QAD Adaptive Applications
Enterprise Edition

User Guide

QAD Planning and Scheduling Workbenches for Production Orders

Overview
Manufacturing Resources
Master Scheduling Workbench (MSW)
Production Scheduling Workbench (PSW)
Component Availability Check (CAC)
Product Structure Projected On Hand (POH)
Co-/By-Products
Enterprise Asset Management
Leveling
Days on Hand
Troubleshooting, Tips, and Errors

70-3387-4.4
Planning and Scheduling Workbenches 4.4
Enterprise Edition 2016 and Later
September 2020

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Planning and Scheduling Workbenches Change Summary

Product Name Changes

Starting in September 2019, the new name for QAD's complete portfolio of products is QAD Adaptive Applications. Additionally, QAD Adaptive ERP is the new name for QAD's flagship ERP solution. QAD Adaptive ERP includes the functionality previously associated with QAD Cloud ERP and QAD Enterprise Applications - Enterprise Edition, plus the QAD Enterprise Platform and Adaptive UX which resulted from the Channel Islands program. Going forward, the terms QAD Enterprise Applications, QAD Cloud ERP, and Channel Islands will be deprecated but will remain in previous documentation and training materials. QAD's intention is to—as soon as possible—eliminate the use of the deprecated terms going forward.

Change Summary

The following table summarizes significant differences between this document and previous versions.

Date/Version	Description	Reference
Version 4.4/September 2020	Need Date added to the Production Order Maintenance tab.	page 4
	Removed some fields from the Data Load tab in Preferences.	page 47
	Updated information about leveling.	page 163
Version 4.3/September 2019	Revision.	--
	Minor updates to Leveling.	page 172, page 191
Version 4.3/September 2019	Added new fields in the Data Load tab.	page 47
	Updated the description of production order tasks that you can perform in MSW.	page 63
	Removed support for production order status B (Batch).	page 68
	Updated Production Order Release/Print.	page 71
	Replaced the Production CUM Activity tab with the Production WIP Status tab.	page 83
	Updated field descriptions for the Compliance tab.	page 84
	Updated information about CAC calculations.	page 116
	Updated information about leveling.	page 163
Version 4.2/October 2018	Revision.	--
	Added hardware recommendations to improve performance.	page 20
Version 4.2/September 2018	Rebranded for version 4.2.	--
	Added new Days on Hand chapter.	page 195

Date/Version	Description	Reference
	Added new Calculate DOH and new Product Structure POH fields to Data Load preferences.	page 47 page 196
	Added new Workbench Control field.	page 45
	Updated EPEI leveling processing information.	page 180
Early Adopter Version 4.1/March 2018	Rebranded for version 4.1.	--
	Added a new chapter for new leveling functions.	page 163
Early Adopter Version 4.0.0/April 2017	Updated with Production Order 1.0.0 changes in the QAD EE ERP, including changes to menu names and numbers.	--
	Added text on how the workbenches updates some window displays for some actions made in the Resource Navigator.	page 4 page 29 page 95
	Added new Supply Details Panel.	page 6 page 87
	Updated the description on how holidays work.	page 6 page 8 page 56 page 89 page 92
	Added functionality descriptions for using large icons.	page 14
	Updated description on customizing windows.	page 14
	Updated description on using the Column option.	page 17
	Added new error condition indicator functions in Production Order Maintenance.	page 18
	Updated schedule horizon functions in the Data Load User Preference, including new option to specify displays of item data without any supply, demand, production orders or inventory activity.	page 47 page 204
	Added descriptions of new Activity column in Scheduling Grid.	page 48
	Updated the Duration functionality for date calculations.	page 52
	Added new subsection for determining which orders require action.	page 64
	Described two ways to create orders in the Workbenches.	page 65
	Added new Update Release Date functionality to the embedded Production Order Maintenance.	page 69
	Added new EE Production Order program to release/print orders.	page 70 page 110
	Updated delete order functionality.	page 73
	Updated Component tab text and graphic in CAC User Preferences.	page 114
	Issue Policy description changes.	page 116 page 135
	Updated fields and field descriptions in the Detail Tab of embedded Production Order Maintenance to reflect EE Production Orders functionality.	page 75
	Added graphics for PSW Browse Grid.	page 96
	Updated explanations of defining run sequences.	page 102
	Removed references to searching for resources by Scheduler ID.	--
	Updated graphics that displayed removed blue shading in the grids.	--

Date/Version	Description	Reference
Early Adopter Version 3.4.2/September 2015	Rebranded for 3.4.2.	--
Early Adopter Version 3.4.1/November 2014	Changed the label from Component Projected on Hand To Product Structure On Hand. Changed all text/graphics associated with the label change.	--
	Added new Refresh, Unload, and Calculate Component Availability functions to the Resource Navigator's right-click context menu. Restructured Resource Navigator chapter around new functions.	page 25
	Added text regarding renamed Expand and Collapse Columns in the Schedule Grid.	page 39
	Added new sections for component changes reflected in Product Structure POH tab.	page 131
	Added text for data on the default BOM used in product structure data.	page 131
	Added text to describe lead time in Product Structure POH displays.	page 131
	Added text to describe how Product Structure POH data is tied to supporting tab data.	page 134
	Added new section to explain component demand calculations.	page 137
Early Adopter Version 3.4.0/August 2014	Added new chapter for Resource Navigator.	page 23
	Added new chapter for Product Structure Projected On Hand tab.	page 129
	Changed user preferences for MSW, PSW, and CAC chapters.	page 47 page 97 page 114
	Updated Overview to reflect new Resource Navigator capabilities and new Product Structure Projected On Hand tab.	page 1
	Updated Performance section in Overview.	page 20
	Removed all references to search function.	--
March 2014 EE	Added new Authorized Receipts Delayed and Scheduled Receipts Delayed statuses for embedded CAC.	page 120
	Added changes to reflect that the MSW Capacity Grid's Required Capacity and Scheduled Quantity rows are based on capacity open quantity.	page 39
October 2013 Enhancement/Maintenance Release	Added new subsection on Personalization Architecture to the Overview.	page 18
	Added new section on Create Process Performance to the Overview.	page 21
	Added new capacity panel information for the Schedule Grid.	page 39
	Added new fields to Workbench Control File, and added a section on setting controls in Workbench Control File to the MSW chapter. Previously, the control file was described in the EAM chapter and only included EAM-related fields,	page 45 and page 155
	Added new section on Selecting the Method for Date Calculations to user preferences description in the MSW chapter. Changed user preferences to reflect user preference updates.	page 52
	Added information on viewing over-completed orders in the workbenches.	page 67
	Updated information for the CAC Computation Method field.	page 115

Date/Version	Description	Reference
	Added information on data that displays in the Quantity Available to Allocate column, in the CAC Shortage Report.	page 122
September 2013.1 EE	Rebranded for September 2013.1 EE.	--
March 2013 EE	Rebranded for March 2013 EE.	--
	Added new create process performance topic.	page 21
December 2012.1 EE Enhancement/Maintenance Release	Added a new quick-find function that lets you locate items and production order records on the MSW.	page 39
	Added new functionality that makes forecast dynamically included in Supply/Demand Panel.	page 42
	Added new Seasonal Build, Change Quantity by Month, Holidays, and Intersite Demand browses for the workbenches.	page 85
	Added new CAC on-demand, dynamic processing for the MSW.	page 114
May 2010.1 through 2012 EE enhancement bundle	Added new co-/by-product chapter to the book.	page 139
	Added new section for deleting/closing scheduled orders to MSW chapter.	page 73
	Added new fields for CAC user preferences.	page 114
	Added new problem/solution information for closing E status co-/by-product orders to Troubleshooting appendix.	page 207
March 2012 EE Retrofit	Added a section to the Overview for Enterprise Asset Management (EAM) future functionality.	page 7
	Added sentence regarding notification of background thread completion to Overview chapter.	page 20
	Added a section to the MSW chapter to describe a the Product Structure Filter that helps schedulers gauge the impact of a schedule the change immediately across for all levels of the bill of material (BOM).	page 60
	Restructured the Overview in the component availability check (CAC) chapter to better reflect workbench built-in CAC functionality.	page 111
	Added subsection to MSW chapter for functionality to change a firm order back to a planned order.	page 68
September 2011/2011.1 EE	Rebranded for QAD 2011.1 EE.	--

Chapter 1

Overview

The QAD Planning and Scheduling Workbenches—which include both a Master Scheduling Workbench (MSW) and a Production Scheduling Workbench (PSW) with integrated component checking capabilities (CAC)—provide planners and schedulers with unprecedented, simultaneous visibility to schedules and all supporting data and enable control and collaboration across the production and materials planning space.

The following topics introduce the MSW, PSW, and CAC and discuss basic features, functions, and options available to both workbenches.

Introduction 2
Introduces the components and features of the Planning and Scheduling Workbenches.

Common Workbench Elements 3
Describes the elements of both the MSW and PSW and tells you the capabilities and purpose of each element.

Synchronizing MSW and PSW Data 11
Describes the way to use the MSW and PSW simultaneously to build schedules.

Common Features 11
Describes features and components that are common to both the MSW and PSW.

Limitations 20
Describes areas not covered by MSW or PSW.

Performance 20
Describes performance considerations and tips to improve performance.

Introduction

Successful scheduling deals with analysis, review, and manipulation of all data that impacts production machines, work centers, production orders, production lines, and other related resources of the manufacturing process. It also requires complex calculations that are immediately applied to manipulated schedules or any supporting data. More importantly, it requires immediate display of calculation results, especially when scheduling issues arise.

Previously, you needed numerous QAD application menus to effectively view or manipulate schedule data, which could be time consuming and cumbersome. Now, new scheduling tools are provided through the.NET UI that let you effectively plan and schedule resources for a master schedule or a production schedule from a single workbench for each type of schedule.

Initially, building a master schedule, then a subsequent production schedule, was done in a step-wise manner using several reports and maintenance screens, which was a cumbersome process. Now, you can concurrently plan and schedule production in a single process/toolset.

Schedules built through MSW or PSW let you build schedules that assist in doing the right production order in the correct order and consumes less time for you when building them.

Providing tools to build schedules is not enough, though, if you cannot monitor and manage component shortages. For that reason, several shortage-monitoring features are also available when you are building effective schedules.

Master Scheduling Workbench (MSW)

The MSW is a .NET UI application that increases master scheduling efficiency by displaying and manipulating system demand, supply, scheduling, inventory, production order, and MRP data from several applications into a single workbench.

You can use the MSW to interact with production lines, machines, and production order schedules and make changes where necessary.

Within MSW, you can update the production order status—planned, firmed, allocated, released, closed—as well as create production orders, while considering all demand and supply sources, from this single workbench. You can ensure that items with similar attributes are scheduled together while also ensuring that there is enough capacity to take advantage of running similar items. You can also identify items with demand that have no released production orders or check component availability for each production order to be released.

User-configurable parameters control the number of days you can directly manage a scheduling period, as well as the future and historical periods available for schedule review.

Event-based color coding lets you easily identify areas of concern. You can review and manipulate schedule and production order data in a simulation mode, then save the updated information back to QAD ERP.

Production Scheduling Workbench (PSW)

After you generate a master production schedule over a monthly, weekly, or daily horizon, you may need to refine the master schedule by creating a production schedule for a shorter two-to-five day period for the shop floor to use. Production scheduling entails:

- Sequencing jobs by key attributes/constraints within a day or shift to obtain maximum operational efficiencies
- Verifying that materials are available before releasing the schedule/orders to the shop floor
- Releasing and authorizing production orders

Some companies run a single production order over several days, while others run multiple production orders within a single day. Further, some companies define a production sequence by shift to monitor shift performance or ensure that products are available for a specific shipment time. The PSW lets you schedule items on production lines. You can schedule items within a day and shift (sequencing).

Component Availability Check (CAC)

Component Availability Check is another component of the Planning and Scheduling Workbenches and is integrated into both the MSW and PSW workbenches. This lets you verify that materials are available before you release orders and print the orders and schedules. Integrated CAC serves two distinct purposes:

- Schedulers and planners use CAC features to ensure that the jobs they schedule days in advance to production have enough materials.
- Schedulers and planners use CAC features to ensure that the jobs they release to the shop floor have enough materials.

The CAC engine is also leveraged in several user-based collections developed specifically to be leveraged with the Planning and Scheduling Workbenches

All users can use CAC supporting data to analyze component availability. CAC calculations are performed on-demand and you control when they occur. You can even cancel calculations once they start.

Within the planning and scheduling workbenches, built-in panels at the bottom of the workbench provide supporting data. For more information on the Component Check browse collections, see “Component Availability Check (CAC)” on page 111.

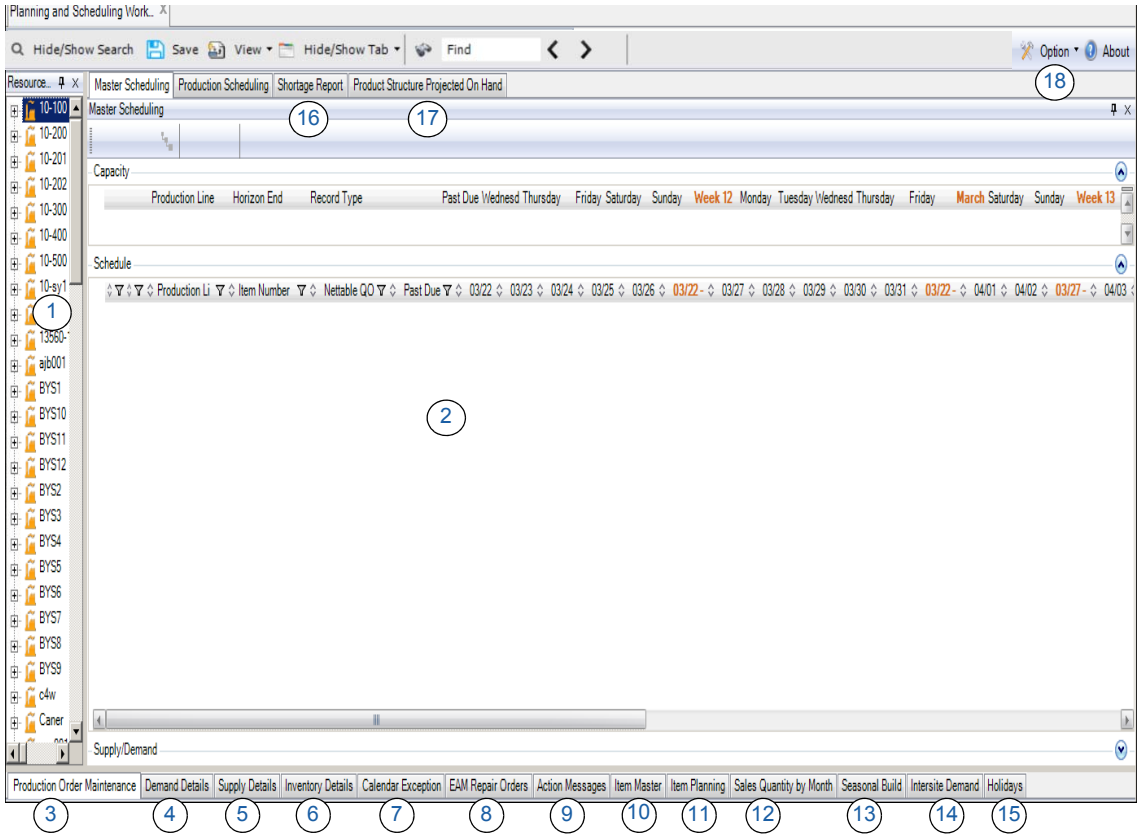
Common Workbench Elements

You can interactively control the workbench behavior and content, such as the panels that display, data filters, and business rules. You can save your customized workbenches layout as a View and invoke it on demand, based on the type of scheduling you are performing.

When you make selections within some panels, the system displays supporting information related to the record selected in the supporting tabs. This information is detail information; for example, demand detail records, supply detail records, item transaction history, item inventory details, bill of material, and routing. Also, when you make changes or create new data in some panels, data in other panels changes to reflect the new data.

The following depicts areas that are common to both MSW and PSW.

Fig. 1.1
Common Scheduling Elements



(1) Resource Navigator

The Resource Navigator displays the sites and resources; see “Manufacturing Resources” on page 23.

(2) Schedule or Sequence Grid

This area displays the Schedule Grid in MSW or the Sequence Grid in PSW. The MSW, PSW, and Shortage Report content are controlled by the Navigator Panel.

For information on MSW, refer to “MSW Schedule Grid Data” on page 59.

For information on PSW, refer to “Working with Sequence Grid Data” on page 101.

(3) Production Order Maintenance

You can access Production Order Maintenance within the workbenches. Production Order Maintenance lets you view individual item production order supply records for items that display in the MSW Schedule Grid or PSW Sequence Grid. Production Order Maintenance uses a

horizontal layout and supports scheduling of work centers, production orders, and production lines. You can view, monitor, and interact with details of a production order within the Production Order Maintenance tab.

The left side of Production Order Maintenance displays production order summaries with the order ID, status, quantity ordered, and release date columns.

Note The Need Date field is available on the Production Order Maintenance tab. It is editable but is hidden by default. When a production order is loaded, the Need Date value comes from the production order record. If the order is newly created on the MSW, the system sets its Need Date to the due date.

The right side of Production Order Maintenance displays production order details, comments, date/time, operations, order relationships, component availability data, production activity, production CUM activity, compliance data, and accounting data for the order.

Using these tabs, you can view several aspects of data that have an impact on the production order and alter data without leaving MSW/PSW. Production Order Maintenance also lets you create a new order, delete an order, or validate an order. When you validate the order, the system checks for correct data in production order fields and when errors occur, it indicates which fields require that you correct data.

After you complete production order updates, you can save changes globally by clicking the workbench toolbar Save button. Some validations take place in real time when you modify the order on the workbench; others are performed during the save process. The Validate button invokes the validations that would be performed during the save process, but without actually saving.

For details of field descriptions, see “Details Tab” on page 75.

Fig. 1.2
Production Order Maintenance

Production Order Maintenance auto-selects the first production order on the selected Schedule Grid due date and displays additional production orders in the past and future. Scroll up to view orders with prior due dates; scroll down to view orders with future dates.

When you select an item on the Schedule Grid with a supply/demand issue, Production Order Maintenance displays any planned orders MRP generated to resolve the supply/demand issue and existing production orders of various statuses associated with the item.

Also, for loaded resources, when you invoke certain actions in the Resource Navigator or in the PSW Sequence Grid, the workbenches-embedded Production Order Maintenance panel updates the order display to reflect the actions you take. See “Resource Navigator Actions Reflected in Production Order Maintenance Panel” on page 29 and “Sequence Grid Actions Reflected in Production Order Maintenance” on page 95.

For each due date, production orders display by status in this order: P(lanned), F(irm planned), A(llocated), E(ploded), R(eleased), C(losed). Then, for each status, they display by production order ID.

If you select a different production order in Production Order Maintenance, the Schedule Grid does not change.

(4) Demand Details

When you select an item in one of the daily schedule fields, the system displays information about the components of the demand, such as sales order/line numbers and quantities or seasonal demand under the Demand Details tab. This display is based on MRP detail records.

Special behavior of the MSW Schedule Grid is as follows:

- When you select a specific day on the Schedule Grid, the Demand Details frame displays all demand records with due dates equal to the selected Schedule Grid date column.
- For the item/day selected on the MSW Schedule Grid, the Demand Detail Frame focuses on demand records, starting with the demand records with due dates equal to the selected item/day. If no matches are found, the frame focuses on the first demand record found—the oldest record. You can scroll to see all open demand records in the past or records in the future.

(5) Supply Details

The Supply Details Panel displays the ID, parent item, order and component status, quantity open, production line, primary line, shift, sequence, release and due date, quantity ordered, actual quantity complete, pur/mfg code, buyer/planner, work order, sales job, site, and more. For all areas, you can choose to display details for all, custom, blanks, or so on.

(6) Inventory Details

The Inventory Details Panel displays the item number, site, quantity on hand, inventory master data, location, lot/serial, status, expiration date, and the date created. For all areas, you can choose to display details for all, custom, blanks, and so on.

(7) Calendar Exception

Occasionally, exceptions such as overtime or machine downtime cause changes in productivity and capacity for various shifts. When you set up calendars in Calendar Maintenance, you specify a reference, such as downtime, and the number of hours per day affected. This information displays in the Calendar Exception Maintenance grid within MSW/PSW. Negative numbers can display for downtime or holidays. Holidays are days when no production is scheduled. Holidays differ from site to site and domain to domain. Holidays overwrite all working hours when the system processes and calculates workbench data, including exceptional time for the holiday date.

Note You can only create Calendar Exceptions for production lines within the workbench when resources are loaded. When you attempt to create a new calendar exception for resources that are not loaded, the system does not create a record.

When you create a new calendar exception for a loaded production line by selecting New in the Calendar Exception tab, the system displays a new reference line in Calendar Exceptions.

When you enter calendar exception records, the system multiplies by the number of resources. To explain this, the Number of Lines field in Production Line Maintenance (16.1.1) lets you define the number of processors that a particular production line has, so the system computes the available capacity by calculating for the number of processors per line. For example, if a production line has a single 8-hour shift per day and 4 processors (number of lines set to 4), then the available capacity is computed as 32 hours per day. Calendar exceptions work the same way. Using this example, when you define a calendar exception of -3 hours for a particular date, the effect on the date's available capacity is to reduce it by 12 hours, resulting in an available capacity of 20 hours.

(8) Enterprise Asset Management (EAM) Repair Orders

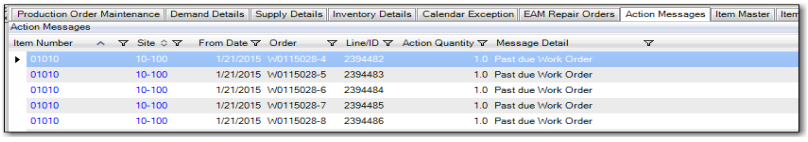
This tab lets you view EAM, version 12.5 or higher, orders for a resource within the workbenches. The EAM Repair Order Tab provides EAM production order data similar to that of production orders. Refer to “Enterprise Asset Management” on page 151 for more information.

(9) Action Messages

The Action Messages Panel displays information regarding the item issues generated by the legacy MRP action message logic. The MSW visual alerts depict negative projected on hand and below safety stocks, but the Action Messages Panel can display additional information, such as canceled production orders.

Note For error messages and conditions, refer to Appendix A on page 203.

Fig. 1.3
Action Messages



(10) Item Master

The Item Master Panel is a browse that displays critical item information leveraged for planning/scheduling purposes and the active field values. The panel lets you view and manage items on multiple resources at once.

Note You can modify the browse view in Browse Maintenance to include information from any field in Item Master Maintenance (1.4.1).

For field descriptions, see “Item Master and Planning Tab” on page 86.

(11) Item Planning

The Item Planning Panel displays item master/planning details for a selected item. At any point during the planning or scheduling process, you can refer to the item planning panel to find information to identify lead time, order quantity, and so on. If an item-site record exists, planning data from item-site record display for the selected item-site record.

You can modify item details to include information from any field in the Item Master Maintenance.

For field descriptions, see “Item Master and Planning Tab” on page 86.

(12) Sales Quantity By Month

The Sales Quantity By Month Panel lets you review or change customer consignment data. Customer Consignment Inventory lets you plan, order, ship, track, and report customer-consigned inventory. It extends the sales order process by providing transactions to ship inventory and identify it as in-transit or consigned.

For field descriptions, see “Sales Quantity By Month Tab” on page 90.

(13) Seasonal Build

The Seasonal Build Panel lets you review or change sales quantities for items that fluctuate according to some seasonal factor, such as weather or the way a firm handles its operations.

For field descriptions, see “Seasonal Build Tab” on page 90.

(14) Intersite Demand

The Intersite Demand Panel displays information for demands that emanate from distribution requirements planning (DRP) intersite requests. DRP balances supply and demand for items transferred between sites. The transfer of demand from the site receiving the items (receiving or demand site) to the site supplying the items (shipping or supply site) is facilitated through the generation of intersite requests. DRP calculates distribution item requirements, generates intersite requests, and manages shipment schedules and transportation. Use the workbenches tab to review information to schedule items for the intersite demand.

For field descriptions, see “Intersite Demand Tab” on page 91.

(15) Holidays

The Holidays Panel displays data for holidays and other non-work days that apply to an entire site. This helps you schedule effectively.

Holidays are days that no one works; the plant is shut down and no production is scheduled. Manufacturing orders are never due and operations are not scheduled on a holiday.

Holidays overwrite all working hours when the system processes and calculates workbench data, including exceptional time for the holiday date. Also, when a date is either a site or domain holiday, the planned capacity of the holiday is 0 (zero), regardless of the working hours or exceptional hours recorded or set for that day.

For descriptions of fields in the Holidays tab, see “Holidays Tab” on page 92.

For more information on planned capacity calculations; see “MSW Capacity Panel Data” on page 56.

(16) Shortage Report

Schedulers can use the Shortage Report, generated by component availability check (CAC), to monitor component shortages of manufactured/purchased parts. In the workbenches, you can see the component status at the production order level; however, the Shortage Report allows you to summarize all material shortages for all production orders in the workbenches. You can run a shortage report by selecting the Shortage Report tab in the workbenches.

Fig. 1.4
Shortage Report Tab

(17) Product Structure Projected On Hand

Schedulers, expediters, and planners can check the projected on hand (POH) quantities for a component —BOM component—of a product structure within the Planning and Scheduling Workbenches. The Product Structure Projected On Hand tab in the workbenches lets you view projected on hand quantities for components of items that are selected in the Master Scheduling Grid. Since the product structure projected on Hand data is item driven, you view a BOM-structured layout of items, with indentations that denote product structure levels.

To drill down even further into the components of an item and their supply/demand data, you click on a row in the main browse of the Product Structure Projected On Hand tab. When you do, the system displays data in the supporting Supply/Demand panel for just the component you selected. This can be any level within the BOM structure

Fig. 1.5
Product Structure Projected On Hand Tab

(18) Options

You can set user preferences when you click Options in the top bar. The Settings panel displays four tabs that let you set options for:

- Data Load
- Display

- Scheduling
- Components

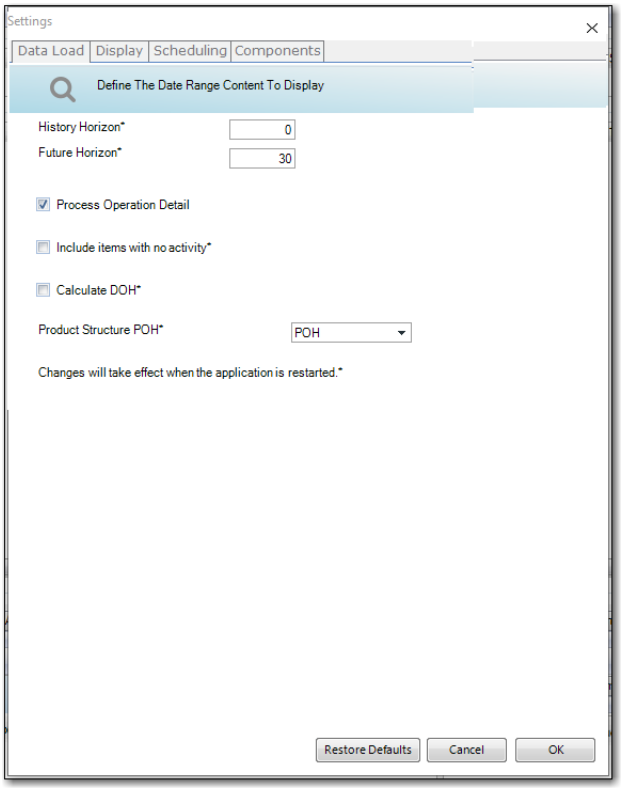
In some of the areas, you can specify separate settings for the MSW or PSW.

The Components tab has areas for CAC and for the Product Structure Projected On Hand panel.

Each chapter in this user documentation contains a section for setting the preferences as follows:

- For MSW settings, see “MSW User Preferences” on page 47.
- For PSW settings, see “PSW User Preferences” on page 97.
- For CAC settings, see “CAC User Preferences” on page 114.
- For BOM POH settings, see “Product Structure Projected On Hand User Preferences” on page 134.

Fig. 1.6
User Preferences



Synchronizing MSW and PSW Data

Typically, you work with master schedules in MSW and production schedules in PSW simultaneously. The two workbenches are designed to work together and are aligned as if they were a single workbench.

For example, you select an item on the MSW Schedule Grid and verify the item supply/demand are correct. You can then determine when the item is produced in relation to other items scheduled on the same day by looking at the PSW Sequence Grid.

Or, if you are working on the PSW and move the production order release/due date back, you can then determine the impact to supply/demand by viewing the MSW demand/supply summary panel. This lets you make decisions that are based on displayed data that you can easily verify.

Note If you apply filters to the MSW/PSW, you may not see the synchronization behavior when the system does not display records per your filters.

Common Features

The following topics discuss features common to the workbenches:

- Customizing Views
- Using Large Icons
- Filters and Browses
- Quick Find
- Displayed Records
- Drag and Drop
- Columns
- Personalization Architecture
- Visual Indicators
- Navigation Shortcuts and Keys

Customizing Views

A number of components of the workbenches can be customized:

- Layout of grids and panels
- Repositioning/hiding tabs
- Resizing panels
- Using large icons

This section discusses each type of customization as well as saving your view.

Saving Views

You can also save customizations as a View when you change the layout of:

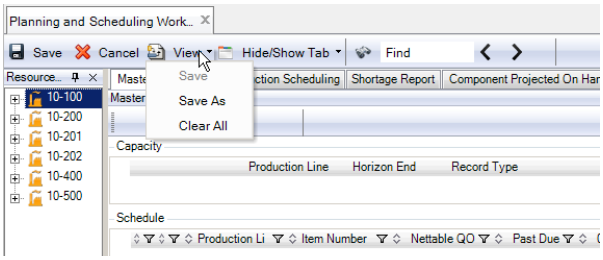
- Grid column settings
- MSW Schedule Grid and Capacity Panel
- PSW Sequence Grid
- PSW right-hand Production Order Browse
- Production Order Maintenance left grid list of orders

You can click on the View option and choose one option from the following:

- Save: Saves the current view.
- Save As: Lets you name the current view.

- Clear all: Lets you delete all saved views.

Fig. 1.7
Options for saving views



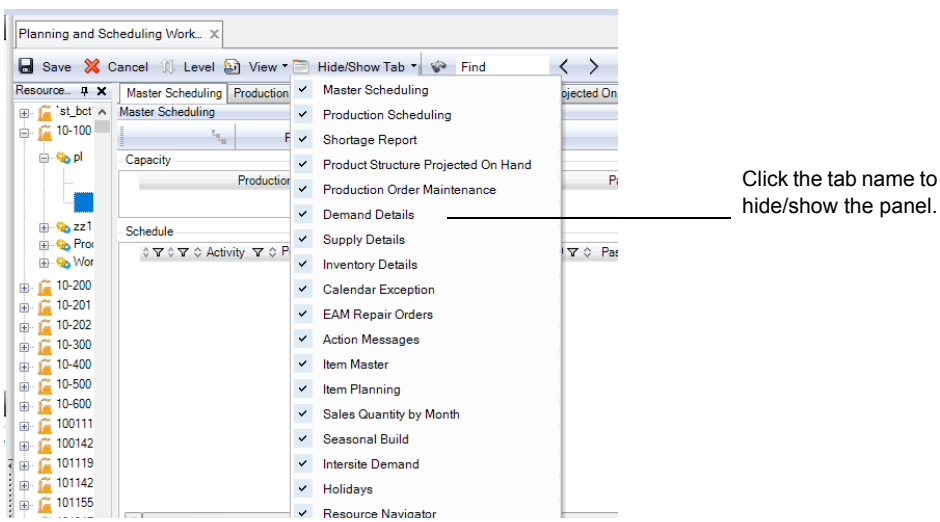
When loading saved views from ERP-version workbenches to the Production Orders-compliant workbenches, the Production Orders-compliant workbenches may encounter errors and then go down. So, after installing Production Orders, which includes the Production Orders-compliant workbenches, you are advised to re-create the stored views to ensure that they can be opened on the workbenches properly.

The Production Orders-compliant workbenches check whether the stored views are for ERP-version workbenches. If so, an error message is displayed, asking you to re-create such views.

Repositioning/Hiding Tabs

You can quickly display or hide any panel with the workbenches by selecting the Hide/Show Tab option. When you click the option, the system displays a list of panels with a tab. Toggle between displaying and hiding the panels by clicking the panel name.

Fig. 1.8
Hide/Show Tab Options



You can move a tab on a workbench to a new location, too.

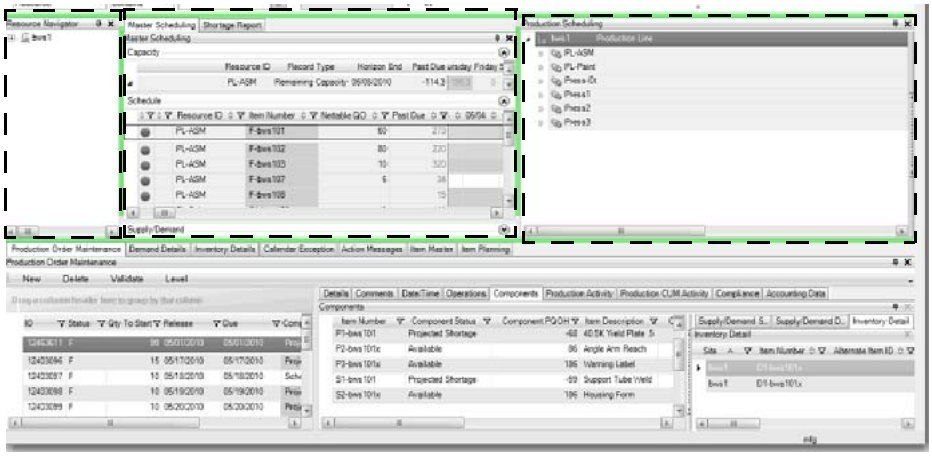
Also, when you work in any of the supporting programs that display at the bottom of the workbenches, and the program has multiple tabs, you can right-click on the tab, then select the Auto Hide option to display only the data in that tab. For example, when working in Production Order Maintenance, you want to focus only on the dates and times of operations for a particular

order. You select the order on the left side, then select the Date/Time tab on the right side. You right click to select Auto Hide so that only the date and time data for that order displays on the right side. You can save auto-hidden areas as part of your view.

Resizing Panels

You can resize a panel to accommodate viewing by grabbing the panel's perimeter and dragging the panel to the size that you want. You can then save your resized panels as part of your view. The following figure shows panels with dotted lines around them that can be repositioned and saved as part of the view.

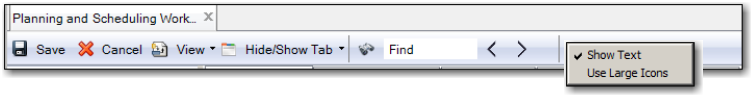
Fig. 1.9
Panels to Resize



Using Large Icons

You can use large icons within the workbenches, including for the Find, Previous, and Next functions. To use large icons, right click on the top menu, then select Large Icons.

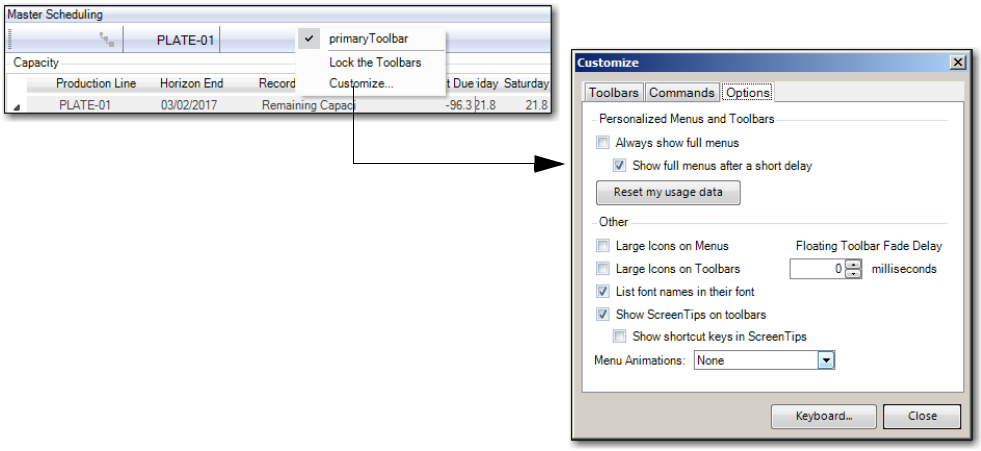
Fig. 1.10
Large Icons



Customize Window

You can customize your display through the Customize window. To view the window, place your cursor on a panel's toolbar, right click to display the Customize option, then select the option. Use the tabs in the window to customize the toolbar, commands, and other options as shown in Figure 1.11.

Fig. 1.11
Customize Window



Horizon

You can set the history and future horizon in the user preferences. The history horizon defines how many days in the past you want to review completed or closed production orders. After you set the history horizon, you restart the application to reset the History Horizon or Future Horizon.

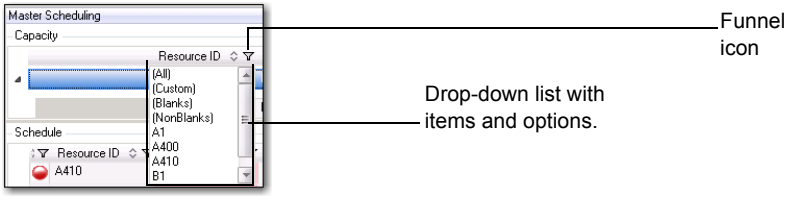
To set up the History Horizon, see:

- “Schedule Horizon” on page 43
- “Defining PSW Sequencing Horizon” on page 98

Filters and Browses

In the various grids and panels, you can apply filters to the columns that display by clicking the funnel icon. Click the funnel icon which presents a drop-down list with items displayed for the column along with options for (All), (Custom), (Blanks), (NonBlanks), (Null), (Not Null), and more, depending upon the panel you are in when you click the icon. This is a standard .NET UI filtering mechanism.

Fig. 1.12
Filter



- To display all data, choose (All). This is the default.
- To include custom criteria, choose (Custom).
- To include only blank items, choose (Blanks).
- To display everything except blank items, choose (NonBlanks).
- For a particular item, select the item from the list.

Note Other options can be available, depending upon the panel you are in when you click the filter icon.

To define a custom browse, click the funnel icon, then choose (Custom). The Enter filter criteria pop-up menu displays. By default, the menu includes an initial criteria. You can add additional criteria by selecting Add a Condition, then selecting an operation.

Quick Find

Within the MSW Schedule Grid, you can quickly find production order records by using the Quick Find feature in the toolbar.

Note You can use this feature in the PSW, too; however, since the PSW displays a limited number of orders, the order may or may not be visible in the PSW. If the order is not visible in PSW, you can switch to the MSW and find the order using the next/previous buttons.

You can enter either numbers or text in the Quick Find feature. You can be at the site level, work center level, and so on. Once results display, click on the Next arrow (>) to go from find to find, one record at a time.

In both the Schedule Grid and the Production Order Maintenance Panel, you can easily find items by:

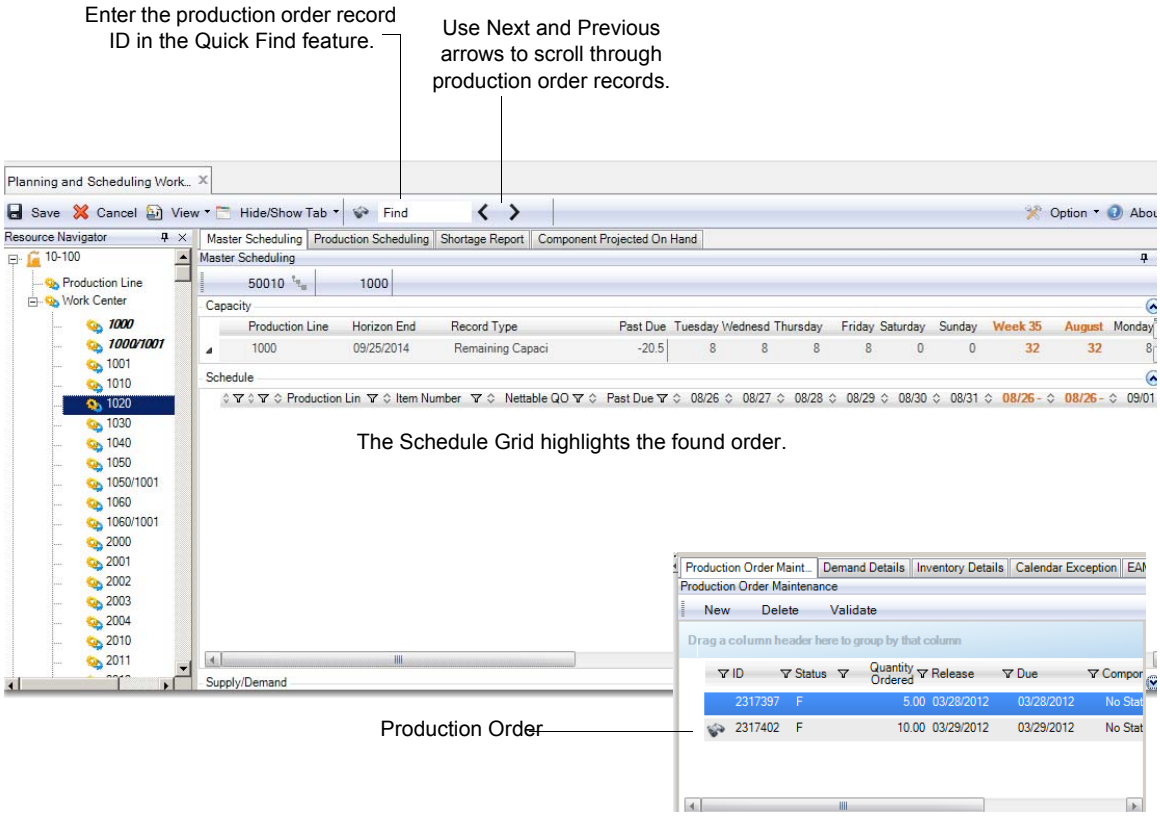
- Order ID
- Item number (when associated with a production order)
- Sales order
- Remarks
- User field 1 and 2 within the production order master table.

Use the following procedure to use the Quick Find feature:

1. Locate Find in the toolbar.
2. Enter numbers or text to find.

   The Schedule Grid highlights the found order with your entered values. The Production Order Maintenance Panel displays an icon in the Summary panel next to the found order; see Figure 1.13 on page 16.
3. Optionally, use the right and left arrows as Next and Previous functions to scroll through records, starting from the found record.
4. Use the position count to determine whether the display moved to the next order.

Fig. 1.13
Quick-Find Feature



Note the following regarding Quick Find abilities:

- When the system does not find any matches, the system displays a message informing you that there is no match.
- When your results do not seem focused, click the next and previous arrows to focus the results.
- When an order has more than one field that contains a match, the system only counts this as one match.
- When you load data for an item number that does not have a production order record but only a demand record, the Quick Find cannot locate the item number.
- When you have an item/order on multiple work centers or when both the production line and work center reference the same order, the system focuses on the first resource/item relationship found for the production order.
- The Quick Find feature does not work on the Shortage Report Tab or on the PSW Production Order Browse.

Displayed Records

You can display records for individual production lines and work center/machine combinations. For more information on records that are loaded, refer to “Loading Resource Data” on page 31.

Drag and Drop

You can easily modify aspects of a production order by dragging and dropping production orders within the PSW Sequence Grid or to the Resource Panel. You cannot drag and drop orders in the MSW Schedule Grid.

In PSW, when you drop an order onto another order, the order you drop acquires the properties of the targeted order, so, for example, if you drag and drop an unsequenced order onto a sequenced order, it becomes a sequenced order. Use the drag-and-drop method to:

- Change due dates by dragging and dropping a production order from one release date to another production order with a different release date.
- Modify resources by dragging and dropping from the source to the target destination after you select a single or multiple production orders.
- Sequence production orders in PSW by dragging and dropping single or multiple orders after a sequenced production order. After you drop the orders, the system assigns the sequence number to the orders as greater than the prior sequenced numbers. Shift numbers are also automatically assigned if an order is dropped on a particular shift.

  Note To sequence the first production order for a given release date/shift, you must manually enter the sequence number of (1). From this point on, you can use drag-and-drop to sequence additional orders within the same release date/shift.
- Unsequence an order by dragging a sequenced order and dropping it on an unsequenced order. The system changes the sequence to 0 (zero).

Columns

You can add hidden columns—a .NET UI feature—and select the additional column that you want to display in the workbenches.

To do this, right-click in any of the following panels with the cursor on any current column, then select the Columns option:

- Capacity panel
- MSW Schedule Grid
- PSW Sequence Grid
- Production Order Maintenance left and right panels
- Component panel
- Shortage Report
- Product Structure Projected On Hand
- Supply/Demand panel

When you select the column option, the Column Maintenance window displays. Select the column that you want to add.

Note The columns you can add depend upon the panel you are in; for example, the columns to add to the MSW Schedule Grid differ from the columns to add to the PSW Sequence Grid.

Personalization Architecture

You can use Personalization Architecture features to easily add columns, fields, and associated processing logic to any of the workbench grids that reference the production order master and/or component detail tables. For restrictions and additional information, as well as instructions, code examples, and customization sample scenarios, refer to *Administration Guide: Planning and Scheduling Workbenches,* item number 70-3174-2013.1-Rev1.

Visual Indicators

The MSW displays visual status indicators to direct your attention to potential capacity and item shortage issues. The projected quantity on hand (POH) displays as soon as items display on the Schedule Grid. The system calculates the POH for every item with supply/demand in the scheduling horizon, and applies the POH status indicator to every resource that has quantities scheduled.

Also, within the workbenches-embedded Production Order Maintenance's left-hand grid, the system indicates production orders with error conditions. This lets you easily locate orders that require your immediate attention.

Table 1.1
Visual Indicator Summary

Panel/Frame	Object	Indicator	Meaning
Resource Panel	Resources		The resource includes one or more items with a supply shortage (negative POH).
MSW Capacity Panel	Remaining capacity	Yellow	The planned capacity was consumed from prior days, to satisfy the required capacity needs of the date column highlighted in yellow.
Period Available Capacity		Red	• Period available capacity is less than or equal to 0 for every day prior to this date. AND
		Yellow	• Required capacity is greater than capacity. • Excess capacity for the day is consumed by a future shortage. • The system consumes excess capacity from a prior day.
MSW Schedule Grid and Supply/Demand Panel	Item number	Red	Projected on-hand is less than 0 (zero) within the firm scheduling horizon.
	Projected On-Hand	Yellow	Projected on-hand is less than safety stock value plus seasonal demand within the firm scheduling horizon.
		Red	Projected on-hand is negative within firm schedule period. Alternate production lines without active orders are not colored for POH. For example, when you have the same item on two production lines, and you schedule quantities on the first production line but not the second line, the system does not display colored schedule grid cells for the second production line.

