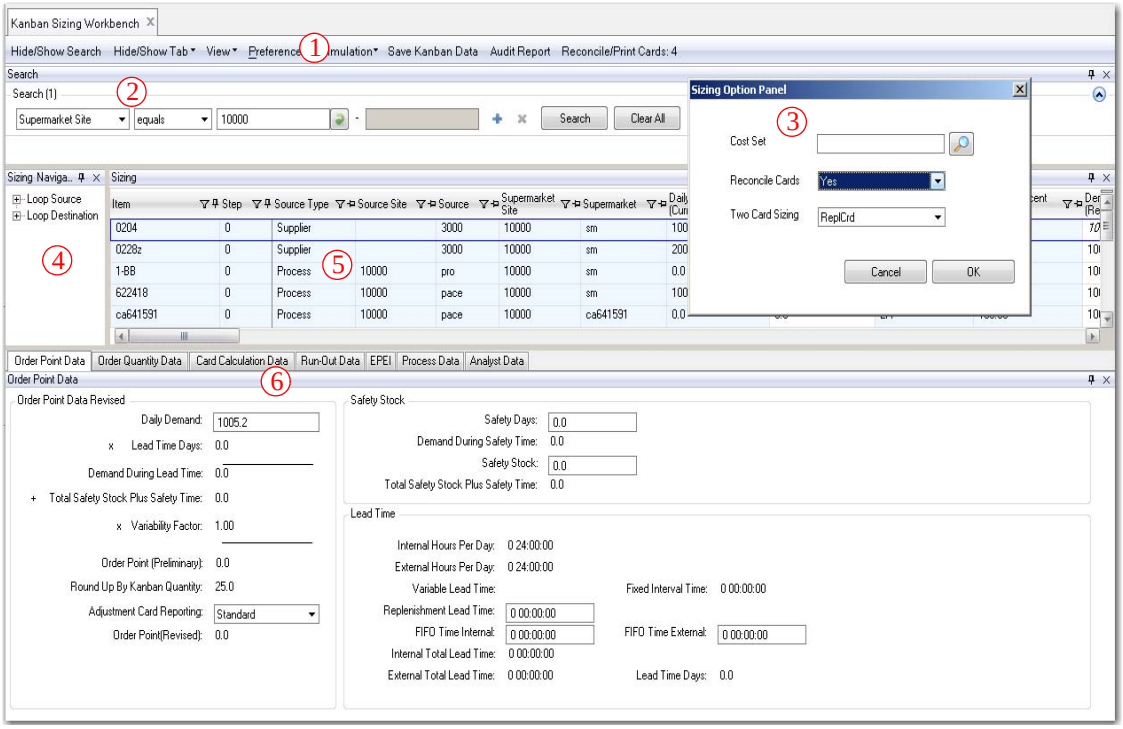
Workbench Elements

Each kanban sizing workbench contains several common structural elements, illustrated in Figure 1.1:

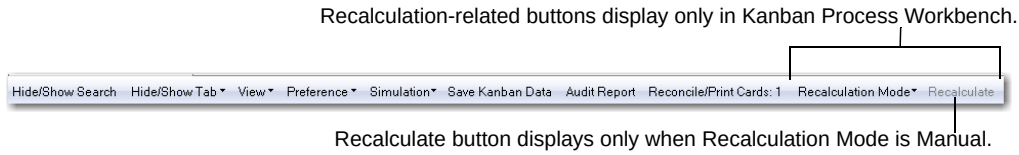
1. Tool Bar: Click buttons to control workbench actions.
2. Search Frame: Use standard .NET UI filtering tools to select records for display.
3. Sizing Option Panel: Access from the Preference button to set default values for fields used on the workbenches.
4. Navigator Frame: Use a tree structure to select filtered records.
5. Main Grid Frame: View and update sizing or process data in a user-configurable, Excel-style UI.
6. Tabbed Detail Frames: View and update sizing or process data in logically arranged collections of fields.

The following topics describe the features of each element.

Fig. 1.1
Structure of Kanban Sizing Workbenches



Tool Bar



Use the buttons on the tool bar to perform the following functions:

Hide/Show Search

Click this button to toggle the display of the search panel. For example, you might want to hide the filter criteria after selecting records to provide more vertical space for the workbench.

Hide/Show Tab

Use this pull-down button to toggle the display of the individual tabbed frames at the bottom of the workbench window. You can also close the tabbed frames by right-clicking the tab and choosing Hide. To show hidden tabs, select them from the Hide/Show Tab button.

View

Use this pull-down button to save the current UI configuration under a user-specified name. For example, you might want to hide some columns or tabs under certain circumstances, or rearrange columns. After you save the configuration using Save As, its name displays under the pull-down on the View button. If you make further changes, use Save to update the configuration record. Each workbench has separate user-defined records; for example, if you customize the layout and save it from Kanban Sizing Workbench, it is not available Kanban Process Workbench.

Note This feature only saves the UI layout. It does not store the current selection criteria in the Search frame.

When user-defined layouts exist, the View menu includes a Default option. Choose it to return to the standard QAD-provided layout.

When you are using a custom configuration, choose Clear All to temporarily remove the Default option, as well as the current custom configuration, from the View menu. From that point on, anytime you choose Save, any UI changes are saved to the custom configuration that is currently in use. The Default and any custom configuration names are reinstituted when you exit and relaunch the program.

Preference

Select Option from this pull-down button to set default values used during loop sizing activities. See “Sizing Option Panel” on page 9.

Simulation

Use the controls on this button to save the current workbench values to a temporary file and reload them later.

Note Updated field values are not committed to the database until you click Save Kanban Data.

Save Kanban Data

Click this button when you are finished analyzing the effects of your changes and want to update the kanban loop and process records in the database.

Audit Report

View a report comparing the baseline data with updates that will take place when you click Save Kanban Data. Use this feature to analyze the effects of your changes before modifying the database. When you are using card reconciliation functions, the audit report shows the impact of reconciling the loops.

Note If you make changes, save, and then click Audit Report, the system does not detect any updates. For this feature to be effective, you should review the report before saving.

Reconcile/Print Cards

This button displays the number of loops included in the selection criteria in which the calculated number of cards needed to support the loop no longer equals the actual number of active cards. This can result either from changes made during the workbench session, or from loop changes made previously that have not yet been reconciled. See “Reconcile Cards” on page 9.

Recalculation Mode

Note This button applies only to Kanban Process Workbench.

By default, the workbenches automatically recalculate all fields each time you update a field and move the focus or press Enter.

In Kanban Process Workbench, if a large number of processes are included in the workbench, automatic recalculations can be time consuming. You can use Recalculation Mode to control whether the system updates calculated fields whenever you make a change.

To have the system always recalculate when any field is updated in the workbench, set Recalculation Mode to Automatic.

To limit the fields that cause recalculations when they are modified, set Recalculation Mode to Manual. Individual loop sizes are still recalculated automatically when you change certain information. However, if the field impacts the EPEI or Variable Lead time calculations—which could cause a change in all of the loops in the process—these are not automatically recalculated in manual mode. To recalculate them, press Recalculate or save your work. Since these values can ultimately change the sizing of all loops in the process, then it is very likely that the individual loop sizing is incorrect. The system calculates the individual loop sizes automatically so that you can can see some of the granular changes. For example, if you update Daily Demand, the workbench shows the impact on Total Safety Stock and Order Point. However, this field also affects the EPEI, which is *not* recalculated, so the order quantity is probably incorrect for this loop as well as all the others.