Projected and Status POH

The POH calculation is as follows:

WO Open quantity + Nettable Inv – Total demand

Where:

Nettable Inv = From MRP Detail Inquiry (23.16)

Total Demand = Independent + dependent + forecast + seasonal

WO Open quantity = Schedule Net Requirement Due (SNRD)

Note SNRD is the summation of production order open quantities for all production orders for a specific order due date and production line.

The POH status for production orders derives from the POH calculation. If any POH for that item is below safety stock, then POH status is set to safety stock status. If any POH is < 0 then the POH status is set to below-zero status.

Additionally, the production order PAC status derives from the POH calculation. If any POH for that item is below safety stock, then POH status is set to safety stock status. If any POH is < 0 then the POH status is set to below-zero status.

Navigation Shortcuts and Keys

While you can use the mouse to click anywhere within the Schedule Grid, the following keyboard navigation shortcuts are available:

- Press Tab to move forward to the next day or to move across a row to skip the total column.
- Press Shift-Tab to move back to the previous day.
- Press the down arrow to move down to the next item.
- Press the up arrow to move up to the previous item.
- Press Enter to commit your changes without moving from the cell.

Navigation Key Limitations

Shortcuts are available only within the window currently displaying. To display additional days or items, you must click the horizontal or vertical scroll arrows. You can use the Tab key, though, to display additional days within your horizon when they do not display because of the grid size.

You cannot use the Esc key in the workbenches as you might in a spreadsheet.

Limitations

MSW and PSW do not support:

- Scheduling for work centers

The workbenches provide the ability to view production orders by work center; however, modifications to production orders do not result in real-time updates across all workbench panels. Due to this limitation, QAD does not support production scheduling using work centers as a resource view.

- Scheduling at the operational level

  You can use the workbenches in a discrete production order environment to schedule release and due dates at the production order or item level; however, you cannot manage discrete production order release or due dates at the operation level. When you do schedule release or due dates at the order or item level, you should set up items on production lines, using utilities described in setup sections of the MSW and PSW chapters.

Performance

Significant updates were made to improve performance in the most recent versions of the workbenches, including:

- There is no search function in the most recent version.
- The Resource Navigator lets you control the loading of data for only those resources you choose to schedule in the workbenches. You can load resources one by one, instead of all at once. You can cancel loading once you have started it.
- CAC calculations are on demand for the resources or production orders you select and can be canceled at your request. You can perform the CAC calculations from either the Resource Navigator, Production Order Maintenance, or the PSW.
- You no longer have to pull in a large amount of calculation data based on searches. Now you only calculate POH for those components of interest to you in the Product Structure Projected On Hand tab, and should you need to pull in additional component data, you can pull in data for only those additional components of interest.

Minimum Hardware Recommended

QAD recommends the following minimum hardware requirements for better performance:

- 3.4GHz CPU
- Client PCs with a CPU chip with at least a score of 8000 on https://www.cpubenchmark.net
- Number of cores: 4
- 16GB RAM

Workbenches-Integrated CAC Data Retrieval

CAC calculations are on demand; refer to Chapter 5, “On-Demand CAC,” on page 113. You can also improve CAC performance by:

- Disabling the CAC calculation by not checking the Calculate Component Availability on Data Load/Save in the CAC user preferences.
- Minimizing the number of MRP detail records the system processes.

You can set the CAC Horizon field. To decide on a value for this field, consider the interval of time from today into the future for CAC purposes. For example, you may be interested only in the data within the time fence number of days into the future.

- Deciding which component items should be included or excluded.

  You can select the Components Included component check boxes as needed. For example, you may be interested only in non-floor stock items.

Note These settings do not pertain to the CAC browse collections, such as Monitor Material Shortages, Release Production Order By Production Line, and so on.

Create Process Performance

The software provides a spreadsheet performance feel when you create new production orders from the workbenches. This feel helps minimize application calls to the server. When you create a new production order as the first order for an item, the originally created process occurs—typically, within two to six seconds—but all subsequent orders that you create typically take less than one second. This performance is possible because the system uses the first production order as the master copy; then, it uses the master copy to create all subsequent orders. The system is aware of BOM or routing changes and effective dates as part of this process.

When you enter a new scheduled quantity in the MSW Schedule Grid, the system uses the planned order, when there already exists one, instead of creating a new production order when the planned order due date equals the date in the Schedule Grid. This eliminates the system need to create redundant supply records and helps minimize MRP cleanup during the next MRP run.

Note The create performance features do not apply to base or co-/by-product items.

Chapter 2

Manufacturing Resources

Before you begin scheduling using either workbench, you set up manufacturing resources using the manufacturing resource navigator. The following topics tell you how to set up manufacturing resources to meet your scheduling needs.

Introduction 24
Introduces the Resource Navigator and its purpose within the Planning and Scheduling Workbenches.

Benefits 24
Describes benefits of using functions provided through the Resource Navigator.

Resource Navigator Functions and Features 25
Describes features; includes individual sections for each function, which includes step-by-step procedures; and includes a cross-reference table of functions by loaded, unloaded, and resource group.

Multi-Selecting Manufacturing Resources 36
Explains the selection process within the Resource Navigator.

Introduction

The Resource Navigator in the upper left corner of the workbench lets you select resources; then, optionally load data into the workbenches for those resources so that you can plan, monitor, and manage schedules for them. See Figure 2.1 on page 24.

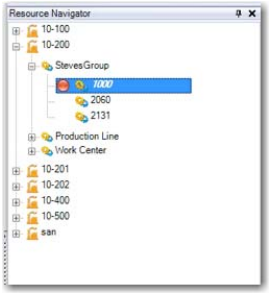
Manufacturing resources are grouped by site and resource type. Manufacturing resource types consist of two categories:

- Production lines
- Work centers

When one or more items associated with the manufacturing resource has a POH shortage within the resource's defined scheduling horizon, the Resource Navigator displays a POH shortage icon for the manufacturing resource; see Figure 2.1.

Like other panels in the Planning and Scheduling Workbenches, you can right-click on the thumbtack icon in the Resource Navigator's panel title to hide, float, or auto-hide the Resource Navigator.

Fig. 2.1
Resource Panel



Benefits

The Resource Navigator has features and functions that provide the following benefits:

- Focus on only those manufacturing resources of interest.

  You can create a resource group, select specific manufacturing resources for the group, load data only for that group or resources only, refresh data for that group or a single resource or unload data for a single resource at a time, then manage your schedules for only the manufacturing resources within the group.
- Saves time by letting you:
  - Select only manufacturing resources of interest, rather than scrolling through numerous manufacturing resources to locate those resources of interest; see "Calculating Component Availability" on page 36
  - Load data for only the manufacturing resources of interest. You no longer wait for specified search criteria results to load data for numerous resources; see "Loading Resource Data" on page 31.
  - Load resources for an entire user-created resource group, then unload data for resources that you do not work with on a regular basis. Or unload data that you did not save, to undo the changes that you temporarily made.

- Refresh data for resources when you make changes to rerun calculations on the changes.

Note Component availability calculations are subject to user preference settings.

- Quickly view only manufacturing resources of interest through resource groups.

- Improved performance with stages for data loading, including an on-demand loading of data into the workbenches for only those resources you choose to schedule or monitor; see "Loading Resource Data" on page 31.
- Organize your resources

  You can set up several manufacturing resource groups of interest, creating a hierarchical or tiered approach to scheduling and resolving scheduling issues for top-priority resource groups first, and so on; see "Creating Resource Groups" on page 29.

Resource Navigator Functions and Features

You can perform the following functions by right clicking the context menu on a resource/resource group in the Resource Navigator:

- "Creating Resource Groups" on page 29
- "Renaming Resource Groups" on page 30
- "Moving Resources to a Resource Group" on page 30
- "Loading Resource Data" on page 31
- "Unloading Resource Data" on page 34
- "Refreshing Resource Data" on page 34
- "Removing Resources from a Group" on page 35
- "Deleting a Resource Group" on page 35
- "Calculating Component Availability" on page 36

In addition, when working with the resource groups, you can:

- Expand the group to see the resources within by left-clicking on the resource group and clicking on the plus sign (+).
- Set up an unlimited number of resource groups per site.

  Note A resource can only exist in one site/resource group at a time.

Resource Group Functions

Some Resource Navigator functions are for loaded resources, while others are for unloaded resources, and still others have caveats or special conditions for a combination of loaded and unloaded resources. Additionally, a subset of functions are available for user-defined resource groups while others are for resources within a user-defined or system-defined group.

The following table describes the functions available through the Context Menu that displays when you right click on sites, user-defined groups, loaded/unloaded resources, and combinations of loaded/unloaded resources.

Table 2.1
Unloaded Resource Functions

Resource	Load	Refresh	Create Resource Group	Move to Resource Group	Rename	Delete	Remove from Resource Group
Site	Not applicable	Not applicable	Creates a new resource group for the site.	Not applicable	Not applicable	Not applicable	Not applicable
User-created resource group	Performs load of data for all resources in the group and performs calculations. **Note:** See "Rules for Loading and Refreshing Data" on page 28.	Not applicable	Not applicable	Not applicable	Renames the resource group	Deletes the resource group. All resources return to the original system-created group	Not applicable
Unloaded resource in a system-defined resource group	Performs load of data and calculations. **Note:** See "Rules for Loading and Refreshing Data" on page 28.	Not applicable	Creates a resource group from selected resources or creates the group then lets you move resources to it after creation	Moves the resource to an existing resource group,	Not applicable	Not applicable	Not applicable
Unloaded resource in a user-defined resource group	Performs load of data and calculations. **Note:** See "Rules for Loading and Refreshing Data" on page 28.	Not applicable	Creates a new resource group and move the resource from the existing group to the new group.	Not applicable	Not applicable	Not applicable	Remove the resource from the group and returns it to the system-defined group of origin.

The following table describes functions available for previously loaded resources.

Table 2.2
Loaded Resource Functions

Resource	Refresh	Calculate Component Availability	Unload	Create Resource Group	Move to Resource Group	Rename	Remove from Resource Group	Delete
Resource Group with all resources loaded	Unloads, then reloads data for all resources, performs calculations. **Note:** See "Rules for Loading and Refreshing Data" on page 28.	Calculates component availability on demand for all loaded resources.	Not applicable	Not applicable	Not applicable	Renames the resource group.	Not applicable	Deletes the group and returns all resources to their original system-defined group.
Loaded resource in a system-defined resource group	Unloads, then reloads data for all resources, performs calculations. **Note:** See "Rules for Loading and Refreshing Data" on page 28.	Calculates component availability on demand.	Unloads all data for the resource. When changes are unsaved, warns to save first.	Creates a new resource group and moves the resource to it.	Lets you move the resource to a user-defined resource group	Not applicable	Not applicable	Not applicable
Loaded resource in a user-defined resource group	Unloads, then reloads data for all resources, performs calculations. **Note:** See "Rules for Loading and Refreshing Data" on page 28.	Calculates component availability on demand.	Unloads all data for a resource. When changes are unsaved, warns to save first.	Creates a new resource group and moves the resource to it.	Lets you move the resource to another group.	Not applicable	Removes the resource from the group and returns it to the system-defined group of origin.	Not applicable

The following table describes functions available when you select a combination of previously loaded and unloaded resources.

Table 2.3
Combination of Loaded and Unloaded Resource Functions

Resource	Refresh	Calculate Component Availability	Unload	Create Resource Group	Move to Resource Group	Rename	Remove from Resource Group	Delete
Loaded and unloaded resources in a system-defined resource group	Unloads, then reloads data for all resources, performs calculations. **Note:** See "Rules for Loading and Refreshing Data" on page 28	Calculates component availability for loaded resources.	Unloads all data for a resource. When changes are unsaved, warns to save first	Creates a new resource group and moves the resources to it.	Lets you move the resources to another group.	Not applicable	Removes the resources from the group and returns them to their system-defined group of origin.	Not applicable
Loaded and unloaded resources in a user-defined resource group.	Unloads, then reloads data for all resources, performs calculations. **Note:** See "Rules for Loading and Refreshing Data" on page 28	Calculates component availability for loaded resources.	Unloads all data for the resource. When changes are unsaved, warns to save first.	Creates a new resource group and moves the resources to it.	Lets you move the resources to another group.	Not applicable	Removes the resources from the group and returns them to their origin.	Not applicable

Rules for Loading and Refreshing Data

To better understand the rules for loading and refreshing when you deal with production lines resources, consider the following setup where you have items that are shared among multiple resources:

Table 2.4
Example for Rules

Resource	Items on Resource
PL1	Item1, Item2
PL2	Item1, Item 3
PL3	Item 2, Item 3

- The rules do not apply to work centers.
- Since refresh unloads then loads data, the refresh function adheres to user preference settings to calculate component availability upon load/save.
- Supply/demand is tied to an item, not to a resource. So, using the example data, when you click on loaded PL1 and PL2 data, Item1 supply/demand data is identical.

- When a resource is loaded, the system calculates supply/demand for items not previously loaded.
- When a resource is refreshed, the system recalculates supply/demand for all items, regardless of what was previously loaded.
- You can only refresh resources that are currently loaded, or that you previously refreshed.

  So, if PL1 was previously loaded, but not PL3, then you choose to load PL2, the system only calculates Item3 because Item1 was calculated when PL1 loaded.
- You cannot refresh a resource unless scheduling changes made on that resource are saved.

Resource Navigator Actions Reflected in Production Order Maintenance Panel

For *loaded resources*, when you invoke certain actions in the Resource Navigator, the workbenches-embedded Production Order Maintenance panel updates the order display to reflect the actions you take. The following table depicts the Resource Navigator action and the resulting Production Order Maintenance panel display changes.

Table 2.5
Actions and Resulting Display Changes

Resource Navigator Action	Production Order Maintenance Display Change
Click on a site row	Displays all order data when you click on the site
Click on either a production line or work center resource type row within a PSW site	Displays all order data for the resources for the site
Click on a resource row	Displays all order data for the selected resource

Creating Resource Groups

You can create a new resource group at either the site or resource level and specify the name for the group.

Note The system-defined resource groups are created on the fly, and the system does not store them. You can right click on manufacturing resources in system-defined groups to create a new user-defined resource group; however, this is the only option available and there is no context menu for a system-defined resource group.

When creating a resource group, the system adds the new resource group under the site and highlights the new resource group for editing so that you can name the new group appropriately. This keeps you from having to select the newly created resource group name.

The system stores user-defined resource groups in an XML file on the Tomcat server.

To create the new manufacturing resource group under **a site:**

1. Select the system site for the new group.
2. With the cursor on the site, right-click.

   The system displays a single option to create the new group.
3. Select `Create Resource Group`.
4. Name the new resource group.

5 Optionally, click outside the resource group name or press Enter to save the name.

6 Go on to move resources into the new group (see “Moving Resources to a Resource Group” on page 30) and, optionally, load data for the moved resources (see “Moving Resources to a Resource Group” on page 30).

To create a new manufacturing group **that includes an existing resource**:

1 Right-click on the resource.

Note You can multi-select resources and move them all into a resource group; see “Multi-Selecting Manufacturing Resources” on page 36.

2 Select `Create Resource Group`.

The system creates a new group and moves the resource to the new group.

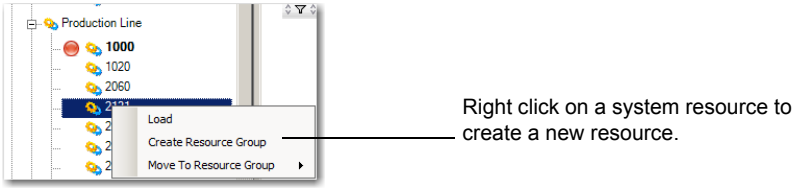
3 Name the new resource group.

4 Optionally, click outside the resource group name or press Enter to save the name.

5 Go on to move additional resources to the new group (see “Moving Resources to a Resource Group” on page 30) and, optionally, load data for the moved resources (see “Loading Resource Data” on page 31).

You can optionally automatically move manufacturing resources—production lines or work centers—when you create a new resource group. (See “Moving Resources to a Resource Group” on page 30.)

Fig. 2.2
New Resource Group



Renaming Resource Groups

You can rename a user-defined resource group by right-clicking on the resource group, then selecting Rename Resource Group. Once you select the option, type the new name. To save the new name, right-click outside the resource group to save or press Enter to save.

Moving Resources to a Resource Group

Once you set up a user-defined resource group, you can move resources either from new or existing user-defined manufacturing resource groups or from system-defined manufacturing resource groups.

Note You cannot move resources to system-defined groups unless you use the Remove From Resource Group option; see “Schedule Grid Display of Loaded Resources” on page 33.

You can move a single resource or you can select multiple resources to move in a single move function.

When a move is not valid, the system does not display the context menu that contains the move resource group option.

To move resources to a **new resource group**:

1 Select the resources to move.

Note You can multi-select resources; see “Multi-Selecting Manufacturing Resources” on page 36.

2 Right click to view the context menu and select `Create New Resource Group`; then, create the new resource group as described in “Creating Resource Groups” on page 29.

The system creates the new resource group and automatically moves the resources to that group.

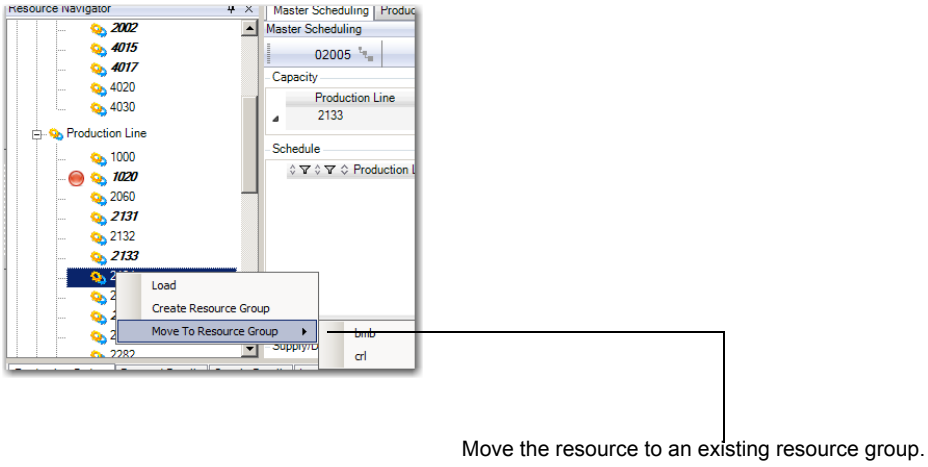
To move resources to **an existing group**:

1 Select the resources to be move.

2 Select a valid resource group to move the resources to in the sub-menu under the Move To Resource Group option; see

The system moves the selected resources to the existing resource group.

Fig. 2.3
Move Resource Group



Loading Resource Data

There are different stages for data loading for the Planning and Scheduling Workbenches, as shown in the list below:

Note Only those sites for which you have access as set in Site Security Maintenance (36.3.13.8) can be loaded.

1 Bootstrap: System load of libraries, configuration file, data, and so on.

2 Initial data load: System loads initial data that consists of tables needed for the session.

3 Resource data load: You request the system to load data for a particular resource. The system loads scheduling, capacity, supply/demand, and order data related to the selected resource. Every subsequent request loads more data.

For on-demand loading of resources, you can load at these levels:

- User-defined resource group
- System-defined resource
- A resource within a user-defined resource group

Note You cannot load at the site level.

To load a single system-defined resource or a single resource in a user-defined group, double-click the resource. The system displays the resource in **bold** text.

To load data for a user-defined resource group:

1 Select the resource group.

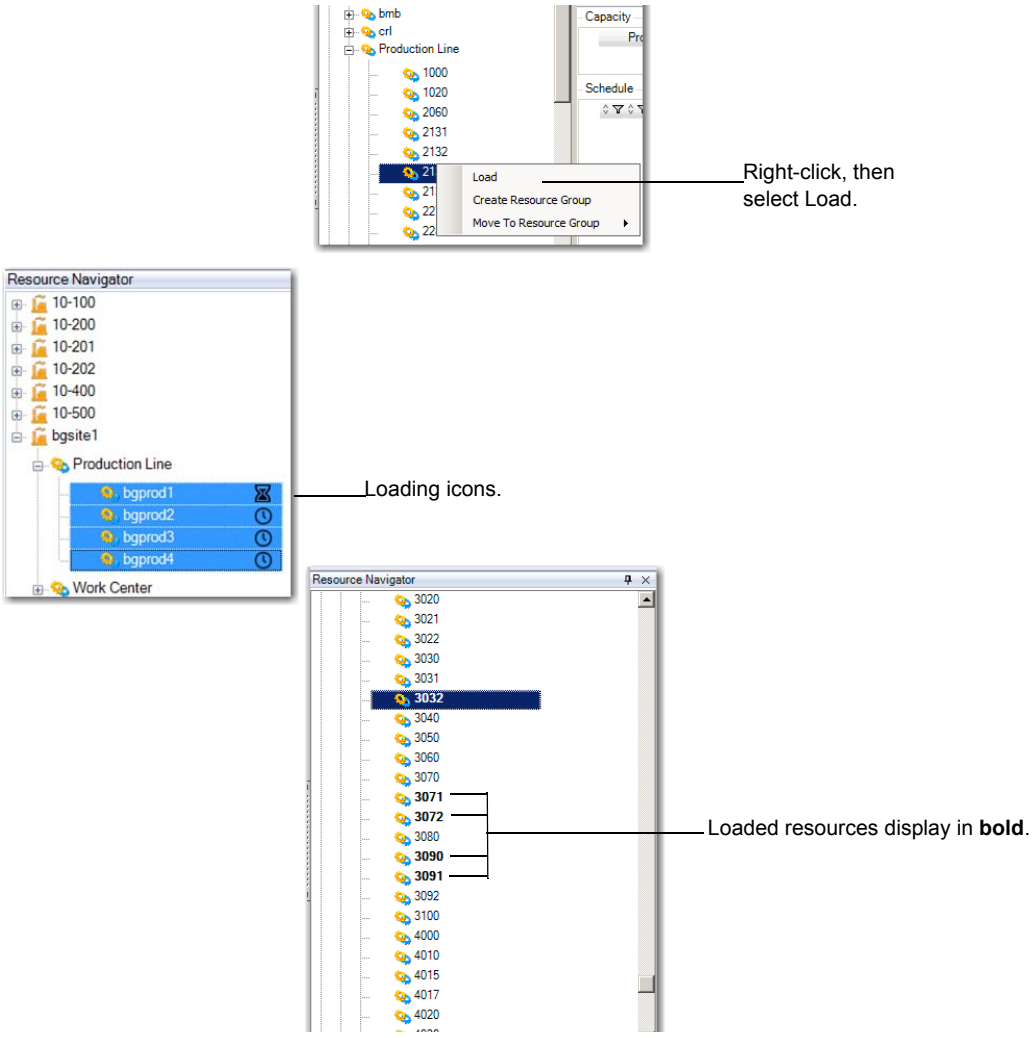
2 Right-click to select Load from the context menu.

The system loads all resources that have not previously been loaded to the workbenches.

The system displays icons when loading. The hourglass icon indicates that the resource is being processed. The Clock icon indicates that the resource is queued for processing. Once a resource is processed, the icon no longer displays. When resources are loaded, they display in bold font in the Resource Navigator. Loaded resources remain bold once you move the resource to a user-defined resource group or move it back to a system-defined resource group; see Figure 2.4 on page 33.

When you set workbench Component user preferences to have the system calculate component availability during a load/save, the loaded resource is both bold and *italic,* with the italic portion indicating the component availability calculation completed.

Fig. 2.4
Load Resources

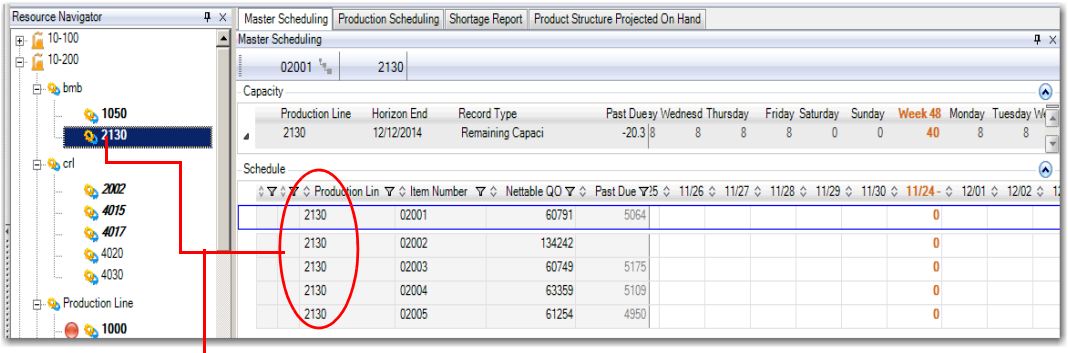


Schedule Grid Display of Loaded Resources

In the Resource Navigator when you click on a loaded resource, the Schedule Grid displays all resources that are loaded.

You can also click on single resources in the Resource Navigator to display loaded data for only that resource.

Fig. 2.5
Resource Navigator Selections in Schedule Grid



Select the resource in the Resource Navigator. The MSW Schedule Grid reflects data for the resource you selected.

Unloading Resource Data

You can unload data for a previously loaded resource. When items are shared across resources, the shared item's data remains for the resource you are not unloading.

Refreshing Resource Data

You can refresh data that you previously loaded into the workbenches from the Resource Navigator. You can refresh a user-created resource group, or individually selected resources.

Note Rules apply when refreshing and loading data; refer to "Rules for Loading and Refreshing Data" on page 28.

When you select the Refresh for a resource or resource group, the system:

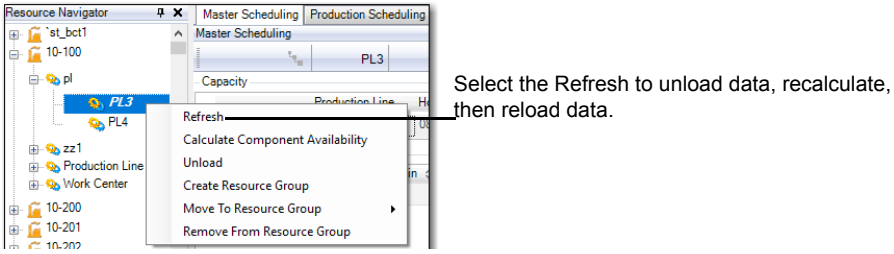
- Validates that the resources do not have any pending changes. When there are pending changes, then the system cancels the Refresh.
- When no pending changes, the system unloads each resource and then reloads the resource.
- Refresh adheres to the workbenches user preference function for calculating component availability automatically on load or on demand. See "Calculating Component Availability" on page 36.

Note You must set user preferences for the system to perform component check calculations at load; see "CAC User Preferences" on page 114.

To refresh, right click on the resource; then, select Refresh. The system removes the data from the Schedule Grid, then reloads it after performing calculations.

Once the data is pulled in, and you make changes on the data, then decide that you do not want to commit those changes, you can use Refresh as a method of undoing changes that you made. When you Refresh, the system clears the Schedule Grid of data for the resource. When you click on the resource after you Refresh it, you do not see the option to Refresh when you right-click on the resource, just the Load option, and other group-related options.

Fig. 2.6
Resource Navigator Selections in Schedule Grid



Removing Resources from a Group

You can remove the resources from a group. When the resource you are removing is a work center, the system moves the resource from the work center you selected back to the system-defined work center resource group. When the resource being removed is a production line, the system moves the resource back to the system-defined production line resource group.

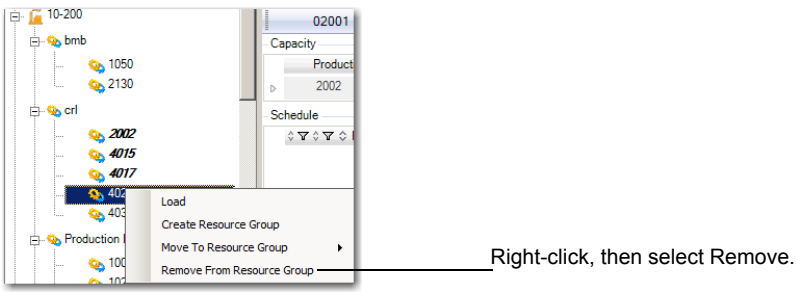
To remove resources from a resource group:

1. Right-click on a user-defined resource group to display the context menu.
2. Select the resources to remove.
3. Select `Remove From Resource Group.`

   The system moves the resources from the user-defined group back to the appropriate system-defined resource group.

After removing resources from a group, the Resource Navigator active row is the resource group from which resources were removed.

Fig. 2.7
Remove Resources from a Group



Deleting a Resource Group

You can delete a user-defined manufacturing resource group. To do this,

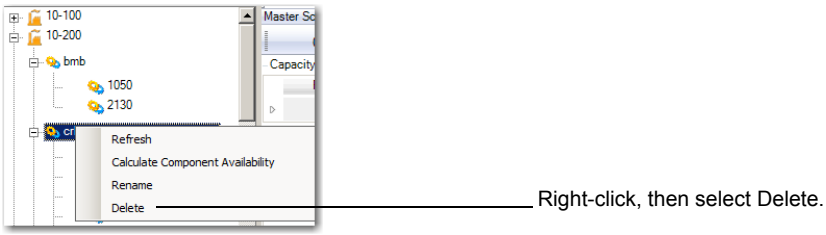
1. Select the resource group to delete.
2. Right-click to select `Delete` from the context menu.

   The system prompts you to delete the resource group.
3. Respond with Yes.

The system moves resources within the resource group back to the appropriate system-defined resource group; then, deletes the resource group. The system focus is moved to the Site and level at which you originally created the resource group.

When you do not confirm the deletion, and instead select Cancel, the resource group remains.

Fig. 2.8
Delete a Resource Group

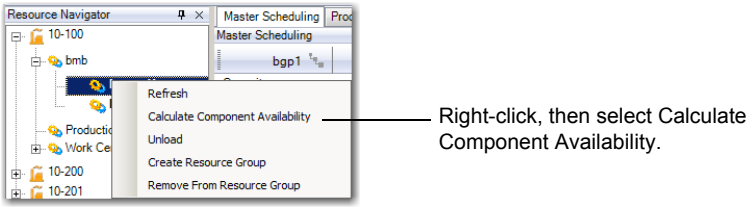


Calculating Component Availability

When you do not check the Calculate Component Availability on Data Load/Save in the user preferences Components tab, you can calculate component availability at the resource or resource group level when you have loaded resources from the Resource Navigator.

The system always calculates/recalculates CAC for loaded resources, regardless of the resource's CAC state; that is, regardless of whether CAC is calculated versus uncalculated.

Fig. 2.9
Calculate Component Availability



Multi-Selecting Manufacturing Resources

You can multi-select resources within the Resource Navigator much like you do when you work in the Windows Explorer tool.

To select consecutive resources, click on the first resource, press and hold down the Shift key, and then click on the last resource. To select non-consecutive resources, press and hold down the Ctrl key, and then click on each resource that you want to select.

Important Double-click loads the resource. Single-click selects the resource only and allows you to properly multi-select resources using either the Shift or Ctrl key.

After selecting multiple resources, you can perform common tasks, such as moving them to a newly created or existing resource group. Once the selection is highlighted, right-click it to open the context menu and then select the functions to perform for the multiple selection. For example, you can load data only for those resources you selected, including for system-defined resource groups.

Chapter 3

Master Scheduling Workbench (MSW)

The following topics describe how to use the features of the Master Scheduling Workbench (MSW).

Introduction 38
Introduces the MSW, components, and features.

Accessing MSW 44
Provides procedures to access the MSW in the .NET UI.

Setup 44
Describes setup steps you should perform before beginning workbenches scheduling.

MSW User Preferences 47
Lists fields, describes field input, and presents screens for all windows for user preferences.

Processing Master Schedules 54
Provides a general procedure to create and process a master schedule and describes processing results.

Working with Production Orders 63
Describes the pulled-in QAD programs and data presented in the MSW, including field descriptions for the various programs. Also, instructions to edit, modify, delete, and manipulate production orders are provided.

Viewing and Editing Order Data 73
Describes ways to view data from the MSW.

Item Specific Information 85
Describes the pulled-in QAD programs and data presented in the MSW, including field descriptions for the various programs that let you manipulate and view item data.

Additional Workbenches Tabs 85
Describes features and functions available through the Calendar Exceptions, Sales Quantity by Month and other workbenches tabs.

Saving Your Changes 92
Provides a procedure to save changes in MSW.

Introduction

Use the Master Scheduling Workbench (MSW) to create master schedules for medium to long periods of time (weeks to months) with supporting data to review on items, operations, demand, supply, capacity, and material.

Features

Functions within the workbench let you concurrently manage work centers and production lines within a single workbench. From a single workbench screen, master schedulers can:

- Split production orders.
- Reschedule or change the status of production orders.
- Maintain production order details.
- Manage production order operation lists.
- Move production orders to alternate production lines/work centers.
- Release production orders.
- Export schedules to a spreadsheet (MS Excel).

You can display:

- Supply, demand, and capacity in daily increments at the item level
- Supply, demand, and capacity in weekly and monthly buckets
- Capacity and demand issues
- A list of items requiring master scheduling attention
- Production orders that are past due, cannot complete on time, have component availability shortages, or are released
- Production order status
- Resources to be scheduled
- Demand details
- Action messages
- Item master or planning data
- Inventory details

The following topics provide more information on MSW elements, the functions they provide, and QAD program functions that you can access within MSW.

Visual Indicators

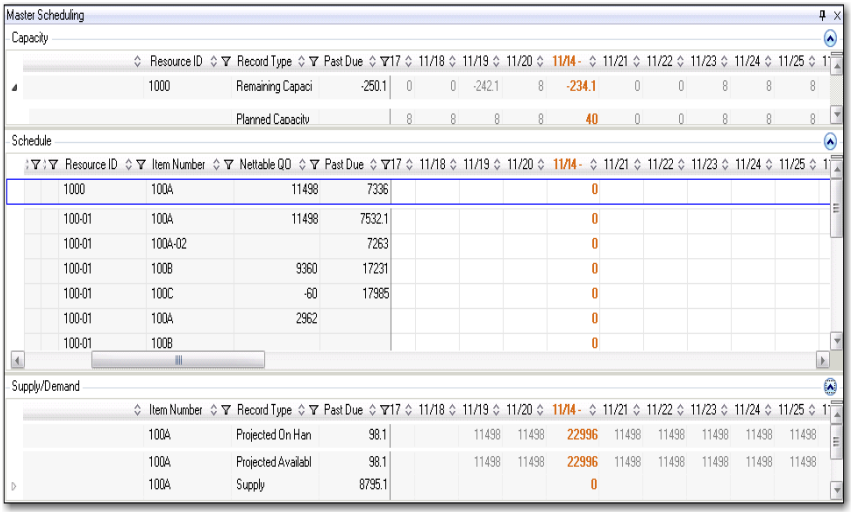
MSW displays visual status indicators to direct your attention to potential capacity and item shortage issues. The projected quantity on hand (POH) displays as soon as items display on the Schedule Grid. The system calculates the POH for every item with supply/demand in the scheduling horizon. When the resource type is a production line, the system applies the indicator to only the item's primary production line. When the resource type is a work center/machine, the system applies the indicator to any resource associated with the item.

Shortage warning status applies to required capacity, available capacity, part number, scheduled quantity, and projected on-hand (POH) quantity. Shortage warning status indicators can display as a low warning status (yellow shading), which typically applies to non-critical potential shortages; for example, when the quantity on hand does not meet safety stock requirements. A high warning status (red shading) indicates a potentially critical capacity or item shortage problem; for example, when the projected on hand quantity is less than zero. Chapter 1 summarizes visual indicators.

Workbench Elements

MSW lets you schedule items and set the production order due/release dates and quantities within a certain daily, weekly, or monthly based horizon.

Fig. 3.1
MSW



Capacity Panel

The Capacity Panel displays resource capacity. Use data in this panel to view production order required capacity. The system calculates summaries and displays required capacity and available capacity data in this grid as you enter data in the Schedule Grid. You can expand and collapse the Capacity Panel to show capacity and schedule quantities in weekly and monthly buckets. The weekly and monthly buckets are display only.

You can display capacity information in daily, weekly, or monthly buckets by using a combination of User Preference and context menu settings; see Figure 2.3. Weekly and monthly buckets are display-only, so when you set the Schedule Grid for weekly/monthly buckets, you cannot edit data.

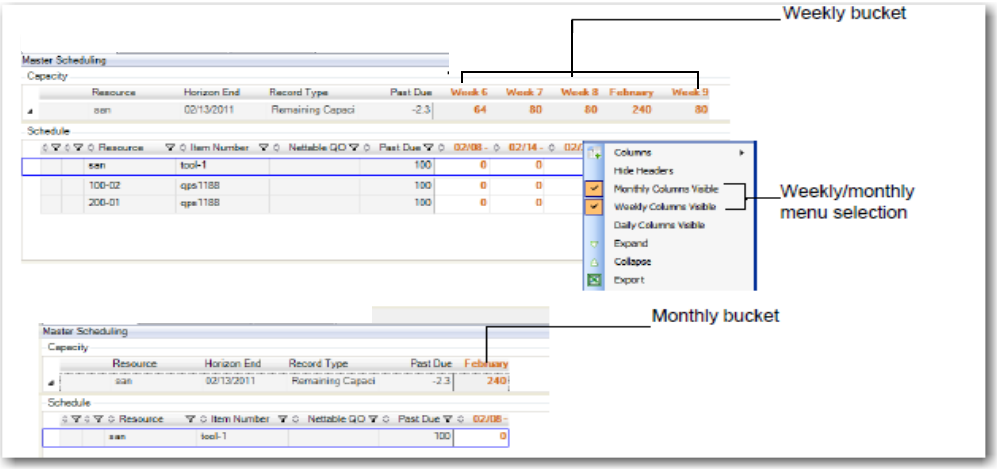
Note When you set up weekly or monthly bucket display for the Capacity Panel, the setting applies to the Schedule Grid and Supply/Demand Panel, too.

You can expand the weekly or monthly buckets to daily buckets. You can only edit daily buckets in the Schedule Grid, not the Capacity and Supply/Demand Panels.

In the Schedule Grid, when you enable right click on the week total or month total columns, a context menu displays. You can select the Expand Column and Collapse Column functions on the week total and month total columns, but not on all columns. When you select Collapse Column,

the daily columns are hidden, and when you select Expand Column, the daily columns are displayed.

Fig. 3.2
Monthly and Weekly Buckets



When you start to create a schedule in the Schedule Grid for the item you selected, the system shows you the capacity impact in real-time. For information on field descriptions, see “Consume Prior Remaining Capacity” on page 49.

The Capacity Grid’s Required Capacity and Scheduled Quantity rows are based on capacity open quantity. For more information, see the User Exit section of *Administration Guide: Planning and Scheduling Workbenches* for workbenches.

Schedule Grid

The Schedule Grid displays item supply records; that is, production orders, with bucketed quantities of the production order supply records for the item. The records represent the master production schedule for a given period. The summarized quantity values within the Schedule Grid are production order quantities.

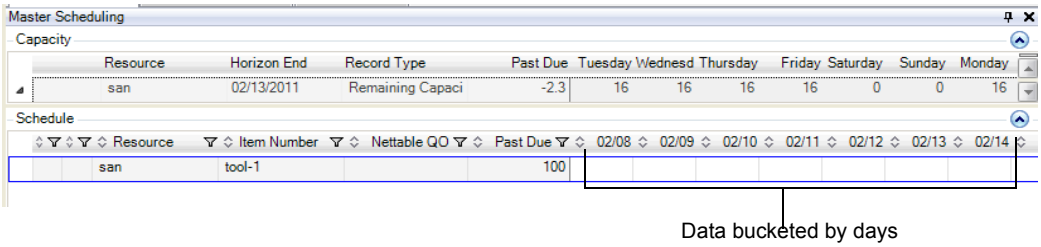
You can expand the Schedule Grid to display capacity in weekly and monthly buckets. The weekly and monthly buckets are display only, though, so you can only edit in daily buckets; see Figure 3.2.

For more information, see “MSW Schedule Grid Data” on page 59.

Daily Buckets

Each supply record is associated with one or more resources. For production orders, resources can be work centers or production lines. You can schedule discrete production orders on both production lines and work centers. Schedule data bucketed by day is appended on the right for the range of days identified in the data selection criteria; see Figure 3.3. You enter data in this right-hand area.

Fig. 3.3
Data Bucketed by Day



Descriptive and transactional item attributes identify items in the Schedule Grid. Descriptive item attributes are those found in the item master/detail tables; transactional item attributes include scheduled quantities past due and nettable on-hand inventory. Because the system calculates the net past due quantity remaining for an item, you can view item past due quantities as your day begins. This lets you check results of prior shifts. As you scan items, you can monitor inventory levels and easily determine the nettable inventory on hand. You can easily spot inventory levels of concern.

You can make updates to existing quantities in the Schedule Grid. When you do, the system performs POH, required capacity, and other calculations and displays changes. Also, when you make changes to some fields in the Production Order Maintenance Details tab, it can cause changes to capacity. For more information, see “Details Tab” on page 75.

Planned orders within the scheduling horizon are not included in the POH and resource required capacity calculations in MSW, so planned orders do not display in the Schedule Grid. To view planned orders, drill down to data in the Demand/Supply Grid.

Note You can also view the orders in the Production Order Maintenance window within MSW.

Supply/Demand Panel

Use the information in the Supply/Demand Panel to view the item’s total demand and total supply data over a period of time. Total demand is from sales, DRP, forecast, seasonal demand, or dependent demand. Total supply is from planned, firm, released production orders, or purchase orders.

The Supply/Demand Panel displays the record type and past due quantities. You can also view cumulative ATP, demand, projected available balance, POH, receipts, seasonal/safety stock, and supply as the record type.

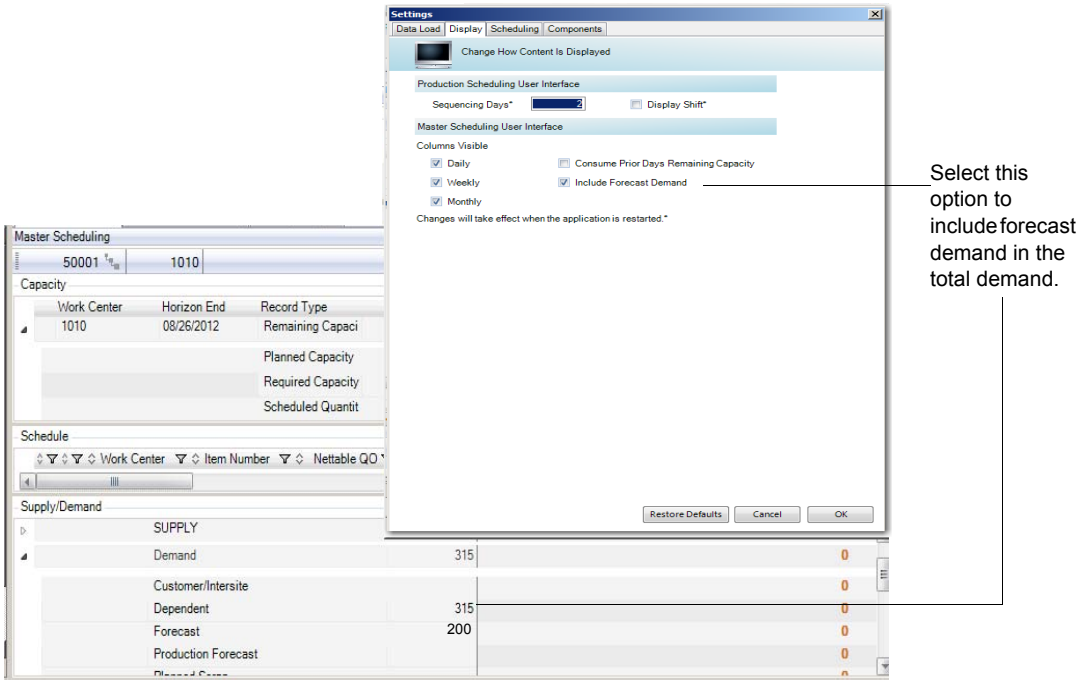
When you enter or update a scheduled quantity in the Schedule Grid, the Supply/Demand Panel is updated to show the remaining open quantity due for the item. Whether the resource selected is a production line or work center, the Supply/Demand Panel displays the quantity and due data from production orders.

When you want more details related to the demand information that shows in the Supply/Demand Panel, you can select the Demand Details tab within Production Order Maintenance to view demand details for the item selected in the Schedule Grid. For more information, see “Working with Supply/Demand Panel Data” on page 61.

Dynamic Forecast

The system includes forecast dynamically in the Supply/Demand Panel when you select the Include Forecast Demand option within the Display tab of the user preferences. You do not have to refresh your search data when you enable Forecast Demand in user preferences as the system includes the forecast demand within the total demand. When you disable Include Forecast Demand, you can still view the forecast demand.

Fig. 3.4
Dynamic Forecast Demand



Seasonal Demand

The system performs the following calculation for each date when a Master Scheduled receipt is due or a seasonal build quantity is made available, causing a net increase in supply. It takes into account all sales order and required ship schedule demand and gross requirements up to the next increase in available supply.

Master Scheduled Receipt – Sales Orders and Required Ship Schedules – Gross Item Requirements – Seasonal Build Net Increases + Seasonal Build Net Decreases = ATP

Past due is not calculated.

Independent/Dependent Demand

Independent and dependent calculations are based on the following function:

summarize mrp_quantity

Where:

For independent demand, mrp_dataset = sod_det, cs sch_mstr, ds_det, sob_det, pb_sold, pbo_sold

For dependent demand, mrp_dataset = jp_det, wod_det, wo_scrap

The past due independent demand calculation is as follows:

Summarize mrp_quantity prior to the beginning date

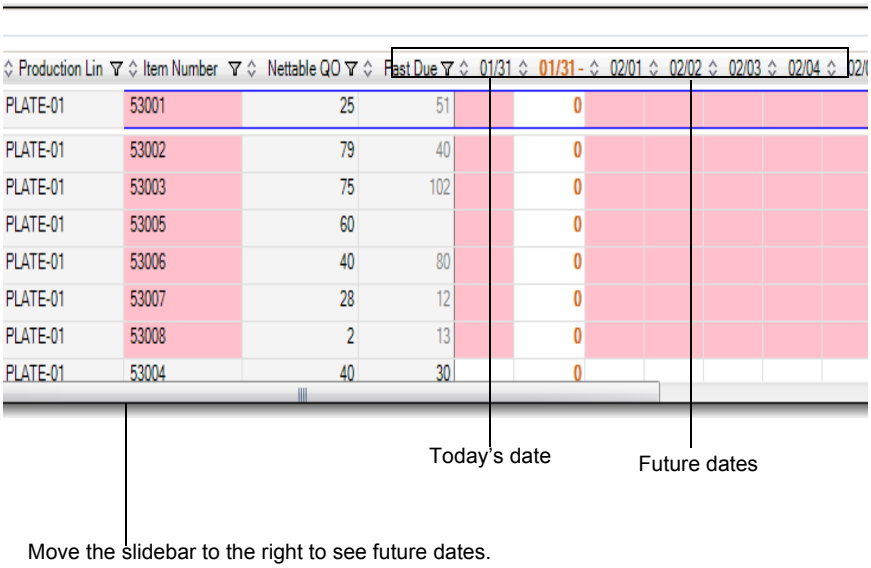
Schedule Horizon

MSW gives you user-configurable control over where the MPS schedule horizon ends and where the future window begins. MSW calculates data differently in the scheduling horizon display than in the future window. Visual indicators only apply to the defined scheduling horizon.

Fields in Work Center Maintenance (14.5) are also available in Production Line Maintenance (16.1.1) and help control the schedule horizon. Specifically, you set the Horizon End field to either Day, Week, or Month, then set the number of periods for the increment in those programs. The system displays a read-only calculate date. The system calculates the date from period and period number, so if you set Horizon End to Day and Period to 5, the Calculate Date is five days starting with today. If you set Horizon End to Week and Period to 4, then the Calculate Date is four weeks from now including today.

Figure 3.5 shows a sample time line in the MSW Schedule Grid. The left side shows the Schedule summary, while the right side shows individual dates, starting with today's date of October 19.

Fig. 3.5
Scheduling Period Example



Even though your future horizon may not fit into the.NET UI window on your screen, you can use the slidebar to display day-by-day future dates. When you scroll into future days, the day-by-day regions of the Capacity and Supply/Demand Panels are also scrolled.

Within MSW, only production orders with a status other than P within the MPS Scheduling Horizon impact these calculations:

- POH
- Available to promise
- Required capacity

MSW does not calculate for planned orders inside the scheduling horizon; however, you can view planned orders using supporting data in other programs within the MSW. To view a planned production order, view data in:

- Demand Details tab
- Production Order Maintenance tab
- Supply row in Supply/Demand Panel

The scheduling horizon impacts the color logic, POH, auto firm, and resource required capacity within the Schedule Grid.

Accessing MSW

You access the MSW through QAD .NET UI. You can enter the full name—Master Scheduling Workbench—or a partial name in the Applications field. You can also add MSW to your list of favorites.

Access to Workbenches Data and Supporting Functions

You must have access to the following:

- Production Order Maintenance (16.3.1) or Master Schedule Order Maint (22.13)
- Production Line Calendar Maintenance (16.1.13.1)

When you do not have access, the system displays an error message, informing you that you do not have access and you cannot:

- Add, modify, or delete production orders.
- Save changes.
- Access workbenches-embedded Production Line Calendar Maintenance functions/data.
- Save changes to workbenches-embedded Calendar Exception data.

Setup

You should perform the following setup steps before you begin scheduling in the workbenches:

- Setting Up Production Lines
- Setting Up Workbenches Controls

Setting Up Production Lines

You can set up items on production lines through the Production Line Browse collections. You can update production lines through Production Line Update.

If you have used QAD applications for scheduling, you probably have production orders, but you may or may not have items on production lines set up. To create a master and production schedule for production lines, and not work centers, you must have items tied to a production line or lines. To avoid manual re-entry of setup data, you can use Item Production Line Browse (.NET UI only), which contains the Item Production Line Maintenance supporting browse, to:

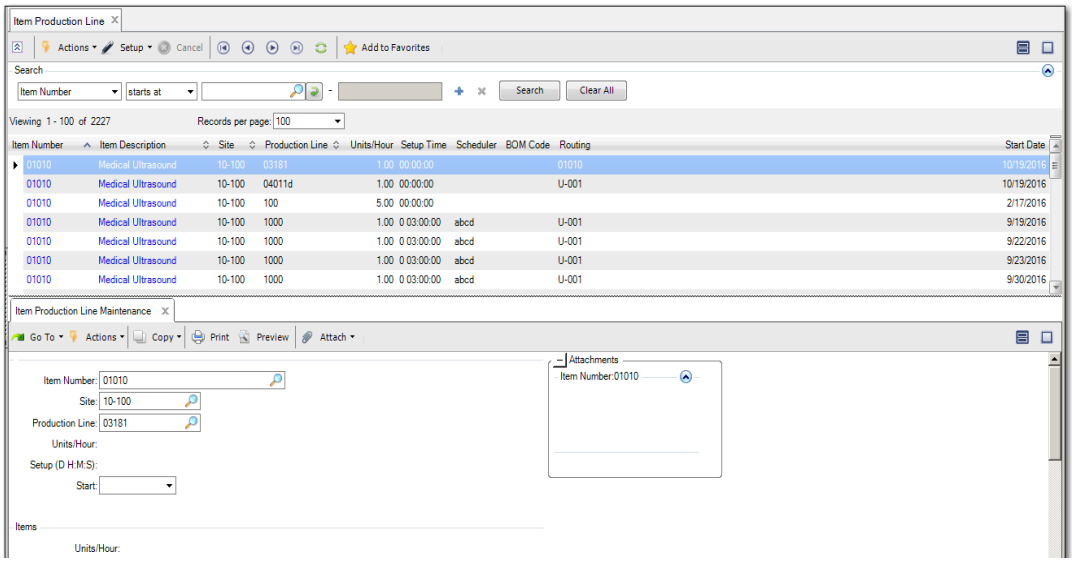
- Set up items on production lines.

- Apply the default run rates, setup time and crew, and run crew for items on a production line.
- Apply routing and BOM codes to production lines.
- Apply tools and run sequences to production lines.

Since this program sets up items on production lines, it reduces the chances of newly introduced items not being added to a production line, which would prevent you from scheduling the item.

The program locates sites where the item routing contains a specified work center/machine, and for these items, associates the items with a specified production line. If an item has no routing (no item/resource record), the program does not find the item to associate with a production line.

Fig. 3.6
Item Production Line Browse collections

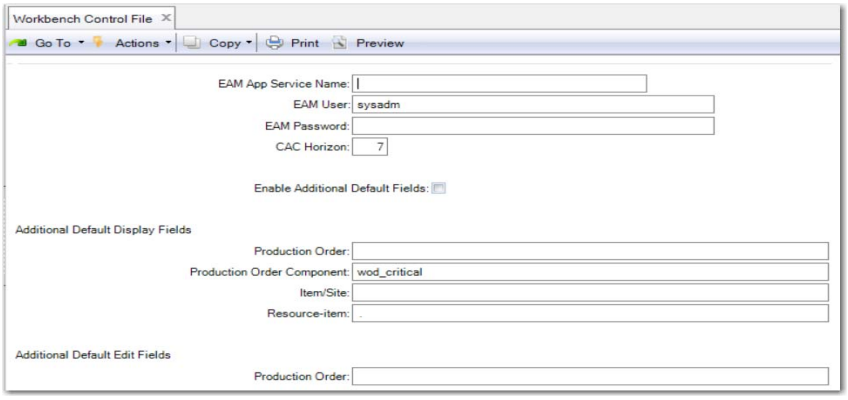


Setting Up Workbenches Controls

Use the Workbench Control File (22.20.24) to set defaults and other controls for the Planning and Scheduling Workbenches and the Component Availability Check (CAC) browse collections.

You can set controls for the workbenches to work with Enterprise Asset Management (EAM) and set defaults for the CAC horizon and to enable the workbenches personalization architecture.

Fig. 3.7
Workbench Control File (22.20.24)



EAM App Service Name. Enter the name of the AppServer service name entered in AppServer Service Maintenance (36.19.1).

If the entry created in AppServer Service Maintenance has wrong values or there are other technical problems encountered in trying to connect to or make calls to the EAM AppServer, the system generates exception data that is written to the NETUI log file. The exception data contains information about the operation being attempted and the failure reasons.

EAM User. Enter a valid EAM user name. This is used to log in to the EAM AppServer.

EAM Password. Enter the EAM password. This is used to log in to the EAM AppServer.

CAC Horizon. Enter the default for the number of days into the future within which the CAC calculations consider MRP detail data. This applies to the CAC Collections and not the workbenches. For the workbenches, there is a similar field in the user preferences (refer to “MSW User Preferences” on page 47). The system counts the number of days from the due date of the production order, not the release date.

Enable Additional Default Fields. Enter Yes to enable additional default fields. When set to Yes:

- You can enter a list of additional default fields to display in the Production Order or Production Order Component panels.
- The system sends the additional default fields lists to the client.
- Various user exit programs are called; refer to the section on User Exit programs in *Administration Guide: Planning and Scheduling Workbenches*.

Additional Default Display Fields:

Production Order. Enter a list of additional default fields to display in the Production Order panels.

Production Order Component. Enter a list of additional default fields to display in the Production Order Component panels.

Item/Site. Enter a list of additional fields, separated by commas, to display item-site planning data in the Planning and Scheduling Workbenches when you load data. For example, you can display a column of supplier data (ptp_vend field) in the MSW Schedule Grid.

The data displays in the MSW Schedule Grid and PSW Sequence Grid, the Production Order Browse in the top grids, the Product Structure On Hand panel, and the workbenches-embedded Production Order Maintenance data.

For more information on using the fields, refer to the Personalization Architecture chapter of the *Planning and Scheduling Workbenches Administration Guide*.

Resource-item. Enter a comma-delimited list of additional default fields to display in the MSW Scheduling Grid. For example, to show resource items in test, you set the Resource-Item field to `resource_test`. You set the resource_test field value to `test.` You save the control file, then start the Workbenches and load data to view the resource-item data in the new column.

Note You should complete all steps for adding columns to the workbenches for the example. For detailed information on adding columns to the workbenches, refer to the Personalization Architecture chapter of the *QAD Planning and Scheduling Workbenches Administration Guide.*

Additional Default Edit Fields:

Production Order. Enter a list of additional default fields to edit in the Production Order panels.

MSW User Preferences

The following topics discuss options available to you when configuring MSW:

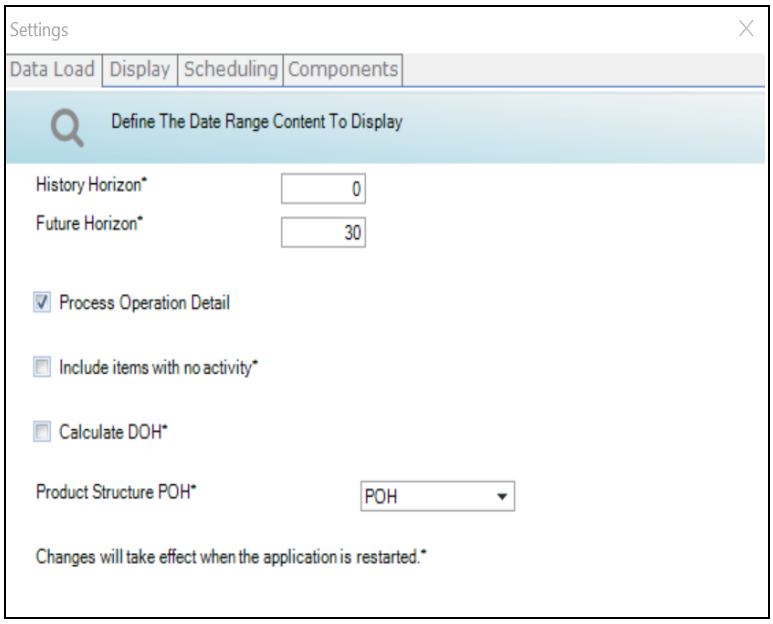
- MSW Data Load Preferences
- MSW Display Preferences
- MSW Consume Prior Remaining Capacity
- MSW Scheduling Preferences

MSW Data Load Preferences

You can configure the scheduling horizon so that you work with the number of days that make up your company's master schedule.

You can change the schedule horizon through the Preferences drop-down menu. You select Options, then Preferences, then Data Load to set the future and history horizon or to control whether the system retrieves item data without any supply, demand, production orders or inventory activity. The Preferences settings control how far out in time you can view dates on the Schedule Grid.

Fig. 3.8
Data Load Preferences



History Horizon. Enter the number of days that constitute the past days of your history horizon.

Once you set the History Horizon, you must re-start the application to have data appear within the set horizon.

Future Horizon. Enter the number of days that constitute your future horizon. Once you set the Future Horizon, you must restart the application to have data appear within the set horizon.

Process Operation Detail. Indicate Yes for MSW to retrieve and display operation details for production orders.

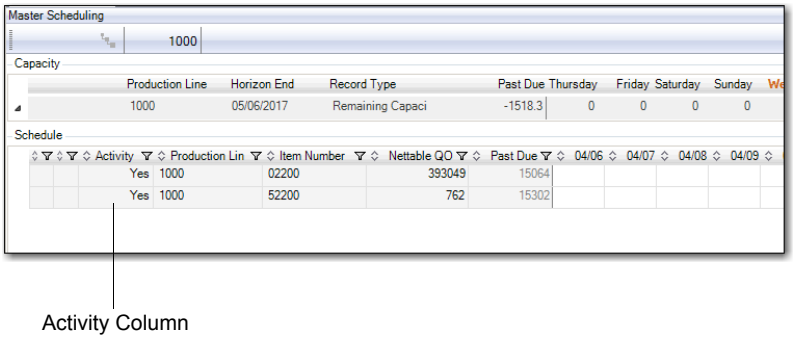
Include Items with No Activity. Indicate Yes to view items that do not have supply, demand, production orders, or inventory activity within MSW. When Yes, search functions return data for all items associated with the resources retrieved. When No, the system only retrieves those items with supply, demand, production orders, or inventory activity.

The Scheduling Grid includes a display-only Activity column that indicates with a Yes or No when items are active or not (see Figure 3.9.) The Activity column is not visible by default. To make it visible, place the cursor on any column in the Scheduling Grid, then right click to display an additional functions menu. Select Columns to display the Column Maintenance window, then select the Activity column.

When determining when an item has activity, the system considers the following:

- Is there supply or demand (MRP detail) for the item with a due date on or before the future horizon end date?
- Are there production order receipt transactions (tr_hist) for the item within the history/future horizon?
- Are there orders (wo_mstr) for the item that are not closed?

Fig. 3.9
Activity Column



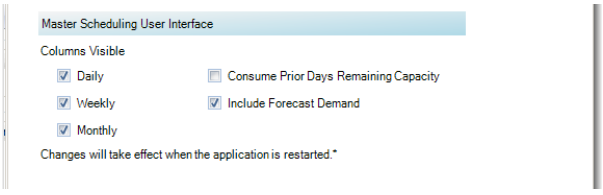
Calculate DOH. When checked, the system calculates DOH in all panels while loading data. After you change the field, the change takes effect when you restart the application. For detailed information on setting this option, see "Calculate DOH" on page 197.

Product Structure POH. Select either POH or DOH calculation to run, then view results in the Product Structure Projected on Hand tab. For detailed information on setting this option, see "Product Structure POH" on page 197.

MSW Display Preferences

Use the Display tab of the Settings window to define the increment by which MSW calculates totals. Select Option, Preferences, then the Display Tab.

Fig. 3.10
MSW, Display Preferences



Columns Visible. Specify Daily, Weekly, or Monthly as the increment by which scheduling totals are displayed in the Schedule Grid. When you enter a value, the totals in the Supply/Demand Panel, Capacity Panel, and Schedule Grid display by the increment you enter. You still view data by daily increments in the Schedule Grid. When you select weekly or monthly, you must expand those increments to access the daily display. MSW uses the calendar definition of a month and the GL calendar period for the week.

Consume Prior Remaining Capacity. For information on the Consume Prior Remaining Capacity field, refer to "MSW Consume Prior Remaining Capacity" on page 50.

Include Forecast Demand. Specify Yes to include the forecast demand in the Demand row in the MSW Supply/Demand Data grid as part of the POH calculation. When you enable this option, you do not have to refresh your screen with a new search to see the forecast demand in the Supply/Demand Panel. You can click on the Demand field in the Supply/Demand Panel to see the forecast demand and to have it automatically included in the Demand field.

For forecast demand, the system displays the net balance of current forecast demand from QAD ERP for the selected item. Master production scheduling and MRP use the net forecast and sales order demand to calculate total demand. The net forecast is calculated as follows:

Net Forecast = Forecast – Sales Order Demand

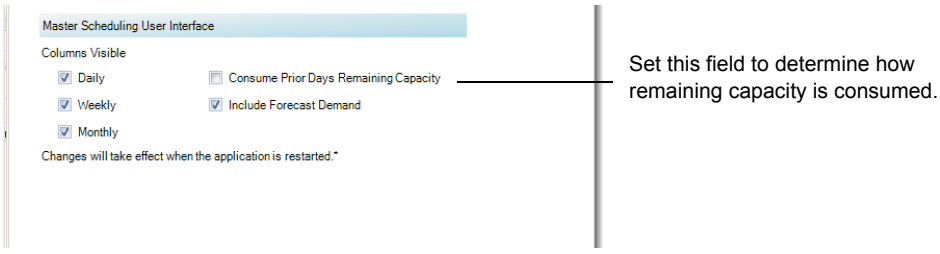
Note When the shipment forecast is oversold—that is, the quantity sold exceeds the forecast amount—the net forecast will not go below zero.

Past due is not calculated.

MSW Consume Prior Remaining Capacity

You can specify whether capacity is consumed by future required capacity or not by setting the Consume Prior Remaining Capacity field in the Display Window of User Preferences. Color coding extends beyond the firm scheduling horizon for visibility of capacity shortages. When you set the field to Yes, the cell displays with yellow shading when the system uses available capacity from prior days to satisfy the required capacity. It displays with red shading when there is not enough available capacity on or in days prior to the required capacity date.

Fig. 3.11
Display Window, Remaining Capacity Setup



Consume Prior Remaining Capacity. Specify whether prior days remaining capacity is consumed by future required capacity.

Yes: The prior days remaining capacity is consumed by future required capacity. In Figure 3.12, on Tuesday, 7/13, 12.5 hours of capacity are required; however, only 8 hours of capacity are available. When this field is set to Yes, the system looks at remaining capacity before Tuesday to determine whether the Tuesday work can be completed on time. The system finds 8 hours of available capacity on Monday 7/12. So, if the Tuesday work starts on Monday, then 4.5 hours can be used from Monday, and all Tuesday work can be completed on time.

No: The prior days remaining capacity is not consumed by future required capacity.

Fig. 3.12
Capacity Example 1

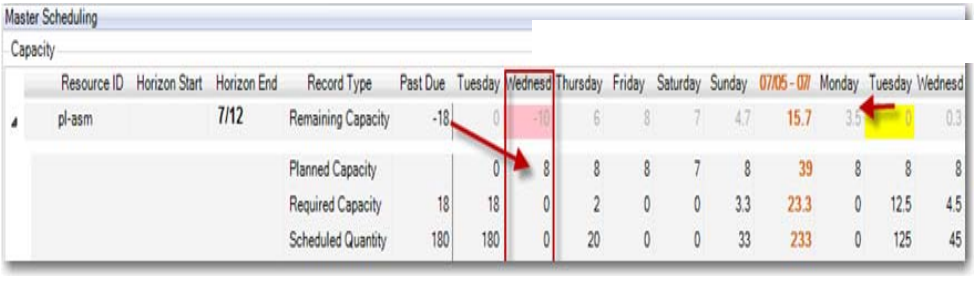
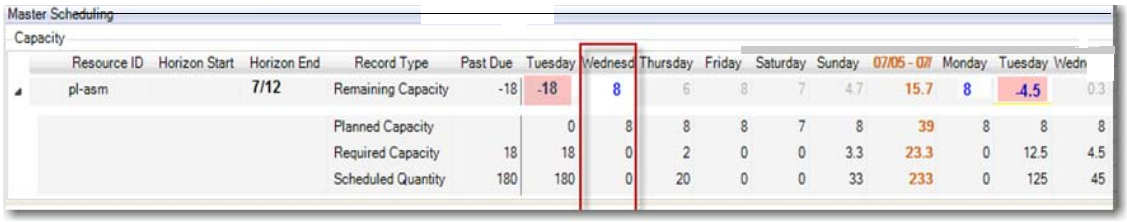


Figure 3.13 shows results when the field is set to No. In the figure, the number of remaining capacity hours for Tuesday shows as –18. Tuesday 7/12 displays –4.5 hours remaining and the system did not consume prior remaining capacity available on Monday. The system displays colors beyond the firm scheduling horizon for the capacity frame.

Fig. 3.13
Capacity, Example 2

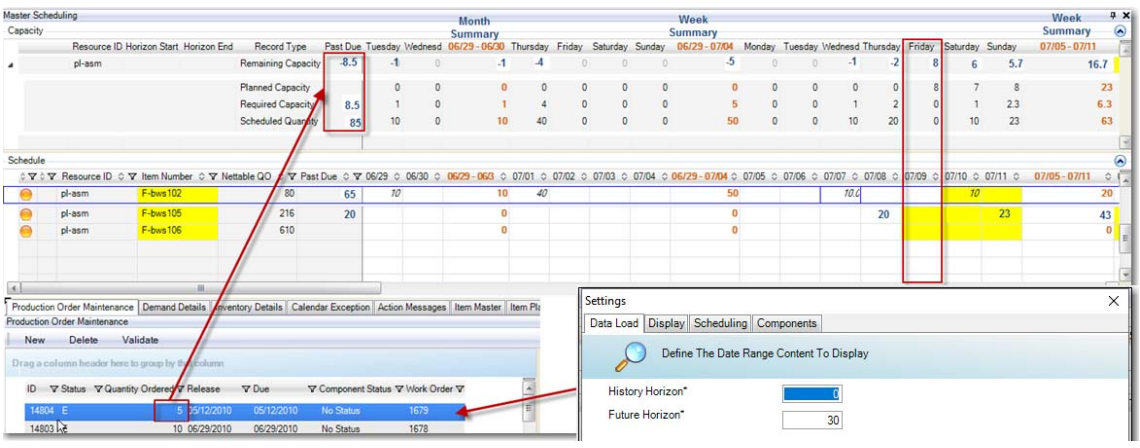


The remaining capacity row displays a daily delta between the required capacity and planned capacity with no consumption of remaining capacity of prior days. For the daily delta calculation:

- The firm scheduling horizon still excludes planned orders.
- The future horizon includes all open orders.

In the following figure, the history horizon was set to 10 days, the future horizon was set to 30 days, and the current date is Friday, 07/09. The past due column totals display past due records; however, the history horizon columns display past due requirements in the Monthly and Weekly Summaries categories. The past due quantity of 5 from 5/12/2010, as shown in the Production Order Maintenance window below the grid, is summarized in the Past Due column. Even though the history horizon is 10 days, the system pulls in all past due supply/demand records.

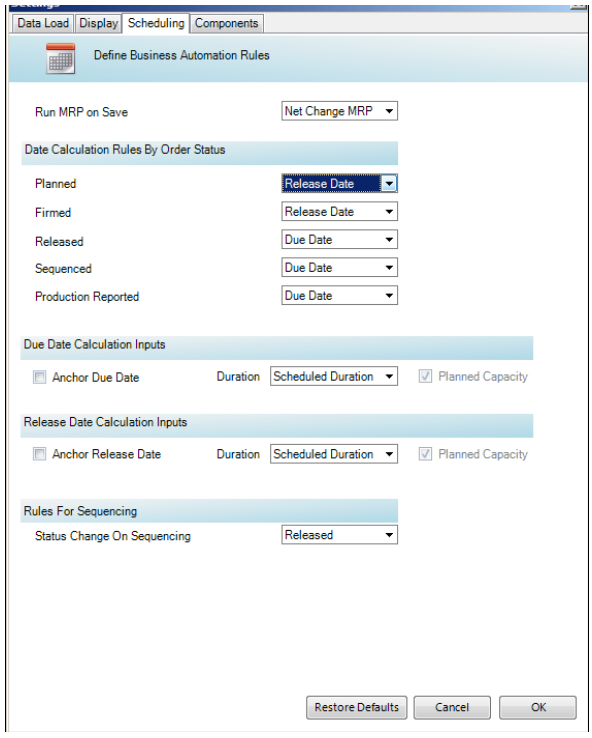
Fig. 3.14
History Horizon, Daily Net Calculations



MSW Scheduling Preferences

You can set preferences for the rules under the Option menu in the toolbar. Select Preferences, then Scheduling.

Fig. 3.15
MSW Scheduling Preferences



For MSW, you can set options to:

- Run MRP on save.
- Select the method for date, due date, and release date calculations.

Run MRP on Save

Run MRP on Save. Optionally, you can run MRP when you save your changes in MSW. Choose from:

- Net Change MRP: The system runs MRP for all changes made within MSW.
- None: MRP is not run when saving changes.

Selecting the Method for Date Calculations

The fields for date calculations are grouped under the following headings in the Scheduling tab of User Preferences, and each heading has several different fields:

- Date Calculation Rules By Order Status
- Due Date Calculation Inputs
- Release Date Calculation Inputs

The Date Calculation Rules by Order Status section has the following fields. You can select either Due Date or Released Date for each field. The fields have their own rules that inform the system which date to calculate when the order is in that particular status:

Planned. When the order has a P(lanned) status and the system calculates dates, the date (due versus release) assigned here is the date calculated.

Firmed. When the order is in F(irm), E(xplode) or A(llocate) status, and the system calculates dates, the date (due versus release) assigned here is the date calculated. The default is the release date.

Released. When the order is in R(eleased) status, and the system calculates dates, the date (due versus release) assigned here is the date calculated. The default is the due date.

Sequenced. When the order has been sequenced and the system calculates dates, the date (due versus release) assigned here is the date calculated. This setting takes precedence over the Planned, Firmed, and Released user preference settings. The default is the due date.

Production Reported. When the order has production reported, and the system calculates dates, the date (due versus release) assigned here is the date calculated. This setting takes precedence over the Sequenced, Planned, Firmed, and Released settings. The default is the due date.

The Due Date Calculation Inputs section has the following fields:

Anchor Due Date. When Yes, the due date stays fixed during date calculations, unless you select the due date to be calculated.

Duration. Select the type of duration. Note that order duration changes happen differently based on whether you select Projected or Scheduled duration.

Scheduled: When Scheduled, the system uses the value in the production order Scheduled Duration field to calculate order dates. This value is usually the item's manufacturing lead-time.

When you make the following changes in status and duration and select Scheduled, the system calculates/recalculates dates:

- Firm an order
- Change a date that causes another date to recalculate

  For example, when you set user preferences for firm order recalculate release date; then, change the due date, the system recalculates the release date.
- From either the Production Order or PSW grids, when you right-click on a production order and select the context menu Calculate Release Date option, the system recalculates the release date based on user-preference settings.
- Manually change the Scheduled Duration field on the production order. The system recalculates either the release or due date, based on preference settings.

Projected: When Projected, the system uses the value in the production order Projected Duration Days field to calculate order dates. Projected Duration is calculated based on required capacity and various other inputs.

When you make the following changes in status and duration and select Projected, the system calculates/recalculates dates:

- Firm an order.
- Make changes that affect required capacity for the order, such as quantity, run time, setup time, run rate, number of resources changes, and so on.
- Make changes that directly affect projected days, such as duration buffer, number of lines changes, and so on.

- Make changes to the direct date changes as described for the Scheduled preference when you change a date or initiate a date calculation/recalculation.

Planned Capacity. When Yes, the system uses a date's planned capacity to determine whether a production order can be scheduled for that date. For information on calculations for planned capacity, see "MSW Capacity Panel Data" on page 56.

The Release Date Calculation Inputs section has the following fields:

Anchor Release Date. When Yes, the release date stays fixed during date calculations, unless you select the release date to be calculated.

Duration. Set the type of duration:

Scheduled: When Scheduled, the system uses the value in the production order Scheduled Duration field to calculate order dates. This value is usually the item's manufacturing lead-time.

Projected: When Projected, the system uses the value in the production order Projected Duration Days field to calculate order dates. Projected Duration is calculated based on required capacity and various other inputs.

Planned Capacity. When Yes, the system uses a date's planned capacity to determine whether a production order can be scheduled for that date. For information on calculations for planned capacity, see "MSW Capacity Panel Data" on page 56.

Rules for sequencing

Status Change on Sequencing. Indicate the status to which you want the order to be changed when sequencing orders. Select from Firm, Exploded, Allocated, Released, and Closed statuses.

Processing Master Schedules

This section tells you how to process your master schedules using MSW. A generic procedure is provided, along with descriptions of the fields within each grid. Individual tasks for the production orders that display follow the grid and field explanations.

MSW General Procedure

Before you begin, you should have set fields in Options under the Preferences drop-down menu; this includes setting history/future horizon, scheduling total options, and other scheduling options. You use the Resource Navigator to load data within MSW; there are many different functions that you can perform using the data for a master schedule. The following provides instructions that tell you how you can leverage the MSW for master scheduling purposes using key information in the MSW:

1. Load data for resources through the Resource Navigator; see "Loading Resource Data" on page 31.

   The system displays resources and items related to the work centers or production lines you selected. The system retrieves all transactional, demand, and supply records for items with dates that also match the History and Future Horizon values that you set in Options.

Note You can set data load preferences to view items that do not have supply, demand, production orders, or inventory activity within MSW; see "MSW Data Load Preferences" on page 47.

2 From the Views drop-down menu, select Save or Save As to save the view. If you select Save As, name your view, then save the view.

3 Identify resources and items that require scheduling intervention.

In the Scheduling Grid, items with scheduling issues have the item number field colored red or yellow depending on the issue at hand.

- Locate resources that have items with negative POH for every item with supply/demand within the scheduling horizon. The system reveals a visual indicator showing that one or more items on the resource have POH issues.
- Locate resources that have items with safety-stock issues within the scheduling horizon.
- Locate completed scheduled quantities and open scheduled quantities.
- Consider both static data and transactional data pertaining to the item. View any of the supporting data in the Supply/Demand Panel and view other details in the secondary tabs/browses, such as production orders, item planning, demand details, action messages, calendar exceptions and so on

4 Identify and correct capacity issues.

The Capacity Panel displays visual indicators for period available capacity issues through the scheduling horizon. If the daily required capacity is greater than planned capacity for a given day, the daily required capacity field for that day is highlighted in yellow. If the period available capacity is less than zero for a given day, that day is highlighted in red.

If the capacity is insufficient for the primary resource an item is produced on and you have set up alternate production lines for the item, you can assign the item to an alternate production line in Production Line Maintenance (16.1.1). You can select the alternate production line or work center from the Resource Panel when you select the Site in the Resource Panel.

You can adjust capacity, for example, through the Calendar Exception tab in the Workbenches. You can also use corresponding menus to add or subtract workday hours as needed for a work center. You can adjust the required capacity by modifying order due dates.

5 Schedule items by:

- Changing the quantity of items in the daily buckets in the right side of the Schedule Grid. When there is more than one production order behind a cell in the Schedule Grid, that cell's quantity displays in gray text, indicating that the cell cannot be directly updated. In this case, you can modify the quantities related to the cell using the Production Order Maintenance tab.
- Retrieving the production order in Production Order Maintenance within MSW, then modifying the quantity, dates, or status of the order.
  - Modifying order operations, setup, or runtime
  - Aligning order dates
  - Creating a new production order
  - Deleting, copying, or splitting orders
  - Identifying and correcting capacity issues

6 Monitor a production order by displaying:
   - Order supply summary or history
   - Order details or attributes
   - Production rates or comments
   - Order dates, times, shop floor activities
   - Basic and detailed routing data
   - Inventory details

7 Save your changes and optionally run MRP automatically upon the save.

8 Repeat the process until issues have been resolved for all resources.

9 Report production.

MSW Capacity Panel Data

This panel includes required capacity and capacity information for the selected resource on each day of the schedule horizon, starting with the current day. Also, you can expand and collapse the Capacity Panel to show schedule quantities in weekly and monthly buckets. The weekly and monthly buckets are display only.

Capacity calculations start from the current system date and include the daily capacity. If the capacity results in a negative value, the system attempts to consume the excess capacity available from previous days and continues the consumption until either the available capacity is zero or all previous days' excess capacity is consumed. The capacity calculation runs from the system date until the last day of the schedule horizon. When past due, the period available capacity is zero minus the past due required capacity.

In the Capacity Panel, you can optionally display the daily delta of required and planned capacity in the MSW. You can set the Consume Prior Remaining Capacity to No; you can see a daily delta calculation in the Remaining Capacity field. For more information, see "MSW Consume Prior Remaining Capacity" on page 50.

The MSW Capacity Panel includes cumulative capacity calculations as found in capacity requirements planning reports. The Cumulative Capacity row identifies the next available-to-promise date for an order, displays capacity in weekly and monthly buckets, and displays in weekly or monthly capacity buckets. The cumulative capacity uses remaining capacity or planned and required capacity as input.

- Remaining capacity as the input:

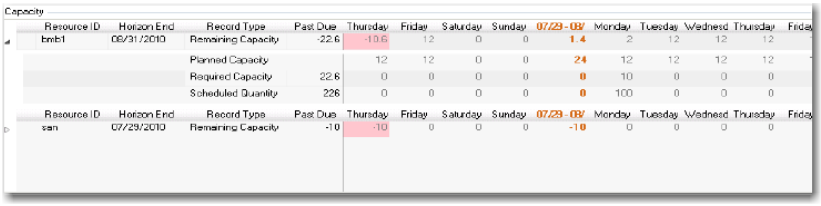
  [N] = each day. [N "Remaining Capacity"+ Prior Day Cumulative Capacity = Cumulative Capacity of [N]

- Using the Required Capacity and Planned Capacity as an input:

  [N] = each day. [N "Planned Capacity - Required Capacity"+ Prior Day Cumulative Capacity = Cumulative Capacity of [N]

The following figure show how you can see capacity trends across resources—production lines and work centers—at the same time by selecting Site in the resource navigator. Or, you can see capacity trends across only your production lines, only your work centers, or only a particular resource.

Fig. 3.16
Capacity Panel



You can toggle the Capacity Panel to show only remaining capacity. You can optionally hide fields within the grid. When you collapse or hide aspects of the grid, however, you may lose sight of the firm schedule horizon dates that display in the grid. The panel includes the following fields:

Resource ID. The valid system identifier for the resource.

Record Type. The following are the different record types:

- Planned Capacity

  This row displays the daily calculated capacity (in hours) based on production line or work center capacity parameters. It does not include past-due capacity; the Past Due column is always set to 0 (zero) and shows no hours.

  The workbenches determine the planned capacity of a production line by considering the capacity defined for shifts in Production Line Calendar Maintenance (16.1.13.1) and the number of production lines/machines available to the shift per the production line. The capacity defined in Production Line Calendar Maintenance is always defined as the hours of operation for the production line with 24 hours maximum, regardless of the number of lines/machines the production line represents.

Example You define the production line capacity in terms of the operating hours within a day, maximum 24 hours. You also define the number of lines/machines the production line represents that the system uses to compute the total planned capacity of the production line. The system:

- Calculates the planned capacity on the MSW by taking the capacity defined in Shift Calendar Maintenance times the number of production lines, defined on the production line header record.
- Calculates the planned capacity on the PSW by taking the capacity defined in the Shift Calendar Maintenance for each shift times the number of production lines defined on the production line header record.
- Adjusts the calculation to include holiday considerations (see below).
- Adjusts the current computation that calculates the weighted and shift level productivity to consider the number of lines on the production line header record.

  For the workbenches, the planned capacity formula is:

  *Working hours * Number of Lines*

  Where:

  Number of Lines is the number of lines/machines the system uses to process the production order. The system uses the Number Of Lines field also to calculate the production order duration by dividing the production run time/resources.

For holidays, the system applies holidays to production line planned capacity calculations. You can set holidays at the site or domain level (see “Holidays Tab”). When you do, the system removes production line planned capacity (making it zero capacity) for the holiday.

When determining if a date is a holiday, the system first checks if site-specific holidays are defined. If so, it checks if a holiday is defined for the site. Otherwise, it checks if a holiday is defined for a blank site.

Example You set a site holiday on Monday and a global holiday on Tuesday; for the production lines in that site, the system only considers the Monday holiday because Tuesday is not a holiday for the site.

Holidays overwrite all working hours when the system processes and calculates workbench data, including exceptional time for the holiday date. When a date is either a site or domain holiday, the planned capacity of that day is 0 (zero), regardless of the working hours or exceptional hours recorded or set for that day.

For standard capacity, the formula is:

Standard capacity = Working hours per week / working days per week

The formula for planned capacity is as follows:

*Planned capacity = if date is a holiday then zero else shift hours (shift_hour[1-4]) * shift efficiency (shift_load[1-4]) / 100 + shift adjustments (cal_det)*

Where:

cal_det = calendar detail or non-work hours/days

The production order formula is as follows:

capacity = WC capacity + Sum of adjustments (cal_det)

The calculation for a production line is as follows:

Capacity per day = [Shift hours available - Downtime + /- Holiday Calendar]

The calculation for a work center is as follows:

Capacity per day = [Shop Calendar hours - Holiday Calendar]

The past due calculation is always 0 (zero).

- Remaining Capacity

  Identifies the resource required capacity overages and shortages based on a period calculation to help you isolate scheduling issues; see“Consume Prior Remaining Capacity” on page 49.

- Required Capacity

  Identifies the capacity required for this resource (the *load* for the resource). Capacity shortage is calculated as capacity minus the load.

  If capacity – DailyLoad < 0, then PAC =
  (capacity – DailyLoad + previous day capacity if > 0).

  Previous day consumption continues until today.

  If capacity – DailyLoad > 0 then PAC = (capacity - DailyLoad)

  This calculation can be affected by future day consumption.

  The past due period available capacity is as follows:

  *Past due DailyLoad * –1*

The value is negative because it represents load that was due in the past. The calculation consumes just enough of the previous days' available capacity to cover the current day's gap. Since the calculation consumes previous days' capacity, both previous and current days' values are adjusted.

- Scheduled Quantity

  Identities the capacity, in terms of quantity, scheduled for this resource.

Horizon End. Displays the date that indicates the end of the schedule horizon.

Past Due. This field displays past due capacity requirements.

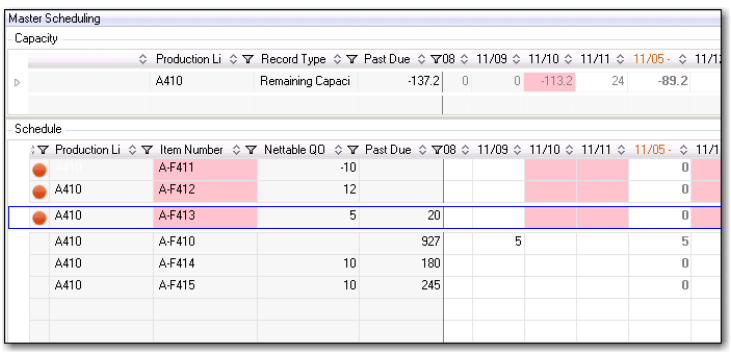
MSW Schedule Grid Data

The Schedule Grid displays item supply records—production orders—with bucketed quantities of the production order supply records for the item. The records represent the master production schedule for a given period. When you select an item by clicking a daily schedule cell, the entire row is highlighted. Additional visual indicators call your attention to potential issues.

Also, you can expand and collapse the Schedule Grid to show schedule quantities in weekly and monthly buckets. The weekly and monthly buckets are display only.

When you make a change that remedies the problem, the system updates the cell to remove the color indicator.

Fig. 3.17
Schedule Grid



The following topics describe fields unique to the Schedule Grid. Other fields also found in other QAD ERP programs are not described below:

Item Number. The valid system item number.

Nettable QOH. This column displays the nettable inventory on-hand. Nettable is an inventory status attribute that determines whether MRP includes items in its planning. As you scan items, use the data in this column to monitor inventory levels and easily identify inventory levels with issues or concerns.

Past Due. The MSW Past Due field displays past due scheduled quantities.

You can also display the run sequence of an item in the grid. If multiple items are produced on a single production line, efficiency can be improved by producing the items in a certain order. Run sequences let you control the order, or sequence, in which items are scheduled on a production line.

Displaying Product Structure Levels

When customers increase demand for an end item with an immediate due date, the demand change causes an increase in the schedule. Schedulers may have to increase one or more lower assembly schedules to meet this short-term demand; however, there may not be enough sub-assemblies to produce the item.

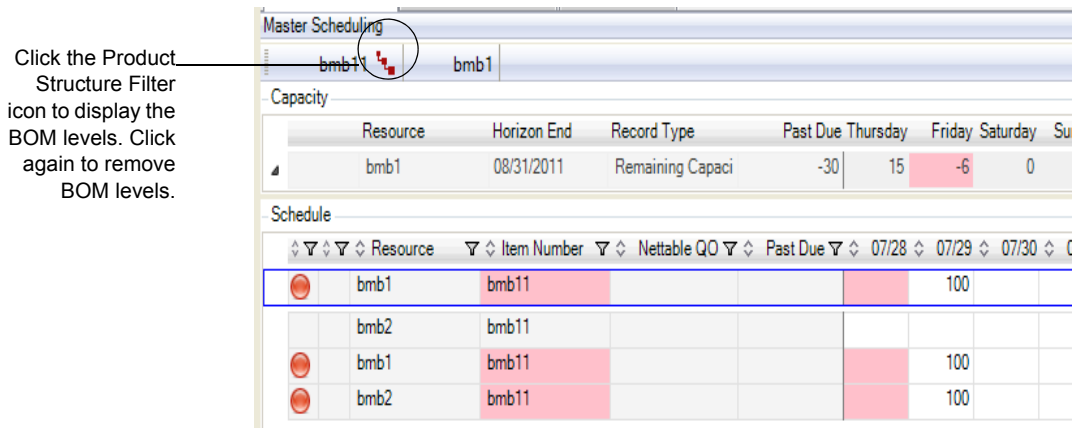
Previously, to make changes across all product structure levels, schedulers typically had to go through all multi-level planning cycles to make updates. When a product has a bill of materials (BOM) that is two or more levels deep, schedulers had no way to:

- Schedule the increase right away for the parent.
- Quickly determine the demand impact on the dependent lower levels.

Schedulers can use the Product Structure Filter to gauge the impact of the change immediately for all levels of the BOM. The MSW Schedule Grid includes the Product Structure Filter (see Figure 3.18).

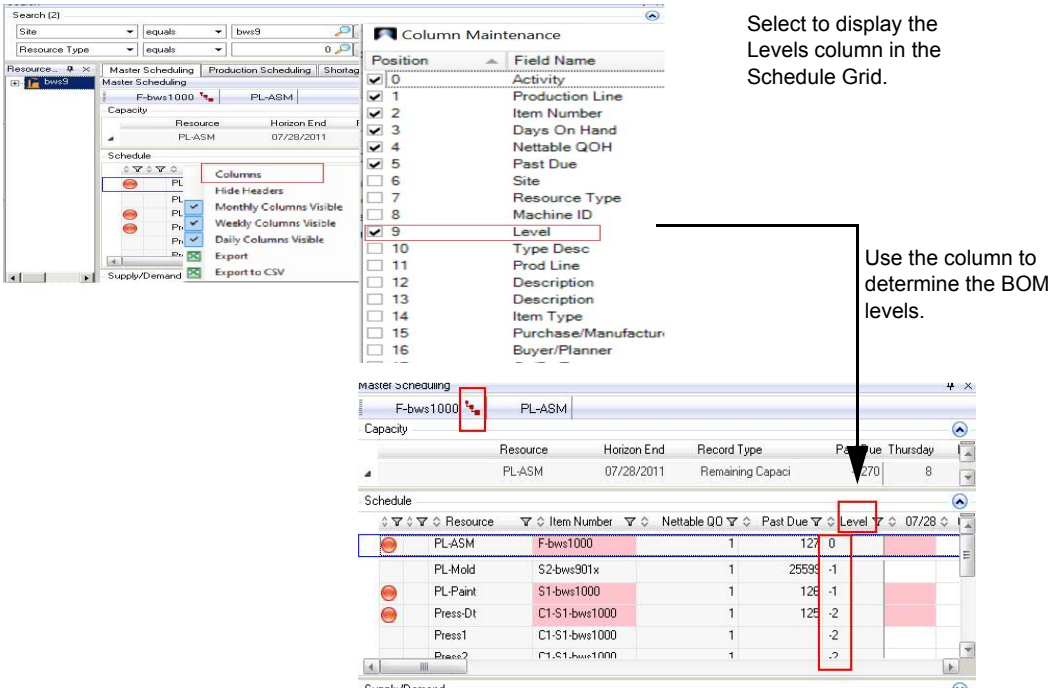
With a single click, schedulers can render all levels of an item—both up and down—within the Schedule Grid. When you click the Product Structure Filter, the filter turns red and the MSW Schedule Grid provides immediate visibility to the QOH as well as the PQOH for each component across the BOM for the scheduled production order, letting you quickly gauge the impact of the change for lower levels. When you click the Product Structure Filter again, the BOM levels are removed from the Schedule Grid.

Fig. 3.18
Schedule Grid Product Structure Filter



To determine BOM levels, you select to display the Levels column in the Schedule Grid by right-clicking on any column header in the Schedule Grid, then selecting Columns, and Levels. When levels display in the grid, you can determine the product hierarchy. A level 0 (zero) is the main item, while a 1 is one upper level, a 2 is two upper levels, and -1 is one lower level, -2 is two lower levels, and so on.

Fig. 3.19
Product Structure Filter Levels



Levels and Search Results

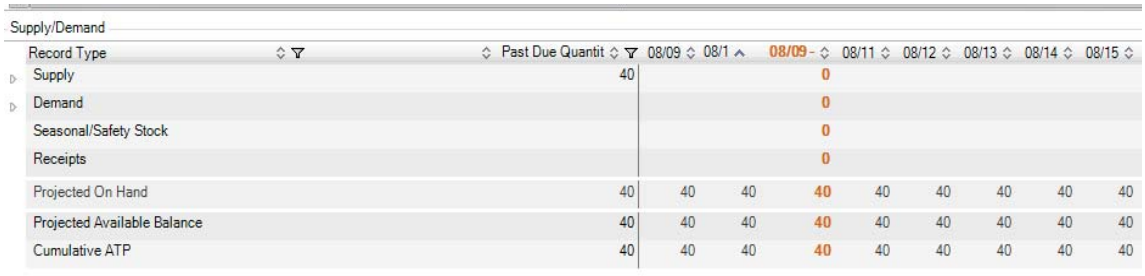
The search process may result in only a subset of BOM components and levels. So, for example, if you search for a finished item and a component item that is five levels down the BOM, you may only see two items that display in the Schedule Grid.