Table 1.1 Fields Calculated Automatically in Manual Mode

Sizing Frame	Process Item Frame
Daily Demand (Revised)	Minimum Item EPEI (Revised)
Replenishment Lead Time	EPEI Revised

Sizing Frame	Process Item Frame
Internal FIFO Time	EPEI Automatic
External FIFO Time	Yield
Safety Days	
Safety Stock	
Variability Factor	
Packs per Kanban	
Card Reporting	
Fractional Kanban	
Order Quantity Multiple in Kanbans	

In manual mode, the system provides visual clues when changes to individual fields have left workbench data in a “stale”—or non-current—state. Indicators adjacent to the following fields and on process records show that data is inaccurate until manual recalculation:

- EPEI Revised
- Variable Lead Time

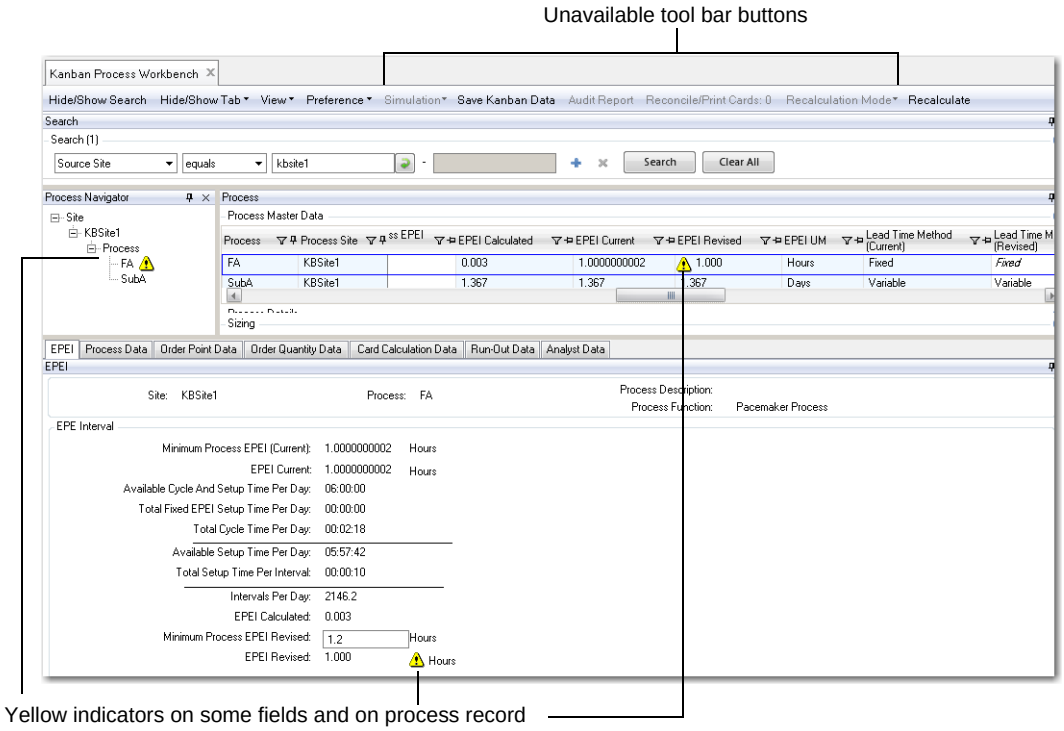
Additionally, the following tool bar buttons are unavailable because stale data would cause the results of those actions to be inaccurate:

- Simulation
- Audit Report
- Reconcile/Print Cards

Note Recalculation Mode is also disabled while the workbench contains stale data; you cannot change the setting to Automatic until the data is recalculated.

Figure 1.2 summarizes how the UI indicates that the workbench includes stale data.

Fig. 1.2
Indicators that Manual Recalculation Is Needed



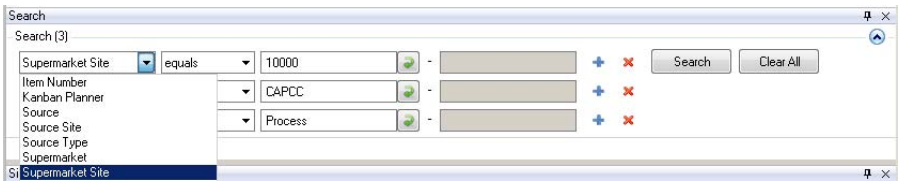
Recalculate

Note This button applies only to Kanban Process Workbench.

Click this button to have the system recalculate after you have changed one or more values. It is activated only under the following circumstances:

- Recalculate Mode is Manual.
- The workbench has been modified since the last save or manual recalculation.

Search Frame



The Search frame in each workbench is a standard .NET UI filter screen. For more information on the QAD .NET UI, see *User Guide: Introduction to QAD Enterprise Applications* for QAD 2010.

Use it to find kanban process and loop records by defining one or more search conditions, using operators such as equals, range, contains, and so on. Click the Add icon (+) to add another condition; click the Delete icon (X) to remove an existing condition. Available search criteria include:

- Kanban Sizing Workbench

  - Item Number
  - Kanban Planner
  - Source
  - Source Site
  - Source Type
  - Supermarket
  - Supermarket Site
- Kanban Process Workbench
  - Process Planner
  - Source
  - Source Site

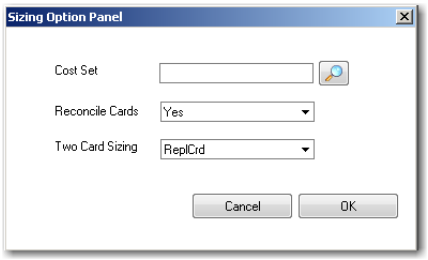
Depending on the filters you set and the amount of kanban-related records in your database, an initial workbench query can take one minute or longer.

The system displays a Cancel dialog during each part of the two-phase query:

- During the browse query, which retrieves indexes and and performs a total record count. The dialog displays the percentage of records counted.
- During data retrieval. The dialog does not include status information.

If the time required seems extensive, you can click Cancel, then define additional filters to reduce the number of target records.

Sizing Option Panel



Select Options from the Preference tool bar button to display three fields that provide default values to workbench functions.

Reconcile Cards

This field sets the default for the same field on the Card Calculation Data tab. The initial value is from Kanban Control.

When the system-recommended number of cards in Kanban Master Maintenance is not the same as the actual number of active cards, you can have the system automatically bring the loop back into balance by clicking the Reconcile/Print Cards button.

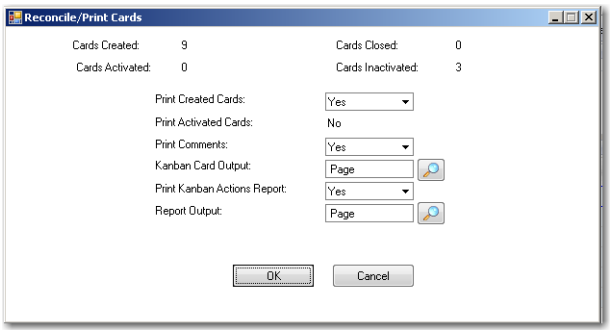
Note The total number of active cards does not include limited-use cards, which have an active code of Close, Period, or Cycles.

When Card Reconciliation is Yes in the Card Calculation Data tab for one or more loops and you save your changes, the system records the number of loops needing reconciliation on the Reconcile/Print Loops button on the Tool Bar to indicate that cards are available for printing.

Note Even before you do any workbench sizing, the system may determine that one or more loops in the selection criteria need to be reconciled. If this is the case, a value displays on the button when you initially enter the workbench. Optionally, you can reconcile those loops immediately by clicking Reconcile/Print Loops. No save is needed.

After completing sizing activities and saving your changes, click Reconcile/Print Loops. This removes or adds replenishment cards as needed and displays an additional frame that lets you print any new cards before leaving the workbench.

Fig. 1.3
Reconcile/Print Cards Frame



If a loop requires fewer cards, reconciliation may decrease the number of cards by inactivating some, using the following rules:

- When Decrease at Consume is Yes in the loop's Kanban Master Maintenance record and Card Reconciliation is Yes in Kanban Control, cards are not reduced by the workbench reconciliation function. Instead, the system counts all active, non-limited cards for the loop each time a card is recorded in Kanban Consume/Post and compares this to the optimum number of cards. If the current card is not needed, the user is prompted to inactivate it and physically remove it.
- When either of those two fields is No, the system uses the phase-out method specified in Kanban Control to determine whether cards are inactivated immediately or next time they are consumed.

If the reconciliation function indicates that additional cards are required, the Kanban Control phase-in method determines whether any current inactive cards are reactivated before new ones are created.

Move Card Sizing

For two-card loops, you can use the Move Card Sizing field to specify whether and how the number of move cards is adjusted when replenishment cards are reconciled.

The default is set in Kanban Control. The value in the Option Panel applies to all loops for the workbench session.

You can:

- Leave the number of move cards as-is, regardless of replenishment card changes.

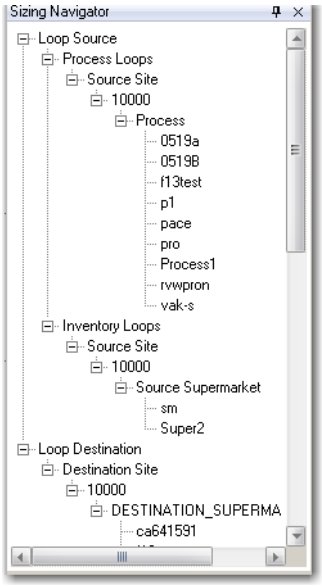
- Add or remove move cards as needed to balance the new maximum buffer size.

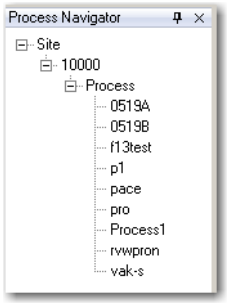
  Note This is based on the kanban quantity of the move loop stored in the kanban master. Buffer maximum / kanban quantity equals the number of cards.
- Set the number and kanban quantity of move cards to match the reconciled replenishment cards.

Cost Set

Optionally enter the identifier for the cost set used in inventory value calculations. The default comes from Kanban Control, if one is specified. Entries are validated against records defined in Cost Set Maintenance (30.1).

Navigator Frame





The Navigator Frame displays the results of the filtered selection in a tree structure. By clicking the plus sign (+) on a node, you can view lower-level records. Click the node name to view all the available child records in the Main Grid.

Example In Kanban Sizing Workbench, you define a search filter to equal a Source Site and specify a site number. The Main Grid frame shows only loops sourced from that site. By drilling down through the tree structure, you can select down to the level of individual processes and inventory supermarkets. When you click one of these, the Main Grid displays only the individual loop records associated with that supermarket.

Note The structure of the tree varies both by which workbench you are using and the criteria specified in the Search frame.

Main Grid Frame

This frame displays selected kanban loop and process records in a spreadsheet-like view. Use the horizontal scroll bar to view additional columns.

You can edit fields in some columns; they are shown in white. When you select a row, the current values of editable columns are shown in italic type. Blue columns are read-only.

Grid Display Options

You can control several aspects of the display using QAD .NET UI features.

- Right-click the grid heading row and choose Columns to select or deselect columns to be displayed.
- Resize column width by dragging the borders.
- Move columns to the right or left by dragging and dropping the column heading.
- Click on a column heading to sort records based on values in that column. On headings with an arrowhead icon, click the icon to reverse the sort order.
- Use the pushpin icon to freeze columns in place during horizontal scrolling. Click a left-pointing icon so that it points down. The column moves to the left side of the frame and is locked in place. To unfreeze a column, click the icon so that it points to the left.

  Note On other UI elements, this same icon serves to auto-hide or minimize/maximize the frame.
- Click the filter icon to display a list of all the values in the current column, as well as All, Custom, Blank, and NonBlank options. Chose a value to filter the records in the grid.
- Choose the right-click option Return to Factory Settings to reverse all modifications to column settings.

Important Click View|Save As to save your display changes to a specified file name. Otherwise, the workbench returns to the default settings next time you access it.

Note Changes to display options apply to all users of the computer from which the changes are made.

Grids

The Kanban Sizing Workbench includes a single grid containing data related to loop sizing.

The Kanban Process Workbench has a three-part grid:

- The top grid has data related to the overall process.
- The middle grid provides process-item detail fields.
- The bottom grid is identical to the Kanban Sizing Workbench grid.

When you click on a process record in the top grid, the system displays process-item details and loop sizing information for the items produced by that process in the middle and bottom grids, respectively.