This is because your original search criteria did not include all components and the product structure filter can only display components that are available, based on the criteria you set for the search.

Working with Supply/Demand Panel Data

When the Schedule Grid displays the scheduled quantity for an item, the Supply/Demand Panel displays the remaining open quantity due for the item. Sources of demand can include forecasts, safety stock requirements, sales orders, customer scheduled orders, component requirements from manufacturing, and so on. Sources of supply include nettable QOH, production orders, production/purchase orders, supplier scheduled orders, and so on.

Fig. 3.20
Supply/Demand Panel



When an item is highlighted, the system displays the following associated data in the Supply/Demand Panel:

- POH

  The system displays the real-time projected inventory on hand for the item.

  The projected on-hand calculation includes firm scheduled quantities from alternate resources for the item. So, for example, if you schedule item A on production lines 1 and 2, and item A has:

  - Demand for 100 outstanding
  - A production order for 50 on production line 1
  - A production order for 100 on production line 2

  Then, the system displays a POH of 50 for production line 1.

  The projected QOH calculation is as follows:

  WO Open quantity + Nettable Inv – Total demand

  Where:

  Nettable Inv = From MRP Detail Inquiry (23.16)

  Total Demand = Independent + dependent + forecast + seasonal

  WO Open quantity = SNRD

  The POH status derives from the POH calculation. If any POH for that item is below safety stock, POH status is set to safety stock status. If any POH is < 0, the POH status is set to below-zero status.

  Additionally, the production order PAC status derives from the POH calculation. If any POH for that item is below safety stock, POH status is set to safety stock status. If any POH is < 0, the POH status is set to below-zero status.

Past Due (Demand). The system displays past-due totals by demand type.

Note This includes all past-due demand for the item—not just demand from the specified historical period.

Record Type. The following are examples of the types of records that display:

- Independent demand

  The system displays independent demand from QAD ERP for the selected item.

  This quantity includes confirmed sales orders, DRP orders, and type 3 (required ship schedule) customer schedules.

  All demand values match quantities shown in MRP Detail Inquiry (23.16).

- Dependent demand

  The system displays additional demand from QAD ERP based on dependent demand from parent-level items for the selected item.

- Forecast demand

  The system displays the net balance of current forecast demand from QAD ERP for the selected item.

  QAD ERP stores forecasts by week. The workbench shows the entire forecast for the week on one day.

The system displays the net balance of current forecast demand from QAD ERP for the selected item. Master production scheduling and MRP use the net forecast and abnormal sales order demand to calculate total demand. The net forecast is calculated as follows:

Net Forecast = Forecast – Sales Order Demand

When the shipment forecast is oversold—that is, the quantity sold exceeds the forecast amount—the net forecast will not go below zero.

- Seasonal/safety stock

  The system displays seasonal build quantities as well as safety stock.

  The system performs the following calculation for each date when a master scheduled receipt is due or a seasonal build quantity is made available, causing a net increase in supply. It takes into account all sales order and required ship schedule demand and gross requirements up to the next increase in available supply.

  Master Scheduled Receipt – Sales Orders and Required Ship Schedules – Gross Item Requirements – Seasonal Build Net Increases + Seasonal Build Net Decreases = ATP

- Receipts

  The system displays supply from order receipts, such as production order receipts.

- Production Forecast

  When you establish planning bills and forecast and master schedule at the family-item level, the system automatically calculates the derived demand for components of the family or upper-level item. These calculations are based on the ATP quantities for the family-level item and the quantity per and forecast percentage for the components of that family item. The result is called a *production forecast*, since it derives from the master production schedule and the forecast percentage specified in the planning bill.

- Planned Scrap

  The number of items planned as unusable while producing the quantity.

  Scrapped quantity displays on production order history and cost reports. The total GL cost of the rejected items posts to the scrap account.

Working with Production Orders

MRP generates planned orders, balancing supply and demand; however, when scheduling issues arise, you can manually adjust production order quantity, status, dates, and so on when you need to:

- Reduce the quantity to account for a capacity constraint.
- Increase the quantity by merging production orders into a single order.
- Increase the quantity because of an increase in demand during the scheduling horizon.

If you do not save your changes, the production order reverts back to its prior condition.

If you load a production order record to the MSW, modify it, and then save it on the MSW, the MSW checks whether this order has been modified by another user or in another program after you load it to the MSW. If so, the MSW displays an error message, indicating the commit failure. The error message does not contain any information about which fields have been modified for the order.

The MSW, however, automatically records the field inconsistencies in the client log file. So in this scenario, you can check the log file to identify the modified fields.This helps you to locate the root cause.

The following topics describe production order tasks that you can perform in MSW.

Determining Which Orders Require Actions

In addition to visual indicators within the Resource Navigator and the MSW Scheduling Grid, you can determine which orders require immediate attention by viewing the list of orders in the workbenches-embedded Production Order Maintenance left-hand grid. The system indicates production orders with error conditions. This lets you easily locate orders that require your immediate attention.

Scheduling Items

After you select the resource and item, you can make changes to production orders either in the Schedule Grid or under the Production Order Maintenance tab. The system looks for open discrete orders when determining if an item is required by the workbenches.

Within the Schedule Grid you can:

- Update quantities directly in the daily buckets by entering new values.
- Create a new production order by entering the desired quantity.
- Delete an order by overwriting a quantity with a 0 (zero).

Modifying Production Order Quantities

Even though MRP generates planned orders, balancing supply and demand, in some cases, you may need to manually adjust the production order quantity. You can use MSW to do this. You can modify quantities directly in the Schedule Grid in any horizon period.

When you make a quantity change against a production order, the quantity change applies to the entire order, not just a specific operation. For example, if you change the quantity on work center A for operation 10, MSW applies the quantity change to the order and, subsequently, all operations related to the production order in question.

You cannot modify the value in Schedule Grid:

- If the Schedule Grid cell value represents more than a single production order
- If the order is closed

1. Select an item on the Schedule Grid.
2. Modify the value in the quantity column.

   The system validates the quantity change can be made.

   MSW updates all calculations. Color indicators may change.

Note You can also change the quantity using Production Order Maintenance within MSW.

Creating Production Orders

You can create production orders in two ways in the Planning and Scheduling Workbenches:

- “Creating an Order in the Scheduling Grid”
- “Creating an Order for an Item in Production Order Maintenance”

Creating an Order in the Scheduling Grid

You may need to create a new production order within MSW. For example, MRP may create a planned order to cover weeks’ worth of requirements; however, you may need to level the supply by entering daily production quantities. For another instance, sales representatives can enter new sales orders into the system, and if the current demand for the sales order exceeds supply, MSW displays a visual indicator depicting the shortage. Since MRP has not run yet, there is no planned production order to firm and so you can decide to create a new order.

Use the following procedure:

1. In the Schedule Grid, for the work center/machine/production line selected, enter a scheduled quantity for an existing item where no production order currently exists.
2. Use Production Order Maintenance within MSW to complete other fields for the new production order.
3. Click the Save button to save your changes.

You cannot create a production order from the work center resource on the Schedule Grid. The system does not backward calculate production order dates, so the operation date for that work center is the date you specify. For example, if you enter a quantity for date1 on the MSW Schedule Grid, the system creates a production order with a start date of (date1 – x) where x is the number of days for the preceding operations that need to complete. The order would have the operation for that work center on date1.

Creating an Order for an Item in Production Order Maintenance

You can create a production order for any item in the workbenches-embedded Production Order Maintenance.

Note When you select New in Production Order Maintenance, the system checks data already displayed in Production Order Maintenance to determine if data is for the site level (which displays when you select the site row in the PSW Sequence Grid). If so, the system displays an error message, informing you that multiple resources are selected and prompts you to select a single resource.

To create an order by selecting an item in the Production Order Maintenance panel:

1. Select New in the left-hand grid of Production Order Maintenance.

   The system creates a new line for the new order in the left-hand grid, displays a control icon in the Item Number field (see Figure 3.21), and defaults the item number based on one of the following:

   - When you previously selected an order in Production Order Maintenance before you pressed New, the system defaults the item number of the selected order.

- When there is only one item number referenced in the Production Order Maintenance list of orders, the system uses that item number.
- When there is no order information available, the item number is blank.

2 In the new production order line of the Production Order Maintenance left-hand grid, use the arrow key to display the drop-down list to select an item number.

The list displays all items associated with the selected production line, retrieved through the resource load; see Figure 3.21.

3 Click the Details tab in the Production Order Maintenance right-hand panel; then, complete item details in the panel.

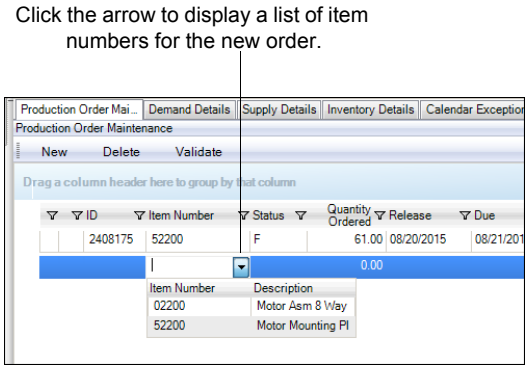
When details are complete, the system validates the item number for the resource. When invalid, the system displays an error.

When the item number is valid and a production line exists, the system defaults the release date to the current date and calculates the due date based on scheduled duration.

When there is no default item number, the system defaults the release date to the current date and calculates the due date based on scheduled duration once you input the item number and leave the record.

4 After you enter data for an order and focus is removed from either the left-hand Production Order grid or the right-hand details panel, the system saves the order in the MSW/PSW working memory. To save the new order to the database, click the Save button.

Fig. 3.21
New Order in Production Order Maintenance



Calculating Dates for New Orders

When you create a new production order, the system needs to calculate the projected release and due dates of the production order and the operations.

You can select an item/date and enter a new quantity in the Schedule Grid. When you do, the system:

- Sets the due date to a date entered on the Schedule Grid
- Calculates the operation due date of all operations
- Calculates the order release date, which is based on MRP lead time days
- Updates the workbench with the resulting calculation

When you change the due date, the normal duration calculation rules apply. Normal duration is the default setting (MF-LT) for the duration calculation method that you set in the Scheduling tab of user preferences in the workbenches; refer to “Projected Duration” on page 79.

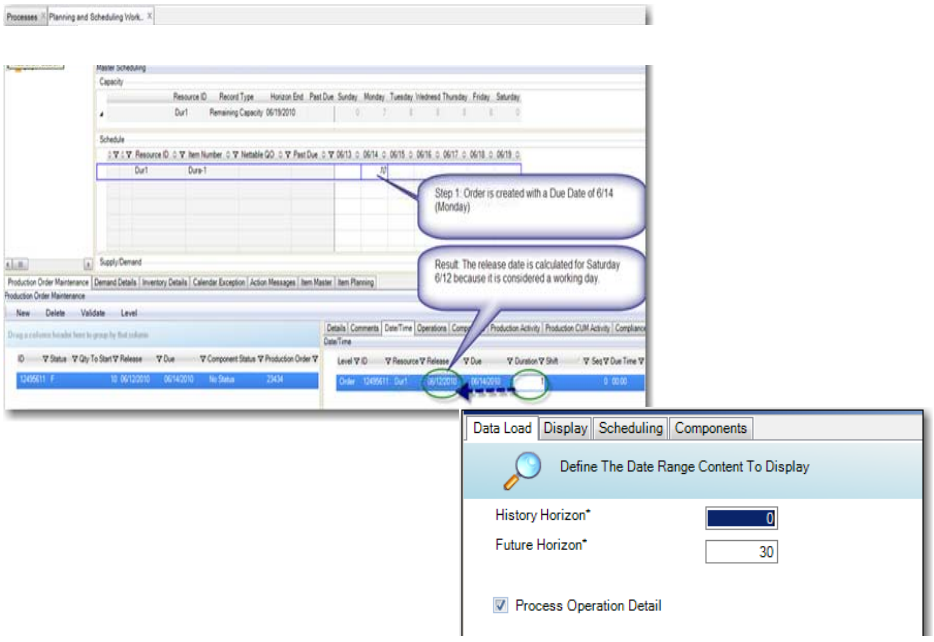
Setting Dates Prior to Horizon Dates

When you create a production order where the production order release date is calculated prior to the History Horizon dates, the system calculates the release dates.

Example Today is Monday 6/14. You set the History Horizon field for one day and the Future Horizon field for five days, then create an order with a due date of 6/14 for an item with a manufacturing lead time of 1 day. The system calculates the release date for Saturday 6/12 because it is considered a working day.

When determining dates in the past, MSW considers working days in the past; however, if you set a date that is beyond the history horizon, MSW treats every day beyond the history horizon as a working day. This also is true for dates beyond the future horizon. The Schedule Grid shows all dates between the start of the history horizon and the end of the future horizon, including working and non-working days.

Fig. 3.22
Example Dates Prior to Horizon Date



Scheduling Discrete Production Orders on a Production Line

You can use Production Order Maintenance (16.3.1) or the Production Order Maintenance function that displays inside the MSW to schedule and view production orders with Mfg Type WO on a production line. You can also view open over-completed discrete orders.

If the item you specify on the order is line scheduled (Pur/Mfg is L) in Item Master Maintenance, Item Planning Maintenance, or Item-Site Planning Maintenance, the production order type is S and the status is F.

For a discrete order, the type is blank, and the status is F. This occurs when Pur/Mfg code is blank or M(anufactured) for the item.

Modifying Production Order Status

You can manually change production order status to accomplish scheduling goals.

You cannot change the status of an order with issued materials or reported production to any status earlier than E. In other words, changing the status of such an order to P or F is not allowed.

To modify production order status:

1. In the Schedule Grid, select an order and modify the order by changing quantity, date, and so on.

   MSW updates all workbench calculations. Color adjustments are made.

2. Click the Save button to save your changes.

Note You can also change the order status using Production Order Maintenance within MSW and update records to QAD ERP.

Auto-Firming Orders

In many businesses, MRP output is the starting point for master production scheduling. You can use the auto-firm function to quickly adjust orders and expedite your scheduling tasks. Auto-firming is based on the order due date.

You cannot auto-firm these item types:

- Purchased (items with a P code in Item Master Maintenance (1.4.1)
- Configured
- Routable
- Phantom

You can auto-firm orders using programs that are external to the workbenches. The programs firm planned orders for your work centers and production lines for a specific horizon or a range of dates.

Changing Firm Orders Back to Planned

When you change the status of planned order to firmed and then decide that the resulting effect on the schedule is not as expected, you can change the status back from F(irm) to P(lanned) so long as you did not save. The system restores the whole record.

When the order has been firmed and split, you cannot undo the changes. You must delete the order in this case.

Modifying Production Order Dates

You can modify production order header dates in MSW to help you manage the due and release dates of production orders. Use the following procedure:

1. Select the Production Order Maintenance tab within MSW.
2. Choose one of the following:
   a. In the order summary list, modify dates in the Due Date or Release Dates field; see Figure 3.23.

      When you modify the due date, MSW updates workbench calculations and other calculations impacted by order due date and quantity.

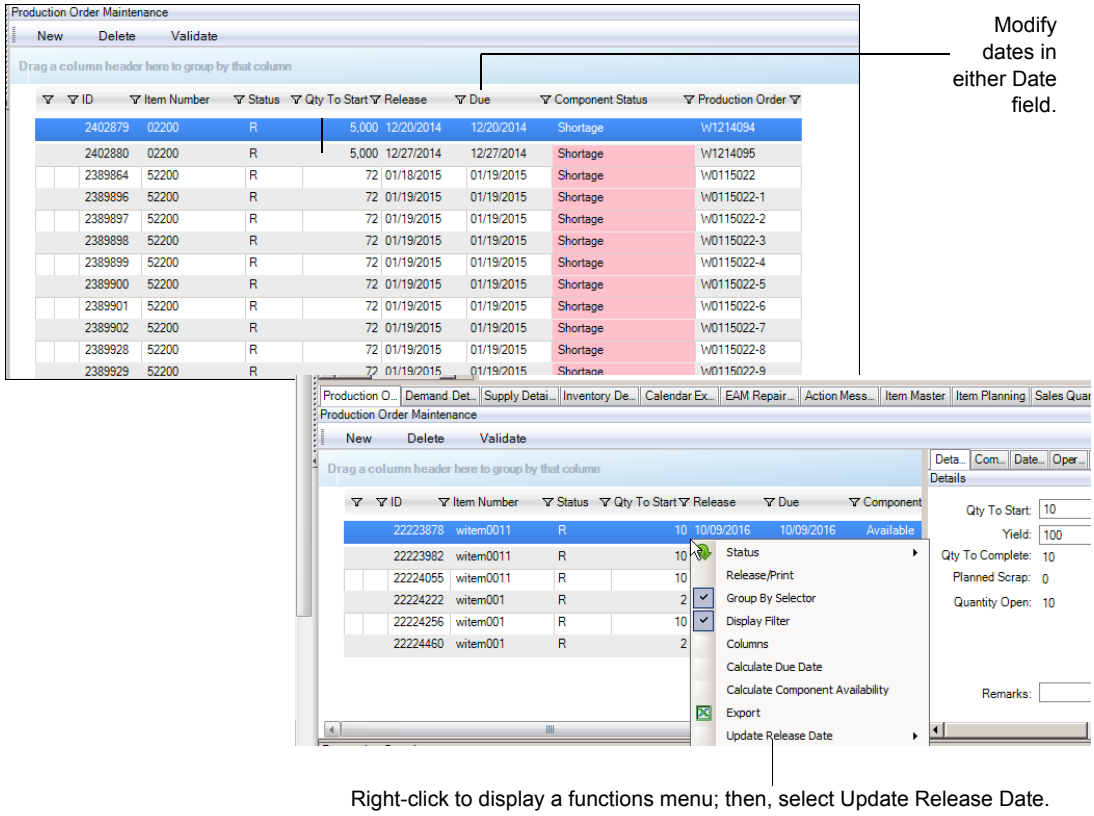
      When a due date is changed, the system changes the corresponding release date so that the lead time from item planning remains the same.

      If changing dates for a production line, MSW updates the production line required capacity; if changing dates for a work center, there is no impact.

   b. In the embedded Production Order Maintenance's left-hand list of production orders by ID, move the cursor to the order of interest.
      - Right-click to display a menu of additional functions.
      - Select `Update Release Date`; the system displays a calender to enter a new release date.
      - Enter a new date; the system records the date as the release date for the production order.

   Note You can also multi-select orders in either the Production Order grid or the PSW grids, letting you mass change the release date of selected orders.
3. Click the Save button to save your changes.

Fig. 3.23
Production Order Maintenance, Date Fields



Dividing Production Orders in the MSW

The MSW lets you divide a schedule order into smaller orders while tracking costs to a cumulative order.

Note Dividing an order is not the same as the Production Order function to split an order. For more information on differences, see “Dividing Production Orders in the PSW” on page 104.

To divide a new discrete production order into several production orders:

1. Select the production order to divide in the Schedule Grid.
2. Right-click to display the drop-down menu.
3. Select Divide Order.

   A window displays additional options.
4. Enter the quantity to divide the order; the release date; and if necessary, the shift.
5. Press OK.

   The system creates a new production order per the data entered in the Divide Order pop-up window and reduces the open quantity.

Releasing and Printing Production Orders

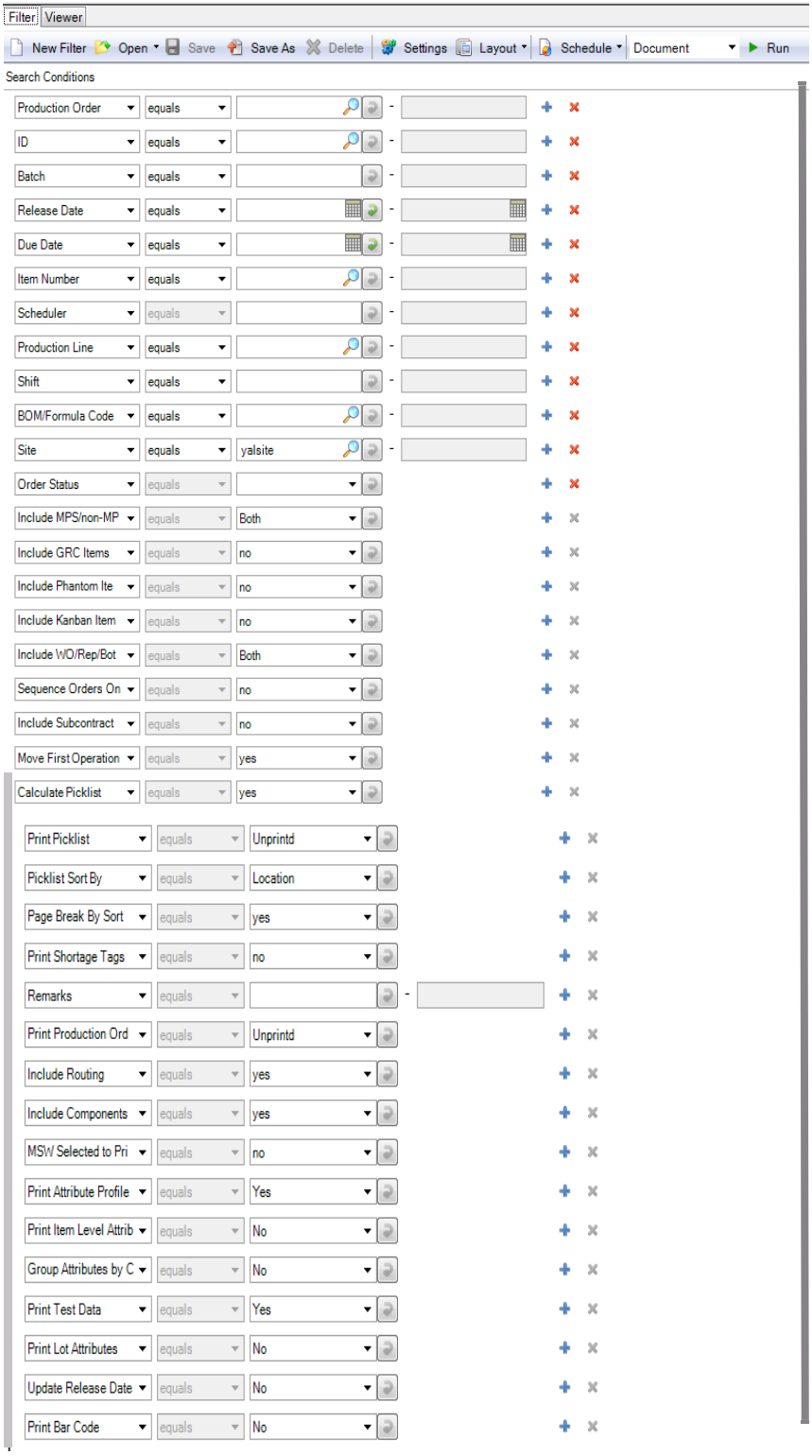
You can print production orders from the MSW. To do this:

1. Select orders for print.
2. Save the production orders you want to print.
3. Use Production Order Release/Print (16.4.2) to print the orders managed by MSW/PSW; see Figure 3.24.

   When using Production Order Release/Print to print selected orders, the system checks whether the Release/Print in the Workbenches is set to Yes and the order status is set to Released.

   To check the Release/Print field, while in Production Order Maintenance with an order displayed, right-click to display menu options, then select Release/Print.

Fig. 3.24
Production Order Release/Print (16.4.2)



Deleting Production Orders

You can delete a production order within MSW, using the Production Order Maintenance tab.

You cannot delete an order that has:

- Production reported for it.

  You must first run Prod Order Accounting Close (16.20.10) to clear work in process (WIP) amounts, calculate and post variances, and close outstanding operations for the production orders you want to close.
- A status of E(xploded), A(llocated), or R(eleased).

  When you try, the system displays an error message.

Use the following procedure to delete an order:

1. Select the Production Order Maintenance tab within MSW.
2. Select the order from the summary list.
3. Click the Delete button.

   The system verifies the order status before it deletes the order.
4. Click the Save button to save your changes.

Viewing and Editing Order Data

The following topics discuss the data that displays in the MSW. Field explanations are included.

Working with Order Summary List Data

When you select items in the Schedule Grid, you can manipulate order data through two-sided Production Order Maintenance functions. The left side includes a summary list, while the right side includes details.

The summary list starts with orders that have operation due dates on the selected day. To view past-due orders, click the up arrow in the summary list. To show additional records for the current day or for future days, click the down arrow. The sequence in which orders are listed is based on the due date of the order and the production order ID.

You can update some fields directly in this panel. Changes applying to the production order itself update when they are saved.

Fig. 3.25
Summary List

Production Order Maintenance

New Delete Validate

Drag a column header here to group by that column

ID	Item Number	Status	Qty To Start	Release	Due	Component Status	Production Order
2402879	02200	R	5,000	12/20/2014	12/20/2014	Shortage	W1214094
2402880	02200	R	5,000	12/27/2014	12/27/2014	Shortage	W1214095
2389864	52200	R	72	01/18/2015	01/19/2015	Shortage	W0115022
2389896	52200	R	72	01/19/2015	01/19/2015	Shortage	W0115022-1
2389897	52200	R	72	01/19/2015	01/19/2015	Shortage	W0115022-2
2389898	52200	R	72	01/19/2015	01/19/2015	Shortage	W0115022-3
2389899	52200	R	72	01/19/2015	01/19/2015	Shortage	W0115022-4
2389900	52200	R	72	01/19/2015	01/19/2015	Shortage	W0115022-5
2389901	52200	R	72	01/19/2015	01/19/2015	Shortage	W0115022-6
2389902	52200	R	72	01/19/2015	01/19/2015	Shortage	W0115022-7
2389928	52200	R	72	01/19/2015	01/19/2015	Shortage	W0115022-8
2389929	52200	R	72	01/19/2015	01/19/2015	Shortage	W0115022-9

Production Order. The production order identifier. This can be the system-generated order ID from Production Orders. If you enter a new order, the system retrieves the next available number from Production Orders or you can optionally enter your own production order value.

ID. A production order lot identifier. The production order number and lot ID work together to identify a specific production order. The same production order can be used with different lot IDs.

Item Number. A valid item number as defined in Item Master Maintenance.

St(atus). The current status of the order. With some restrictions—for example, you can only change a firm order back to planned when you have not saved—you can update the status as needed. When you save your changes, the system updates the order with the new status.

Qty To Start. The quantity to begin producing when an order is released. For new production orders, the Qty to Start is 0 (zero). When the order is maintained by entering the Quantity to Start, the system calculates the Quantity to Complete from the Quantity to Start and the Estimated Yield Percent. When an order is maintained by entering the Quantity to Complete, the system calculates the Quantity to Start. When both quantities are entered, then the system recalculates and updates the Estimated Yield Percent.

Release. The date this production order is scheduled to be released to production. The date you enter here changes to the actual release date when you release and print the production order. Release dates also determine the date components are required. Normally components are picked when an order is released.

The system calculates either release or due date, creating, in effect, forward or backward order scheduling.

Due. The due date defaults to today's date plus the manufacturing lead time for the item. The due date is the date this order is due to be completed. This is the date you plan to have product available for shipment to the customer or issue to another manufacturing order. All MRP plans are based on this due date.

Component Status. The component status of the order. For detailed information on the component status and what it entails, see "Displayed Calculation Results" on page 120.

Production Order (number). A valid production order number as specified in Production Order Maintenance.

Working with Order Detail Records

When you click a cell in the daily supply grid, the system lists production orders for the associated item.

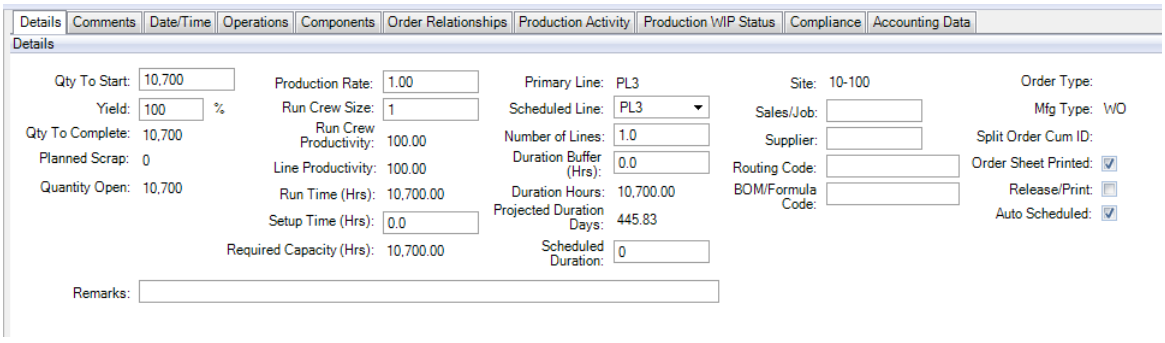
Field explanations are organized by tabs in the Order Detail portion on Production Order Maintenance, starting with the Details tab and ending with the Accounting Data tab.

To quickly assign production orders to other production lines while scheduling, use the Scheduled Line field in the Production Orders Detail tab. It lists the production lines that have been loaded for the associated item. You can specify a production line in the Scheduled Line field to assign an order to this line.

Details Tab

The following topics discuss fields in the Details tab. Field explanations are summarized. For full field explanations, refer to the field help for Production Order Maintenance (16.3.1).

Fig. 3.26
Production Order Maintenance, Detail Window



Qty To Start. The quantity to begin producing when an order is released. For new production orders, the Qty to Start is 0 (zero). When the order is maintained by entering the Quantity to Start, the system calculates the Quantity to Complete from the Quantity to Start and the Estimated Yield Percent. When an order is maintained by entering the Quantity to Complete, the system calculates the Quantity to Start. When both quantities are entered, the system recalculates and updates the Estimated Yield Percent.

Yield. Enter the percentage of the number of items built on this production order expected to be in usable condition. Yield defaults from item-site or item planning data.

Qty To Complete. The quantity that is expected to be completed for the production order. When the order is maintained by entering the Quantity to Start, the system calculates the Quantity to Complete from the Quantity to Start and the Estimated Yield Percent. When an order is maintained by entering the Quantity to Complete, the system calculates the Quantity to Start. When both quantities are entered, the system recalculates and updates the Estimated Yield Percent. The system calculates the following fields to determine the quantity to complete:

- POH
- Projected available balance
- Supply - manufactured

- Supply - planned
- Receipts

The system also checks demand for component items in MSW, using the Qty To Start to help calculate the Qty to Complete.

Planned Scrap. The quantity that is expected to be unstable as a result of production. Planned scrap is the difference between the quantity to complete and the quantity to start, rounded up to the next integer value.

Quantity Open. This field is display only and shows the scheduled order quantity that the system uses to calculate the duration of a production order. The system uses this quantity to calculate run time. For new production orders, the Quantity Open is 0 (zero).

Production Rate. Enter the standard run rate for the production line. When you update the value here, the system recalculates the production order run time.

Run Crew Size. Enter a number that reflects the size of the run crew. The number affects the order run time if you set Run Crew Enabled to Yes on the production line header record. When you update the run crew size, the system recalculates run crew productivity, run time, and required capacity of the production order. The standard run rate is based on a run crew of two people as the standard.

When you change Run Crew Size in Production Line Maintenance, it only affects orders created after that change has been made—not existing orders.

Note You can run a conversion for existing item records to populate the Run Crew Size field. See *QAD Planning and Scheduling Workbenches Administration Guide* for more information.

*Run Crew Productivity% = 1 + ((WO run crew size – PL run crew size) / PL run crew size) * 100*

Note The system only calculates this if the Run Crew Enabled field is Yes on the production line header record; otherwise, the value is always 100%.

Run Crew Productivity. This field is display only and depicts the percentage of productivity for the run crew.

Line Productivity. This is the shift productivity% if the order is assigned to a shift; otherwise, it is a calculated weighted average%.

Run Time (Hrs). This field informs you of the amount of run time that is required to produce the production order. When you update the production rate, the system recalculates the run time. It calculates the new required capacity (run time + setup time).

The calculation for run time is:

*(Open quantity / Run Rate) * Production Line Productivity% * Run Crew Productivity%*

Where:

Setup Time (Hrs). Enter the standard time in decimal hours required to prepare the work center to carry out the operation, independent of order quantity.

Required Capacity (Hrs). Identifies the capacity required or the total required capacity required to fully produce this production order.

Primary Line. This field displays whether the line is the primary production line. You can use Production Line Allocation Maint (16.1.6) to specify a percentage for one item on each production line. The line with the largest production percentage is the primary production line. With Production Line Item Update (16.1.16), you can view primary production lines. You can also update a production line and make it the primary line with Production Line Item Update (16.1.16).

Scheduled Line. Enter the scheduled line for the order. You can use the drop-down list to select a scheduled line.

Number of Lines. Enter the number of lines/machines the system uses to process the production order. The default is 1. The system uses it to calculate the production order duration by dividing the production run time by the number of lines/machines the production line represents. Changes to this field recalculate duration hours and duration days.

Duration Buffer (Hrs). Enter the number of hours for the duration buffer. This field also exists in Production Line Maintenance (16.1.1). Changes to this field recalculate duration hours and duration days. You can use this field to add miscellaneous time required to a production order.

Duration Hours. This field is display only and represents the number of hours required to produce a production order. The workbenches calculate projected duration hours as:

(Required Capacity / Number Of Lines) + Duration Buffer

The system overrides the standard duration calculation with projected duration when you enable projected duration in the workbenches User Preferences or when you apply it to an order. The standard duration calculation is as follows:

Defaults = ML-LT for planned orders

The system calculates this planned capacity per delta of order release/due dates for non-planned orders when the orders are pulled into the workbench.

Projected Duration (Days). This field is display only and represents the number of days required to produce a production order. If you apply projected duration, the system determines a new order release/due date. When you update any of the following fields, the system recalculates the projected duration:

- Number of Lines
- Duration Buffer (Hrs)
- Run Crew
- Qty Ordered
- Production Rate
- Setup Time

Applying the projected duration in days helps you monitor production activity against the scheduled due date. As the production order is processed and you report against the order (daily), the quantity open is reduced; therefore, the required capacity is reduced. The Projected Duration reflects the current required capacity for the order, providing a projected remaining days the order requires to complete. You can then compare this value to the scheduled due date to validate that the order is on schedule.

Scheduled Duration. The duration that is scheduled, not planned, for production. Planning programs use lead times to determine the duration of an operation. The amount of time a work center is actively involved in producing an item is determined by setup, run, and subcontract times. The time between operations—interoperation time—is determined by queue, wait, and move times. Most of these times are stated in hours, except for subcontract, which is stated in days.

Site. The site associated with this production order.

Sales/Job. This is an optional code associating this order with a specific sales/production order. For a new order, the default is blank.

Supplier. The supplier associated with this order.

Routing Code. This field depicts the routing code associated with the production order. BOM/routing codes default as they do in QAD ERP.

BOM/Formula Code. The identifier for the BOM/formula. Each BOM/formula consists of a parent and component. BOM/formula identifies the parent, usually an item number that has been predefined in Item Master Maintenance.

Order Type. For new production orders, you can indicate the type of production order; otherwise, this field is display only. The new order type can be blank or S. When creating a new order, you can change the order type.

The production order type identifies the production order source and how it should be processed. Most production orders are entered with blank type. These are normal manufacturing orders with a standard product structure and routing.

Values are E, R, S, C, F, or blank:

- E (Expense). Create an order with type E when a production order is required to capture the costs and expenses for non-inventory jobs, such as engineering prototypes or design projects. They are tracked by a production order so costs can be accumulated. Usually a special GL account and project code is entered. Expense production orders do not have any routing operations or components. These are added manually.
- R (Rework). Create an order with type R when a production order is required for the rework or repair of an item quantity. This type of order is created with no routing and only one component—the product being reworked. Additional component materials can be issued as required to complete the rework or repair. Rework expenses can be tracked separately by entering a different GL account and project code.
- S (Repetitive, Scheduled). Repetitive scheduled orders when the manufacturing type is set to Rep. The default value is S when the Pur/Mfg code for the item or item-site is L. Both discrete production orders and repetitive scheduled orders are created by the system when you maintain schedules using the Planning and Scheduling Workbenches. The system also generates production orders of type S when a production order is split. Split production orders have a cumulative order with the same order number.
- C (Cumulative). System-generated cumulative orders are generated by the system to account for the production costs of both repetitive scheduled orders and split production orders. You can modify operations on a C type order. On a cumulative order for repetitive production, you can only modify its start and end dates. On a cumulative order for split production orders, you can update the order status and the accounts. The order number is the same for the cumulative order for split orders and each of the split production orders.

- F (Final Assembly). System-generated final assembly production orders are generated when a sales order for a configured product is released to manufacturing. It uses the standard routing for the item, but the product structure contains only the items chosen on the sales order configuration. These orders are released and processed as regular production orders. You must specify Type as F when you release/print the order using Production Order Release/Print (16.4.2).

For the production of co-products and by-products, joint production order sets can be created using production orders with the value of Order Type being blank. Rework and Expense production orders can share the same production order number as a joint production order set, but are not considered part of that set. As an example, a production order for a co-product or by-product can be reworked using the original order number. The type code must be blank for a base process order.

Mfg Type. This describes how the production order is manufactured, either WO, or Rep (Repetitive), or blank. The field is blank when the order status is P, or when the order type is F.

Split Order Cum ID. This field is display only and shows the system cumulative identifier.

Order Sheet Printed. Indicate Yes if you want to print the order sheet for this order.

Release/Print. Indicate Yes to release or print this order; see "Dividing Production Orders in the MSW" on page 70.

Auto Scheduled. This field allows you to set a flag on a production order so that the Production Schedule Leveling calculation program knows whether it can reschedule that order or not. When this field is set to YES, the order will be rescheduled via Production Schedule Leveling when it runs next time.

Production Rate, Run Crew Size, and Required Capacity

When you change the Production Rate (run rate) or the Run Crew Size fields in the Production Order Maintenance Details tab in the workbenches, the system recalculates the production order required capacity.

The calculation for required capacity is:

Run Time + Setup Time

When you modify the Run Crew Size field, the system recalculates the Run Crew Productivity field value, Run Time field value, and the required capacity of the production order.

The calculation logic is as follows:

- The system verifies whether the field is set to activate the run crew size relationship to the run rate. If No, the run crew productivity remains a constant 100%.
- If Yes, the system calculates the run crew productivity by calculating the difference between the production line standard run crew size and the modified order run crew size and then dividing by the production line standard run crew size to get the percentage value.

Projected Duration

In the workbenches, you have two ways to apply the projected duration to the production order:

- Automatically

The system applies order duration automatically when you modify any field on the production order that recalculates an order's required capacity and/or projected duration hours. This includes such fields as Quantity Ordered, Production Rate, Run Crew Size, Setup Time, Number of Lines, and Duration Buffer in the Details tab of Production Order Maintenance in the workbenches as well as in Production Line Maintenance.

- Per user action in the workbenches grid

  The system applies order duration when you change production order status from P(lanned) to any other status.

- When you right-click on a production order in the grid, and the system displays options to Calculate Release Date or Calculate Due Date from the drop-down menu.

When the system calculates the order release and due date, the calculations are based on actual, not planned, input values for each production order. These calculations are only applicable within the workbenches and do not apply to the planning or scheduling functions outside of the workbenches.

The system calculates the production order dates based on User Preference settings:

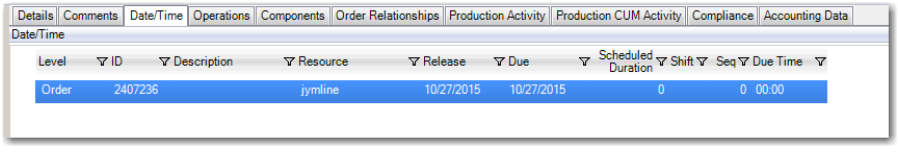
- When User Preferences indicate to calculate the release date, the following rules apply:
  - From the order due date, working backward, the system determines the required release date by taking the projected duration hours and factoring in the available capacity hours in each working day until projected duration hours are met.
  - When the calculated release date pushes the release date in the past, the system sets the release date to today.
  - When the order release is in the past, the system sets the order release date to today and instead recalculates the due date of the order.
- When User Preferences indicate to calculate the due date, the following rules apply:
  - From the order release date, working forward, the system determines the required due date by taking the projected duration hours and factors in the available capacity hours in each working day until projected duration hours are met.
  - When the system calculates the order due date to a date beyond the future horizon, it sets the order due date equal to last day of the future horizon.

The system uses the method you specify to use for calculations through the Scheduling tab of the Preferences window; see "Selecting the Method for Date Calculations" on page 52.

Date/Time Tab

The following topics discuss fields in the Date/Time window.

Fig. 3.27
Production Order Maintenance, Date/Time Window



Level. This field displays either the order or operation.

ID. The routing operation number from the production order routing detail record. If you create a new production order, the system determines the operation based on the routing. In addition to operation number, it can also refer to the production order number at the order level row.

Resource. The work center or production line identifier.

Release. The date this routing operation is scheduled for the item release. It can also refer to the production order release date when at the order level row.

Due. The date this routing operation is scheduled to complete work on this order. It can also refer to the production order release date when at the order level row.

The system validates that this date falls within the overall scheduling horizon defined by Historical Schedule Days and Future Schedule days in the site Configuration record.

Duration Days. The time, in days, between the release date and due date. Duration is calculated only at the order level and takes into account working and non-working days in its calculation. This is a decimal field that you can update.

Shift. This field depicts the shift defined for the resource. Shift schedules define how many days a week and how many hours the work center or production line is run. When you change the shift, it may change the production productivity percentage, which in turn may change the production order required capacity, and ultimately, change the projected duration days and hours.

Seq. This is the production sequence for the order. This fields tells the system in which order to process orders as part of the production schedule that you create in PSW. You can set the Sequence value here manually, set it within PSW manually, or use the drag-and-drop method in PSW to set it.

Due Time. Optionally enter the time of day that this order should be completed.

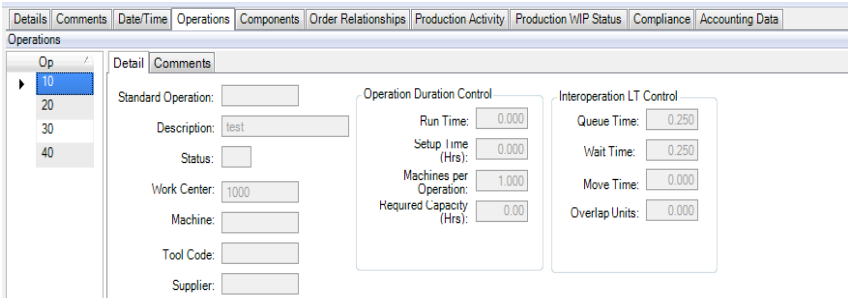
Enter the time in HH:MM:SS format based on a 24-hour clock. For example, enter 1:30 pm as 13:30:00.

This field is for reference. It appears on some reports and inquiries, and can be used to introduce a greater level of detail into the sequence of activities on a production line.

Operations Tab

The following topics discuss fields in the Operations window. Only those fields not previously described for other MSW windows are described. You cannot change values in the Operations fields.

Fig. 3.28
Production Order Maintenance, Operations Window



Op. The number identifying the operation in the routing or process.

Standard Operation. The valid standard operation code that identifies a process operation common to several products or applicable to different routings in different sequences.

Status. This field displays the production order status codes correspond to stages in the order's life cycle:

- Planned
- Firm planned
- Exploded
- Allocated
- Released
- Closed

The status of an order determines how much control you have over its bill, routing, inventory allocations, inventory transactions, and labor feedback. An order progresses from one status code to the next and, unless prematurely released, does not return to an earlier status.

Work Center/Machine. A valid work center identifier for an individual machine, group of similar machines, or subcontract supplier. Work center and machine code work together to identify a work center, which is a basic production unit used in manufacturing and control.

Tool Code. Optionally, enter the code for a tool normally used during this operation. This is for reference only. To standardize tool codes, set them up in Generalized Codes Maintenance (36.2.13) for field ro_tool.

Setup, Run, and Move Time. Enter the standard times, in decimal hours, to process items during this operation. Run time is per unit; setup and move time are independent of order size.

Machines per Operation. The number of machines per operation. As the number of machines increases, work center capacity and the number of hours a work center is available for work also increase. The number of machines per operation is also used for calculating the lead time and machine burden cost for an operation.

Required Capacity. Identifies the capacity required or the total required capacity required to fully produce this production order. For more information on required capacity, see "Capacity Panel" on page 39.

Queue Time. The standard time, in decimal hours, a production order normally spends waiting at this work center before it is set up and processed.

Wait Time. The standard time in decimal hours that a production order normally spends waiting at this work center after processing has completed.

Move Time. The time in hours to move items on the shop floor. The time between operations—interoperation time—is determined by queue, wait, and move times.

Overlap Units. The number of units that must be completed at this operation before work can begin at the next operation.

Components Tab

When you click the Components tab, you can view a summary list of components for the order, then view supply/demand summary, supply/demand detail, and inventory detail by site data.

Note The components you view only go one level down in the BOM, except for phantom items where the system displays components in the BOM until it finds a non-phantom component.

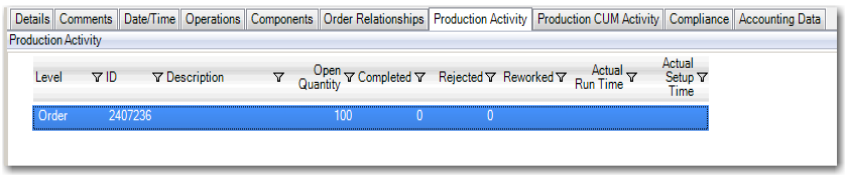
This information is useful when you use the Component Availability Check features; for more information, see "Component Availability Check (CAC)" on page 111.

Production Activity Tab

Use the Production Activity window to track production order activities. For an order, you can view the operation and description, open completed, rejected, and reworked quantity; the actual run time; and the actual setup time. The actual time shows the time required to manufacture a single unit. Run time for an operation is a function of total run time, work center or shop calendar hours, and the machines per operation. Run time is expressed in terms of an hourly production rate.

This time is differentiated expected run time. The actual time is the time required to set up a resource.

Fig. 3.29
Production Order Maintenance, Production Activity Window



Production WIP Status Tab

Use the Production WIP Status window to track the WIP status information of discrete orders, repetitive scheduled orders, and split scheduled orders. For an order, you can view the level, Cum ID, description, the quantity processed, rejected, or in the reject queue; the number scrapped, reworked, and the number in and out of the queue. You can also see the actual run time and the actual setup time.