Fig. 1.4
Main Grid, Kanban Sizing Workbench

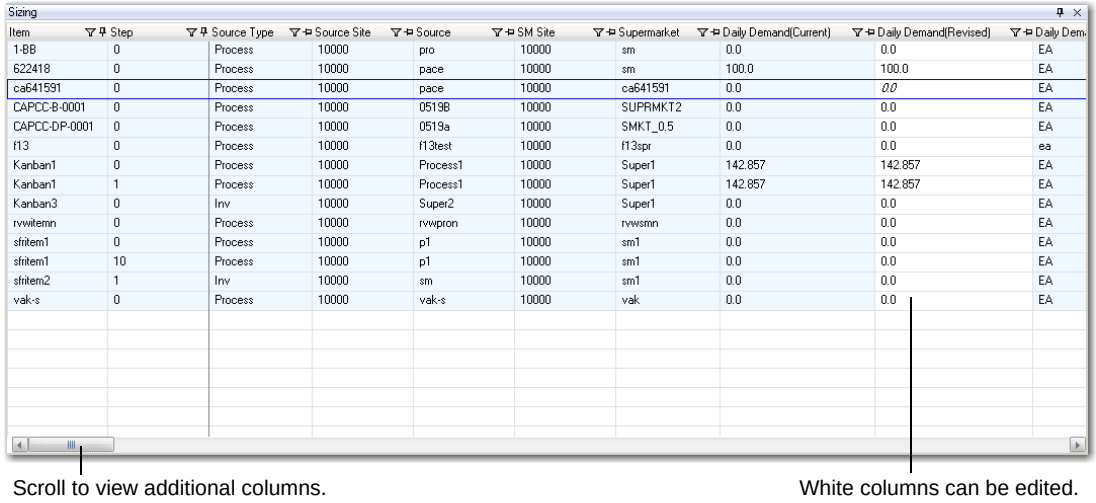
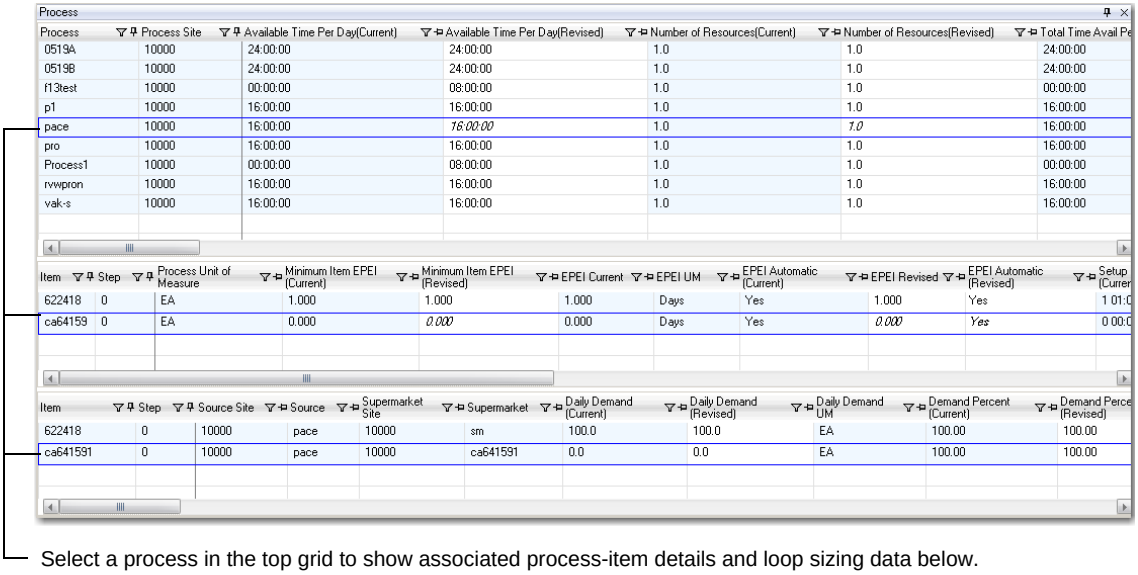


Fig. 1.5
Main Grid, Kanban Process Workbench



For descriptions of the fields available in the grids, see “Workbench Data” on page 15.

Tabbed Detail Frames

Each workbench provides a collection of seven tabbed frames. Each frame contains a logically related collection of fields, in some cases grouped in sub-frames.

Drag and drop the tabs to change their display order. If you do not want a tab to display, use the Hide/Show Tab button on the tool bar to toggle the display of individual tabs. You also can right-click on a tab and select Hide, but you must then use Hide/Show Tab to view it again.

The tabbed frames (sequenced as shown in the default Kanban Sizing Workbench) are:

- Order Point Data

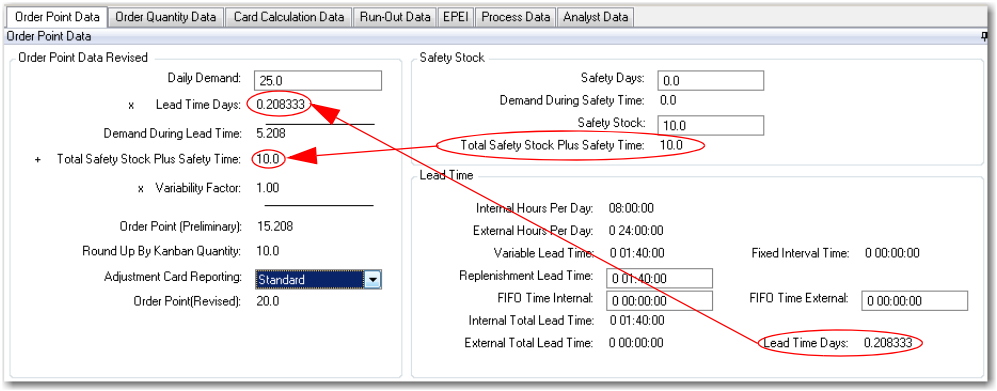
- Order Quantity Data
- Card Calculation Data
- Run-Out Data
- EPEI
- Process Data
- Analyst Data

The tabs are the same in both workbenches (although their default sequence is different); however, their use sometimes varies between the workbenches. For example:

- In Kanban Sizing Workbench, information on the EPEI and Process Data tabs is relevant only when the selected loop is sourced by a process. For inventory and supplier loops, labels display on those tabs, but none of the fields are populated.
- In some cases, fields display in one workbench with gray shading to indicate that they are read-only, but can be modified in the other workbench. For example, even when a loop is sourced by a process, you cannot update process master data from Kanban Sizing Workbench. That data applies to the process itself, rather than the item represented by a kanban loop. Instead, the system displays process information for reference. The fields are gray, indicating that the values can be modified in Kanban Process Workbench.

A feature of the tabbed display not available in the grid is the relationships between fields. For example, Figure 1.6 shows the structure of the Order Point Data tab. The field groupings—along with sub-frames—show how calculated values are derived.

Fig. 1.6
Calculated Fields in Order Point Data Tab



For descriptions of the fields available in the tabs, see “Workbench Data” on page 15.

Workbench Data

Tables 1.2 through 1.5 describe the fields in the two kanban sizing workbenches.

Process Master Data

Table 1.2
Process Master Data Fields

Field	Description
Available Time Per Day (Current and Revised)	The system displays the available time for each work day, as defined in Kanban Process Maintenance. If you revise the current value and save your changes, the system updates that record.
Number of Resources (Current and Revised)	The system displays the number of resources available to the process, as defined in Kanban Process Maintenance. If you revise the current value and save your changes, the system updates that record.
Total Time Available Per Day (Current and Revised)	The system displays the current available time for each work day multiplied by the number of resources, as defined in Kanban Process Maintenance. If you update the number of resources or the time available per day, the system calculates and displays the revised total.
Uptime Percent (Current and Revised)	The system displays the percentage of the available time for each work day that the process is actually producing, as defined in Kanban Process Maintenance. If you revise the current value and save your changes, the system updates that record.
Adjust Time Available per Day (Current and Revised)	These fields display on the Process Data tab only (not on the grid). They are directly associated with the Available Cycle and Setup Time Per Day field in the process grid. • The Current value displays the value as it was when you entered the workbench. It is initially the same as the Available Cycle and Setup Time Per Day grid field. It updates to match the revised value of that field when you save your changes. • The Revised value is the same as Available Cycle and Setup Time Per Day. Any changes automatically update Available Cycle and Setup Time Per Day.
Available Cycle and Setup Time Per Day	The system displays the result of: *Available Time Per Day (Revised) * Uptime Percent (Revised) * Number of Resources (Revised)*
Total Cycle Time Per Day	The system displays the total of all individual cycle times multiplied by the daily demand for the items produced by this process. When you modify values in the process data grid, the system updates this field.
Total Fixed EPEI Setup Time Per Day	The system displays the daily total setup time for items that have EPEI Auto set to No in Kanban Master Maintenance.
Available Setup Time Per Day	The system displays the result of: *Total Time Available Per Day (Revised) – Total Cycle Time Per Day – Total Fixed EPEI Setup Time per Day*
Total Setup Time Per Interval	The system displays the total of all individual setup times for the items produced by this process that have EPEI Auto set to Yes. When you modify values in the process data grid, the system updates this field.
Intervals per Day	This is the number of times all setups can be performed each day. The system displays the result of: *Available Setup Time Per Day / Total Setup Time Per Interval*