After you change the order status and click Save, the Production WIP Status window displays the updated WIP information accordingly.

Fig. 3.30
Production Order Maintenance, Production WIP Status window

Details | Comments | Date/Time | Operations | Components | Order Relationships | Production Activity | Production WIP Status | Compliance | Accounting Data

Production WIP Status

Level	Cum ID	Description	Processed	Rejected	Reject Queue	Scrapped - Reject Queue	Scrapped	Reworked	In Queue	Out Queue	Actual Run Time	Actual Setup Time
Order	2767053											
Operation	10	TESTING	0	0	0	0	0	0	10700	0	0	0

Compliance Tab

Some features of production orders are affected when you use Regulatory Attributes. When you set the Compliance Active field to Yes in Regulatory Attributes Control (1.22.24), you can assign batch numbers, restrict items issued to an order, restrict items received, and enforce stricter lot/serial control rules. The Compliance window of the workbenches lets you view Regulatory Attributes data.

Note You should have Compliance installed and enabled. When you do not, you can still update the values on the Compliance Tab; however, your changes do not impact system processing. The system does store the updated values on the production order master table.

The following topics discuss fields in the Compliance window. Only those fields not previously described for other MSW windows are described.

Assay Percentage. The presence, absence, or quantity of one or more components, usually expressed as a percentage.

Grade. Identifies the quality or physical properties of an inventory quantity. Graded products include raw materials, intermediates, and finished goods.

Expire Date. The expiration date for items that eventually spoil, and for pharmaceuticals that lose potency over time.

Receipt Status. The default receipt status for the order.

Active. Indicates whether the inventory status code entered in Receipt Status should override status assigned in item, site, and location data.

Batch. A system-assigned number for tracking the quantity scheduled to be produced or in production.

Single Lot. Determines whether each receipt from a production order should be assigned to a single lot. This is a default setting you can change at receipt.

Lot Number. The lot number for this production order. Enter a lot number in this field.

Accounting Data Tab

The following topics discuss fields in the Accounting window. Only those fields not previously described for other MSW windows are described.

WIP Account. The general ledger account code used to track work in progress (WIP) inventory values for the order.

Material Usage Var. Material usage variance is calculated as the difference between the actual and expected quantities issued, extended by the cumulative order operation component cost. The expected issue quantity is the cumulative order operation standard quantity required per unit multiplied by the quantity processed at the operation.

Material Rate Var. When you issue components to a production order, material costs post to WIP as the quantity issued and multiplied by the GL cost of the material. Rate variance is calculated as the difference between the GL cost of materials used and the GL cost of materials required.

Subcontract Usage Var. Usage variance is an efficiency variance, calculated as the difference between the subcontracted quantity received and the standard subcontract quantity needed to make this order quantity complete.

Subcontract Rate Var. Rate variance is calculated as the difference between the order cost and the standard subcontract cost.

Mix Variance Acct. Mix variance is calculated as the difference between the standard or expected quantity and the actual quantity received, multiplied by the GL cost of the item.

Floor Stock Account. The GL account code used to track WIP stock adjustments for bulk issue items on this order.

Item Specific Information

The following topics discuss the types of items with which you can work in MSW and explains item data that is presented in MSW.

The system displays a Schedule Grid including each item that can be produced on the selected resource—sorted by item number, scheduled due date, or item status—including the current quantity on hand and any past-due quantity. Vertical scroll arrows let you display additional items.

Note Items without supply/demand are not included in the workbench.

Color coding in the item field reflects the highest-priority situation for a day within the firm scheduling period. For example, if the projected on-hand for the item is negative for one day in the period, while another day's quantity is just less than safety stock, the item number cell is shaded red to reflect the more critical issue versus yellow for the less critical issue of being below the item's safety stock level.

When you select an item in the Schedule Grid, the system provides you with supporting information related to the resource and item combination in the form of several types of item and production information, as well as messages related to status indicators and sources of demand.

Additional Workbenches Tabs

The following topics describe the type of data you can find in browses that are in these tabs:

- Item Master and Planning Tab
- Inventory Details Tab
- Calendar Exception Tab
- Sales Quantity By Month Tab

- Seasonal Build Tab
- Holidays Tab
- Intersite Demand Tab

Item Master and Planning Tab

This section explains fields in the Item Master tab. Only those fields not previously described for other MSW windows are described.

Fig. 3.31
Item Planning Window

Item Planning

Item Number	Site	MRP Required	Safety Stock	Minimum Order	Order Multiple	Yield Percent	Order Policy	Order Period	Time Fence	Safety Time	Manufacturi
sop05	bmb2	Yes	100	0	0	100.00%	POQ	7	0	0	

MRP Required. The current value of the system-maintained MRP Required field in the item master or item-site record. When this is Yes, the system has detected a change in such things as product structure, inventory, or transactional records that requires the item to be replanned.

Safety Stock. The safety stock quantity for the selected item defined in the item-site or item master records.

Minimum Order. The minimum quantity that can be placed on a single order for this item, as specified in the item-site or item master records.

Order Multiple. The order multiple specified for the item in the item-site or item master records. When Order Policy is POQ (period order quantity) or LFL (lot for lot), MRP rounds net requirements for the item up to the next multiple of this number.

Yield Percent. The yield percentage specified for the item in the item-site or item master records.

Order Policy. The order policy specified for the item in the item-site or item master records. This value determines the method MRP uses to plan orders for this item.

Order Period. The order period specified for the item in the item-site or item master records. This is the length of the planning period MRP uses when Order Policy is POQ (period order quantity).

Time Fence. The time fence specified for the item in the item-site or item master records. This is the number of days inside of which MRP does not replan this item.

Safety Time. The number of days of safety time specified for the item in the item-site or item master records. MRP adjusts actual need dates by this value as protection against late deliveries.

Manufacturing Lead Time. The manufacturing lead time defined in Item-Site Planning Maintenance (1.4.17) or Item Master Maintenance (1.4.1).

Cumulative Lead Time. The total cumulative lead time for the item from the item-site or item master records.

Buyer/Planner. The user ID of the buyer/planner specified for the item in the item-site or item master records.

Purchase/Manufacture. The code indicating how this item is typically processed by the system. This code controls how the system explodes forecasts, plans and creates orders, and calculates costs for the item. It affects MRP and DRP.

Phantom. This field indicates whether an item is normally stocked or simply put together as part of a higher level assembly. When Yes, the item and its product structure are phantoms, typically used for transient assemblies or intermediate products.

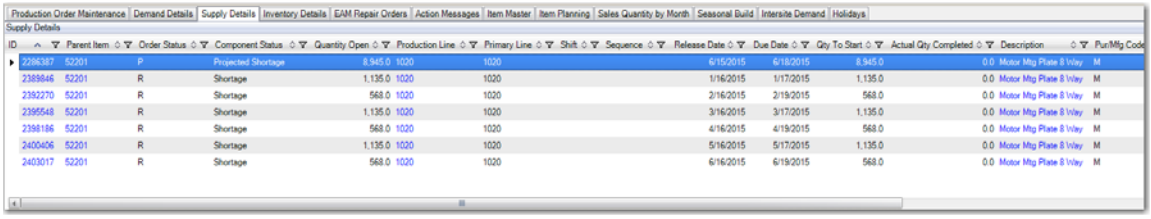
Order Quantity. The standard production quantity defined in the item-site or item master records.

Alternate. An alternate item should the original item become unavailable.

Supply Details Tab

Use the data in the Supply Details window to help you track supply information entered on production orders. This helps you control the tracking of materials through manufacturing. This section explains fields in the Supply Details tab.

Fig. 3.32
Supply Details Window


Production Order Maintenance | Demand Details | Supply Details | Inventory Details | EAM Repair Orders | Action Messages | Item Master | Item Planning | Sales Quantity by Month | Seasonal Build | Intersite Demand | Holidays

Supply Details

ID	Parent Item	Order Status	Component Status	Quantity Open	Production Line	Primary Line	Shift	Sequence	Release Date	Due Date	Qty To Start	Actual Qty Completed	Description	Pur/Mfg Code
2286387	52201	P	Projected Shortage	8,945.0	1020	1020			6/15/2015	6/18/2015	8,945.0	0.0	Motor Mtg Plate 8 Way	M
2389846	52201	R	Shortage	1,135.0	1020	1020			1/16/2015	1/17/2015	1,135.0	0.0	Motor Mtg Plate 8 Way	M
2392270	52201	R	Shortage	568.0	1020	1020			2/16/2015	2/19/2015	568.0	0.0	Motor Mtg Plate 8 Way	M
2395548	52201	R	Shortage	1,135.0	1020	1020			3/16/2015	3/17/2015	1,135.0	0.0	Motor Mtg Plate 8 Way	M
2398186	52201	R	Shortage	568.0	1020	1020			4/16/2015	4/19/2015	568.0	0.0	Motor Mtg Plate 8 Way	M
2400406	52201	R	Shortage	1,135.0	1020	1020			5/16/2015	5/17/2015	1,135.0	0.0	Motor Mtg Plate 8 Way	M
2403017	52201	R	Shortage	568.0	1020	1020			6/16/2015	6/19/2015	568.0	0.0	Motor Mtg Plate 8 Way	M

Note Only those fields not previously described for other MSW windows are described.

Parent Item. Displays an item with associated child items in a BOM structure, as defined in QAD product structure products.

Order Status. The current status of the production order. Production order status tracks the order through the manufacturing process:

P (Planned). Created only by MRP and deleted the next time MRP runs. Planned orders can be included in CRP calculations.

F (Firm Planned). Orders you enter, or planned orders you firm up. Once firm, MRP cannot change them. If MRP sees a need to change them, it generates action messages. If you change the quantity on a production order, the quantities of its components and the times for its routing operations are automatically adjusted. If you change a quantity or date on a co-product/by-product or base process production order, the quantities and corresponding dates are automatically adjusted on the other orders in the joint production order set.

E (Exploded). Fixes the bill and routing for this production order. Once exploded, changing the standard bill or routing does not affect the order. Any changes must be made in Production Order Bill Maintenance and Production Order Routing Maintenance.

A (Allocated). Generally allocates components in inventory against other work or sales orders. Detail allocations (specific lots or locations) can be made in Production Order Bill Maintenance and components can be issued. You can also receive against an allocated order.

R (Released). All available components are detail allocated and a picklist can be printed. If a key item is not available, the production order cannot be released. You can process material issues, receipts, and labor feedback against released production orders.

C (Closed). No more material can be issued or received against a closed production order. Labor can still be reported. When the status of a joint production order set is set to closed using Production Order Receipt or Production Order Receipt Backflush, current average, current last, and GL average costs are updated. Costs are also updated when running Production Order Accounting Close. When the status of an order is changed to C, all of the

Component Status. The component status of the order. For detailed information on the component status and what it entails, see "Displayed Calculation Results" on page 120.

Quantity Open. This field is display only and shows the scheduled order quantity that the system uses to calculate the duration of a production order. The system uses this quantity to calculate run time. For new production orders, the Quantity Open is 0 (zero).

Production Line. A valid production line as set up in Production Line Maintenance.

Primary Line. Displays the primary production line. You set up a primary production line in Production Line Allocation Maint (16.1.6). Use Production Line Allocation Maint to specify a percentage for one item on each production line. The line with the largest production percentage is the primary production line.

Release Date. The date this production order is scheduled to be released to production. The date you enter here changes to the actual release date when you release and print the production order. Release dates also determine the date components are required. Normally components are picked when an order is released.

The system calculates either release or due date, creating, in effect, forward or backward order scheduling.

Due Date. The due date defaults to today's date plus the manufacturing lead time for the item. The due date is the date this order is due to be completed. This is the date you plan to have product available for shipment to the customer or issue to another manufacturing order. All MRP plans are based on this due date.

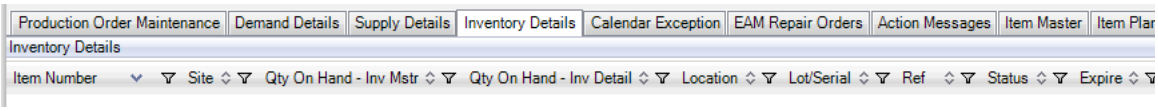
Qty To Start. The quantity to begin producing when an order is released. For new production orders, the Qty to Start is 0 (zero). When the order is maintained by entering the Quantity to Start, the system calculates the Quantity to Complete from the Quantity to Start and the Estimated Yield Percent. When an order is maintained by entering the Quantity to Complete, the system calculates the Quantity to Start. When both quantities are entered, then the system recalculates and updates the Estimated Yield Percent.

Actual Qty Completed. The total quantity of finished items received against this production order. This total is updated by the system as finished items are received into inventory. The amount remaining open on a production order is calculated as the quantity to complete less this quantity received.

Inventory Details Tab

Use the data in the Inventory Details window to help you track attribute information entered on production orders. This helps you control the tracking of materials through manufacturing and into inventory. This section explains fields in the Item Details tab. Only those fields not previously described for other MSW windows are described.

Fig. 3.33
Inventory Details Window



Quantity On Hand - Inv Mstr. The current on-hand inventory balance for the item from the inventory master table.

Quantity On Hand - Inv Detail. The current on-hand inventory balance for the item from the inventory detail table.

Expire Date. The expiration date associated with this specific inventory quantity. The system calculates this date when an item is received into inventory.

Calendar Exception Tab

Use the fields in the Calendar Exception tab to review or change calendar exceptions. You set up calendars for production lines using Production Line Calendar Maint (16.1.13.1). When you do, you specify a reference, such as downtime, and the number of hours per day affected. This information displays in the Calendar Exception tab within MSW.

Note You can also set up calendars for sites, suppliers, work centers, and customers in QAD ERP.

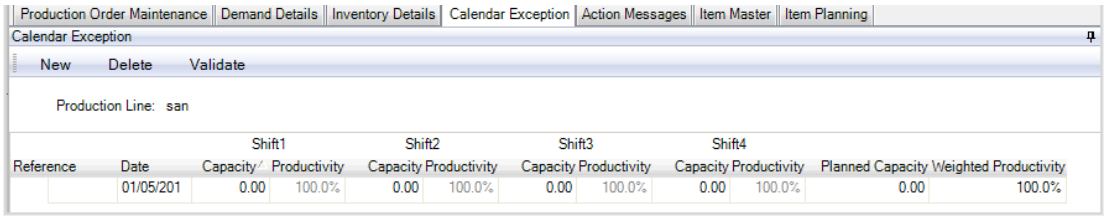
In the Calendar Maintenance tab within the workbenches, you can create a new calendar exception, save an exception, or validate an exception. When you click New, the system fills in zeros for each shift; see Figure 3.34.

Before you create a new calendar exception, the system verifies that the production lines you selected have a production line calendar. When a production line calendar does not exist, the system prevents the creation of a new calendar exception.

Once you create or update a calendar exception and click Validate, the system verifies that the data in Calendar Exception is correct; it also makes the data available for use in the workbenches.

Note Holidays overwrite all working hours when the system processes and calculates workbench data, including exceptional time for the holiday date. For more information, see “Holidays Tab” on page 92.

Fig. 3.34
Calendar Exception, New Exception

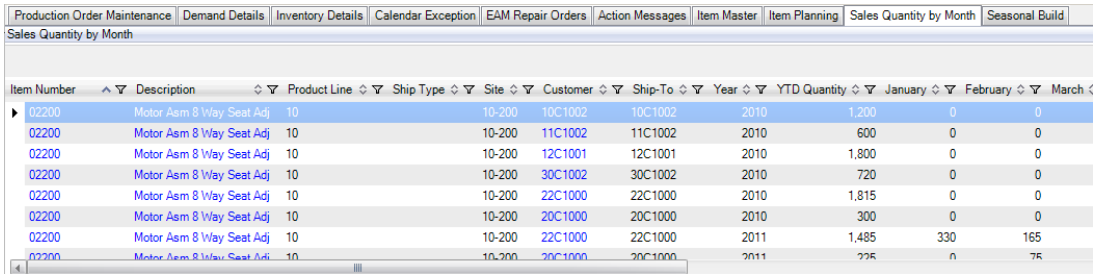


You define shifts in Production Line Calendar Maintenance (16.1.13.1) for the production line. For each production line, Calendar Exception displays the reference, date, the capacity (in decimals), and the percentage of productivity for each shift. It shows the planned capacity and weighted productivity for the production line, too.

Sales Quantity By Month Tab

Using the fields in the Sales Quantity By Month Tab you can track sales history data by viewing the items, product lines, ship type, site, customer, ship-to, year, and year-to-date quantity. The panel displays quantities in a month-by-month grid so that you can track invoiced sales orders.

Fig. 3.35
Sales Quantity By Month



Item Number	Description	Product Line	Ship Type	Site	Customer	Ship-To	Year	YTD Quantity	January	February	March
02200	Motor Asm 8 Way Seat Adj	10		10-200	10C1002	10C1002	2010	1,200	0	0	
02200	Motor Asm 8 Way Seat Adj	10		10-200	11C1002	11C1002	2010	600	0	0	
02200	Motor Asm 8 Way Seat Adj	10		10-200	12C1001	12C1001	2010	1,800	0	0	
02200	Motor Asm 8 Way Seat Adj	10		10-200	30C1002	30C1002	2010	720	0	0	
02200	Motor Asm 8 Way Seat Adj	10		10-200	22C1000	22C1000	2010	1,815	0	0	
02200	Motor Asm 8 Way Seat Adj	10		10-200	20C1000	20C1000	2010	300	0	0	
02200	Motor Asm 8 Way Seat Adj	10		10-200	22C1000	22C1000	2011	1,485	330	165	
02200	Motor Asm 8 Way Seat Adj	10		10-200	20C1000	20C1000	2011	225	0	75	

Item number/Description. The ID and description of the consignment item.

Product line. The product line for the consignment items. You use Product Line Maintenance (1.2.1) to tailor consignment accounts for items that belong to a particular product line. When you do not define specific product line accounts, the system uses the default GL accounts from Domain/Account Control (36.9.24).

Ship type. Enter the ship type for the consignment order. Shipping consigned inventory uses the same process as shipping non-consigned inventory.

Note The difference between shipping consigned and non-consigned inventory is in the booking of transaction history and accounting. You own consigned inventory until the customer notifies you that it is consumed.

Site. The site of the consignment order.

Customer. The customer ID for the consignment order.

Ship-to. The ship-to address for the customer. When orders are shipped, the system transfers inventory to the location representing the customer.

Year. The year for the consignment order.

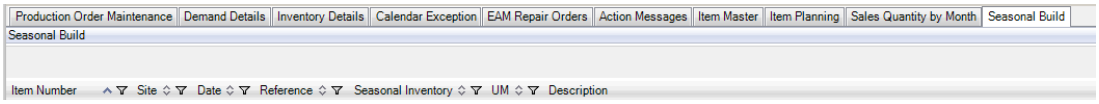
Year-to-Date Quantity. The accumulated consignment item quantities for the year to the current date.

Seasonal Build Tab

Use the fields in the Seasonal Build tab to review sales quantities for items that fluctuate according to some seasonal factor, such as weather or the way a firm handles its operations. For products with seasonal demand cycles, you may need to build up inventory in advance of periods of peak demand. You can do this by viewing the orders and items by site. The date is the end date by which you need items in inventory, while the seasonal inventory is the quantity needed by that end date.

Note The system regards seasonal build quantities as real demand.

Fig. 3.36
Seasonal Build



Item Number. The item number of the seasonal-demand order.

Site. The site the seasonal build applies to.

Date. The end date by which you need items in inventory and a seasonal inventory quantity needed by that end date.

Reference. Any additional information about the seasonal order.

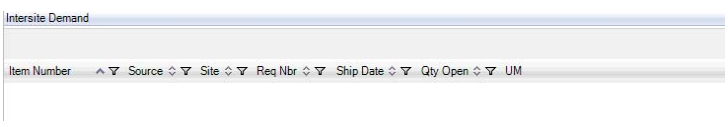
Seasonal Inventory. The quantity needed by the date. Setting the seasonal inventory quantity to 0 (zero) for December 1st indicates that the seasonal build requirement is complete. This means that the item is now included in ATP calculations and is considered a source of supply by MRP.

UM. The unit of measure for the item.

Intersite Demand Tab

Use the fields in the Intersite Demand tab to view demand information from distribution requirements planning (DRP) intersite requests. DRP balances supply and demand for items transferred between sites. The transfer of demand from the site receiving the items (receiving or demand site) to the site supplying the items (shipping or supply site) is facilitated through the generation of intersite requests. DRP calculates distribution item requirements, generates intersite requests, and manages shipment schedules and transportation. Use the workbenches tab to review information to schedule items for the intersite demand.

Fig. 3.37
Intersite Demand Tab



Item Number. The item number of the seasonal-demand order.

Source. The site that supplies the item when demand exists at the receiving site.

Site. The site the seasonal build applies to.

Req Nbr. The intersite request number.

Ship Date. The system uses ship dates set up in Shipping Schedule Maintenance, in coordination with receiving days and load, transit, and unload lead times defined in Transportation Network Maintenance, to calculate default ship dates for intersite requests. When a shipping schedule is not defined, the ship days from the transportation network are used instead.

Qty Open. The open quantity on the intersite request.

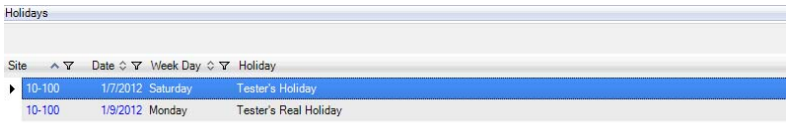
UM. The unit of measure for the item of the DRP intersite request.

Holidays Tab

Use the fields in the Holiday tab to view data for holidays and other non-work days that apply to an entire site. This helps you schedule effectively.

Holidays are days that no one works; the plant is shut down and no production is scheduled. Manufacturing orders are never due and operations are not scheduled on a holiday.

Fig. 3.38
Holidays Tab



Site. The site to which the holiday applies.

When a date is a site holiday, it overwrites all working hours, including exceptional time. When a site holiday does not exist, the system uses the domain holiday to overwrite all working hours including exceptional time.

When a date is either a site or domain holiday, the planned capacity of that day is 0 (zero), regardless of the working hours or exceptional hours recorded or set for that day.

Date. The date of the holiday.

Weekday. The day of the week of the holiday.

Holiday. The name of the holiday.

Saving Your Changes

To save the modified and new production orders to QAD ERP, click Save.

You can make changes across items or sites in the workbench without saving first. You should save, though, before you run a new search when you want to save existing changes to the database before retrieving data from the new search.

Chapter 4

Production Scheduling Workbench (PSW)

The following topics describe how to use the features of Production Scheduling Workbench (PSW).

Introduction 94
Introduces the PSW, components, and features.

Accessing PSW 97
Provides procedures to access the PSW in the .NET UI.

Setup 97
Tells you how to set up production lines, then mass update the setup.

PSW User Preferences 97
Describes user preferences for PSW, including field descriptions for all user preferences

Processing PSW Schedules 100
Provides a general procedure to create and process a production schedule and describes processing results.

Working with Sequence Grid Data 101
Describes various ways to manipulate dates, data, and other items within the PSW Sequence Grid.

Dispatching and Printing 109
Provides instructions to dispatch and print PSW-built schedules.

Introduction

Use the Production Scheduling Workbench (PSW) to prioritize or sequence production orders within a day and, optionally, a shift. You can use the PSW to view and update production line schedules.

Note Operation-based scheduling and work center production scheduling are not available in the PSW in the current release.

Features

Using PSW, you can build production schedules with full knowledge and visibility of resources, production orders, items, the shop floor, and more. Besides just scheduling items, you can:

- Determine production order status and whether they are sequenced or nonsequenced.
- Determine production progress by displaying shop floor activity
- Define the sequence horizon and configure the display.
- Modify orders and order quantities.
- Create, delete, copy, and split production orders.
- Modify production order status or duration.
- Calculate order dates.
- Define defaults, shifts, and sequences.
- Sequence/unsequence production orders.
- Dispatch production to the shop floor by printing dispatch lists, picklists, production orders.

Drag and Drop

You can easily modify aspects of a production order by dragging and dropping production orders within the PSW Sequence Grid and from Production Order Maintenance to the Sequence Grid. When you drop an order onto another order, the order you drop acquires the properties of the receiving order, so, for example, if you drag and drop an unsequenced order onto a sequenced order, it becomes a sequenced order. Use the drag-and-drop method to:

- Change due dates by dragging and dropping a production order from one release date to another production order with a different release date.
- Change status by dragging and dropping a selected order. When you do, PSW updates the production order status to F if the status is P.
- Modify resource capacity by dragging and dropping from the source to the target destination after you select a single or multiple production orders.
- Sequence production orders in PSW by dragging and dropping single or multiple orders after a sequenced production order. Once you drop the orders, the system assigns the sequence number to the order(s) as greater than the prior sequenced numbers and assigns the appropriate shift number if shifts are being used.
- Unsequence an order by dragging a sequenced order and dropping it after an unsequenced order. The system changes the sequence to 0. When you do not have unsequenced orders, you can unsequence by changing the sequence number to zero.

Quick Find

You can use the Quick Find feature in the toolbar to quickly locate orders. You can enter text or numbers in the Quick Find feature, then scroll through records. You can use the Quick Find feature in the PSW, too; however, since the PSW has a shorter window and does not show planned orders or orders with a zero (0) open quantity, this restricts data that displays in the PSW, resulting in limited displayed orders. When you use the Quick Find feature, the order may or may not be visible in the PSW. You should switch to the MSW and find the order using the next/previous buttons.

For more information, see “Workbench Elements” on page 39.

Sequence Grid Actions Reflected in Production Order Maintenance

For *loaded resources*, when you invoke certain actions in the PSW Sequence Grid, the workbenches-embedded Production Order Maintenance panel updates the order display to reflect the actions you take. The following table depicts the Sequence Grid action and the resulting Production Order Maintenance panel display changes.

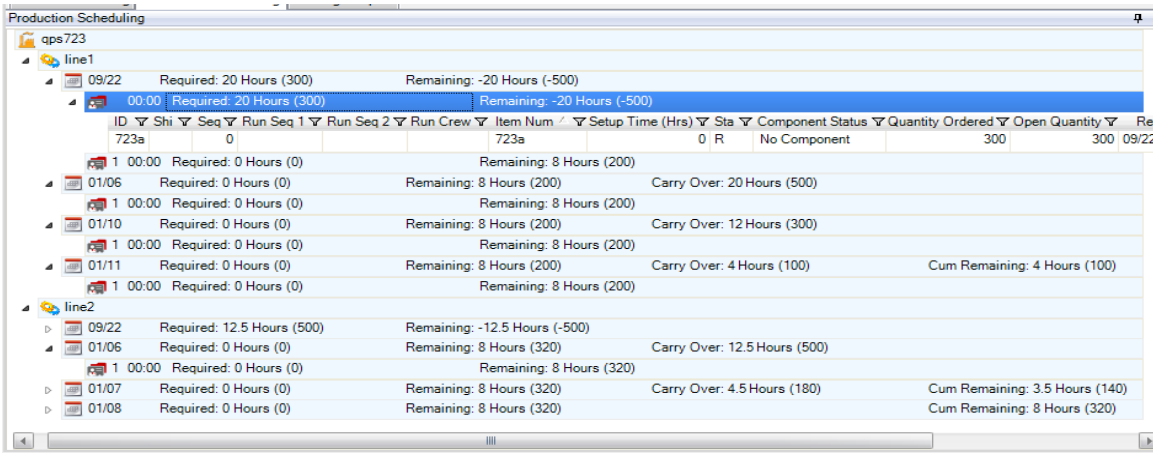
Fig. 4.1
Actions and Resulting Display Changes

PSW Action	Production Order Maintenance Display Change
Click on a site row	Displays all order data for the site
Click on a resource row	Displays all order data for the site/resource
Click on a release date row	Displays all order data for the resources for the site/resource/release date
Click on shift row	Displays all order data for the site/resource/release date/shift

PSW Workbench Elements

Figure 4.2 displays the PSW workbench. The text following the figure describes how each panel is used.

Fig. 4.2
PSW



Sequence Grid

The Sequence Grid lets you concurrently view a list of both sequenced and non-sequenced production orders. In the Sequence Grid, you can view sequenced and non-sequenced orders that you move from Production Order browse. Production Order Browse lets you view all sequenced and unsequenced orders across the board.

The Sequence Grid displays item supply records—that is, production orders—with daily bucketed quantities of the production order supply records for the item. The quantities shown within the Sequence Grid are production order quantities.

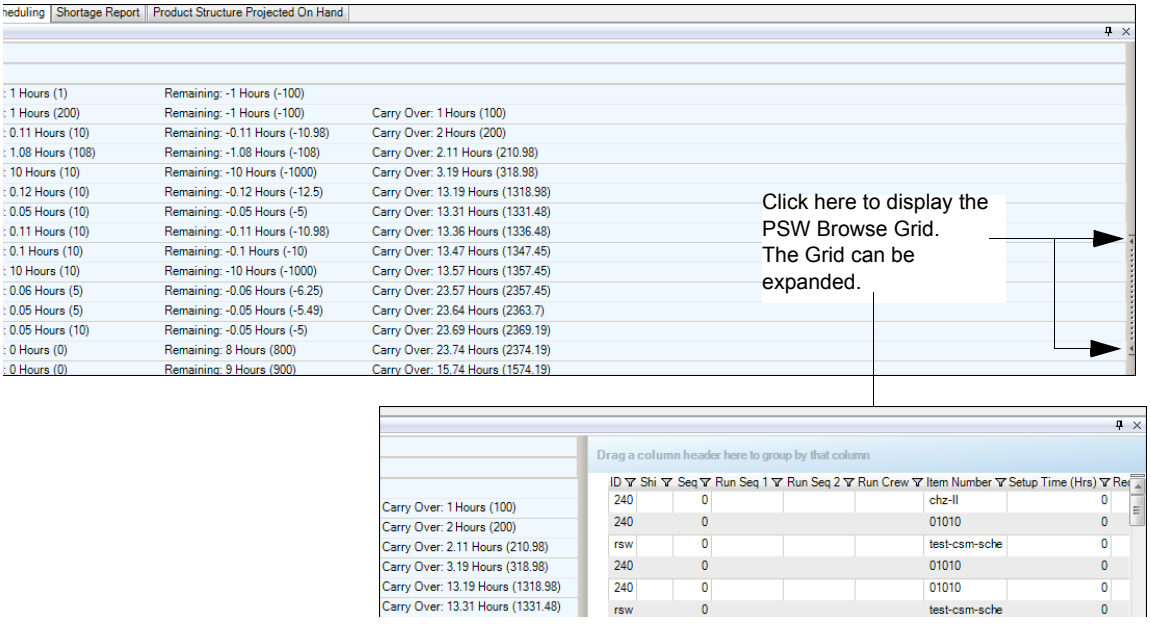
PSW shows capacity in hours and units. The unit reflection is for required capacity; that is, that x units are needed per the schedule. There is also a unit reflection for remaining capacity; that is, you can produce x more units based on the current schedule entered for the release date. In the PSW, the unit that displays is based on an average. There are two types of values for hours that display: one pertains to remaining capacity, while the other pertains to required capacity.

You can add columns to the PSW Sequence Grid as well as add or modify column header labels, using QAD standard label maintenance programs.

PSW Browse Grid

You can display an additional PSW Browse Grid while in the PSW. To do this, click on the arrows in the splitter bar. You can view additional information and drag and drop from the PSW Browse Grid to the Sequence Grid.

Fig. 4.3
Display PSW Browse Grid



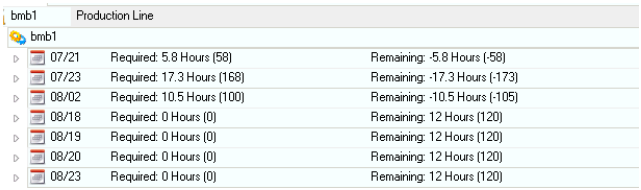
Supporting Data/Information Tabs

Similar to the MSW, additional data/information for production orders and items is provided in various supporting tabs that display at the bottom of the PSW. For information on updating data or field descriptions in these windows, refer to “Common Features” on page 11.

Sequence Horizon

The sequence horizon determines the number of sequencing daily buckets that show in the PSW. If the horizon is three days, for example, then you see today plus two more days in the PSW. Past due orders always display in the Sequence Grid even if they are not within the current sequencing horizon. For information on setting the sequence horizon, see “Defining PSW Sequencing Horizon” on page 98.

Fig. 4.4
Sequence Horizon



Accessing PSW

You access the PSW through QAD .NET UI. You can enter either of the following in the .NET UI Applications field to access the PSW:

- Master Scheduling Workbench, or part of this name
- Production Scheduling Workbench, or part of this name

Setup

You should perform the following setup steps before you begin scheduling in the workbenches:

- “Setting Up Production Lines” on page 44
- “Setting Up Workbenches Controls” on page 45

PSW User Preferences

The following topics discuss the following setup parameters for PSW:

- Defining PSW Sequencing Horizon
- Configuring Schedule
- Defining Defaults

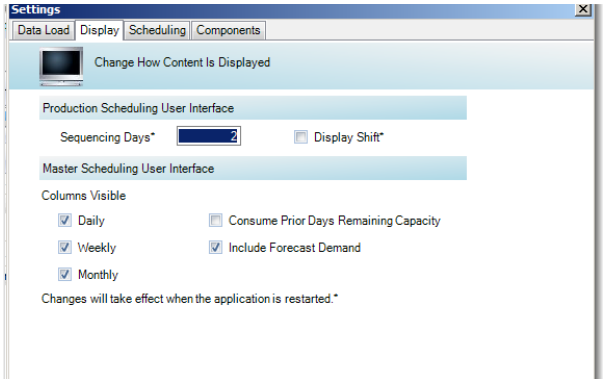
Defining PSW Sequencing Horizon

The PSW horizon setting is based on calendar days, not the shop calendar. Regardless of their status, past due production orders on the production schedule that have not been completed by the current date always display. Past due production orders do not have to be in status Released to show on the PSW.

For manageability, the PSW should contain a small data set so that you can easily view and manage production lines, release date buckets, and release date details. So, for example, if you set the horizon for one day, you can see all production lines and easily schedule from one to ten lines in a single view. You can also see the production schedule across several production lines.

You define the sequence horizon dynamically through the Options drop-down menu. You select Option, then Preferences, then the Display tab to set the sequence horizon.

Fig. 4.5
User Preferences, Display Tab



Sequencing Days. Enter the number of days for the sequence horizon. When working on a production schedule, the typical horizon is 24 hours to 5 days.

During production sequencing—that is, prioritization of production orders within the sequence horizon—you can view supply and demand, and any potential issues for sequence schedules, then drill down to determine the problem and possible resolutions.

Display Shift. Set this field to Yes to display shifts in the Sequence Grid. Shift buckets display:

- When orders exist for the item/shift/release date
- When capacity exists for a shift.

Note The shift still displays when its remaining capacity is zero or less than zero, because production orders have been scheduled against that shift and therefore, still display in the PSW. Shifts do not display when no production orders have been scheduled against the shift and the planned capacity for the shift is zero, which indicates that the shift is not in use.

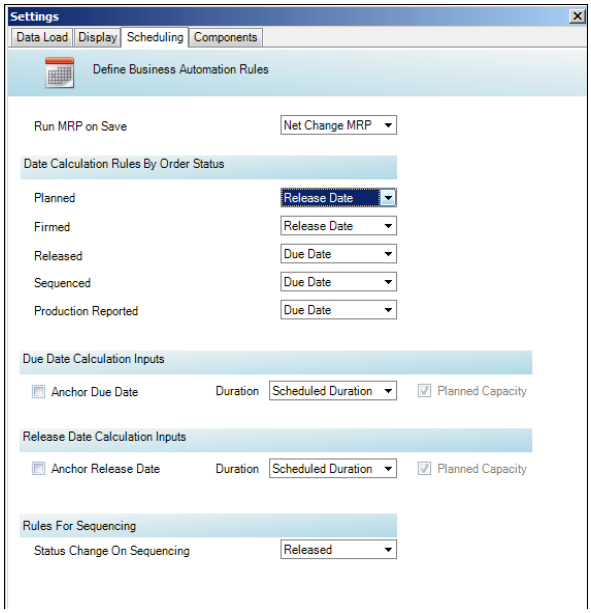
- For standard capacity
- For exception capacity

You set the shift start time in Production Line Calendar Maintenance (16.1.13.1).

Configuring Schedule

Use the fields in the Scheduling tab of the Settings window to set options for PSW.

Fig. 4.6
Settings, Scheduling Tab



Anchor Due Date/Anchor Release Date. Refer to the MSW chapter for descriptions of these fields; see Anchor Due Date“Anchor Due Date” on page 53.

Status Change on Sequencing. Indicate the status to which you want to change the order status when sequencing orders. Select from Firm, Exploded, Allocated, Released, and Closed statuses.

PSW Forward Consumption

You use the MSW to create a master schedule for the medium-to-long term range—week, month, or longer—balancing demand, supply, and capacity, typically at the departmental level. You use the PSW for the short-term range—one day to few days—sequencing and prioritizing production orders at the production line level. As such, it is critical at the production scheduling level to forward consume capacity when production orders run longer than a day and therefore, require the consumption of future capacity.

With the PSW forward capacity logic, you can see two columns within the PSW Sequence Grid:

- Carry Over: The sum of load remaining from previous days.
- Cum Remaining: Any excess capacity for that day.

Schedulers can take advantage of the data that displays in these columns. Cum Remaining, which only shows when it is positive, is an opportunity to add load to a shift or release date, while Carry Over is indicative of overloading. So, for jobs that run for more than a day, the apparent overloading is managed by balancing over those days.

Example Available capacity for today’s release date is 8 hours. The same amount of capacity of 8 hours is available for tomorrow’s release date. You place Production Order A under today’s release date and the order requires 12 hours to run. The PSW release date for today shows 0 (zero) remaining capacity and four hours of remaining capacity for tomorrow’s release date. When you have 12 hours of load on a day that has 8 hours of total capacity, then, you have–4 hours that show

in the Cum Remaining for that day. Those–4 hours plus a carry over—that is, the excess load from the preceding day—display for tomorrow's carry over. When only 4 hours remain on tomorrow, the scheduler realizes than another job that takes only 7 hours and would normally complete, cannot be done tomorrow since there are 4 hours remaining after doing the carry over load. The other balance of 3 hours spills into the day after tomorrow. Figure 1 shows the two new columns in the PSW Sequence Grid.

Fig. 1
PSW Forward Capacity-Related Columns

Defining Defaults

You can define defaults for:

- Shift scheduling behavior
- Sequencing behavior

For shifts, you can enter a blank shift to indicate that production orders do not have a shift.

You can remove the display of shifts through the Options in the drop-down menu.

Processing PSW Schedules

The following topics describe a generic procedure to produce a production schedule. Specific tasks follow this section.

Procedure

You use the Resource Navigator to load data within PSW; there are many different functions that you can perform using the data for a production schedule. The following provides instructions that tell you how you can leverage the PSW for scheduling purposes using key information in the PSW:

1. Load data for resources through the Resource Navigator; see "Loading Resource Data" on page 31.

   The system displays resources and items related to the resources you selected. The system retrieves all transactional, demand, and supply records for items with dates that also match the History and Future Horizon values that you set in Options.

   Note You can set data load preferences to view items that do not have supply, demand, production orders, or inventory activity within MSW; see "Loading Resource Data" on page 31.

2 If you have a view, you can optionally apply your View.

3 Click on the resource in the Resource Panel.

Determine which production orders should be released and sequenced over the next few hours or days.

The production orders may not be assigned to the resource in view; they may be assigned to a default resource. Uses Production Order Browse to find items and production orders that you can move to the selected resource.

4 Schedule items.

Focus on finalizing the details of the production schedule for your sequencing horizon. In addition to changing resources, dates, or status, you can:

- Sequence production orders.
- Schedule using shifts.
- Drag and drop scheduled production orders.
- Retrieve the production order in Production Order Maintenance, then:
  - Modify order setup.
  - Align order dates.
  - Create a new production order.
  - Delete, copy, or split orders.

5 Monitor a production order by displaying:

- Order supply summary in the Production Order Maintenance summary list
- Order details or attributes
- Production rates
- Comments
- Order dates, times, shop floor activities
- Routing data
- Inventory details

6 Save your changes.

7 Optionally, export data to a spreadsheet.

8 Report production.

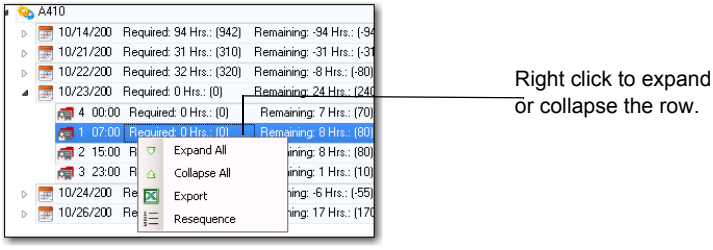
Working with Sequence Grid Data

The following topics explain the data within the Sequence Grid and describes ways that you can interact with the data.

Expanding/Collapsing Data

You can expand or collapse data within the Sequence Grid. To do this, click on the release date header row.

Fig. 4.7
Expand Options



Viewing Capacity

You can view the required capacity and remaining capacity of a production line by release date.

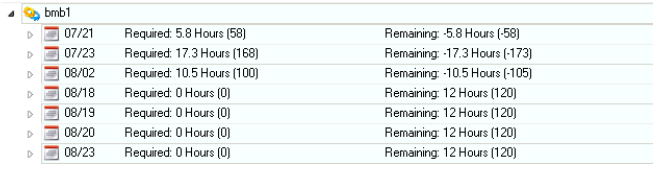
Example For release date 1/1/2011, there are two shifts: 1 and 2. The orders currently placed under the release date consume two hours under shift 1 and three hours under shift 2. The capacity row for the release date is a summation of what is scheduled under the various shifts for the release date in question.

Unlike the MSW, the PSW does not display a Capacity Grid; instead, you view required and remaining capacity at the production line level. This is because you use the Sequencing Grid to manage production orders by release date, not due date. In some cases, the order release/due date are the same, and in other cases, they differ.

When you select a resource from the Resource Navigator, the Sequence Grid displays the production line and a list of release dates, based on the setting of your sequence horizon. For each release date header record, the system displays required and remaining capacity information.

When you expand release date details, the Sequence Grid displays the capacity/required capacity of each shift header record.

Fig. 4.8
Sequence Grid



The following topics explain fields within the PSW.

ID. The valid system production order identifier.

Shift. The production line shift as defined in Production Line Calendar Maintenance.

Seq. The production order sequence number.

Run Seq 1, 2. You use run sequence fields as a reference to control the sequence in which firmed orders are sequenced on a production line schedule. When multiple items are produced on a single production line, efficiency can be improved by producing the items in a certain order. Run sequence fields display the attributes of an item; for example, you can have a run sequence of small, medium, or large or white, red, black assigned to your various items.

As you define the sequence for production lines in Production Line Maintenance based on the order release date, the PSW displays Run Seq 1 and 2 first for a production line; then, the system goes to the item-site level; and finally, the system goes to the item level.

Item Number/Description. The valid item number and description.

Status. The production order status code. Production order status codes correspond to stages in a production order's life cycle:

- Planned
- Firm planned
- Exploded
- Allocated
- Released
- Closed

The status of a production order determines how much control you have over its bill, routing, inventory allocations, inventory transactions, and labor.

Quantity Ordered. The planned quantity of the production order. Compare this with the closed quantity, which is the good quantity reported for the order.

Release Date. The date this production order is scheduled to be released to production. The date you enter here initially changes to the actual release date when you release and print the production order. Release dates also determine the date components are required. Normally components are picked when an order is released.

When you move an order in the PSW from one release date to another, the system changes the release date on the order. The change in release date is reflected immediately on the PSW. The order does not have to be in any specific status for this to happen. Only non-planned orders show on the PSW.

The system calculates either release or due date, creating, in effect, forward or backward order scheduling.

Due Date. The due date is the date this order is due to be completed. This is the date you plan to have product available for shipment to the customer or issue to another manufacturing order. All MRP plans are based on this due date.

Resource. The production line as listed in the Resource Panel.

Site. The site to which the resource belongs.

Modifying Production Order Quantities

You can manually adjust the production order quantity in PSW. When you change the quantity of a production order, PSW applies the quantity change to the entire order, not a specific operation.

1. Select a production order on the Sequence Grid.

   The system highlights the selected production order.

2. Modify the value in the Quantity Ordered column by double-clicking in the cell.

   PSW updates all calculations. Color indicators may change in the MSW.

Note You can also change the quantity using Production Order Maintenance within PSW.

Creating/Deleting Production Orders

Procedures to create and delete production orders are in Chapter 3, “Master Scheduling Workbench (MSW),” on page 37.

Dividing Production Orders in the PSW

The PSW lets you divide a production order into smaller production orders while tracking costs to a cumulative order.

Dividing Versus Production Order Splitting

Dividing a production order within the workbenches is different from the Production Order function to split an order. Dividing results in two orders that the system processes separately, from reporting and accounting perspectives. Splitting an order creates different orders for scheduling and execution; however, the reporting and accounting are collected on one order, called the split CUM order.

Procedure to Divide an Order

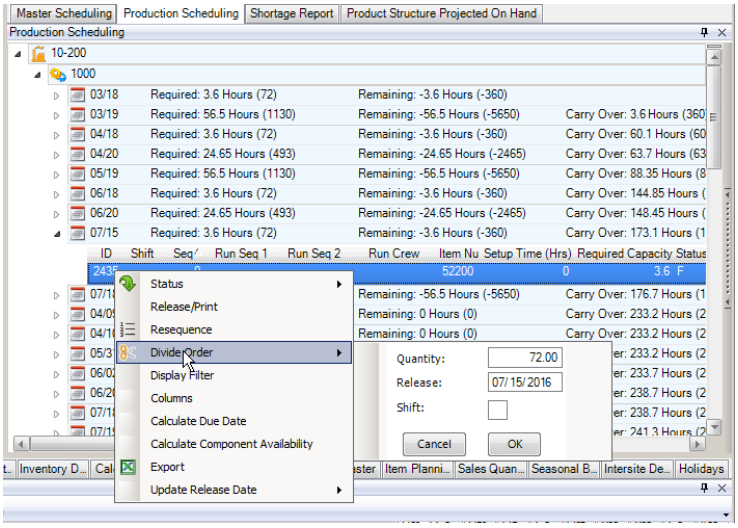
To divide a new discrete production order into several production orders:

1. Select the production order to divide in the Sequence Grid.
2. Right-click to display the drop-down menu.
3. Select Divide Order.