Table 1.2 — *Process Master Data Fields* — (Page 1 of 3)

Field	Description
EPEI (Current)	The system displays the process every-part-every interval (EPEI) value from Kanban Process Maintenance. This is the time interval during which all parts produced by this process can be made while still meeting demand. EPEI is expressed in the interval defined in Kanban Process Maintenance. For example, when you choose Days as the interval, an EPEI of 1 means that the process can produce each part every day.
Minimum Process EPEI (Current and Revised)	The system displays the minimum process EPEI defined in Kanban Process Maintenance. If you revise this value and save your changes, the system updates that record.
EPEI (Calculated)	The system displays the EPEI value initially calculated by the workbench. If the value is negative, an error message displays.
EPEI (Revised)	The system displays the updated EPEI value. If the calculated EPEI is less than the value of Minimum Process EPEI (Revised), the system sets EPEI (Revised) to that value.
Lead Time Method (Current and Revised)	The system displays the process item lead time calculation method defined in Kanban Process Maintenance. If you revise this field, the system updates the Variable Lead Time field in the Sizing Data grid based on the new method. When you save your changes, the Kanban Process Maintenance record is updated. Valid values are: • Variable. Default the value of Lead Time to Replenishment Time (Revised). Replenishment Time (Revised) cannot be updated. • Fixed. Default the value of Replenishment Time (Current) to Replenishment Time (Revised).
Item Count	The system displays the number of items produced by this process, as defined in Kanban Master Maintenance or Kanban Process Maintenance.
Total Item Volume per Day	The system displays the total demand quantity of all the items produced by the process. This is calculated as the sum of the values in the Daily Demand Total column in the process item data grid.
Takt Time per Unit	The system displays the takt time for this process. Takt time is the time in which the process must produce one unit in order to match the rate of demand. It is calculated as: *Available Cycle and Setup Time per Day / Total Item Volume per Day*
Pitch Time	The system displays the Pitch Interval value specified in Kanban Process Maintenance.
Pitch Quantity and UM	The system displays the pitch quantity and unit of measure specified in Kanban Process Maintenance. If an individual item is defined in a different UM, the conversion factor displays in the last column of the process item data grid.
Process Function	The system displays the process function specified in Kanban Process Maintenance. Processes can be defined as standard, pacemaker, or FIFO processes.
Load Limit Percent	The system displays the load limit specified in Kanban Process Maintenance. If you revise the current value and save your changes, the system updates that record.
Load Limit Time Per Day	The system displays the total time represented by the specified load limit percent, calculated as: *(Total Cycle Time Per Day + Available Setup Time Per Day) * Load Limit Percent*
Current Load Percent	The system displays the percentage of total time available represented by the time required to produce this process item. It is calculated as: *Current Load Time / Total Time Available Per Day (Current)*

Table 1.2 — *Process Master Data Fields* — (Page 2 of 3)

Field	Description
Current Load Time Per Day	The system displays the total amount of time needed each day to set up and run the current daily demand for this process or for all items in the process. If this is greater than the value of Load Limit Time or Total Time Available Per Day, the system displays a warning message. If either Order Quantity (Revised) in the sizing data grid or EPEI (Revised) is 0, the system uses 0 in the Current Load Time calculation.
Days Per Week	The system displays the number of days in a standard work week. These are days with any number of hours assigned to at least one shift in Process Shift Maintenance.
Number of Changeovers Per Week	The system displays the number of times the process can be set up each week, calculated as: *(SUM (Revised Item EPEI * Daily Demand / Revised Order Quantity)) * Days Per Week / Revised Process EPEI*
Changeover Hours Per Week	The system displays the total time required for setup each week, calculated as: *(SUM (Item Setup Time * Daily Demand / Revised Order Quantity)) * Days Per Week*
Percent Changeover in Operating Cycle	The system displays the percentage of total load time represented by changeover time, calculated as: *SUM (Revised EPEI for process / Revised EPEI for item) * Setup Time in seconds / (Total Time Available Per Day in seconds * Revised EPEI for process)*

Table 1.2 — *Process Master Data Fields* — (Page 3 of 3)

Process Detail Data

Table 1.3
Process Detail Data Fields

Field	Description
Item	Display only. This field displays the identifier for a kanban item.
Step	Display only. If a process step is defined for this item in Kanban Master Maintenance, it displays here.
Process UM	Display only. The system displays the item unit of measure specified in Item Master Maintenance. If this is not the same as the pitch UM defined in Kanban Process Maintenance, the system displays the conversion factor.
Minimum Item EPEI (Current and Revised)	The system displays the minimum item EPEI specified for the loop in Kanban Master Maintenance. When EPEI Automatic (Revised) is Yes, the system sets the item EPEI (Revised) to either the value of the EPEI (Revised) field in the process data frame or Minimum Item EPEI (Revised), whichever is greater. If you update Minimum Item EPEI (Revised) and save your changes, the system updates the corresponding value in Kanban Master Maintenance.
EPEI (Current and Revised)	When EPEI Automatic (Revised) is Yes, the system displays the calculated process EPEI. When it is No, the system displays the reference value entered for the item in Kanban Process Maintenance. Based on whether you change the value of EPEI Automatic (Revised), you can either update the manual entry here or have the system automatically update the field based on the process EPEI.

Table 1.3 — *Process Detail Data Fields* — (Page 1 of 2)

Field	Description
EPEI Automatic (Current and Revised)	The system displays the EPEI Automatic setting specified for the item in Kanban Master Maintenance. This setting determines whether the system uses information for this item when calculating process EPEI. When it is No, the setup time is fixed and is removed from the calculation of the time available for changeover during EPEI calculation. You can enter EPEI manually as a reference value. If you change it, the system updates the process EPEI, either including or excluding the item based on the new setting. Additionally, the system updates the Kanban Master Maintenance record when you save your changes.
Setup Time (Current and Revised)	The system displays the setup time for the item from the Kanban Process Maintenance record. If you change this number and click Save Kanban Data, the system updates that record with the value of Setup Time (Revised).
Cycle Time (Current and Revised)	The system displays the cycle time for the item from the Kanban Process Maintenance record. If you change this number and click Save Kanban Data, the system updates that record with the value of Cycle Time (Revised).
Yield (Current and Revised)	The system displays the item yield percentage from the Kanban Process Maintenance record. If you change this number and click Save Kanban Data, the system updates that record with the value of Yield (Revised).
Yielded Daily Demand Total	Display only. Calculated as: *Daily Demand (Revised) / Yield (Revised)*
Cycle Time Total	The system displays the total cycle time for the quantity daily demand, calculated as: *Yielded Daily Demand Total * Cycle Time (Revised)* If you update either Daily Demand (Revised) in the sizing data grid or Cycle Time (Revised), the system updates Cycle Time Total.
Conversion Factor to Pitch UM	Display only. When the item unit of measure defined in Item Master Maintenance is not the same as the pitch UM specified in Kanban Process Maintenance, the system displays the conversion factor. If the units are the same, the field defaults to 1.0.