   A window displays additional options; see Figure 4.9.
4. Enter the quantity to divide the order; the release date; and if necessary, the shift.
5. Press OK.

   The system creates a new production order per the data entered in the Divide Order pop-up window and reduces the open quantity.

Fig. 4.9
Dividing Orders



Scheduling a Production Order by Dragging and Dropping

For a selected production order, you can drag and drop from Production Order Browse to the Sequence Grid.

1 Select the production order in Production Order Browse.

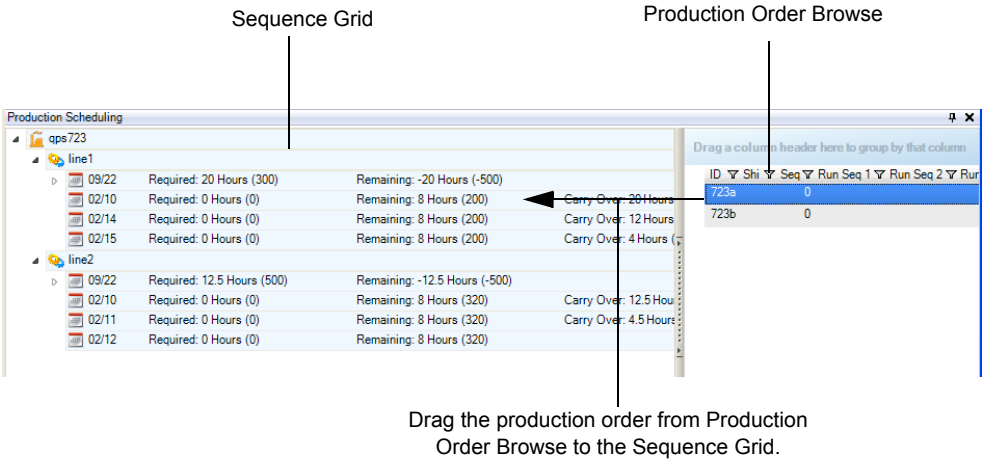
2 Drag the order to the PSW Sequence Grid.

A drop indicator displays, indicating the location at which you can drop the production order.

Note The indicator does not display if the production line target is not defined as a primary or alternate production line.

PSW updates and recalculates data.

Fig. 4.10
Drag and Drop from Production Order Browse



Modifying Production Order Status

You can modify the status of one or many production orders easily within the PSW Sequence Grid.

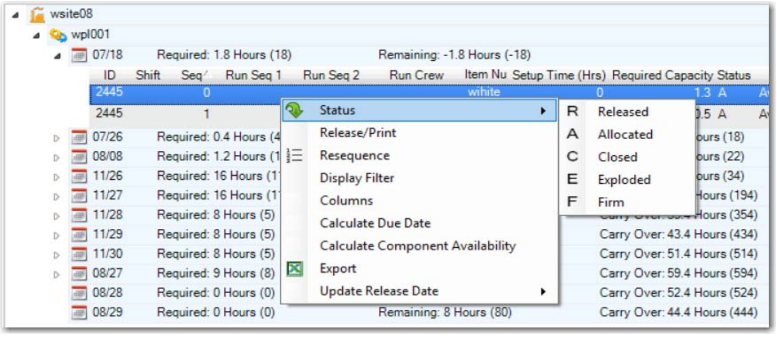
To do this, use the following procedure:

1. Drill down in the Sequence Grid to view orders.
2. Right click, then select Status.

   Note You can hold down the right mouse button to select more than one production order to mass change the status.

3. Select the status for the change:
   - A(llocated)
   - C(losed)
   - E(xploded)
   - F(irm)
   - R(eleased)

Fig. 4.11
Status Change



Modifying Production Order Duration

Occasionally, you may need to manually increase or decrease the production order duration. For example, you may want to expedite a production order and thereby collapse the average duration of the order. Or you may need to expand the duration, starting earlier to complete by the due date.

Production order duration is initially derived from the item manufacturing lead-time or calculated per the required capacity of the production order, factoring resource capacity. Other consideration may influence the amount of time to produce an item, considering:

- Average capacity
- Order quantity
- Operation lead time
- Process time

Production Order Duration can be greater, less than, or equal to the calculated routing duration. To modify the production order duration, use one of the following options:

- Manually update the Duration field in the Date/Time sub-tab in Production Order Maintenance.
- Modify the production order release date only when the due date is anchored; modifying the release dates increases or decreases the duration value.
- Set the Order Duration Calc Method in the Scheduling tab of Preferences, under Option in the top tool bar. This sets the method to calculate the order duration when the order is firmed, created, and modified.

Note You can set the Order Duration Calc Method in the Scheduling tab of Preferences, under Options in the top tool bar. This sets the method to calculate the order duration when the order is firmed, created, and modified (future). When you select a different calculation method from user preferences, the Order Duration Calc Method takes precedence over the standard duration calculation; see "Selecting the Method for Date Calculations" on page 52.

Defining Shifts/Sequences

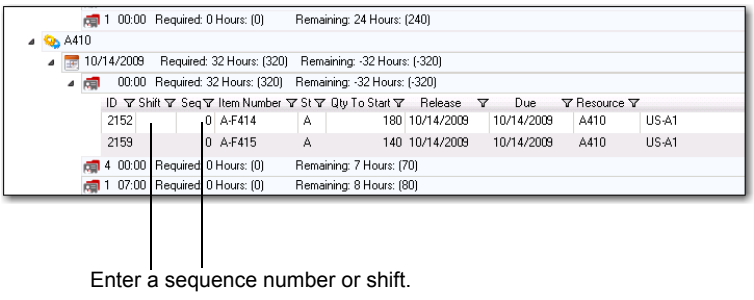
Sequencing determines the order in which manufacturing processes production orders. Within QAD ERP, sequenced orders have a unique sequence number that identifies the order as sequenced. Sequencing of production orders is by release date and optionally, shift when shifts are used. Sequence IDs are unique to each shift. Within PSW, the order in which shifts display is based on the shift start time defined in Production Line Calendar Maintenance (16.1.13.1).

Production scheduling determines the order start (release) date and sequence, and sequencing is by release date in the PSW. The system considers the release date and sequence of the production order to determine which is consumed first.

Note When working with Component Availability Check (CAC), the system prioritizes by order status, release date, then sequence for component consumption. When you have multiple shifts per day and the sequence number repeats within that day, CAC cannot determine the shift. For more information on CAC, refer to Chapter 5, "Component Availability Check (CAC)," on page 111.

To change an order from unsequenced to sequenced or to change an existing sequence number, select a single production order and enter a sequence ID in the Seq field. You modify the shift by entering a shift number in the Shift field.

Fig. 4.12.
Sequence and Shift Field



Once you update the sequence, the Sequence Grid displays the new position of the production order in the specified sequence. If the sequence number you enter is assigned to an existing order, PSW resequences the existing sequenced order number by increasing the number as well as all subsequent orders for the release date.

Dragging and Dropping for Sequence/Shift Changes

You can also select one or more production orders to sequence and drag and drop from Production Order Browse to the Sequence Grid or within the Sequence Grid. Once you drop the orders, the system assigns the sequence number to the orders and assigns as greater than the prior sequenced numbers. The system also assigns shift numbers.

If you change production order release dates, PSW sets the sequence and shift to 0 (zero). You cannot drop an order onto a production line that does not have a release date.

Unsequencing Production Orders

Occasionally, you may need to unsequence a production order, removing the sequence ID and replacing with an unsequenced status, that is, the sequence ID is 0 (zero).

You can do this by:

- Entering a 0 (zero) in the Seq field of the Sequence Grid
- Entering a 0 (zero) in the Seq field within the production order in Production Order Maintenance within PSW.
- Dragging a sequenced order and dropping it after an unsequenced order. The system changes the sequence to 0.

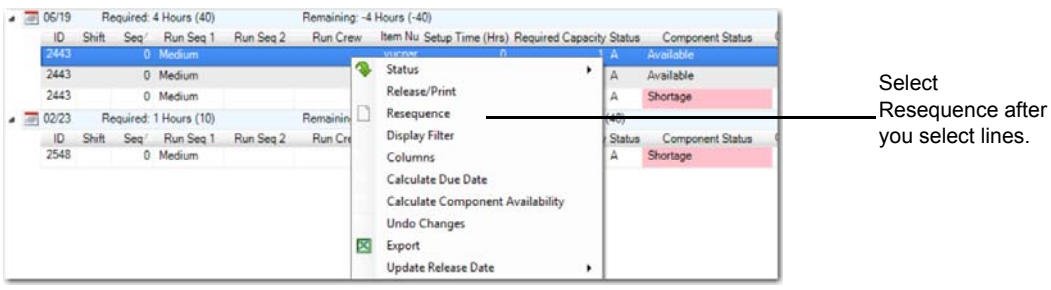
  Note Dragging/dropping after an unsequenced order only works when the order you are dragging is the only sequenced order or you drop that order between two unsequenced orders.

Resequencing Production Orders

Resequencing should happen automatically whenever release date, shift, or production line change on an order; however, occasionally, resequencing does not occur automatically. When this occurs, use the resequencing option in the right-click menu. You can quickly resequence selected orders by right-clicking on a line, then selecting the Resequence option.

When you delete a production order, the system resequences the orders.

Fig. 4.13Y
Resequence Option

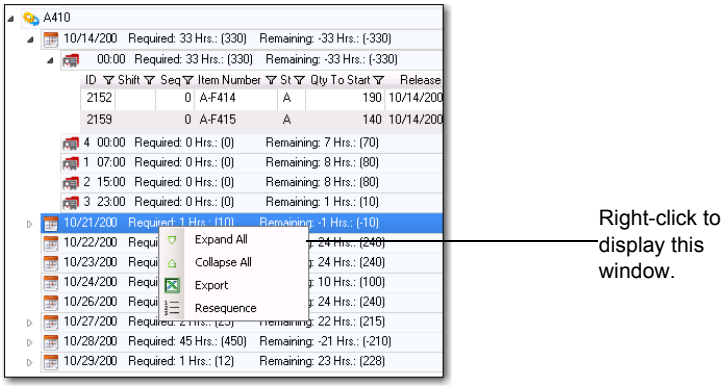


Dispatching and Printing

You can publish production schedule data to the shop floor using a dispatch list. To do this, you export PSW data to a Microsoft Office Excel spreadsheet.

While in the Sequence Grid, right-click on the release date row. A window displays options to expand, collapse, export, and resequence. Select Export. When you do, the system opens Excel and creates a temporary spreadsheet file. You should rename the file from Microsoft Office Excel.

Fig. 4.14
Export Window



Collections to Use When Dispatching and Printing

You can use the following browse collections to help you release production to the shop floor:

- Release Production Orders by Production Line
- Release Production Orders by Work Center

You also use the Print Orders Selected for Print function when dispatching to the shop floor.

Releasing Production Orders by Production Line

Production schedulers can use Release Production Orders by Production Line to quickly determine if the production schedule is viable for the day, week, month, or any specified time period. Release Production Orders by Production Line provides quick answers for production schedulers when they need to know the following:

- Before releasing a production order to the floor, are all components available?
- For production orders scheduled over the next one+ days, are there component shortages?

Releasing Production Orders by Work Center

Production schedulers can use Release Production Orders by Work Center to quickly determine component availability of discrete production orders for a particular work center. Checking components by work center lets production schedulers know if the production schedule is viable for the week. Release Production Orders by Work Center provides quick answers for production schedulers when they need to know the following:

- Before releasing a production order to the floor, are all components available?
- For production orders scheduled over the next one+ days, are there component shortages?

Selecting Orders to Release and Print

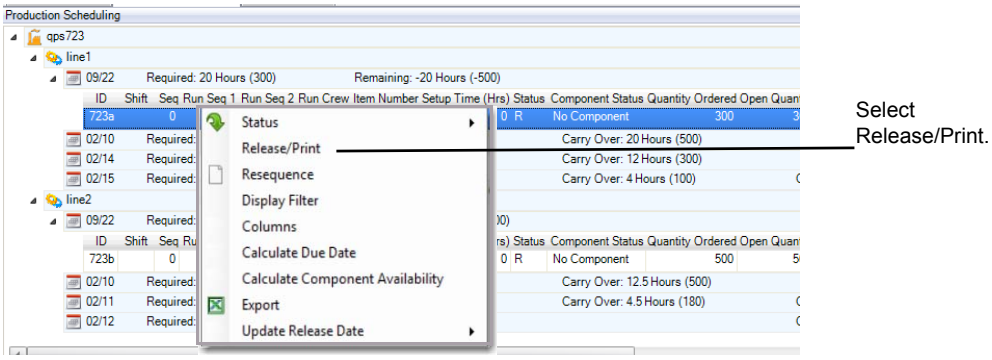
You can use the PSW Sequence Grid, the PSW Browse Grid, or workbenches-embedded Production Order Maintenance Grid to select orders to release and print. You then use Production Order Release/Print (16.4.2) to print the orders.

1. In the PSW Sequence Grid, select the production orders to print.
2. Right-click, then select Release/Print.

   The system changes the order status to R(elease) and release/print is selected on the production order.
3. Save your changes.
4. In the .NET Menu Search Panel, type `Production Order Release/Print`; then, open the program.
5. In Production Order Release/Print, select the production line that has the orders you want to print, then set the output to page.

   The system prints the orders, picklist, routing, and so on. Use the MSW Selected to Print search condition to select orders per their release/print field value.

Fig. 4.15Y
Print Function



Chapter 5

Component Availability Check (CAC)

This chapter presents an overview of the features within the planning and scheduling workbenches that help you check component availability. Specific topics include:

Introduction 112
Introduces the CAC elements and features.

CAC User Preferences 114
Describes user preferences for CAC, including field descriptions for all user preferences.

Using CAC to Schedule Production 118
Prior to releasing production schedules or orders to the shop floor, you can verify which orders have and do not have the necessary materials before releasing them to the shop floor. This section describes how the integrated workbench component checking capabilities can help you determine this.

Using CAC to Check Component Requirements 123
Presents data that lets you use the workbenches to check components for requirements.

Supporting Data 123
Describes supporting data that helps you find the cause of a shortage and find a solution.

Introduction

MSW helps you create a balanced production plan, typically at the departmental level, balancing demand, supply, and capacity. PSW helps you create a production schedule that optimizes use of resources on the shop floor. Before you release a production plan or schedule, you want to ensure that you have enough materials to support the plan/schedule. You can use the component availability check (CAC) capabilities built into the MSW/PSW to do this.

QAD Core Role-Based Browse Collections

Within the QAD core programs, you can use the following component check browse collections for real-time retrieval of production order component availability, maintenance, manipulation, viewing, and reporting of production details:

- Manage Materials for Production Line
- Manage Materials for Work Center
- Monitor Material Shortages
- Purchase Direct Materials

The browse collections are discussed in *User Guide: Manufacturing* and outside the scope of component check capabilities within the workbenches that the following topics describe.

Workbenches-Integrated Component Check Capabilities

The workbench-integrated component check capabilities let schedulers and planners use CAC features to ensure that the production orders they plan/schedule have enough materials. They check component availability across a range of production orders and order statuses, then use CAC supporting data to analyze shortages and potential shortages to determine action that needs to be taken, if any.

Both schedulers who use the workbenches and buyers, materials planners, and materials expediters who use the Monitor Material Shortages browse collection can use CAC supporting data to analyze the details behind a production order component availability status. Within the MSW/PSW, panels are included that provide supporting data for:

- Component list

  When you select the Component sub-tab within the Production Order Maintenance tab, component information is divided into two parts: the left side displays the BOM list of a production order, including component status, picking and issuing status, and more. See “Component List” on page 124.

- Supply/demand summary

  To get a summary of how the system got to the component status, you can look at the Supply/Demand Summary sub-tab to view all demand and supply related to the component within a site or domain. See “Supply/Demand Summary” on page 125.

- Supply/demand details

  The Supply/Demand Detail sub-tab provides MRP details of the selected component. You can drill down into the details, viewing projected QOH based on supply and demand by date. See “Supply/Demand Details” on page 126.

- Inventory details by site

Use data in the Inventory Detail sub-tab to drill into component inventory detail records for a particular site/location combination to determine options when dealing with component shortages. See “Inventory Details by Site” on page 127.

On-Demand CAC

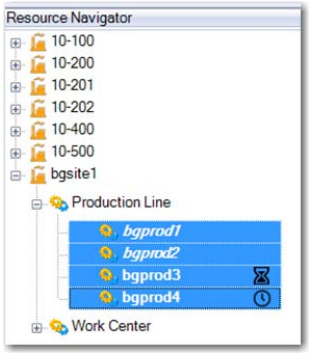
CAC calculations are user controlled. The calculations run as a background process, and you decide when they occur. You can also optionally cancel the background process once it starts. This on-demand CAC calculation method improves performance and saves time. CAC is calculated in the following ways:

- When you choose to load data for resources that you selected
- When the system saves production order changes (dependent on user preference setting)
- For production orders that you select in the embedded Production Order Maintenance.

Since CAC calculations are a part of the background process, the workbenches interface remains responsive while the calculations run, letting you continue within the workbenches. The workbenches display icons that let you know the progress of the background processing. For example, in the Resource Navigator, once you choose to load data for a selected resource, the resource displays an hourglass icon while loading, turns bold when loaded, then turns italic when CAC calculations complete. For information on the Resource Navigator, see Chapter 2, “Manufacturing Resources,” on page 23.

Note The system displays an error when you try to run CAC calculations on a modified production order.

Fig. 5.1
Resources with CAC Calculations



Note Other processes run as background processes, too, including data loading for selected resources and the new component on hand availability calculations (see Chapter 6, “Product Structure Projected On Hand (POH),” on page 129). Only one background process at a time can run; attempting to run multiple background processes displays an error message.

Canceling CAC Calculations

You can stop the CAC calculation once it starts by pressing the Cancel button in the toolbar or by selecting Cancel from the context menu that displays when you right-click on the loaded resource. These features provide full control over when the system calculates CAC.

This chapter is divided into the following sections:

- CAC User Preferences

  Discusses options available when configuring CAC within the MSW/PSW.
- Using CAC to Schedule Production

  Discusses features and procedures for schedulers and planners.
- Using CAC to Check Component Requirements

  Discusses features and procedures for buyers, materials planners, and expediters
- Supporting Data

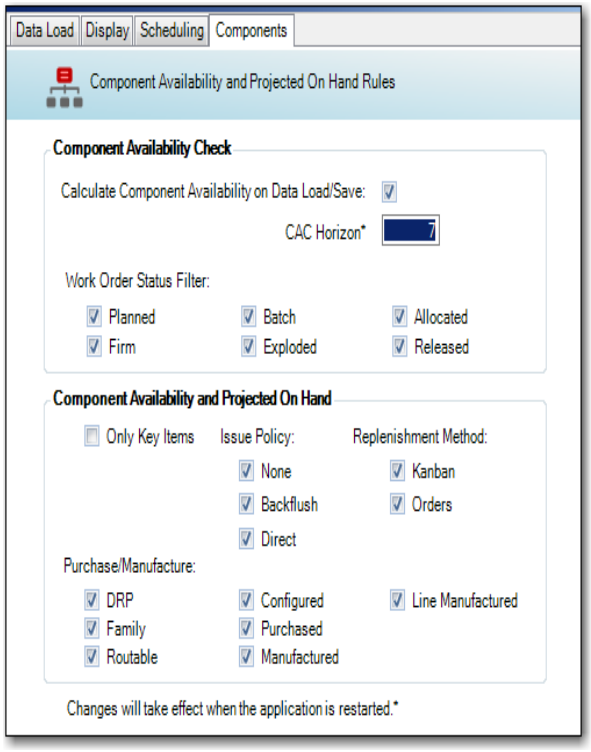
  Covers supporting data that either group of users can access.

CAC User Preferences

You select Option | Preferences | Component tab; then, navigate to the Component Availability section to set CAC preferences. Set the horizon, then select the components the system includes in the component check.

Important Changes to preferences require that you reload data.

Fig. 5.2
Settings Window, Component Tab



Calculate component availability on data Load/Save. Select Yes (checked) to calculate component availability when you choose to load data through the Resource Navigator or when you save data. When you save data, the system calculates CAC for:

- Orders that were added or modified and successfully saved. For each of these production orders, all components' statuses are recalculated and the maximum component status found is recorded in the order header record.
- Orders that were not added or modified but that previously had CAC calculated. For each of these orders, the system recalculates CAC only for the component records that have an item number in common with the component item numbers of the orders that were added or modified and successfully saved. The maximum component status found is recorded in the order header.

None (Not checked): When you select None for the Calculate Component Availability Data Load/Save field, you prevent the CAC calculation from occurring; however, you can right-click on an already loaded work center or production line resource to display an option that lets the system calculate CAC for the loaded resource even though you selected None. You can also select certain orders in either the Production Order Maintenance grid or the PSW Sequencing grid and run the CAC calculation for them by right-clicking on the resource to display the context menu, then selecting Calculate CAC.

CAC Horizon. Enter the number of days into the future within which the CAC calculations consider MRP detail data. Only production orders with a Due Date within the CAC Horizon are processed.

Typically, CAC statuses are relevant only for production orders due in the near-term; therefore, you should set this to the horizon within which you expect the production orders to be due.

If the manufacturing lead time is long, then you should set many days for checking; otherwise, the system does not select orders for checking. For example, this can occur for production orders with a due date that is after the end of the horizon.

Production Order Status Filter. Select a particular order status to be included in the CAC calculation. Selecting an order status reduces the number of production orders for which CAC is calculated, thereby reducing the overall calculation time. You can select from the following statuses:

P(lanned)

F(irm)

E(xploded)

A(llocated)

R(eleased)

The system calculates CAC status for the specified order types only. The system does not calculate orders with a status you did not select and sets the status of unselected orders to a CAC status of `No Status`.

Only Key Items. Indicate whether to include only key items when calculating CAC. Key items are identified using Item Master Maintenance (1.4.1), Item Inventory Data Maintenance (1.4.5) or Item-Site Inventory Data Maintenance (1.4.16).

No: Both key items and non-key items are included in the CAC calculation.

Yes: Only key items are included in the CAC calculation.

Issue Policy. Indicate whether to include items according to their Issue Policy. Issue Policy is set using Item Master Maintenance (1.4.1), Item-Site Planning Data Maintenance (1.4.17), or Enter Item Planning Data (.NET UI only).

The system maintains this policy value for the component item in Item Master Maintenance, Item Inventory Data Maintenance and related programs for item-site data and item master copy functions.

Issue Policy None: When checked, component items that are floorstock, not consumed by production, and not processed by inventory transactions are included in the component availability calculations. When not checked, they are not included.

Issue Policy Backflush: When checked, component inventory for items that are consumed by production by using production backflush transactions, are included in component availability calculations. When not checked, they are not included.

Issue Policy Direct: When checked, component inventory for items that are consumed by production by using component issue transactions, are included in component availability calculations. When not checked, they are not included.

Replenishment Method. Indicate whether to include items according to their replenishment method. You set the replenishment method using Item Master Maintenance, Item Planning Maintenance, or Item-Site Planning Maintenance.

Replenishment Method Kanban:

Not checked: Items whose Replenishment Method is set to Kanban are not included in the CAC calculation.

Checked: Items whose Replenishment Method is set to Kanban are included in the CAC calculation.

Replenishment Method Orders:

Not checked: Items whose Replenishment Method is set to Orders are not included in the CAC calculation.

Checked: Items whose Replenishment Method is set to Orders are included in the CAC calculation

Purchase/Manufacture. Indicate whether to include items according to their Purchase/Manufacture code. Purchase/Manufacture code is set using Item Master Maintenance (1.4.1), Item Planning Maintenance (1.4.7), or Item-Site Planning Maintenance (1.4.17). Items for each possible Purchase/Manufacture code type can be selected or not selected by checking or unchecking its check box:

Not checked: Items with the indicated Purchase/Manufacture code are not included in the CAC calculation.

Checked: Items with the indicated Purchase/Manufacture code are included in the CAC calculation.

Starting CAC Calculations

Before you start CAC calculations, set user preferences for CAC; see “CAC User Preferences” on page 114. You can set automatic CAC calculations to be performed through user preference settings.

To have the system automatically calculate CAC when you load data for resources and save modified production orders, select the Calculate Component Availability on Data Load/Save check box.

The CAC calculation starts automatically when loading resources:

1. Select the resource.
2. Double-click the resource to load data for it.

   Loaded resources display in bold.

   CAC is calculated for the resource.

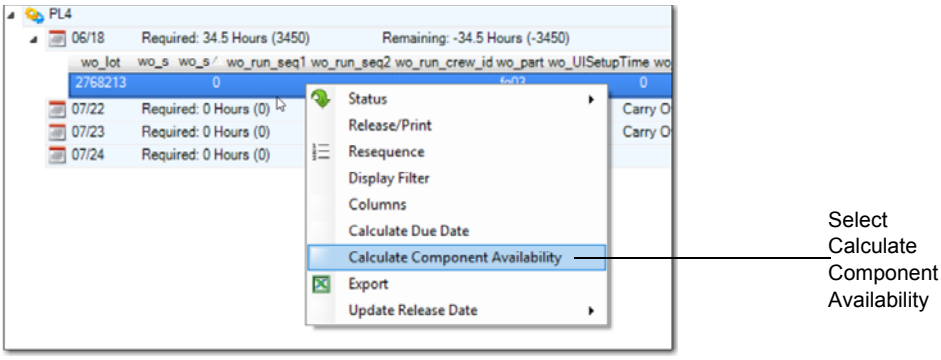
   Resources that are loaded and have CAC calculations are displayed in bold and italic.

To start the CAC calculation manually when you uncheck the Calculate Component Availability on Data Load/Save check box:

1. Right-click on the loaded resource in the PSW or MSW grids.

   The system displays the context menu.
2. Select Calculate Component Availability.

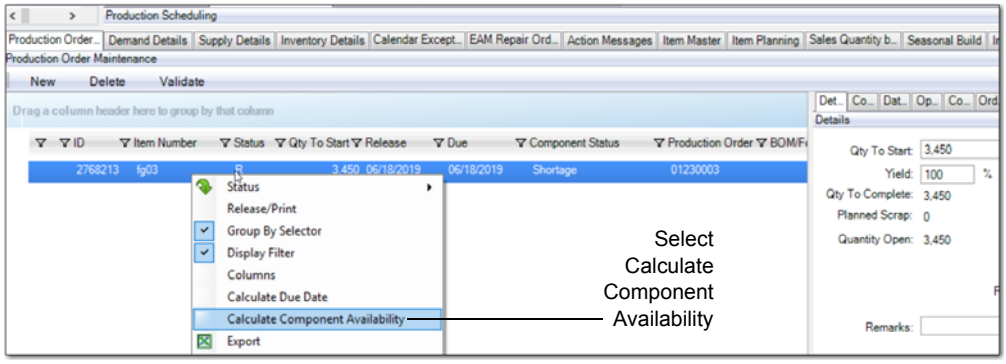
Fig. 5.3
Calculate Component Availability Action



To start the CAC calculation manually in Production Order Maintenance or the PSW:

1. Select one or more orders.
2. Right-click to display the context menu.
3. Select Calculate Component Availability.

Fig. 5.4
Calculate Component Availability Action



CAC Calculation Results

The system retrieves production order component detail records when it calculates CAC. The system displays the production order component status of each production order retrieved. Results are shown in the Component Status column within the Sequence Grid; see Figure 4.2. They also display in the same-named column in the Production Order Maintenance Summary List and in the Components sub-tab in the workbenches; see Figure 3.23 on page 70.

When a production order has a component or components tied to it with a Shortage or Projected Shortage status, then the Component Status field tied to the production order is colored red.

Using CAC to Schedule Production

CAC provides visibility during master scheduling, production scheduling, and the releasing of production orders. For each production order, you can view the component status of the order. During production sequencing, you can determine if there are material constraints in the production schedule, and drill down to determine the problem and possible resolutions.

Prior to releasing production schedules or orders to the shop floor, you can verify which orders have the necessary materials before releasing to the shop floor. You have full details of the materials issued and specific shortages by item.

Use CAC features within PSW to:

- Release production orders to the shop floor that have the necessary components available.
- Calculate and display the severity of a material shortage at the production order and component levels.
- Help you:
  - Release production orders to the shop floor that have the necessary components available.
  - Calculate and display the severity of a material shortage at the production order and component levels.
  - Determine when the next material receipt will be available in the case of material shortages.
- Drill down into the material shortage details for a component to analyze the cause and possible solutions.

- Simulate a schedule change and recalculate production order material status for all production orders sharing common components when a production order is modified.
- Output production orders related to particular release dates to a spreadsheet that can include the component status when you indicated to display the status column in the Sequence Grid.

The following subsections provide procedures to check components during production scheduling, followed by information to configure CAC.

Component Check Example

As a Production Planner, you want to ensure that all production orders scheduled for the upcoming week have enough components available. You run the MSW/PSW to look at production orders that have a release date during the next seven days.

The Shortage Report tab in the MSW/PSW displays all production order component records with a status of Projected Shortage or Shortage. You look at the Supply/Demand Summary data under the Components tab in Production Order Maintenance to see the cumulative supply and demand information for that production order component detail record. To get more information, you look at data under the Supply/Demand Details tab to view the MRP details the system used to calculate the production order component status.

You have several options to resolve the shortage. You can reschedule either supply or demand. For example, to reschedule supply you can reschedule a purchase order receipt if the component is purchased. Or, if the component is manufactured, you can reschedule a production order. To reschedule demand, you could reschedule a sales order or forecast demand.

Once you make the change, refresh the data to determine if the shortage no longer exists for the component.

Component Check Calculations

The system calculates component availability for a production order component record by calculating projected quantity on hand (PQOH) using MRP supply and demand detail information.

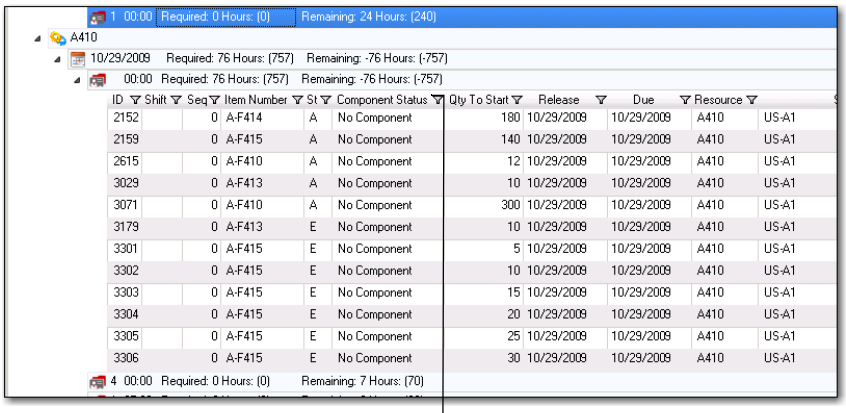
The system factors these key considerations when computing the time-phased consumption and supply of material:

- For component demand records:
  - Release dates: oldest demand records processed first
  - Shift and sequence
  - Orders status: Authorized, Firmed, then Planned
  - R and A orders have priority over F and P orders, regardless of consumption date.
- For component supply records:
  - Due dates
  - Order status: Authorized, Firmed then Planned
  - Expiration dates

Displayed Calculation Results

The calculation results display in the Component Status column within the PSW Sequence Grid. They also display in the summary list of the Production Order Maintenance tab and in its Components sub-tab.

Fig. 5.5
Sequence Grid, Component Status Column



The Component Status column displays a textual description of the status. The following lists the possible component status in order of severity.

No components: The production order does not have any components.

Issued complete: All materials have been issued for the production order component.

Available: Sufficient inventory is projected to be available for the production order component. This includes nettable on-hand inventory and non-expired component supply.

Note Nettable inventory includes inventory that may not be of inventory status available.

Scheduled Receipts: Sufficient inventory is projected to be available for the production order component. This includes nettable or non-expired inventory, plus authorized receipts and firm purchased and manufactured receipts component supply.

Authorized Receipts: Sufficient inventory is projected to be available for the production order component. This includes nettable or non-expired inventory and authorized purchased (unconfirmed ASNs) and manufactured (allocated and released) receipts component supply.

Planned Receipts: Sufficient inventory is projected to be available for the production order component. This includes nettable or non-expired inventory, plus authorized receipts and Firm Receipts, and planned purchased and manufactured planned receipts component supply.

Projected Shortage: There is insufficient inventory projected to be available for the production order component after considering all sources of component supply.

Shortage: Same as Projected Shortage, but only applies to production orders with status A(llocated) and R(eleased).

No Status: CAC not computed for the component. This can occur because:

- Component excluded from CAC check per user preference settings.
- Components where item master issue policy is set to No.

  - Type of BOM component; some component types are not factored by MRP, so CAC does not process them either.
  - CAC horizon does not include the production order and associated components during processing.
  - MRP detail records have been deleted since data was loaded into the workbenches; to check, you can run MRP and reload data for a resource on the workbenches.
- Authorized Receipts Delayed: The same as Authorized Receipts except that the ASNs or production orders covering the requirement are past due (due date < today).
- Scheduled Receipts Delayed: The same as Scheduled Receipts except that the POs or production orders covering the requirement are past due (due date < today).

Note The status also applies to the Release Production Orders by Production Line, Manage Materials for Production Line, Release Production Orders by Work Center, and Manage Materials for Work Center component availability browse collections.

Production Order Status

When calculating component availability, the system considers the status of a production order. Production orders can have a status of:

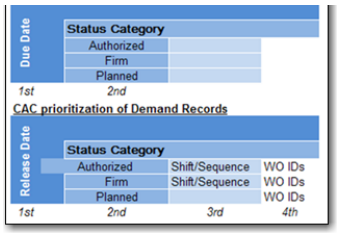
- (A)llocated
- (E)xploded
- (F)irm
- (P)lanned
- (R)eleased

The system groups the production order statuses into three status categories when calculating component availability:

- Planned: Planned production orders are in this category.
- Firm: Firm and Exploded production orders are in the Firm category.
- Authorized: Allocated and Released production orders are in this category.

The following depicts where the system applies demand/supply records to the appropriate status category.

Fig. 5.6
Supply/Demand and Status Categories



Supply/Demand	Order Type	Applied To Status Categories		
		Authorized	*Firm*	*Planned*
Both	Production Order (released)	x	x	x
Both	Production Order (allocated)	x	x	x
Supply	ASN Receipt	x	x	x
Supply	DRP (intransit)	x	x	x
Supply	Expiring Inventory	x	x	x
Both	Production Order (firm)		x	x
Demand	Sales Order		x	x
Supply	Purchase Order		x	x
Supply	Supplier Schedule (firm)		x	x
Demand (site)	DRP Intersite Request (follows same logic as supply work orders)	.....	....	.....
Supply (site)	DRP Intersite Demand (shipped)	x		
Supply (site)	DRP Intersite Demand (scheduled) "follows same logic as work orders"	.....	...	....
Supply	Supplier Schedule (plan)			x
Demand	Forecasts			x
Both	Production Order (planned)			x
Supply	DRP (planned)			x

The steps the system follows for sequenced production orders to calculate their POH and CAC status are as follows:

1. Determine the status category for a production order.
2. Within a production order status category, process by due date, then shift.
3. If no shift start time is defined, then shift processing is sequential (1.2.3.4...and so on). Shift 0 is processed last for each status category.
4. Within a production order status category, process by sequence. Sequence 0 is processed last.
5. If no sequence number is defined, process by production order ID.

Shortage Report

As part of the CAC features integrated into the workbenches, you can access the Short Report tab within the workbenches. Production planners, material expeditors, or schedulers can generate a list of components with shortages that impact the scheduler's production schedules for the production lines or work centers. In the report, these users can expand an item to see details regarding the shortage, such as the first date the shortage occurs, which production line or work center is impacted, and the most recent supplier/PO found in the system for the component.

The shortage report displays a Quantity Available to Allocate column, too. The system calculates quantity available to allocate as:

Qty with Available Status - Qty Allocated where

Qty with Available Status = in_qty_avail

Qty Allocated = in_qty_all

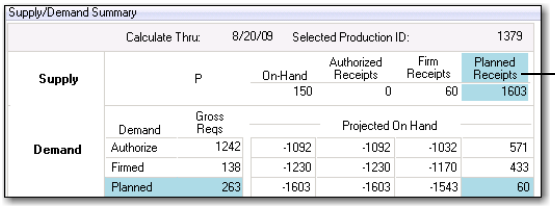
Click on the Shortage Report tab at the top of the workbench to display a report that provides the following data:

- Component item number, description, and CAC status
- Quantity short and gross requirements
- Next scheduled receipt and receipt ID
- Buyer/planner
- Pur/Mfg code and parent item
- Production order ID, status, and operation
- Production line, work center, and site

Using CAC to Check Component Requirements

Use the following topics to help you check components for production order requirements. You can check the Component Status column in the PSW Sequence Grid. Planned Receipts can display in the Component Status column. When it does, there is sufficient inventory projected to be available for the production order component. The data in the Component Status column includes nettable on-hand inventory, unconfirmed shipper receipts, scheduled receipts, and planned receipts.

Fig. 5.7
Planned Receipts



View planned receipts in Production Order Maintenance, Components Tab.

You can rectify shortages by determining if the depending assembly production order for the component can be completed earlier, or if a purchase order receipt can be moved up. Additionally, you could see if the quantity of an outstanding discrete purchase order or supplier schedule can be increased.

Exporting Data

You can export the data that displays in the Shortage Report and the PSW to a Microsoft Office Excel spreadsheet.

From the Shortage Report, right-click on any field within the report, then select Export Report. When you export, the system retains the structure/formatting of the source data.

Supporting Data

When you see that you have a potential shortage or a shortage for a production order, you can drill down into the details behind the component status using the supporting data at the bottom of the PSW. Specifically, you can drill down to Production Order Maintenance, then select the Components tab to see the following data:

- List of components related to the production order in focus within the Sequence Grid
- Supply/demand summary
- Supply/demand details
- Inventory details

You can also run a Shortage Report by selecting that tab within the workbenches.

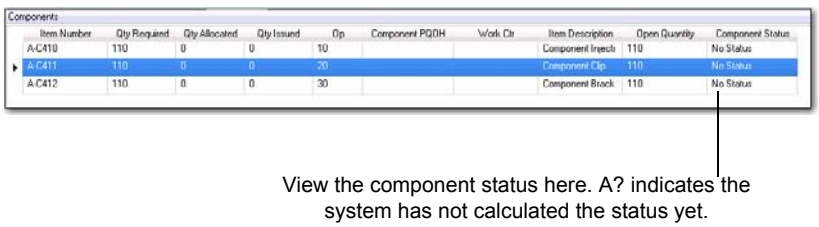
The following topics discuss data found under the Production Order Maintenance Components tab.

Component List

When you select the Component sub-tab within the Production Order Maintenance tab in the workbenches, component information is divided into two parts: the left side displays the BOM list of a production order, including component status, picking and issuing status, while the right side provides more data through tab selections.

Important The system shows one level down in the BOM only, except when there is a phantom at that level.

Fig. 5.8
Component Summary List



Item Number/Description. The number and description of the component that is behind the component status of the selected production order in the Sequence Grid.

Component Status. The status related to the POH of the component.

Quantity Required. The original quantity required for the item/production order.

Quantity Allocated. The quantity allocated for the item/production order.

Quantity Issued. The quantity already issued for the item/production order.

Op. The ID of the operation from where the component is backflushed.

Work Center. The ID of the work center to which the component is issued.

Component POH. The system-calculated value for projected quantity on hand for the component, considering all prior demand/supply, including the demand of the selected order. This does not include future production orders of Authorized status; however, Allocated/Released would also be included in the POH calculation.

Open Quantity. The open quantity for the production order.

Note You can add/remove fields to this panel in the .NET UI Browse Maintenance program.

Supply/Demand Summary

The Supply/Demand Summary Panel provides a summary of all supply/demand records for the selected component. It summarizes the total demand and supply for the component, considering the production order demand from the production order selected in the Sequence Grid.

Use the data in this panel to determine how the component projected on-hand was calculated using the following data:

- Prior scheduled production orders that also require the component
- Prior incoming supply for the component
- Authorized, firmed, or only planned replenishment

Rows, cells, and columns are automatically highlighted in the panel as follows:

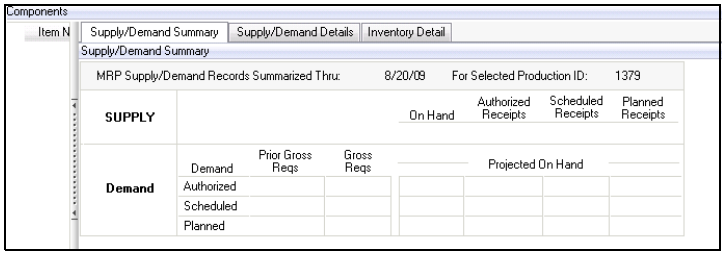
- Demand rows: Highlighted demand row cells indicate that the demand row status category (planned, scheduled, authorized) is equal to the selected production order status.
- Projected On Hand: Highlighted Projected On Hand cell indicates the source POH for the selected component.
- Supply cell column: The highlighted supply cell column indicates the Projected On Hand value that was used to determine the component status.

The Supply/Demand Summary Panel lets you view the aggregated records from a matrix point of view:

- The top portion displays supply quantities. It lists the current quantity On Hand for the production order component item and other sources of supply up to the due date of the production order component record.
- The lower portion displays demand quantities. It lists the three categories of demand (Authorized, Scheduled, and Planned). Each row starts with prior demand requirements and the gross requirements of the selected production order component record. Then, from left to right, it adds in the current QOH, then adds in the other cumulative supply quantities to calculate the projected on-hand quantities.

This supply and demand matrix format provides you with a global view of component supply/demand.

Fig. 5.9
Supply/Demand Summary Panel



MRP Supply/Demand Records Summarized Thru. The issue date of the selected production order component record.

For Selected Production Order ID. The production order ID of the selected production order component record.

On Hand. The nettable, on-hand inventory found in all locations across the site.

Authorized Receipts. The sum of all authorized receipts prior to the Issue Date of the selected production order component record. Authorized receipts are sources of supply and include:

- Production orders with a status of Allocated or Released that cover production order component requirements
- Unconfirmed ASNs that cover the production order component requirements

Firm Receipts. The sum of all firm receipts before the Issue Date of the selected production order component record.

Planned Receipts. The sum of all planned receipts before the Issue Date of the selected production order component record.

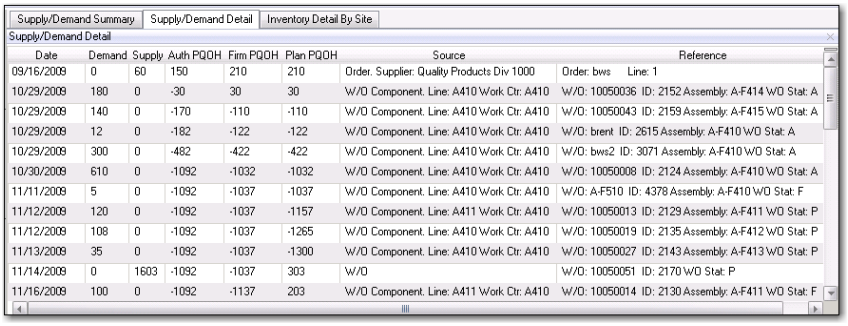
Gross Reqs. The current open quantity of the selected production order component record not netted with inventory.

Supply/Demand Details

Use the data in the panel to easily:

- View demand detail information; for example, demand source, due date, and quantity.
- View supply detail information; for example, supply source, due date, and quantity.
- Determine when inventory expires and the impact on production.
- Identify where you should reprioritize; for example, you can correct a shortage if you expedite production order B and reschedule production order A.

Fig. 5.10
Supply/Demand Details


Supply/Demand Summary | Supply/Demand Detail | Inventory Detail By Site

Supply/Demand Detail

Date	Demand	Supply	Auth PQOH	Firm PQOH	Plan PQOH	Source	Reference
09/16/2009	0	60	150	210	210	Order. Supplier: Quality Products Div 1000	Order: bws Line: 1
10/29/2009	180	0	-30	30	30	W/O Component. Line: A410 Work Ctr: A410	W/O: 10050036 ID: 2152 Assembly: A-F414 WO Stat: A
10/29/2009	140	0	-170	-110	-110	W/O Component. Line: A410 Work Ctr: A410	W/O: 10050043 ID: 2159 Assembly: A-F415 WO Stat: A
10/29/2009	12	0	-182	-122	-122	W/O Component. Line: A410 Work Ctr: A410	W/O: brent ID: 2615 Assembly: A-F410 WO Stat: A
10/29/2009	300	0	-482	-422	-422	W/O Component. Line: A410 Work Ctr: A410	W/O: bws2 ID: 3071 Assembly: A-F410 WO Stat: A
10/30/2009	610	0	-1092	-1032	-1032	W/O Component. Line: A410 Work Ctr: A410	W/O: 10050008 ID: 2124 Assembly: A-F410 WO Stat: A
11/11/2009	5	0	-1092	-1037	-1037	W/O Component. Line: A410 Work Ctr: A410	W/O: A-F510 ID: 4378 Assembly: A-F410 WO Stat: F
11/12/2009	120	0	-1092	-1037	-1157	W/O Component. Line: A411 Work Ctr: A410	W/O: 10050013 ID: 2129 Assembly: A-F411 WO Stat: P
11/12/2009	108	0	-1092	-1037	-1265	W/O Component. Line: A410 Work Ctr: A410	W/O: 10050019 ID: 2135 Assembly: A-F412 WO Stat: P
11/13/2009	35	0	-1092	-1037	-1300	W/O Component. Line: A410 Work Ctr: A410	W/O: 10050027 ID: 2143 Assembly: A-F413 WO Stat: P
11/14/2009	0	1603	-1092	-1037	303	W/O	W/O: 10050051 ID: 2170 WO Stat: P
11/16/2009	100	0	-1092	-1137	203	W/O Component. Line: A411 Work Ctr: A410	W/O: 10050014 ID: 2130 Assembly: A-F411 WO Stat: F

Date. The release dates for demand records or the due dates for supply records.

Demand. The standard MRP definition for demand.

Supply. The standard MRP definition for supply.

Auth POH. The POH of all authorized demand/supply records.

Firm POH. The POH of all firm and authorized demand/supply records.

Plan POH. The POH of all planned, firm and authorized demand/supply records.

Source. The demand/supply record source; for example, production order, sales order, production line, and so on.