Table 1.3 — *Process Detail Data Fields* — (Page 2 of 2)

Sizing Data

Table 1.4
Sizing Data Fields

Field	Description
Item	Display only. This field displays the identifier for a kanban item.
Step	Display only. If a process step is defined for this item in Kanban Master Maintenance, it displays here.
Source Type	Display only. This field indicates whether the source of this item, defined in Kanban Master Maintenance, is a supplier, an inventory supermarket, or a manufacturing process.
Source Site	Display only. This field displays the site where source process or supermarket is located.
Source	Display only. This field displays the source of the item, defined in Kanban Master Maintenance. Depending on the source type, it can be a supplier address code, a supermarket ID, or a kanban process ID.
Supermarket Site	Display only. This field displays the site where the kanban supermarket is located.
Supermarket	Display only. This field displays the supermarket ID associated with the item in Kanban Master Maintenance.

Table 1.4 — *Sizing Data Fields* — (Page 1 of 6)

Field	Description
Daily Demand (Current and Revised)	The system displays the current average daily demand for this item. It defaults from the item detail in Kanban Master Maintenance, where it is either entered manually or calculated using Average Demand Calculation. If you modify it in the Revised field and save your changes, the system updates the item detail and sets the Demand Modified field to Yes in Kanban Master Maintenance.
Daily Demand UM	Display only. The system displays the item unit of measure specified in Item Master Maintenance.
Demand Percent (Current and Revised)	The system displays the current Demand Percent value specified in Kanban Master Maintenance. If an item is supplied to more than one supermarket, this field indicates the percentage of total demand represented by this loop. If you modify it in the Revised field and save your changes, the system updates the Kanban Master Maintenance value.
Variable Lead Time	The system displays the variable lead time for kanban items. The value depends on the method used for selecting information in the workbench. When you select kanban loops by specifying a source site and process in the Selection Criteria frame, the system calculates variable item lead time as the sum of the setup and cycle times for the order quantity of all other items produced by the process, plus the setup and cycle time for one kanban quantity of the item itself. This total is divided by the number of resources available to the process. When Lead Time Method (Revised) is Variable, the system defaults the calculated value to the Replenishment Time (Revised) field. When Lead Time Method (Revised) is Fixed, Replenishment Time (Revised) defaults from Replenishment Time (Current). When you select loops by item, supermarket, or site/source rather than by process, the system sets Variable Lead Time to 0 (zero). Replenishment Time (Revised) defaults from Replenishment Time (Current) regardless of the lead time calculation method.
Internal Hours Per Day	If Available Time Per Day (Current), which is the available time in Kanban Process Maintenance, in Kanban Sizing Workbench is not zero, Available Time Per Day (Revised) should equal Available Time Per Day (Current). If Source Type is Process and Available Time Per Day (Current) is zero, Available Time Per Day (Revised) is determined by the following steps: 1. The system searches for a record in Process Shift Maintenance matching the site and process. If one exists, the defined shift hours will be used. 2. If no record matching site and process exists, the system looks for a record defined for the same site with no process specified. If one exists, the defined shift hours will be used. 3. If no record matches the site, the system determines whether a site calendar exists in Calendar Maintenance. If it does, the calendar hours will be used. 4. If no calendar is defined for that site, the system looks for a record with blank site and blank process in Process Shift Maintenance. If one exists, the defined shift hours will be used. 5. If no matching record is found in Process Shift Maintenance, the system will use the working hours defined in the domain calendar: • Available Time Per Day (Revised) = SUM (working hours of this month) / number of working day: • Internal Hours Per Day = Available Time per day (Revised) If Source Type is Supplier, Internal Hours Per Day = 24. If Source Type is Inventory, Internal Hours Per Day is calculated as the Daily time available for 1 week by summing up the total hours scheduled on work days / number of work days in the site calendar. If no site calendar is defined, the system uses the domain calendar.
External Hours Per Day	This should always equal 24.

Table 1.4 — *Sizing Data Fields* — (Page 2 of 6)

Field	Description
Replenishment Time (Current and Revised) Note The “Current” value displays as Replenishment Lead Time on the Order Point Data tab.	The system displays the total time between recognizing that an item should be reordered and having the item available for use. The current value defaults from the item detail in Kanban Master Maintenance. The default revised value is determined by the Variable Lead Time field. When you save your changes, the system updates the Replenishment Time field in Kanban Master Maintenance based on the revised value.
Fixed Interval Time	Display only. This is the amount of time that elapses before the system checks for empty cards for this loop and determines whether the total number of empty cards has reached the order quantity. When Accumulator Type is set to Time in the Card Control Detail Frame of Kanban Master Maintenance, this field displays the value of Accumulator Interval. When Accumulator Type is Schedule, the field is set to the longest time between any two scheduled intervals. When Accumulator Type is Quantity, no Fixed Interval Time is displayed.
Internal FIFO Time (Current and Revised)	The system displays the time that the item spends in processes defined as first-in, first-out lanes. The current value defaults from the item detail in Kanban Master Maintenance. If you modify the Revised field and save your changes, the system updates that record.
External FIFO Time (Current and Revised)	The system displays the time that the item spends in external FIFO processes such as subcontract operations. The current value defaults from the item detail in Kanban Master Maintenance. If you modify the Revised field and save your changes, the system updates that record.
Internal Total Lead Time	Display only. Calculated as: • Process and inventory loops: Replenishment Time (Revised) + Fixed Interval Time + Internal FIFO Time (Revised) • Supplier loops: Same as Internal FIFO Time (Revised)
External Total Lead Time	External Total Lead Time. Display only. Calculated as: • Process and inventory loops: Same as External FIFO Time (Revised) • Supplier loops: Replenishment Time (Revised) + Fixed Interval Time + External FIFO Time (Revised)
Lead Time (Days)	Display only. For process loops, calculated as: *Internal Total Lead Time / Internal Hours Per Day + External Total Lead Time / (24 * 60 * 60)* For supplier loops, this is assumed to be 24 hours. For loops supplied by a supermarket, it is based on site calendar data.
Demand During Lead Time	Display only. Calculated as: *Daily Demand (Revised) * Lead Time (Days)*
Safety Days (Current and Revised)	This is the number of days of demand to be used as the basis of determining safety stock for this item. It defaults from the Supermarket Item Detail frame of Kanban Master Maintenance. If you update it, the system recalculates the value of Demand During Safety Time. When you click Save Kanban Data, the system updates the Kanban Master Maintenance record.
Demand During Safety Time	Display only. Calculated as: *Daily Demand (Revised) * Safety Days (Revised)*
Safety Stock (Current and Revised)	This is the quantity of safety stock maintained at the kanban supermarket. It defaults from the Supermarket Item Detail frame of Kanban Master Maintenance. When you change this field and click Save Kanban Data, the system updates the Kanban Master Maintenance record.

Table 1.4 — *Sizing Data Fields* — (Page 3 of 6)

Field	Description
Total Safety Stock Plus Safety Time	Display only. Calculated as: *Demand During Safety Time + Safety Stock (Revised)* The system updates the loop record in the database with this value when you click Save Kanban Data. Although the value does not display in Kanban Master Maintenance, it is included in the information available to Kanban Visualization.
Variability Factor (Current and Revised)	This is a factor that can be applied to the supermarket buffer quantity to account for such things as seasonal demand. It defaults from the Supermarket Item Detail frame of Kanban Master Maintenance. When you change this field and click Save Kanban Data, the system updates the Kanban Master Maintenance record.
Order Point (Current)	This is the supermarket inventory level at which a replenishment order is signaled to the supplying process. It defaults from the Supermarket Item Detail frame of Kanban Master Maintenance.
Order Point (Preliminary)	Display only. This is the supermarket inventory level at which the supplying process is signaled to replenish the stock. When the source type is Supplier or Inventory, this is equal to Order Quantity (Current) When the source type is Process and it is non-pacemaker, this is calculated as: *Daily Demand * EPEI* When the source type is Process, it is a pacemaker, EPEI Auto is Yes, EPEI = 0, and Minimum EPEI = 0, it is also calculated as: *Daily Demand * EPEI* Under all other conditions, the field is set to 0.
EPE Interval	Display only. When Type is Process, the system displays the value of EPEI (Revised) from the process data grid. Otherwise, the system sets this field to blank. EPEI calculations are most significant when you are sizing kanbans and supermarkets for all the items in a process.
Order Quantity (Current)	This is the number of units the supplying source will produce at any one time. It defaults from the Card Control Detail frame of Kanban Master Maintenance.
Order Quantity (Preliminary)	Use of this field depends on the source of the kanban loop: • For pacemaker processes, the field defaults from Order Quantity (Current) and can be updated. • For non-pacemaker processes, the field is calculated by the workbench. It cannot be updated. • For loops with a source type of supplier or inventory, the field defaults to the Order Qty current value and can be updated.
Pack Quantity	Display only. Defaults from the supermarket item detail specified in Kanban Master Maintenance.
Packs per Kanban (Current and Revised)	Can be updated. The default value is calculated by dividing the kanban quantity specified in Kanban Master Maintenance by the pack quantity. If you change it, the system updates Kanban Quantity (Revised). When you click Save Kanban Data, the system updates the fields in Kanban Master Maintenance.
Kanban Quantity (Current and Revised) **Note** Kanban Quantity (Revised) displays as Round Up By Kanban Quantity on the Order Point tab.	Display only. The current value defaults from the Card Tracking Control frame in Kanban Master Maintenance. The revised value is set to: *Pack Quantity * Packs per Kanban (Revised)*

Table 1.4 — *Sizing Data Fields* — (Page 4 of 6)

Field	Description
Card Reporting **Note** This displays as Adjustment Card Reporting on the Order Point Data tab.	Can be updated. The field defaults from Kanban Master Maintenance. If you modify it and save your changes, the system updates the loop record. Valid values are: • Standard. This kanban is reported as empty when the first piece is removed from the container. This has no effect on the order point. • Add. This kanban is not reported as empty until the last piece is removed from the container. The system increases Order Point (Revised) by the value of Kanban Quantity (Revised). • Remove. To prevent the number of kanbans required from being overstated by a kanban quantity in loops that should require only one card, the system reduces the Standard calculation by one card. When this field is Add or Remove, the value of Fractional Kanban can result in a logical inconsistency that causes Order Point (Revised) to equal zero. In this case, the system displays a warning message.
Fractional Kanban	Can be updated. The field defaults from Kanban Master Maintenance. If you modify it and save your changes, the system updates the loop record. Valid values cannot be more than 0.99 or less than 0. This setting lets you control the point at which the system automatically sizes a loop with a second card when it might more logically have only one. The system uses the following logic: • If Order Quantity (Preliminary) and Order Point (Preliminary) are both greater than zero but less than Kanban Quantity (Revised), and Order Quantity (Preliminary) divided by Kanban Quantity (Revised) is less than or equal to Fractional Kanban, the system sets Order Quantity (Revised) to 0. • If Order Point (Preliminary) divided by Kanban Quantity (Revised) is greater than Fractional Kanban, the system sets Order Quantity (Revised) to Kanban Quantity (Revised).
Order Point (Revised)	Display only. The field initially defaults from the Order Point field in Kanban Master Maintenance. The system updates the value based on sizing calculations. The field is automatically rounded up to an integer multiple of Kanban Quantity (Revised).
Order Point (Revised) in Kanbans	Display only. Calculated as: *Order Point (Revised) / Kanban Quantity (Revised)*
Order Quantity Multiple in Kanbans (Current and Revised)	The system displays the value of Order Quantity Multiple from Kanban Master Maintenance. If you modify the Revised field and save your changes, the system updates that record. When this value is greater than 0, the system increases Order Quantity (Revised) until it is a multiple of this value. Any quantity changes occur after the system makes adjustments based on card reporting and fractional kanban logic.
Order Quantity (Revised)	Display only. Calculated as Order Quantity (Preliminary) rounded up to be an integer multiple of Kanban Quantity (Revised). When you save your changes, the system modifies the Card Tracking Control frame in Kanban Master Maintenance. This value can be affected by fractional kanban and card reporting settings.
Order Quantity (Revised) in Kanbans	Display only. Calculated as: *Order Quantity (Revised) / Kanban Quantity (Revised)*
Maximum Buffer Size (Current and Revised)	Display only. Current value defaults from the Buffer Maximum field in Kanban Master Maintenance. Revised value is calculated as: *Order Point (Revised) + Order Quantity (Revised)* When you click Save Kanban Data, the system displays the revised value in the Buffer Maximum field in Kanban Master Maintenance.

Table 1.4 — *Sizing Data Fields* — (Page 5 of 6)

Field	Description
Number of Cards (Current and Revised)	Display only. Current value defaults from the Number of Cards field in the Card Tracking Control frame of Kanban Master Maintenance. Revised value is calculated as: *Order Point (Revised) in Kanbans + Order Quantity (Revised) in Kanbans* When you click Save Kanban Data, the system displays the new value in the Number of Cards field in the Card Tracking Control frame of Kanban Master Maintenance.
Number of Cards (Change)	Display only. Calculated as: *Number of Cards (Current) – Number of Cards (Revised)*
Card Reconciliation	Can be updated. Defaults from the Options setting under the tool bar Preferences button. See “Reconcile Cards” on page 9.
Run-Out Option	Can be updated for loops supplied by a process. This field defaults from Kanban Master Maintenance. It is used to indicate that this item is typically made in a quantity large enough to use the entire amount of a specified material regardless of the kanban quantity. Valid values are Yes and No. If you modify this field and save your changes, the system updates the loop record. This field is for reference only; it has no effect on workbench calculations.
Other Run-Out Data	Display only. The system displays several reference fields related to material run-out. They default from the Kanban Item Master Maintenance record for the item/step.