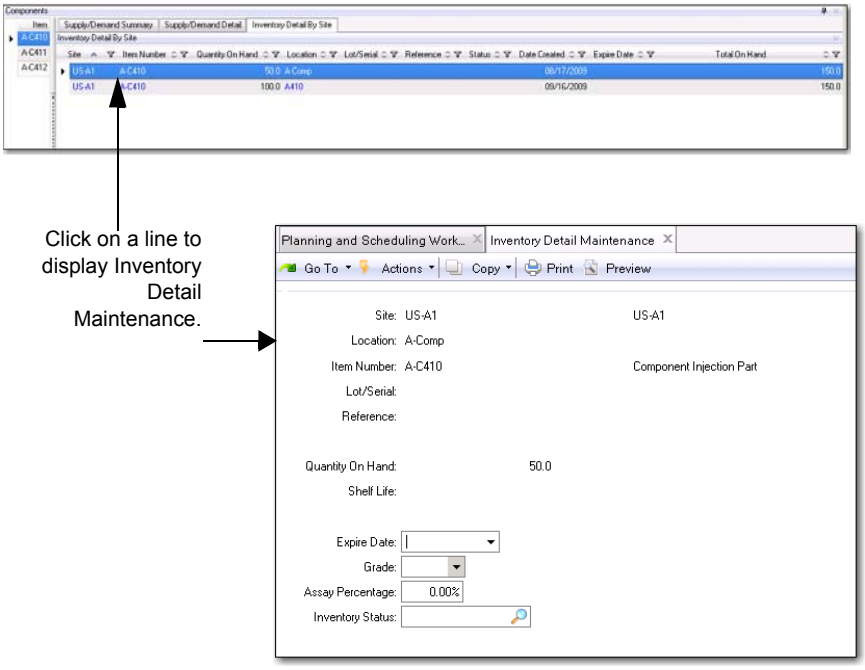
Reference. he demand/supply record reference; for example, the order number, assembly item number, and so on.

Inventory Details by Site

Use the data in the Inventory Details sub-tab to drill into component inventory detail records to determine options when dealing with component shortages.

When you select a record within the Inventory Details by Site Panel, and click on the record, the system launches Inventory Detail Maintenance.

Fig. 5.11
Inventory Details by Site



Site. The site associated with the inventory.

Item Number. The item number.

Quantity on Hand. The system organizes inventory detail data by item, site, location, lot/serial, then reference. For each unique combination of these values, the system tracks the quantity on hand and other inventory attributes, such as expire date and status.

Location. The ID of the physical location where inventory is stored.

Lot/Serial. The lot/serial number for the item.

Reference. The lot reference number.

Status. The inventory status code associated with the inventory quantity. Inventory status codes determine whether inventory balances are available for allocation, are considered by MRP, or are allowed to go negative. Status codes also restrict particular transactions at specific locations.

Date Created. The date the inventory detail record was created.

Expire Date. The date the inventory expires.

Total on Hand. The total on hand quantity of this item in inventory.

Chapter 6

Product Structure Projected On Hand (POH)

This chapter presents features of the planning and scheduling workbenches that help you check product structure projected on Hand. Specific topics include:

Introduction 130
Introduces the Product Structure POH elements and features.

Product Structure Projected On Hand Features 130}
Describes features and benefits of Product Structure Projected On Hand within the Planning and Scheduling Workbenches.

Product Structure Projected On Hand User Preferences 134
Describes user preferences for Product Structure Projected On Hand, including field descriptions for all user preferences.

POH and Supply/Demand Data 136
Describes how the you can view and work with supply/demand data that drives the product Structure POH.

Using Product Structure Projected On Hand Data 137
Presents use cases for using the data in the Product Structure POH tab, including projected on-hand changes when you change aspects of production orders in the workbenches.

Component Demand Calculations 137
Describes aspects of the component demand calculation that all schedulers should consider.

Product Structure Projected On Hand Calculations 138
Describes the calculations for component projected on-hand quantities.

Introduction

To release a production plan or schedule, you want to ensure that you have enough materials to support the plan/schedule. To this end, you can check the projected on-hand (POH) quantities for a component—BOM component—of a product structure.

You can use the component projected on-hand capabilities built into the Planning and Scheduling Workbenches to do this. So, you no longer have to consult the QAD application data to look at current and future BOM component projected quantity on-hand (PQOH) statuses and their supporting supply/demand data while you are scheduling.

This chapter is divided into the following sections:

- Product Structure Projected On Hand Features
- Product Structure Projected On Hand User Preferences
- POH and Supply/Demand Data
- Using Product Structure Projected On Hand Data
- Product Structure Projected On Hand Calculations

Product Structure Projected On Hand Features

The Product Structure Projected On Hand tab in the workbenches lets you view projected on-hand quantities for components of items that are of focus in the master Scheduling Grid.

The data that displays in the tab is the same data that you see in the Supply/Demand panel of the MSW. In the Product Structure Projected On Hand panel, however, the data is structured in a BOM hierarchy. The hierarchy structure provides a top-level view of the component data, rather than the single-item view that the Supply/Demand panel provides. For details on the data in the Supply/Demand panel, see “Working with Supply/Demand Panel Data” on page 61.

Since the component projected on-hand data is item driven, you view a BOM-structured layout of items, with indentations that denote product structure levels. You click on the small arrow to display data. The data displays as projected on-hand balances available for the component per the date that displays in the top row. Balances that display in red depict quantities where demand exceeds supply.

Supporting supply/demand data, via the Supply/Demand panel, displays below the structured BOM list in the top panel. When you click a component in the top panel, the Supply/Demand Panel’s data reflects supporting data for your selection.

Selections and Supporting Data

When you make a selection in the Product Structure POH tab, the supporting tabs within the workbenches display data for your selection.

Note The system may not always display supporting data in the supporting tabs for the item you selected in the Product Structure POH display; for example, there may be no data when:

- Orders do not exist.
- Data may exist on the server, but may not be on the client.

- Supporting tab data is production line related, and the item you selected is not tied to a production line.

Component Changes Reflected

The system considers changes you make to components and reflects those changes in the Product Structure POH tab data. When you make a schedule change to an item in the Schedule Grid, the following grids are updated:

- In the Product Structure POH Data Grid:
  - The supply data for the item whose schedule data was modified
  - The demand data for the item's components
- In the Supply/Demand Data Grid
  - The supply data for the item whose schedule was modified
  - The demand data for the item's components

Projected On Hand quantities are updated for all affected items in the Product Structure POH and Supply/Demand Data Grids.

The system considers the effective date of components when you make updates to the schedule. When you make schedule changes, the system applies the changes to those components that are effective as of the release date of the modified production orders.

Example You have three components for item A as A1, A2, and A3. A1 has a PO with an effective date of today, A2 has a PO with an effective date of tomorrow, and A3 is in effect now and in the future. PO1 is released today, and PO2 is released tomorrow. Based on this setup, when you make a change to PO1, then demand for A1 is affected because the BOM has that component effective until today. When you make a change to PO2, then demand for A1 is not effected and the system instead effects demand for A2. A3 is always affected in both cases.

The system considers the release date as always when making updates; therefore, changes that you make today can reflect in updates being made on previous days, depending on the release date setting.

Default BOM Used

For Product Structure POH data, the system uses the default BOM code specified for an item tied to a production line in Production Line Maintenance (16.1.1) when the production line:

- Is the primary production line
- Has a detail entry for the item, effective as of today’s date

  Note When no such production line detail exists, then the system uses the BOM Code from either Item-Site Planning Maintenance (1.4.17) or Item Planning Maintenance (1.4.7), and work centers still consider the BOM code for an item based on the BOM code settings in Item-Site Planning Maintenance, then Item Planning Maintenance, respectively.

Lead Time Versus Horizon Time

The system uses the following:

- For items on a production line, the maximum firm day

This is the maximum of all production lines where the item is produced, for example, when production line 1 has one day for that item and production line 2 has two days for that item then the maximum is 2 days.

- For items not on a production line, then the system uses the lead time for:
  - Manufactured item, using the manufacturing lead time
  - Purchased items, using the purchase lead time

Note For both the Supply/Demand panel and the product structure POH horizon, the system considers the lead time when there is no production line-item setup for the item; otherwise, the system considers firm days for the horizon.

For manufactured items not produced on production lines, the system determines how to color the horizon based on the following for lead-time:

pt(p)_mfg_lead + pt(p)_sfty_lead

For purchased items, the system determines how to color the horizon based on the following for lead-time:

pt(p)_pur_lead + pt(p)_insp_lead + pt(p)_sfty_lead

Benefits

The Product Structure Projected On Hand tab lets you:

- View a BOM structure for items with clearly denoted levels.
- Focus on only those items of interest by loading selected resources, viewing items of interest in the Schedule Grid, then displaying POH for only those components of the items.
- Control product structure projected on Hand calculations; they run only when you click to see the component data in the panel and they stop when you cancel the calculations.
- Continue working in the workbenches during product structure projected on Hand calculations as they run as a background process.
- Ensure that the production orders have enough materials for firm orders or for planned orders.
- View the supply/demand that drives the projected on-hand quantities by clicking on a component in the top-level browse and having supporting supply/demand browses reflect data for just your selection.

Colors

Balances that display in color depict items with an issue. Coloring is based on the resource upon which the item is scheduled and on the firm scheduling horizon for the item. As you open more BOM levels, the system continues to display the coloring for any level component of the product structure.

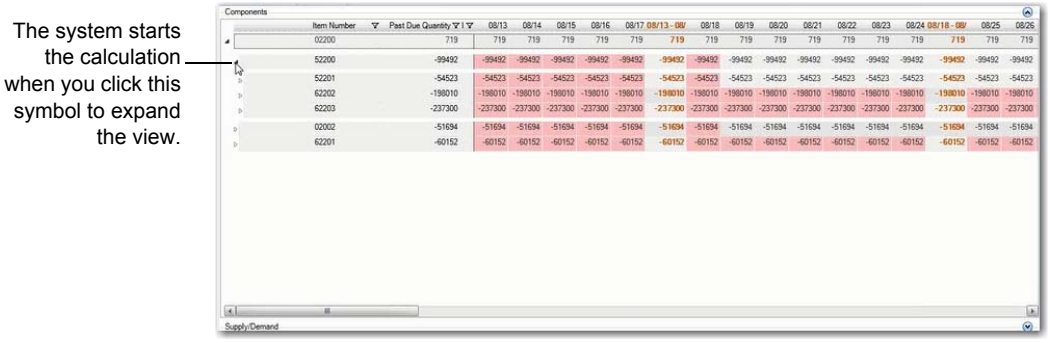
Note The color can display across the entire horizon within the component on hand display for purchased items that are not scheduled on any resource.

For more information on the use of colors with issues, refer “Visual Indicators” on page 18.

Starting and Canceling Processing

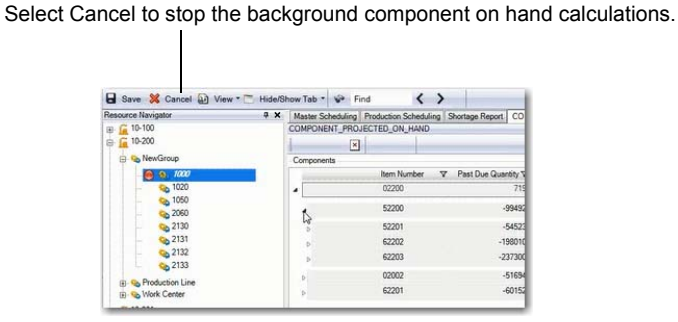
The system runs the component projected on-hand calculations as a background process so that you can continue with other work within the workbenches during calculations. When you load a resource, then view data in the Product Structure Projected On Hand tab, the system runs the calculations when you select the small symbol that lets you expand the view to see components; see Figure 6.1 on page 133.

Fig. 6.1
Product Structure POH Calculation Start



You can cancel the background processing at any time by clicking the Cancel button in the top menu of the workbenches.

Fig. 6.2
Product Structure POH Calculation Cancel



Multi-Selecting Components for POH Calculations

You can multi-select components within the Product Structure Projected On Hand panel much like you do when you work in the Windows Explorer tool.

To select consecutive resources, click the first resource, then press and hold down the Shift key, and then click the last resource. To select non-consecutive resources, press and hold down the CTRL key, and then click each resource that you want to select.

When resources are not loaded, you can multi-select components, then right-click to display the context menu, then select the option to load calculations for just those components you selected.

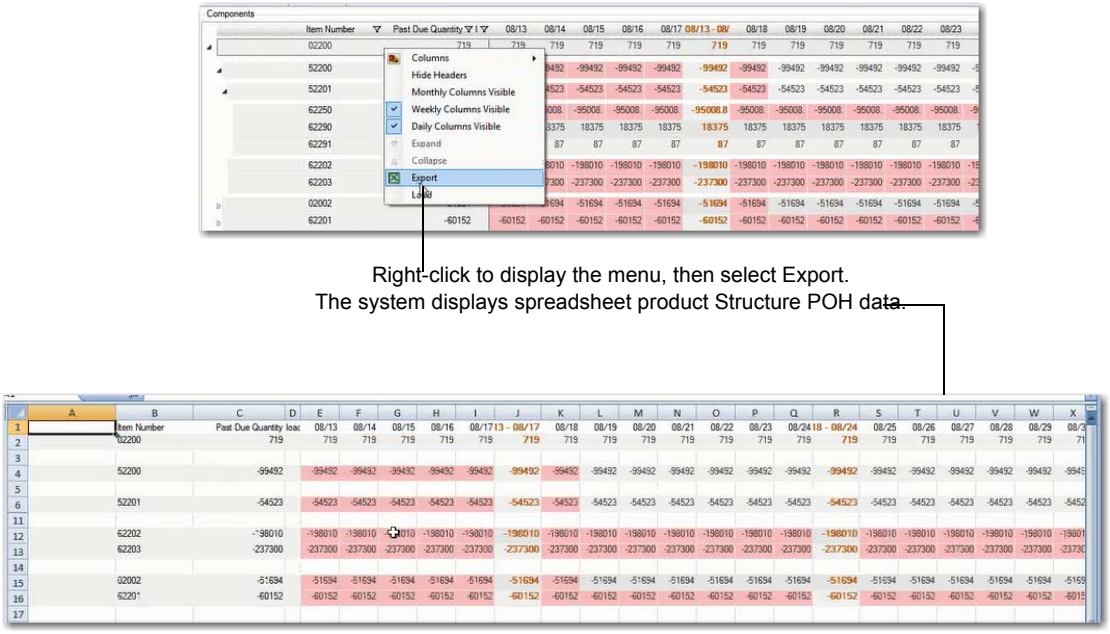
Items in Product Structure POH Tied to Production Order Maintenance

Items within the Product Structure Projected On Hand tab display orders in the workbenches-embedded Production Order Maintenance for the item of interest in the Schedule Grid. This is true even when you switch back and forth between the schedule display and the product structure POH data.

Exporting Product Structure POH Data

Like all Planning and Scheduling Workbenches data, you can export the product Structure POH data. To do this, right-click in the panel to display a context menu; then select Export.

Fig. 6.3
Product Structure POH Calculation Cancel



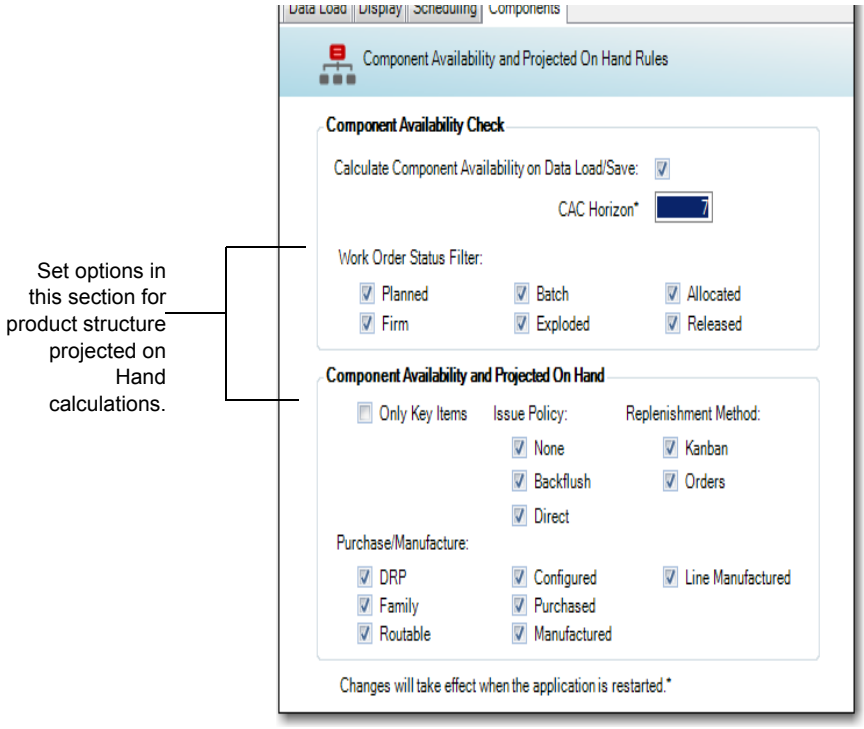
Product Structure Projected On Hand User Preferences

You select Option, then Preferences, then the Component tab to set Product Structure Projected On Hand preferences.

Important Changes to preferences require that you reload data.

You select Option | Preferences | Component tab; then, navigate to the to set CAC preferences. Set the horizon, then select the components the system includes in the component check.

Fig. 6.4
Settings Window, Component Tab



Only Key Items. Indicate whether to include only key items when calculating product structure POH. Key items are identified using Item Master Maintenance (1.4.1), Item Inventory Data Maintenance (1.4.5), or Item-Site Inventory Data Maintenance (1.4.16).

No: Both key items and non-key items are included in the product Structure POH calculation.

Yes: Only key items are included in the product structure POH calculation.

Issue Policy. Indicate whether to include items according to their Issue Policy. Issue Policy is set using Item Master Maintenance (1.4.1), Item-Site Planning Maintenance (1.4.17), or Enter Item Planning Data (.NET UI only). The system maintains the policy value for component items in these programs. The system displays the Issue Policy for component items as one of the following:

None: Component items are floorstocked. They are not consumed by production or processed by inventory transactions.

Backflush: Component inventory for the item is consumed by production by using production backflush transactions.

Direct: Component inventory for the item is consumed by production using component issue transactions.

Replenishment Method. Indicate whether to include items according to their replenishment method. You set the replenishment method using Item Master Maintenance (1.4.1), Item Planning Maintenance (1.4.7), or Item-Site Planning Maintenance (1.4.17).

Replenishment Method Kanban:

Not checked: Items whose Replenishment Method is set to Kanban are not included in the product Structure POH calculation.

Checked: Items whose Replenishment Method is set to Kanban are included in the product Structure POH calculation.

Replenishment Method Orders:

Not checked: Items whose Replenishment Method is set to Orders are not included in the product structure POH calculation.

Checked: Items whose Replenishment Method is set to Orders are included in the product Structure POH calculation

Purchase/Manufacture. Indicate whether to include items according to their Purchase/Manufacture code. Purchase/Manufacture code is set using Item Master Maintenance (1.4.1), Item Planning Maintenance (1.4.7), or Item-Site Planning Maintenance (1.4.17). Items for each possible Purchase/Manufacture code type can be selected or not selected by checking or unchecking the check box:

Not checked: Items with the indicated Purchase/Manufacture code are not included in the product structure POH calculation.

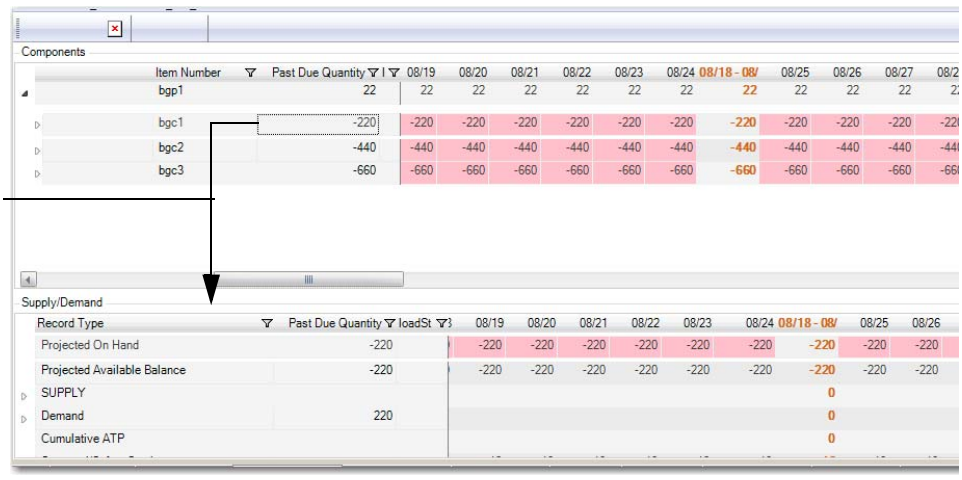
Checked: Items with the indicated Purchase/Manufacture code are included in the product Structure POH calculation.

POH and Supply/Demand Data

The projected quantity on hand (POH) displays for that item when you click the expansion icon in the Product Structure Projected On Hand tab; see “Starting and Canceling Processing” on page 133.

To drill down even further into the components of an item and their supply/demand data, you click on a row in the main browse of the Product Structure Projected On Hand tab. When you do, the system displays data in the supporting Supply/Demand panel for just the component you selected. This can be any level within the BOM structure.

Fig. 6.5
POH and Supply/Demand Data



Sources of demand can include forecasts, safety stock requirements, sales orders, customer scheduled orders, component requirements from manufacturing, and so on. Sources of supply include nettable QOH, production orders, production/purchase orders, supplier scheduled orders, and so on.

The MSW chapter includes details of the Supply/Demand panel, including calculations for POH and field descriptions; see “Working with Supply/Demand Panel Data” on page 61.

Using Product Structure Projected On Hand Data

Colors depict issues with components; see “Visual Indicators” on page 18 for more information on colors and their meaning.

When MRP plans orders for a parent item, it also determines if orders are required for any of the parent’s component items. MRP generates component requirements using the standard product structure or formula effective for that item-site or site on the date of the requirement.

When MRP reschedules planned orders for higher-level end items, lower-level components dependent on the rescheduled demand remain associated with the original supply order date. They are not automatically rescheduled based on where action messages say parent orders should be moved. You can adjust this by running selective MRP.

When you run MRP, then reload data, thereby recalculating POH, too, the system displays planned orders in the Planning and Scheduling Workbenches and displays new quantities in the horizon for the planned orders based on resource and new quantities in the Product Structure POH panel.

Component Demand Calculations

When you change the schedule for a parent item, the system determines the effected component. For calculation speed and application performance, this calculation does not take in account many parameters that MRP considers. **Users should note that this calculation is not exact**.

A few examples of why this calculation is not exact are as follows:

- To determine components, the system uses the BOM code specified for the item’s primary production line in Production Line Maintenance (16.1.1); however, this BOM may not be the production order BOM. So, the system may:
  - Display demand for components that are not affected
  - Not display demand for affected components
- Component demand is set for the production order’s release date, disregarding lead time offset that MRP would have considered. This may cause component demand to show up later than it should.
- When a component that previously did not load onto the client is loaded onto the client, the system must ensure that POH is current with schedule changes that occurred in client memory. In other words, the system has to make the component demand catch up with schedule changes made previously in client memory. This *catch-up logic* does not take component effective dates into consideration and may introduce inaccuracy in component demand.

Product Structure Projected On Hand Calculations

POH calculations are based on the POH calculations for the Supply/Demand panel. When the Schedule Grid displays the scheduled quantity for an item, the Supply/Demand Panel displays the remaining open quantity due for the item.

When you change quantities in the Schedule Grid for an item, then save the data, the Component On Hand tab reflects your changes; however, the change is reflected in only the item for which you made changes. For example, if component AA has components AA1, AA2, and AA3, and you modify quantities for item AA, the subcomponent quantities do not change.

The MSW chapter of this user guide provides detailed information on the Supply/Demand panel, including calculations for POH, examples, and descriptions of Supply/Demand panel fields; see “Working with Supply/Demand Panel Data” on page 61.

Chapter 7

Co-/By-Products

The following topics describe how to use the features of the MSW and PSW.

Introduction 140
Introduces co- and by-product functionality within the workbenches as well as concepts.

Workbenches Co-/By-Product Features 142
Discusses workbenches features for scheduling orders for co- and by-products.

Setup 144
Describes setup steps you should perform before beginning workbenches scheduling of co- and by-products.

Working with Co-/By-Products in the Workbenches 145
Provides procedures to work with orders for co- and by-products within the workbenches.

Introduction

Within Production Orders, you can use a special set of features for managing processes that create more than one product. Such products are referred to as *joint products*, and each joint product is made up of *co-/by-products*. Processes that create only one product are supported by regular bills of material (BOM) and formulas.

Co-product/by-product features support a variety of manufacturing operations, including batch processing, sorting, molding, support for MRP, production orders, shop floor control, and costing, as well as tools for setting up items, structures, and routings.

You can schedule orders for co- or by-products within the workbenches. You should understand concepts before you begin working with these product types.

Concepts

The following topics discuss concepts you should understand before you schedule co-/by-products within the workbenches.

Co-/By-Products and Base Processes

When scheduling co-/by-products in the workbenches, it is important to know that the workbenches work with base processes. A *base process* is a manufacturing operation that creates more than one product, that is, the co-products or by-products.

Co-products and by-products of a base process do not have their own product structures or routings. These are defined in the base process. Base processes are items containing formulas for co/by-product operations, and are defined in the same way as regular items. A base process has an item record, a product structure with co-/by-products, a formula, routing, and BOM code.

There are some important distinctions between base process items and regular items:

- Base process items are never regarded as items to be stocked. Item status codes are used to restrict inventory transactions related to base process items and to ensure that these items never appear on sales or purchase orders. Should base process items end up in inventory, or on sales or purchase orders, they are ignored by MRP.
- Base process items cannot be used as components in another process.
- Demand for co-products drives the planning of base processes, and the co-product that has the most demand is the one planned for.

MRP and Co-/By-Products

MRP plans orders for a by-product as a result of creating planned orders for a base process. By-product demand is not considered when planning a base process, but MRP creates a joint order set for demand records from the unsatisfied demand for a co-product. An item is a co-product when:

- It is manufactured, that is, the Pur/Mfg code is set to Manufactured, Routable, or blank.
- The BOM or formula code is a base process that has the item as a co-product.

MRP plans for a base process by determining the unsatisfied co-product demand for all co-products that reference the base process as their BOM or formula code. MRP creates planned orders to fill the unsatisfied co-product demand without regard to projected quantity on hand for the base process. MRP does not consider base process inventory.

MRP uses the order policy and order modifiers for the base process, except safety stock, when creating planned orders. When the order policy is not period order quantity (POQ) or fixed order quantity (FOQ), MRP uses an order policy of POQ. If no order period is specified, MRP uses an order period of seven days.

When MRP plans a base process, it searches for the first unsatisfied demand record for a co-product. Then, depending on whether the order policy is POQ or FOQ, MRP evaluates unsatisfied demand records for all co-products of the base process:

POQ: MRP searches from the first unsatisfied demand record through the end of the order period.

FOQ: MRP looks at all unsatisfied demand records for all co-products that fall on the same date as the first unsatisfied demand record.

MRP creates one or more planned joint order sets to satisfy demand for the co-product that presents the greatest demand for the base process for a specific date or date range. As a result, planned orders for the other co-products of the base process are also created. MRP also creates action messages for base processes and co-products, but not for by-products.

Joint Order Sets

The workbenches provides the ability to manage and monitor *joint order sets*—two or more production orders that are dependent upon each other. Managing orders for co-/by-product functionality is an example of production order set management.

A joint order set must have only one base process order and at least one co-product order. If you delete the base process order or the only co-product order, the entire set is deleted.

A joint order set consists of the following production orders or order attributes:

- Order for the base process
- Order for each co-product and by-product
- Bill for the bases process
- Routing for the base process
- Same production order number

Joint orders can be added to or deleted from a joint set when the status is Exploded, Allocated, or Released. Since a joint order set must have only one base process order, when you delete the base process order or the only co-product order, the entire set is deleted.

For workbenches considerations:

- Only the base process order is sequenced and has a sequence value, so, only the base-process is shown in the PSW for sequencing.
- All orders within a joint set must have the same production line.

Workbenches Co-/By-Product Features

QAD ERP lets you manage a process that creates more than one product, such as co-/by-products. You have the ability to manage co/by-product orders as discrete orders. The workbenches use the same co-/by-product features found in QAD ERP. Within the workbenches, you can:

- Display base process items, co-/by-product items, and co-/by-product orders on production lines

  Note The PSW only displays and sequences base process orders.
- Display co-/by-product items on work centers (MSW only)
- Display calculated CAC status for base process orders
- Update due dates and depending on order status, optionally synchronize the updated dates across all orders in the set
- Update quantities and depending on order status, optionally synchronize the updated quantity across all orders in the set
- Set an option to automatically synchronize changes in order status and production line across the joint order set

Co-/By-Product Orders

You can retrieve co-/by-product joint order sets in the workbenches.

The workbenches let you schedule discrete joint product order sets. These sets include:

- One base order
- One or more co-product orders
- One or more by-product orders

The workbenches display base items in the Scheduling Grids. In the Schedule Grid, you can generate a joint product order set by either creating an order for the base process or for a co-product.

The base item production order contains all master data for the joint order set, such as BOM data, routings, and so on. The base scheduled order is for scheduling the co-/by-product orders to track quantity completed and requirements for the schedules.

It is important for you to know that for co-/by-product orders (joint order set), when you schedule co-/by-product orders, the system creates a joint production order set. The orders have the same PO number, and the relationship among them is defined technically. When you modify any order in the set, the system immediately synchronizes changes across all orders in the set.

CAC

The system calculates CAC status only for the base process order in the joint order set. The CAC status for all co- and by-product orders is always `No Status.`

This is because the base process order in the joint set contains all components and routings of the joint product. Co-/by-product orders do not have components or routings; therefore, they have no CAC status to calculate. Also, the base process order is always shown in the MSW and PSW, while co-/by-product orders are only visible in the MSW. So, the system calculates the base process order component availability.

Production Order Maintenance Order Relationship Tab

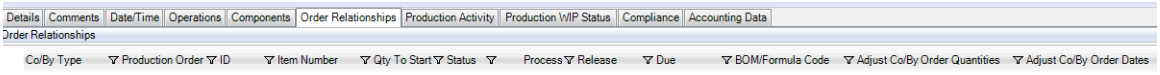
You can use the Order Relationship Tab within the Production Order Maintenance frame at the bottom of the workbenches to view order relationships as defined in production order sets.

In the MSW or PSW grids, when you select a production line or work center and an item, the system displays all production order records for the selected item.

When you select the Order Relationship tab, you can view related production orders. When you select an item in the schedule grid that has related production orders where there is only one match on production order numbers, the Order Relationship tab displays all related orders where a production order number matches the product order number of the production order record you select.

Figure 7.1 depicts order data in the Order Relationship tab. The frame shows joint product order sets. All other types of orders that have the same order number (that is, split orders) do not display in the frame.

Fig. 7.1
Order Relationship Tab



Co/By Type. Co-/by-product orders define a joint order set. When a co-/by-product order is scheduled, the system creates a joint order set. The relationship among these orders is defined technically by the order type and by having the same PO number.

When you modify any order in the order set, the system automatically synchronizes the changes across all orders in the order sets.

ID. The production order identification number.

When an order relationship is created via the production order ID, you may need to maintain the relationships between the orders, such as order quantities or due and release dates.

Item Number. The item for a base process, a co-product, or by-product.

Qty To Start. This field displays the quantity to begin producing when an order is released. For new production orders, the Qty to Start is 0 (zero). When the order is maintained by entering the Quantity to Start, the system calculates the Quantity to Complete from the Quantity to Start and the Estimated Yield Percent. When an order is maintained by entering the Quantity to Complete, the system calculates the Quantity to Start. When both quantities are entered, then the system recalculates and updates the Estimated Yield Percent.

Note In Process/Formula Maintenance (15.18) or Co/By-Product Maintenance (15.12.1), you define how many co- or by-products to create from one base process.

Status. The production order status, that is, Planned, Firm, Exploded, Allocated, Released, or Closed.

Process. The percentage as depicted by forecast percentage, specified in Formula Maintenance. When the Process percentage does not display, the value is 0% (zero).

Release. The order release date.

Due. The order due date.

BOM/Formula Code. This field is display only for base process orders. You can modify it for co- and by-product orders.

Adjust Co/By Order Quantities. Enter Yes or No to adjust the quantities for the order.

Yes: The system automatically rescales all order quantities in the joint order set. The production order status must be E, A, R, or C to optionally rescale quantities. Joint order quantities are recalculated automatically when:

- Order quantity changes on a joint order with a Firm status.
- Status of a production order changes from any status to Firm.
- Status of a production order changes from Planned or Firm, to Firm, Exploded, Allocated, or Released.

The system calculates the quantities for joint orders from quantities entered in Co/By-Product Maintenance (15.12.1). Order quantities for a joint order set can be recalculated automatically or maintained manually, depending on the production order status.

No: The system changes only the order being modified; other orders in the set are not modified. When this happens, the system automatically changes the order status to E.

Adjust Co/By Order Dates. Enter Yes or No to adjust co- or by-product order dates.

Yes: The system resynchronizes the dates for all orders in the joint order set. The production order status must be E, A, R, or C to optionally adjust dates. Firm status orders always resynchronize the dates for all orders in the set. Default due dates for orders in a joint set are calculated using the manufacturing lead time for the base process. Existing logic that allows for modifications to the order joint set must be preserved.

No: When No, the system only modifies the order you change. Other orders in the set are not modified. When this happens, the system automatically changes the order status to Exploded.

The order set is deleted only when you delete the base process order or the last co-product order.

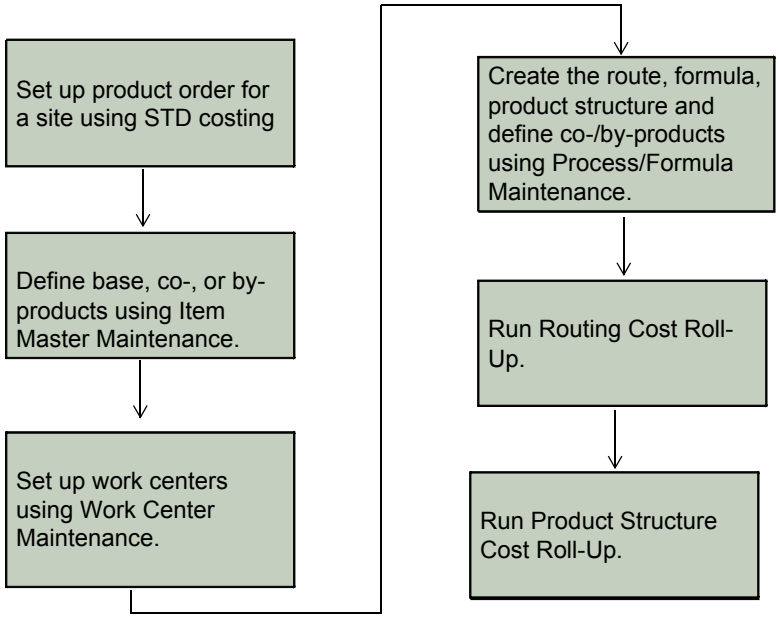
Setup

You set up co-/by-products within QAD ERP as you normally do. Implementing and managing co-products/by-products involves:

- Setting up an operation for co-products and by-products
- Developing standard and simulation costs
- Implementing material requirements planning (MRP)
- Managing the production order life cycle for related products

See Figure 7.2. Refer to *User Guide: QAD Manufacturing* for information on co-/by-product functionality within QAD ERP, including setting up operations for co-/by-products.

Fig. 7.2
Co-/By-Product QAD Setup



Workbenches Setup

For scheduling within the workbenches, you only set up the base process item on production lines, so, there is no need for specific co-/by-product item setup. Since the co-/by-products are defined for a base process, when you add the base process to a production line, the system automatically adds the co-/by-products to that production line.

You only set up the base process on the production line because the system adds the co-and by-products automatically. You can also set up a co-product on a production line and the system adds its primary base process (BOM/formula on the item) and related co- and by-products to the production line.

When scheduling a co-/by-product order sets, all order parameters, such as routing, BOM, run rate, setup time, default from the base process item. When you set up production lines, the system only considers the production line item field values for the base process item. The system does not consider production line item records for co-/by-product items for scheduling purposes.

For work centers/operation, the run rate, setup time, and so on are based on the routing of the base process item, too.

Working with Co-/By-Products in the Workbenches

You can use the MSW or PSW to schedule orders for joint order sets. You can manage both production line and work center orders for co-/by-products in the MSW or manage production lines only in the PSW for co-/by-product orders.

The topics below tell you how to create demand in QAD ERP so that data displays in the workbenches. Following that, the topics discuss workbenches co-/by-product functionality, including:

- Displaying Co-By Product Items
- Retrieving Co-/By-Product Records
- Managing Base Process Items
- Updating Dates and Quantities for Order Sets
- Creating an Order for Co-/By-Product Items
- Deleting Orders
- Dividing Production Orders

Creating Demand

The joint set is created when there is demand for a co-product. To create the demand:

1. Create structure code in Formula Code Maintenance (15.1)
2. Create formula structure in Process/Formula Maintenance (15.18)
3. Roll up costs for routing
4. Roll up costs for product structure
5. Create a demand for the product/item at the site.
6. Run MPR to create a planned joint set.
7. View the planned joint set in QAD ERP.

Note The capacity planning is done at the base order level.

Displaying Co-By Product Items

For production lines, use either the MSW or PSW to display:

- Base process items
- Co-/by-product items
- Co-/by-product production orders
- Co-/by-product joint order sets

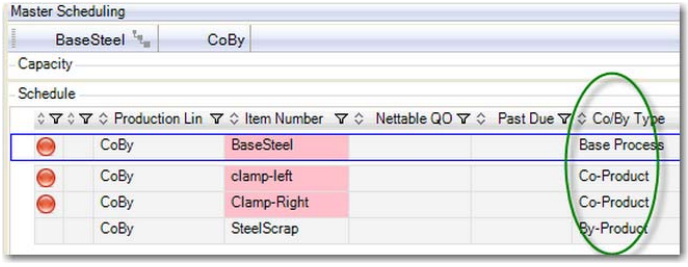
For work centers, use only the MSW to display:

- Base process items
- Co-/by-product items
- Co-/by-product orders
- Co-/by-product joint order sets

The MSW Schedule Grid displays all base and co-/by-product items and production order quantities by production order due date of the base process production order. Work center data includes the display of quantities by operation due date of the base process production order. Production lines display order header record data; work centers display production order operation record data.

Note To suppress base process items or by-product items from the Schedule Grid, you must add a column to you view to filter out base and by-product item types. You add the Co/By Type column by right-clicking and selecting to add a column. The following graphic depicts the column in the MSW Schedule Grid.

Fig. 7.3



Note The PSW Schedule Grid *only* displays the production order records of the base process item.

Disabled Fields

In the Production Order Maintenance frame within the workbenches, fields that do not allow you to input values are disabled and grayed.

Fields in the Details Frame in the Production Order Maintenance portion of the MSW are disabled for all co and by product orders.

Retrieving Co-/By-Product Records

You can retrieve co-/by-product joint order sets in the workbenches. For any production order belonging to a joint order set, the system loads all data for all production orders related to the joint order set, when you load data for the resource.

Managing Base Process Items

The base item displays in the workbenches. The base item production order contains all master data for the joint order set, including BOM, routings, and so on. You can create a joint order set in the Schedule Grid by entering a quantity for a base process item or a co-product item.

The workbenches do not prompt you to schedule the base item on the MSW, since there is never direct demand (forecasts/sales orders) for the base process item.

Calculations

For work center machines, the required capacity is driven from the base process operation required capacity related to:

- MSW operation due date
- PSW operation release date

For production lines, the required capacity is driven from the base process order header required capacity related to:

- MSW order due date
- PSW order release date

Note Co-/by-product orders are not considered from a required capacity perspective.

For each base and co-/by-product item, the POH is based on the production order quantity of each individual base and co-/by-product order per the production order due date. When applying a negative POH color indicator to co-/by-product orders, the system never applies the color to base process items since the POH of the base item is never negative.

Updating Dates and Quantities for Order Sets

For production lines, you can schedule the co/by-product items, modifying the order header level data only.

For work centers, you can schedule co/by-product order sets or co/by-product items, modifying order header level data only.

The workbenches do not support operational-based scheduling, so, you cannot modify operational due or release dates for co-/by-products.

You can make the following changes to the order sets:

- Update the quantity in MSW Schedule Grid
- Update the quantity and date in the PSW Sequence Grid
- Update the quantity and date in Production Order Detail Maintenance
- Update the quantity and date in the Order Relationships tab in Production Order Maintenance
- Optionally synchronize quantity changes in the Order Relationships tab

Updating Quantities

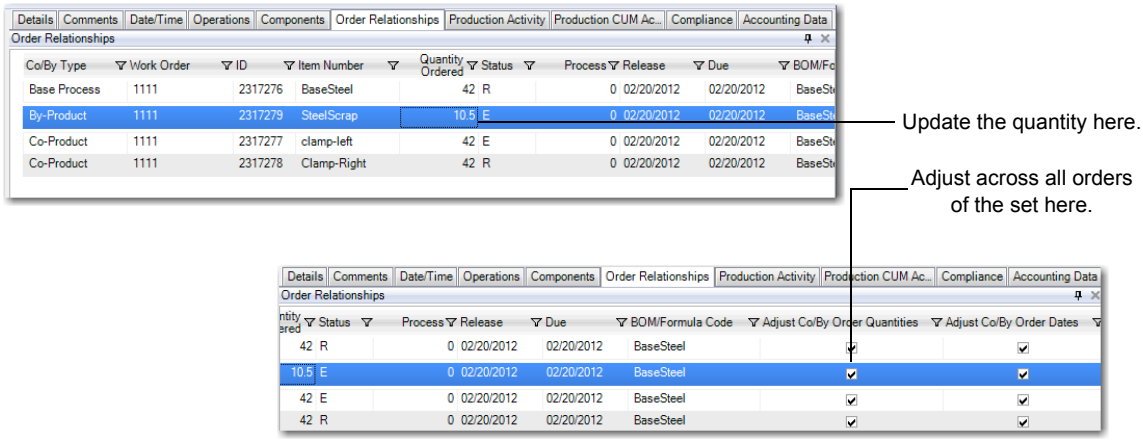
From the workbenches, you can control how many co-/by-products you expect to generate from the base process. You can make changes in the Schedule Grid or Sequence Grid or in Production Order Maintenance tabs within the workbenches.

When the order has an E(xploded) status, you can optionally synchronize the changes across all orders in the order set or just apply the change to the single production order record. You select the Adjust Co/By Order Quantities field to apply changes to all orders.

Example The default expected co-/by-product quantity is 10, but you adjust the value to 12. The system prompts you to synchronize all orders since the order status is E You specify Yes, and the system synchronizes.

The following figure depicts a co-product order within the Order Relationships tab.

Fig. 7.4
Change Quantity



Updating Dates

You can update the production order dates of a co-/by-product production order of a joint set in the workbenches. You can make date changes in the Sequence Grid or in Production Order Maintenance tabs within the workbenches. For example, using the Adjust Co/By Order Dates field in the Operational Relationship tab of the Production Order Maintenance within the workbenches, you can control expected release/due dates of each order within the order set. The system always synchronizes across the orders when you modify the date. When you deselect the Adjust Co/By Order Dates field, the system does not synchronize changes you make to the order.

Example The default expected co-product release or due date is 4/01; however, you select Yes to adjust the date and change the date to 4/02. The system synchronizes all order dates to 4/2 in the order set.

Creating an Order for Co-/By-Product Items

The system treats co-/by-product records as standard production order records; however, there are differences between them. Co-/by-products do not have their own BOM and routing. The system creates a joint order set automatically when the co-product item references the base process BOM on the item master. This is part of the standard set up for joint order items. So, you can create a co-/by-product joint order set dynamically by creating an order from the base process or co-/by-product item.

When you create, the system immediately displays the complete co-/by-product joint order set. The default order due date of all orders in the co-/by-product joint order set are based on workbench current logic. The co-/by-product items must specify the BOM code of the base process item in Item Data Maintenance.

You can add an order to the joint set when you create the order on the workbench and use the same production order number of the joint set on the new order. The item on the new order must be an item not currently part of the joint product structure.

Deleting Orders

The joint order set is only deleted when you delete the:

- Base process
- Last co-product

To delete a co-/by-product order with a status of E(xploded), you must run Prod Order Accounting Close (16.20.10) before you can delete the joint set. This is the standard QAD EPR functionality for co-/by-products. Or, you can set the status back to F(irm) to delete the orders.

Dividing Production Orders

Currently, in the workbenches, you cannot divide an order in the joint product order set, even the base process order.

Chapter 8

Enterprise Asset Management

The following topics describe how to view and leverage EAM maintenance and repair production orders within the Master Scheduling Workbench (MSW).

Introduction 152
Introduces EAM in the workbenches.

EAM-Workbenches Setup 152
Describes setup steps you should perform in both EAM and QAD ERP to ensure workbench-EAM integration.

Workbenches EAM Features 157
Introduces EAM workbench features.

Working with EAM Repair Orders 159
Describes the pulled-in QAD EAM production order functions presented in the workbenches, including field descriptions for various programs.

Introduction

The Planning and Scheduling Workbenches are integrated with QAD Enterprise Asset Management (EAM).

EAM provides supply chain management solutions for project accounting, plant maintenance, repair, and operation, including inventory and purchasing. EAM is integrated with Manufacturing and Financials, too. Using EAM, you can create entries that describe individual pieces of equipment with assigned attributes, then create repair production orders that reference the equipment entries. These production orders also contain information about how long the equipment is down. It is this aspect of EAM that constitutes the bulk of the interaction with the Planning and Scheduling Workbenches.

Within the Planning and Scheduling Workbenches, you can see information about planned/preventative maintenance work that is scheduled in EAM. Since EAM manages your organization's physical assets by maximizing manufacturing equipment use and minimizing repair costs, you can see EAM orders within the EAM Repair Orders tab that displays at the bottom of the workbenches. You also can see that an order is an EAM order as well as the status of the order by an icon that displays in the Schedule Grid.

The following topics describe in more detail how to display and access EAM repair order data.

EAM Production Orders

EAM production orders outline upcoming maintenance. After the work is completed, the system or users update the production order with summary information. By the time it closes, a production order contains valuable data for historical reporting and analysis.

Production orders can contain information on the equipment ID, a statement of work to be done, any precautions, the employees responsible for doing the labor, the scheduling information, the expense accounting structure, and the recipient of the expense.

When the work is complete, technicians can record the type of failure that caused the event and the type of repair made. They can associate it with specific systems or assemblies on the piece of equipment for clearer definitions of where the problem occurred. They can record the amount of downtime that was associated with the event and the amount of labor that was required to repair the problems.