Table 1.4 — *Sizing Data Fields* — (Page 6 of 6)

Analyst Data

Analyst data is designed to help planners make decisions by providing summary-level information about kanban loops. You can update the Average Inventory Calculation Method field to view the effects of changing the method; all other fields are display only.

The columns in the Analyst Data frame include standard identification data about each loop, including the item, step, source type, source, supermarket, and site. Table 1.5 describes the additional fields.

Table 1.5
Analyst Data Fields

Field	Description
Actual Run Interval	The system bases this calculation on the value of Fixed Interval in the Sizing Data frame. When Fixed Interval is 0, the system divides Order Quantity (Revised) by Average Daily Demand and displays the result in Actual Run Interval. When Fixed Interval is greater than 0, the system compares Order Quantity (Revised) with Fixed Interval multiplied by Average Daily Demand and determines the value of Actual Run Interval as follows: • When Order Quantity (Revised) is greater, divide Order Quantity (Revised) by (Fixed Interval * Daily Demand) and round up to the next whole number. Multiply by Fixed Interval and display result in Actual Run Interval. • When (Fixed Interval * Daily Demand) is greater, display Fixed Interval in Actual Run Interval. The system displays Actual Run Interval based on the EPEI display option for the process.
Cost Allocation Percent	The system displays the percentage of the overall item cost allocated to this loop in Kanban Item Master Maintenance.

Table 1.5 — *Analyst Data Fields* — (Page 1 of 3)

Field	Description
Kanban Item Cost	The system calculates this value by multiplying the item master cost for the cost set specified in the Process Option Panel by Cost Allocation Percent. This field displays in the base currency, which is shown in the column heading.
Average Inventory Calculation Method	This is the method the system uses for calculating average inventory for a kanban loop. It defaults from Kanban Master Maintenance. If you change it to view the effects of a different calculation method and save your changes, the system updates the loop record. The following methods are available. • Standard. Average inventory is calculated as follows: *If Order Quantity is greater than 0, then Average Inventory = (Order Quantity * 0.5) + (Average Daily Demand * FIFO Time) + Safety Stock + Container Size Safety Stock* *If Order Quantity is 0, then Average Inventory = ((Fixed Interval Time * Average Daily Demand) * 0.5) + (Average Daily Demand * FIFO Time) + Safety Stock + Container Size Safety Stock* *If Order Quantity and Fixed Interval are both 0, then Average Inventory = (Kanban Quantity * 0.5) + (Average Daily Demand * FIFO Time) + Safety Stock + Container Size Safety Stock* • Mfg1. Average inventory is calculated as follows: *1/4 * (3 * Order Quantity Revised + Average Daily Demand * Run Time in Days) + Total Safety Stock Units + ((FIFO Time in Days * Average Daily Demand) rounded up to the kanban quantity) + Container Size Safety Stock* *In this calculation, Run Time in Days = (Loop Order Quantity Revised * Cycle Time) / Process Time in a Day + (Item Setup Time / Process Time in a Day)* **Note:** Method Mfg1 is designed for loops that have Source Type set to Process.
Average Inventory Units	The system displays the average inventory level based on the specified calculation method, including the unit of measure from Item Master Maintenance.
Average Days of Supply	The system calculates the number of days of demand that can be met out of inventory by dividing Average Inventory Units by the value of Daily Demand (Revised) from the sizing data frame.
Average Inventory Value	The system calculates the base-currency value of the average inventory quantity by multiplying Average Inventory Units by Kanban Item Cost.
FIFO Stock	The system calculates the average amount of inventory that is in production at a first-in, first-out (FIFO) process: *FiFO Stock = FIFO Time In Days * Daily Demand* where: *FIFO Time in Days = (External FIFO/day) + (Internal FIFO / Internal Hours Per Day [using Available Time Per Day when source type is Process]*
Run Time Days	The system calculates this value as follows: *Run Time Days = (Revised Order Quantity * Revised Cycle Time) / Revised Total Time Available Per Day + (Revised Setup Time / Revised Total Time Available Per Day)* This field is relevant only to loops supplied by a process. It is set to 0 for other source types.

Table 1.5 — *Analyst Data Fields* — (Page 2 of 3)

Field	Description
Total Safety Stock plus Safety Time	The system displays the safety stock for the item from the Sizing Data frame.
Container Size Safety Stock	The system displays the amount of safety stock that results from the container size. For example, sizing calculations that round up to a container size may result in additional inventory that should be considered safety stock. This field is calculated using values from the sizing data frame: *Container Size Safety Stock = Order Point (Revised) – Order Point (Preliminary)*
Safety Factor Percent	The system displays total safety stock represented as a percentage of demand during the EPEI. The calculation varies based on the source type. Also, because of the way in which process loops are selected on Kanban Sizing Workbench, the calculation is not the same on both workbenches. • For process loops on Kanban Sizing Workbench: *Safety Factor Percent = ((Total Safety Stock Plus Safety Time + Container Size Safety Stock) / (Daily Demand (Revised) * max ((Fixed Interval Time/ Standard Hours per Day), EPE Interval in days or 1))) * 100* • For process loops on Kanban Process Workbench: *Safety Factor Percent = ((Total Safety Stock Plus Safety Time + Container Size Safety Stock) / (EPE Interval * Daily Demand (Revised)) + (1 - Current Load Percent) / Current Load Percent) * 100* • For supplier and inventory loops on both workbenches: *Safety Factor Percent = ((Total Safety Stock Plus Safety Time + Container Size Safety Stock) / (Daily Demand (Revised) * max ((Fixed Interval Time/ Standard Hours per Day), 1))) * 100*
Total Safety Stock Value	The system calculates the base-currency value of the safety stock by adding Total Safety Stock Plus Safety Time to Container Size Safety Stock and multiplying the result by Kanban Item Cost.
Total Cycle Time/Day (theoretical)	For loops with a source type of Process, the system displays the result of multiplying Daily Demand (Revised) by Cycle Time (Revised). For other source types, this field is 0.
Setup Time Per Standard EPEI	For loops with a source type of Process, the system displays the result of dividing EPEI (Revised) for the process by the actual Run Interval. For other source types, this field is 0.
Setup Time Per Day	For loops with a source type of Process, the system displays the result of dividing Setup Time Per Standard EPEI by EPEI (Revised) for the process, then multiplying by Total Time Available Per Day (Revised). Both EPEI-related values are converted to days before this calculation. For other source types, this field is 0.
Load Percent	The system displays the load percentage of total available time represented by the individual process item. It uses the following calculation: *Item Total Cycle Time/Day (Theoretical) + Item Setup Time Per Day / Total Cycle Time/Day (Theoretical) for all process items + Setup Time Per Day for all process items*

Table 1.5 — *Analyst Data Fields* — (Page 3 of 3)