EAM-Workbenches Setup

Before you can use the Planning and Scheduling Workbenches with EAM production orders you must set up EAM and QAD ERP integration. The following topics provide more information.

Equipment Mapping

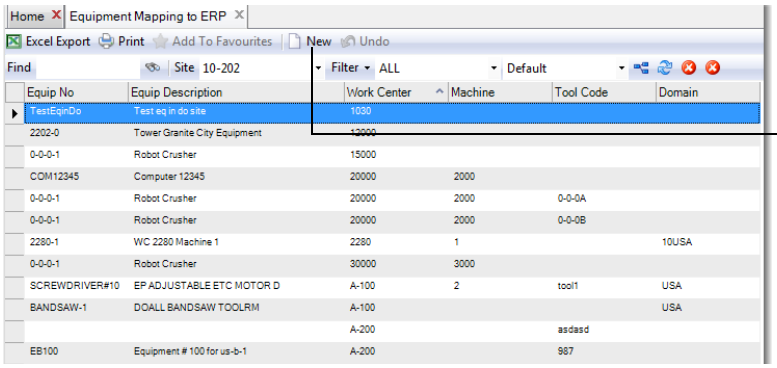
To set up EAM for workbenches integration, you must set up the mapping between the equipment entries of interest to the QAD ERP production lines and work centers of interest. This is done using these EAM programs:

- System Administration/Equipment Mapping to ERP
- System Administration/Production Line Mapping to ERP

Equipment Mapping to ERP

Under System Administration, select Equipment Mapping to ERP to create a *new* equipment record for your work center.

Fig. 8.1
Equipment Mapping to ERP

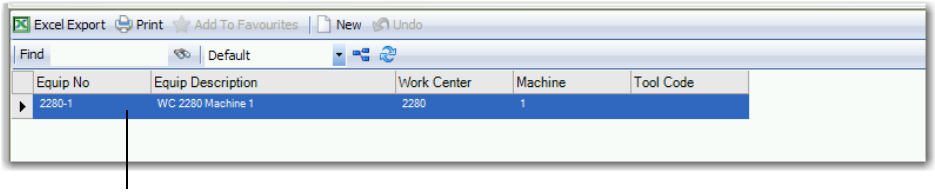


Click the New button to create a new equipment mapping to work center machines as the equipment.

1. Click New to enter a new equipment mapping.
2. Specify the work center as the equipment.
3. Enter other fields as required; then, save your data.

You should see your work center as equipment in any of the EAM equipment lists, as shown in the following figure.

Fig. 8.2
Equipment Mapping to ERP, Work Center



Workbenches work center mapped as equipment to EAM.

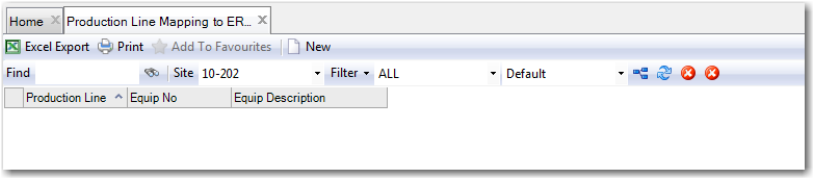
Production Line Mapping to ERP

You can also map a production line to ERP as you did the work center.

Note You can map an equipment instance to either a work center or a production line, or both; however, it is not required that you map both. It is only necessary to map EAM machines to ERP work centers if the item that is scheduled on the production line has a routing that contains the ERP mapped work center.

In Production Line Mapping to ERP, click New, then enter the workbenches production line data.

Fig. 8.3
Production Line Mapping to ERP



QAD ERP Setup

EAM data is retrieved by calling an EAM instance's AppServer. Therefore, you have to set up the workbenches server-side software so that it can call the EAM AppServer. You can do this at any time. The EAM Integration functionality remains inactive until you set it up.

To define this, use the following procedure:

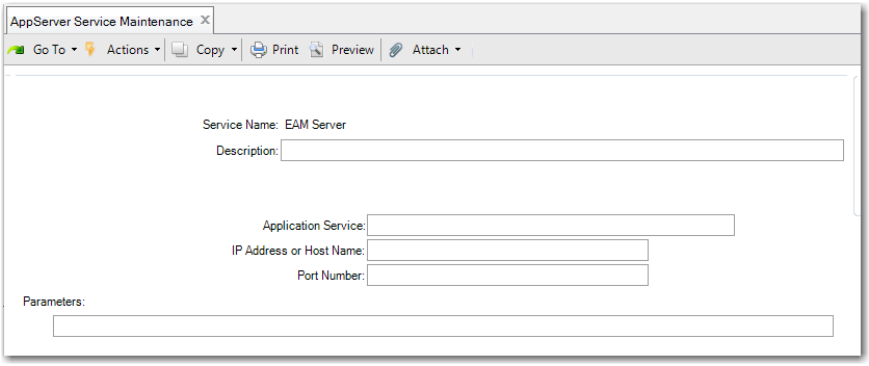
- Define the EAM AppServer in QAD ERP by creating an entry using AppServer Service Maintenance (36.19.1).
- Define the AppServer Service Name to be used for calling the EAM AppServer by using Workbench Control File (22.20.24).

AppServer Service Maintenance

To set up an entry in AppServer Service Maintenance, use the following procedure:

1. Enter the internal name of the application server connection in the Service Name field.
2. In the Application Service field, enter the Progress application service name supplied as the AppServer parameter when connecting to the application server. This is the EAM instance AppServer name.
3. In the IP Address or Host Name field, enter the value supplied as the -H parameter when connecting to this application server. This is the host name or IP address of the machine on which the application server is running.
4. In the Port Number field, enter the port number supplied as the -S parameter when connecting to this application server. This is the port number of the Progress named server that is hosting the application server.
5. Enter any additional parameters required in the Parameters field.

Fig. 8.4
AppServer Service Maintenance (36.19.1)



Workbench Control File

To set up the Workbench Control File, use the following procedure:

1. In QAD ERP, access Workbench Control File (22.20.24).
2. Enter the name of the AppServer service name entered in AppServer Service Maintenance (36.19.1) in the EAM AppService Name field.

   Note If the entry created in AppServer Service Maintenance has wrong values or there are other technical problems encountered in trying to connect to or make calls to the EAM AppServer, the system generates AppShell exceptions. The exception data contains information about the operation being attempted and the failure reasons.

3. Enter a user ID in the EAM User field.

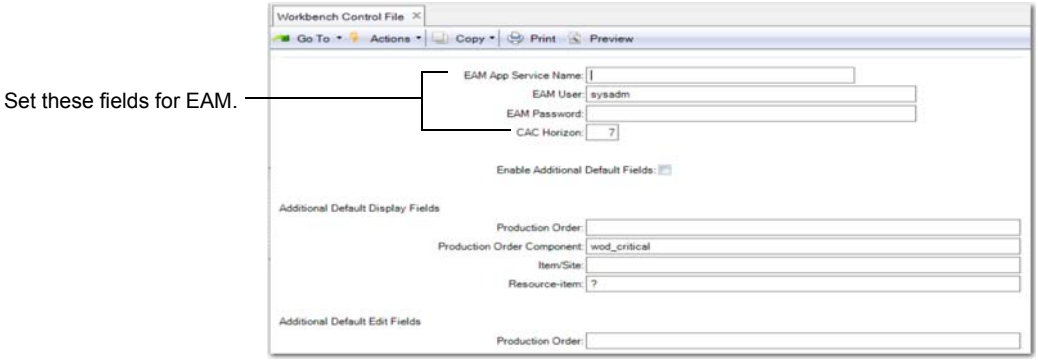
   This is used to authenticate with the EAM API.

4. Enter a password in the EAM Password field.

   This is used to authenticate with the EAM API.

All other fields are for workbenches defaults. Refer to “Setting Up Workbenches Controls” in the MSW chapter.

Fig. 8.5
Workbench Control File (22.20.24)



EAM Setup

You should follow the setup steps of the EAM process map in .NET UI to set up EAM. For most of the steps, refer to the System Administration chapter of the EAM user documentation.

In EAM, ensure that you have the followings set up:

- In System Administration|System Control under the MFG/PRO Options tab, check the MFG/PRO Interface field to use QAD ERP with EAM. Set the remaining fields to interact with the QAD DB.
- In General|Business Units|Domain, ensure that you have the QAD ERP entity and Domain for the workbenches defined in EAM.

  Note In the EAM Domain record, you can set up workbenches bill-to and ship-to addresses in the MFG/PRO Integration tab. You can check EAM Bill-To and Ship-To Downloads to get a list of the bill-to and ship-to addresses.
- In General|Business Units|Sites, ensure that you have a site for the workbenches. You may have to set up a new site, which you can then optionally set to be the primary site.
- In System Administration|User/Roles, set up a user role for the workbenches site. You may have to set up a new user/role.
- In System Administration|Roles, copy the attributes of a system administrator role to the new user role you created for the workbenches site.
- In Production Order Status Maintenance, define the EAM Production Order Status that the system pulls into the QAD ERP workbenches by selecting either Manufacturing Scheduling Active or Manufacturing Scheduling Closed. The system displays only those production orders that have a status indicating Manufacturing Scheduling Active or Manufacturing Scheduling Closed in the workbenches.

  Note The gray EAM hammer and screwdriver icon displays in the schedule grids when there is at least one EAM production order with a status indicating Manufacturing Scheduling Closed. The red EAM hammer and screwdriver icon displays when there are EAM production orders with a status indicating Manufacturing Scheduling Closed and at least one EAM production order with a status indicating Manufacturing Scheduling Active. Orders found for either icon type display in the EAM Repair Orders tab.
- In Production Order|Clearances, define the clearance codes assigned to production orders in EAM that you want the QAD ERP to recognize. For the workbenches to consider displaying an EAM order on the workbenches, the system looks at the clearance code.

  Note The system examines only those production orders that have a clearance code indicating Manufacturing Impact; so, when all production orders have a clearance code with Manufacturing Impact not set, then EAM icons or production orders do not appear in the workbenches.
- In System Administration|Mandatory Fields, set the clearance code as a mandatory field. Select the field using the Mandatory Field Browse, then double-click on it, and ensure that Mandatory is checked.
- In Equipment|Preventive Maintenance (PM), select the Codes tab, then enter hours in the Est Hours Down field.

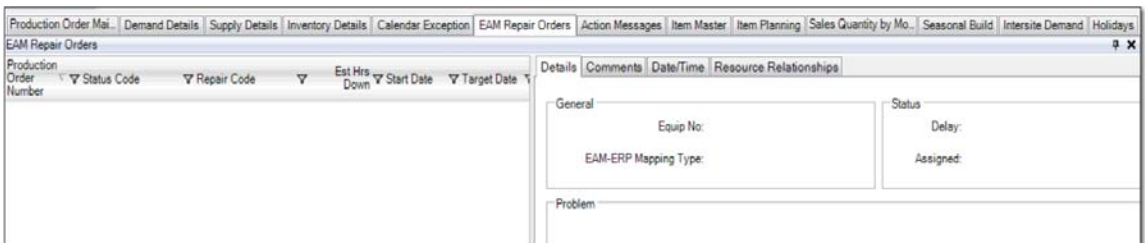
Testing the Setup

You can test the EAM-workbenches integration setup by going to EAM and Production Orders. Select your equipment (work center) then try creating a production order for the work center. You must set these important workbenches-related fields:

- Estimated down start date and time within your MSW/PSW scheduling start and end dates
- Equipment number
- Clearance Code has to indicate Manufacturing Impact

When you create the production order in EAM and save it, you should see the order in the workbenches EAM Repair Orders tab; see Figure 8.6.

Fig. 8.6
Production Order Status



Workbenches EAM Features

Functions within the workbenches let you:

- List EAM orders that are associated with the MSW/PSW resource.
- Display attributes and details of EAM production orders.
- Display EAM order comments.
- Display date and time attributes of EAM orders; for example, indicate estimated start and end downtimes.
- Indicate the production lines or work centers that are associated with the MSW/PSW resource. For example, when the schedule context is for work center 100, the production lines that are associated with work center 100 are listed in the EAM Repair Orders Resource Relationships grid.

The following topics provide more information on EAM functions and features within the workbenches.

EAM Visual Indicators

The Planning and Scheduling Workbenches let you know of the presence of EAM orders by displaying icons in the Remaining Capacity row of the Capacity Grid. There are two different icons that can display depending on the status of the associated EAM orders. The icons can display in any of the cells in the row, depending on whether there are EAM repair orders with particular attributes for that date.

The icons display in the Capacity Grid to let you know that there are EAM orders that might affect manufacturing capacity; however, there is no actual reduction in capacity in the workbenches. You determine when EAM orders impact the capacity and by how much.

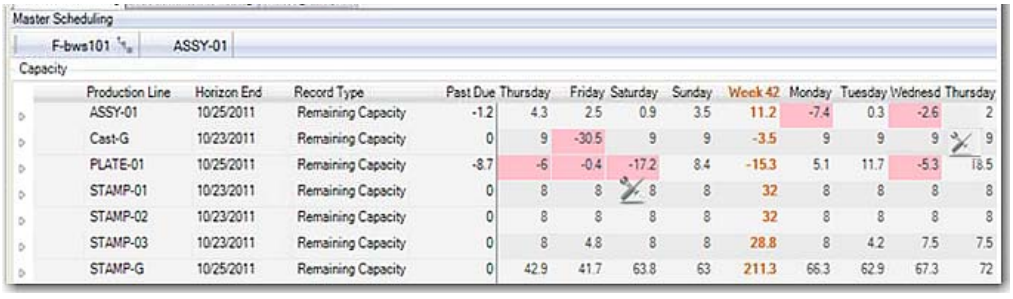
Table 8.1
Visual Indicator Summary

Indicator	Meaning
	There is at least one closed EAM order and no open EAM orders for that date.
	There is at least one open EAM order for that date.

When more than one EAM record exists on the same release or due date with different statuses, the system displays the most severe icon. In most cases, this is the active or red icon indicator. For example, EAM order A has a start date of Monday and a closed status. EAM order B has a start date of Monday and an open status, so the system displays the EAM icon per EAM order B.

The following depicts the icons in the Capacity Panel.

Fig. 8.7.
EAM Icons



Production Line	Horizon End	Record Type	Past Due	Thursday	Friday	Saturday	Sunday	Week 42	Monday	Tuesday	Wednesd	Thursday
ASSY-01	10/25/2011	Remaining Capacity	-1.2	4.3	2.5	0.9	3.5	11.2	-7.4	0.3	-2.6	2
Cast-G	10/23/2011	Remaining Capacity	0	9	-30.5	9	9	-3.5	9	9	9	9
PLATE-01	10/25/2011	Remaining Capacity	-8.7	-6	-0.4	-17.2	8.4	-15.3	5.1	11.7	-5.3	18.5
STAMP-01	10/23/2011	Remaining Capacity	0	8	8	8	8	32	8	8	8	8
STAMP-02	10/23/2011	Remaining Capacity	0	8	8	8	8	32	8	8	8	8
STAMP-03	10/23/2011	Remaining Capacity	0	8	4.8	8	8	28.8	8	4.2	7.5	7.5
STAMP-G	10/25/2011	Remaining Capacity	0	42.9	41.7	63.8	63	211.3	66.3	62.9	67.3	72

Searching for EAM Data

You can use the range of the History and Future Horizon in User Preferences. The system pulls orders based on the EAM order estimated downtime start date. The following topics provide more information on the two workbenches fields:

History Horizon. The workbenches pull active past due EAM maintenance orders to the workbenches, regardless of what you define for this field. They pull closed EAM orders per the value you define here.

Future Horizon. The workbenches pull active and closed EAM maintenance orders, based on the EAM order estimated downtime start date (not the EAM order release date).

Example You set the History Horizon to 10 days. The system displays all active/closed EAM orders through 10 days in the past. You set the Future Horizon to 10 days. The system displays all active or closed EAM orders through 10 days into the future.

Retrieved EAM Data

The system retrieves EAM production orders for the workbenches when the EAM production orders:

- Have an estimated downtime start date within the workbenches history and future horizon
- Have a clearance code that indicates manufacturing impact
- Refer to an equipment instance that has one of these types of mapping to the QAD ERP resource selected in the workbenches:

- A direct mapping—EAM maps equipment instances to the resources selected in the MSW/PSW.
- An indirect mapping—EAM maps equipment instances to work centers which in turn are associated with production lines selected in the MSW/PSW.

Working with EAM Repair Orders

The Planning and Scheduling Workbenches display information about EAM repair orders. This information is displayed in the EAM Repair Orders tab at the bottom of the workbenches; see Figure 8.8. The panels that display are split into two major sections, much like the display for production orders.

The left panel displays a summary of EAM orders that are associated with the resource (work center or production line) that is currently in context. The columns displayed are:

- Order ID
- Order status code description

  Note The Status field is in EAM Production Order|Equipment.
- Repair code description

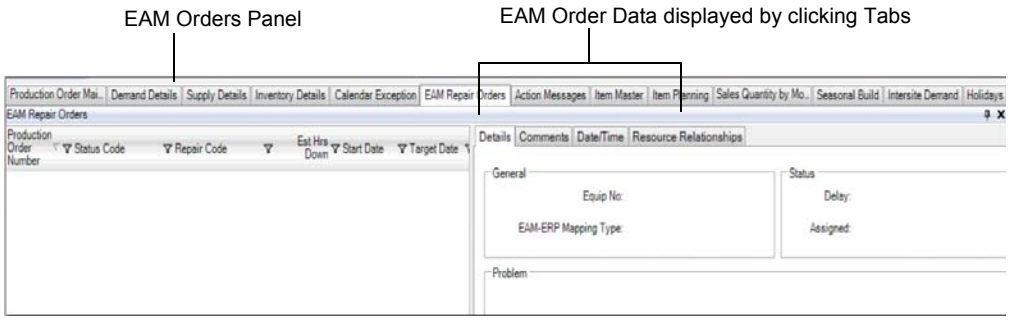
  Note The Repair field is in EAM Production Order|Codes.
- Estimated hours down.

  Note The Est Hours Down field is in EAM PM|Codes.
- Start date and target date

  Note The Start and Target Date fields are in EAM Production Order|Equipment.

The right panel displays various data, depending upon which tab you select. The topics following the graphic describe the data available through each tab.

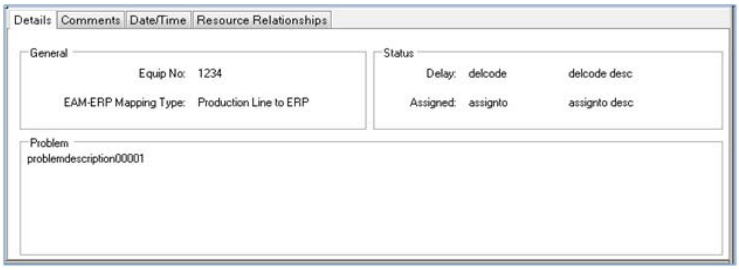
Fig. 8.8.
Workbenches Repair Orders Tab



Details Tab

When a particular order is selected in the EAM Orders grid, this tab will display attributes of the order in a form.

Fig. 8.9.
Workbenches Repair Orders Tab



Equip No. The EAM equipment number.

EAM-ERP Mapping Type. Can be either Production Line to ERP or Work Center to ERP.

Delay. The code and description for the reason why the EAM order is delayed.

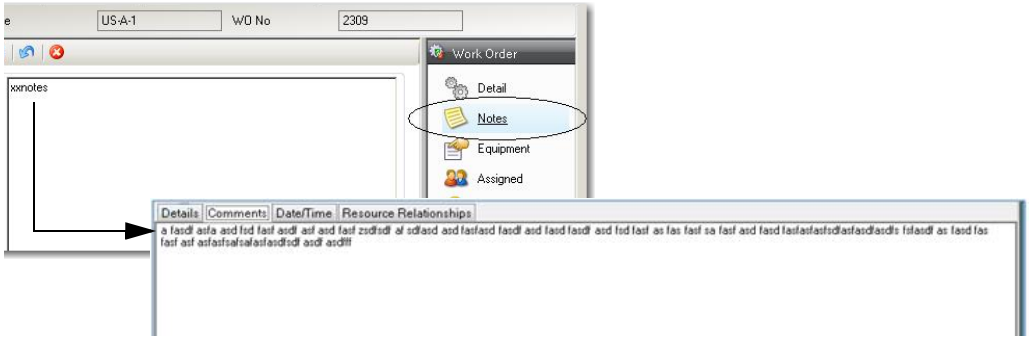
Assigned. The repair technical code and name, assigned to the repair order. This is from the Assigned field in the EAM production order.

Problem. The problem statement.

Comments Tab

Use the Comments tab to view EAM order comments. The comments are from the EAM production order Notes feature in EAM Production Order Maintenance. Figure 8.10 shows the workbenches comments tab; it also shows the Notes section of the EAM production order from which the comments emanate.

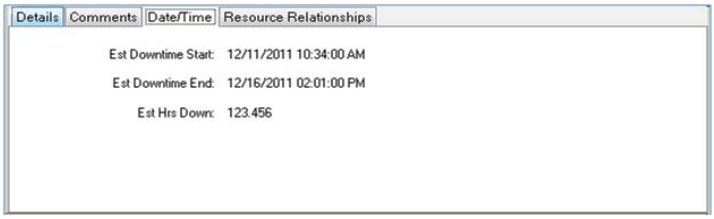
Fig. 8.10.
Comments Tab



Date/Time Tab

This shows date/time attributes of the EAM order.

Fig. 8.11.
Date/Time Tab



Est Downtime Start. The estimated downtime start date and time of the EAM order.

Est Downtime End. The estimated downtime end date and time of the EAM order.

Est Hrs Down. The estimated downtime in hours of the EAM order.

Resource Relationships Tab

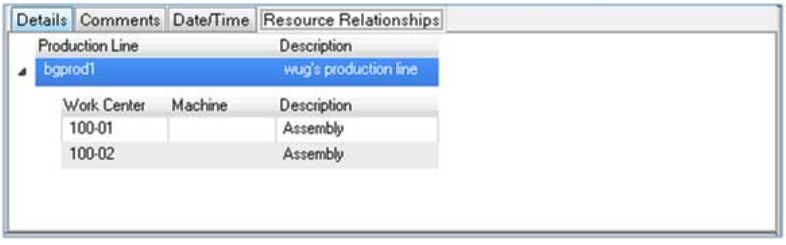
This shows the production lines or work centers that are associated with the MSW/PSW resource in context. The resource in context is the particular resource you select in the MSW/PSW either from the Navigator or by clicking a row in the Schedule Grid. For a resource in context:

- When it is a production line, then its related work centers are listed. This relationship is established because production lines reference production orders, and production order routing details reference work centers.
- When it is a work center, then its related production lines are listed. This relation is established because work centers reference production order routing details, and production orders reference production lines.

This information lets you know which resources might be affected when there are EAM production orders for a related resource.

In the following screenshot, the production line `bgprod` is in context and the work centers that are associated to it are listed below.

Fig. 8.12.
Resource Relationships Tab



Chapter 9

Leveling

From the Japanese, leveling reduces “unevenness” (Mura), which in turn reduces “waste” (Muda). The Planning and Scheduling Workbenches provide the capability to level production orders for a production line, to create a schedule with smaller production intervals and more frequent production orders, to smooth requirements within the production scheduling horizon.

Reduced variability, a level schedule with small production intervals, leads to simpler material and capacity planning. The leveling process determines the mix, sequence, and flow of production, to create a schedule that can be supported by production resources.

Introduction

As illustrated in the beginning of this document, QAD Adaptive ERP includes the functionality previously associated with QAD Cloud ERP and QAD Enterprise Applications – Enterprise Edition, plus the QAD Enterprise Platform and Adaptive UX. Both the QAD Planning and Scheduling Workbenches and Adaptive UX provide the capability of production line leveling.

The QAD Planning and Scheduling Workbenches provide the capability of performing EPEI leveling. They also allow you to launch the Production Line Leveling feature supported by Adaptive UX from the Workbenches, when Adaptive UX is in use.

When you click Level on the Workbenches, the Workbenches invoke different leveling logic, depending on whether Adaptive UX is installed and is in use:

- “Leveling Capability with Adaptive UX Installed”
- “Leveling Capability without Adaptive UX Installed”

Leveling Capability with Adaptive UX Installed

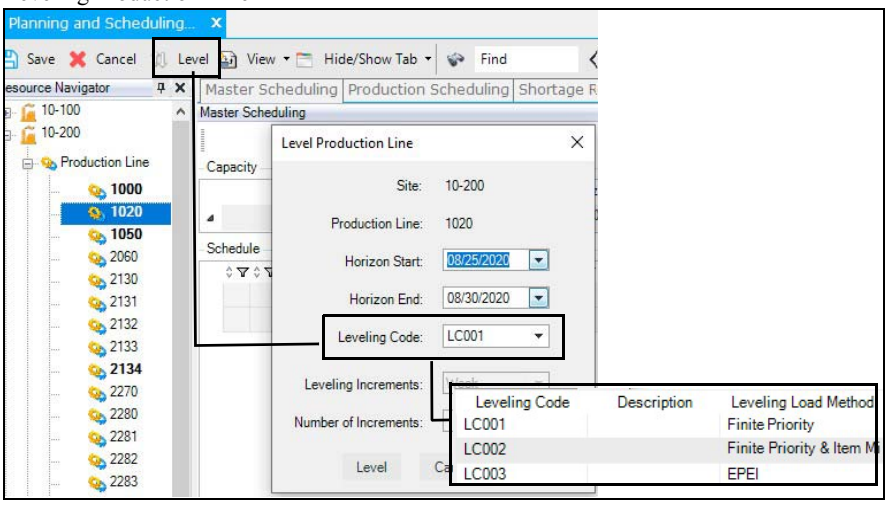
If Adaptive UX is installed and is in use, the system invokes and executes the Production Line Leveling logic on Adaptive UX, which supports the following leveling methods:

- Every Part Every Interval (EPEI) Leveling
- Finite Capacity By Priority Leveling
- Finite Forward Leveling
- Item Mix Leveling
- Finite Capacity By Priority-Item Mix Leveling

Note For more details about the Production Line Leveling feature provided by Adaptive UX, see the *Adaptive UX Online Help*.

You can then use any of the preceding leveling methods on the Workbenches.

Fig. 9.1
Leveling Production Line



When you select a production line and click Level, the system displays the leveling code associated with this line in the Leveling Code field, or leaves this field blank if no leveling code has been assigned to this line. The Leveling Code field is editable. You can click the drop-down arrow and choose from the available leveling codes to perform the designated leveling.

Note The newly selected leveling code applies only to the current leveling operation, and will not replace the original leveling code associated with this line.

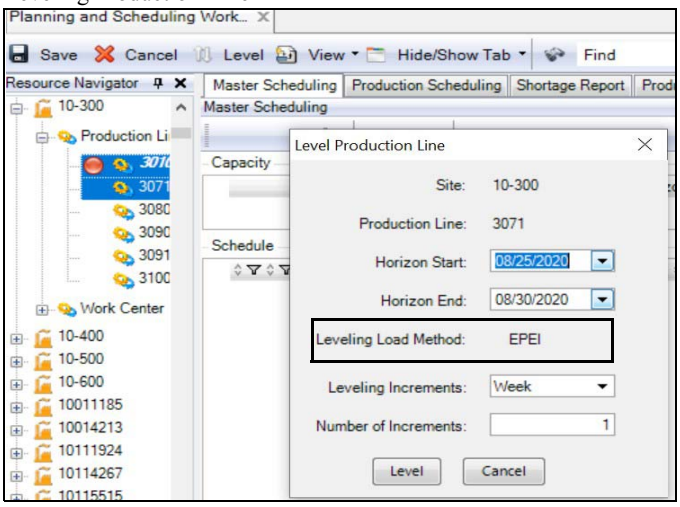
The Leveling Increments and Number of Increments fields are used to define time bucket parameters for EPEI leveling. They are editable only when Leveling Code is left blank or is set to a code representing the EPEI leveling load method. For details about how to set the time bucket, see “Time Bucket Parameters” on page 178.

When Leveling Code is left blank or no leveling code has been assigned to a production line, the system performs EPEI leveling on this line.

Leveling Capability without Adaptive UX Installed

If the Workbenches is not installed with Adaptive UX, the system invokes and runs the EPEI leveling logic on the Workbenches.

Fig. 9.2
Leveling Production Line



The system displays the Leveling Load Method field rather than Leveling Code. This field is read-only and defaults to EPEI. You can then set the Leveling Increments and Number of Increments fields to define the time bucket.

For details about the leveling methods supported on Adaptive UX, see the *Adaptive UX Online Help*. Unless otherwise specified, the information provided in the following sections of this chapter applies only to EPEI leveling on the Workbenches.

Objectives

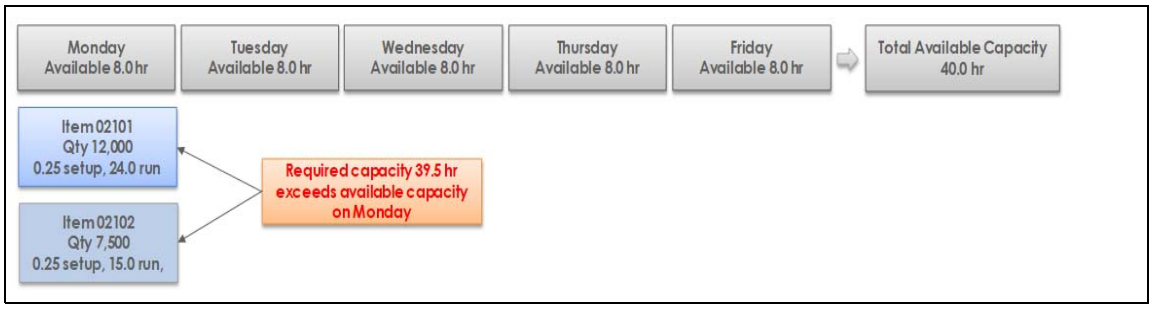
The primary objective for leveling is to reduce the variability of demand for materials and the capacity requirements for production resources. The objectives are to:

- Create a regular and constant rate of production.
- Smooth the production of items to increase responsiveness to changing customer demand and to increase the product availability to satisfy that demand.
- Reduce the variability of demand for materials and the capacity requirements for production resources across time.
- Reduce inventory while decreasing both production lead time and order promising lead time.

Business Drivers for Leveling

The primary reason for leveling production stems from the fact that production schedules are uneven. This presents fluctuations in the demand for production resources, demand that can often exceed the capacity for any given day. What causes uneven schedules? To begin with, the master schedule may contain production orders that are scheduled by week, with a status of being Firm or Planned, for material requirements planning and rough-cut capacity planning. While this may be acceptable within the master schedule horizon, the production schedule may require production orders that are scheduled more frequently, to level the demand for component materials, and to balance the load on production lines and work centers.

Fig. 9.3
Business Drivers for Leveling



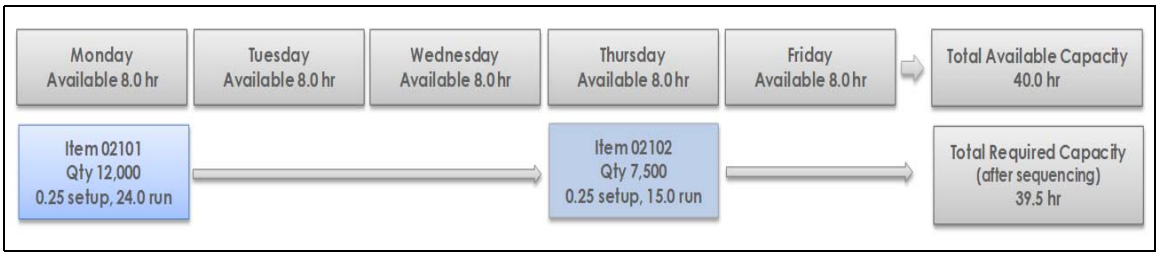
A typical master schedule is stated with weekly quantities, usually due on the first day of the week. Since the master schedule is a series of production orders for different items, all the material requirements for all the components for a week are due on the same date, and all the capacity requirements for shared resources are on the same date as well.

The degree to which demand and capacity variability can be reduced depends on spreading the master schedule quantities over the week, instead of bunching them on a single day. Yet, if the process of spreading master schedule quantities is limited to moving large lot sizes, over the course of the week, the component requirements and capacity requirements may still be lumpy. This lumpiness can only be reduced by taking additional step to reduce the lot sizes, and as a result reduce the “production interval”, the amount of time it takes to get back to the first item in the production sequence.

Sequencing versus Leveling

The process of sequencing production orders within a time bucket is not the same as leveling. Sequencing is not leveling. This explains why the problem of uneven schedules is not solved by the simple re-sequencing of orders. Sequencing alone provides little reduction of variability or “lumpiness” of material requirements and capacity requirements.

Fig. 9.4
Sequencing versus Leveling



Leveling: A Simple Example

The following example shows the production line schedule before leveling, the parameters for leveling, and the schedule after leveling.

There are two items with one order scheduled on the first day of the week. The 31.4 hours of required capacity for that day exceeds the 8.0 hours of planned capacity.

Fig. 9.5
Before Leveling

Master Scheduling

02100

Capacity

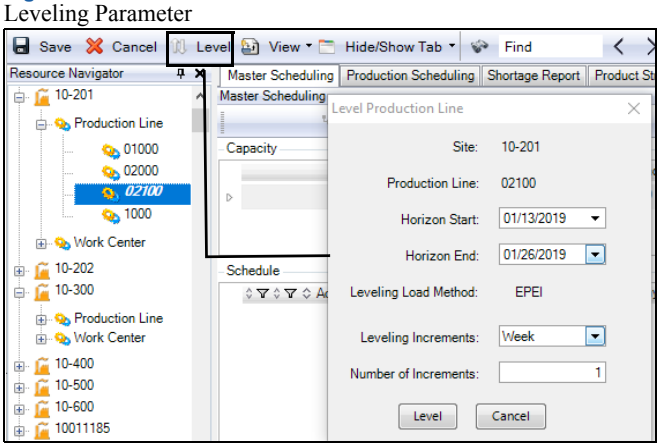
Production Line	Horizon End	Record Type	Past Due	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Sunday	Week 4
02100	02/15/2019	Remaining Capaci	0	-23.4	8	8	8	8	0	0	8.6
		Planned Capacity	0	8	8	8	8	8	0	0	40
		Required Capacity	0	31.4	0	0	0	0	0	0	31.4
		Scheduled Quantit	0	31000	0	0	0	0	0	0	31000
		Cumulative Capac	0	0.6	8.6	16.6	24.6	32.6	32.6	32.6	32.6

Schedule

Activity	Production Lin	Item Number	Nettable QO	Past Due	01/21	01/22	01/23	01/24	01/25	01/26	01/27	01/21 -
Yes	02100	02101			16000							16000
Yes	02100	02102			15000							15000

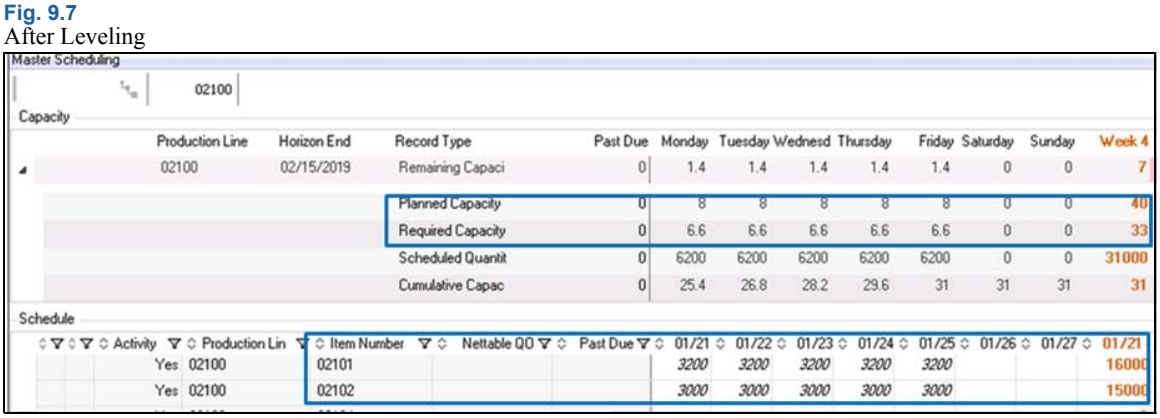
Leveling can be applied for a two-week leveling horizon.

Fig. 9.6
Leveling Parameter



In this example, the production orders created during leveling spread across a week for each item.

Fig. 9.7
After Leveling



Business Case Applications

Leveling is commonly used with Lean manufacturing, Kanban, make-to-stock (MTS) items, and finish-to-order (ATO). Leveling is also done for Finish-to-Order (Assemble-to-Order) situations where planning is done using planning bills of material, and could be done for MTO/ETO situations where there are a few “model” bills of material that are used for planning component materials up to the point of having a customer order or having an engineering design.

What Makes Leveling Effective

The effectiveness of leveling is directly related to the degree that production intervals can be reduced. Physical and process improvements to the production process, as well as setup time reduction are particularly required to achieve this.

By creating a production environment in which each item is produced as needed, in the smallest possible quantities, you achieve a regular drumbeat, eliminating the lumpiness of component requirements as well as the lumpiness of capacity requirements, simplifying the process of both inventory replenishment and capacity planning.

The smallest production interval is called Every Part Every Interval (EPEI). EPEI is an interval during which every item can be set up and produced within a time bucket. It is calculated from the time available for production, the current setup time for each part, and the current run time for each part.

Basic Requirements for Leveling

To assure consistent application of measures to determine how schedules are leveled, the production orders for all of the items that are scheduled on a production line must be either:

- Non-Kanban and Kanban items that are not identified with a Kanban Process that is identified with the production line, or
- Kanban items identified with a Kanban Process that is identified with the production line.

The production orders within the leveling horizon should consist primarily of “non-fixed” orders, those with production order status Planned or Firm.

When the leveling horizon contains both “fixed” orders, those that have production order status of exploded, allocated, or released, together with “non-fixed” orders, the leveling process first loads the fixed orders using backward scheduling, then it loads and automatically level schedules the non-fixed orders.

Leveling, EPEI, and Takt Time

Leveling minimizes lot sizes while increasing the number of setups but not exceeding the available capacity of a production line. It determines EPEI, the smallest interval that every scheduled item can be set up and produced within a time bucket. After determining the EPEI, the leveling process schedules items to be set up and produced for the same number of times (intervals) within a time bucket using takt time. Leveling with EPEI:

- Maximizes the number of intervals that every item can be produced within a time bucket, by consuming the available capacity.
- Minimizes the interval for producing each order.
- Results in greater number of orders, reducing lot sizes, and increasing the number of setups to fully use the available capacity.

EPEI

EPEI is calculated from the available capacity for the production line, the time required for fixed orders, the required quantities and run time for non-fixed orders, and the setup time per unit for all non-fixed orders items. It can be expressed as:

EPEI = Time available for setup of non-fixed orders / Setup time (per unit) for all non-fixed order items

where,

Time available for setup of non-fixed orders = Available capacity for non-fixed orders - Runtime for non-fixed order quantities

and

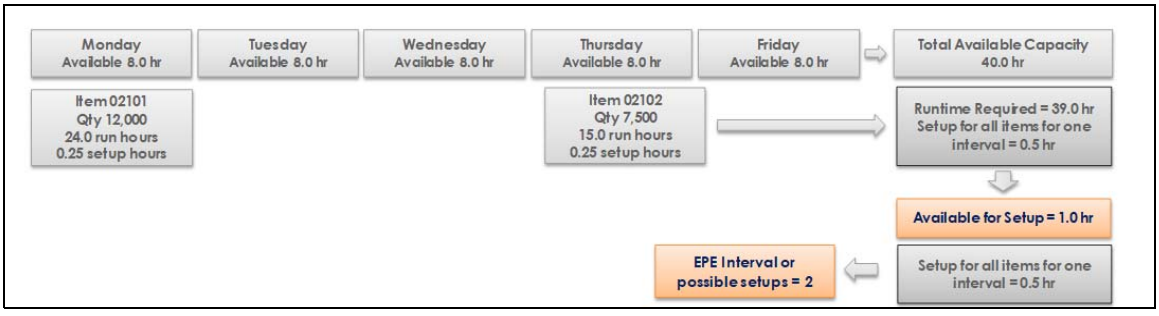
Available capacity for non-fixed orders = Total available capacity - Setup and runtime required for fixed order quantities

In detail, EPEI is calculated as:

EPEI = (Total available capacity in time bucket - Setup and runtime required for fixed order quantities - Runtime required for non-fixed order quantities) / Setup time (per unit) for all non-fixed order items

The following diagram illustrates the calculation of EPEI, the EPE interval.

Fig. 9.8
Calculation of EPE Interval



Takt Time

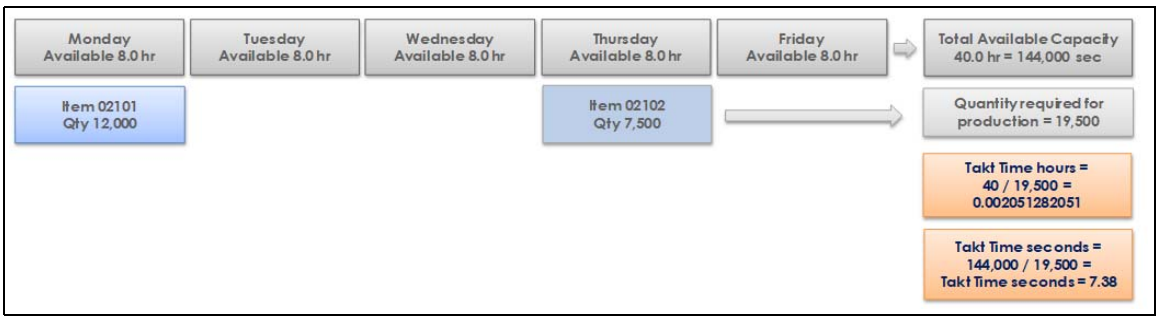
Takt time is the average pace at which items are produced on a production line. It can be expressed as:

Takt time = Total time available capacity for production in time bucket / Total quantity required for production (for both fixed and non-fixed orders)

Leveling schedules orders using takt time within intervals calculated for a scheduling bucket.

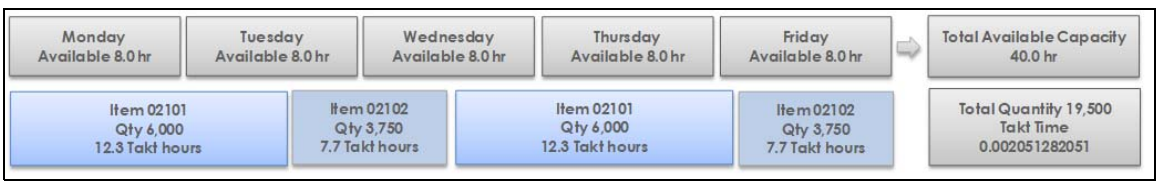
The following diagram illustrates the calculation of Takt time.

Fig. 9.9
Takt Calculation



Leveling schedules orders using takt time within EPE intervals. This diagram shows how leveling two production orders resulted in four production orders, scheduled in two intervals.

Fig. 9.10
Takt Hours



Takt time is also used to determine the maximum quantity that can be produced on a day, where:

Daily maximum quantity = Daily available time / Takt time

The daily maximum quantity can alternatively be expressed as:

Daily maximum quantity = Total quantity required for production / Number of working days in a time bucket

The leveling process schedules production using the Takt time and EPEI (every part every interval). Leveling calculates EPEI - the smallest production interval possible for producing items within a time bucket, the time interval during which every item can be setup and produced. EPEI is calculated from the time available for production, the setup time for each item, and the run time for each item. The ultimate goal of EPEI leveling is to get to the shortest possible interval for producing an item while meeting demand.

Leveling with EPEI:

- Maximizes the number of intervals that every item can be produced within a time bucket, by consuming the available capacity.
- Minimizes the interval for producing each order.
- Results in greater number of orders, reducing lot sizes, and increasing the number of setups to fully use the available capacity.

Sequencing within an Interval

The production of items within an interval is sequenced by the:

- Mfg Seq setup for a Kanban Process and item
- Run Sequence setup for the item and production line
- Item number

Note For Kanban items, the system considers the Run Sequence setup in Item Production Line Maintenance instead of Mfg Seq in Kanban Process Maintenance.

Use Kanban Process Maintenance to set the value for the Mfg Seq parameter for an item.

Fig. 9.11
Kanban Process Maintenance (17.1.3.1)

Site: 10-201 Lean Manufacturing Site
Process: FA Final Assembly

Kanban Process Detail

Item Number	Step	UM	UM Conv	Kanban Qty	SM Site	Supermkt
02101	0	EA	1.0000	100.0	10-201	FGI
02102	0	EA	1.0000	100.0	10-201	FGI
02103	0	EA	1.0000	100.0	10-201	FGI

Item: 02101 Step: 0 Mfg Seq #: 0
EPEI: 0.861 Setup Time (D H:M:S): 0 00:12:00
EPEI Auto: ☑ Cycle Time (D H:M:S): 0 00 00 01.8000
Min EPEI: 0.000 Work Time (D H:M:S): 0 00 00 07.1006
Yield: 100.00% Lead Time (D H:M:S): 0 00:00:00
Start Op: 0 End Op: 10 Move Time (D H:M:S): 0 00:00:00
Req Oper: 0.0 Equipment Time (D H:M:S): 0 00:00:00

Use Item Production Line Maintenance to set the value for the Run Sequence parameter for an item on a production line.

Fig. 9.12
Item Production Line Maintenance (16.1.4)

Item Production Line Maintena...
Go To | Actions | Copy | Print | Preview | Attach

Item Number: 02104
Site: 10-201
Production Line: 02100
Units/Hour: 1,000.00
Setup (D H:M:S): 0 00:30:00
Start: 10/22/2018

Items

Units/Hour: 1,000.00
Number of Lines: 1.0
Setup Time (D H:M:S): 0 00:12:00
Minimum Interval: 0.000 Hours
Setup Crew: Size: 0
Run Crew: Size: 1
Routing: V-001 Valve Assembly
BOM Code:
Tool ID:
Run Sequence 1: 4 2: Comments:

Leveling and Scheduled Capacity

The planned and required capacities for a production line appear in the Master Scheduling Workbench Capacity panel. Leveling schedules orders so that the **required capacity** for the quantities of items scheduled on a day, does not exceed the **scheduled (planned)** capacity for that day. The required capacity is determined using the setup and run time for the item and routing, together with the production quantity. When the production of an item within an interval spans more than one day, leveling creates orders for each day.

Fig. 9.13
Planned Capacity and Required Capacity

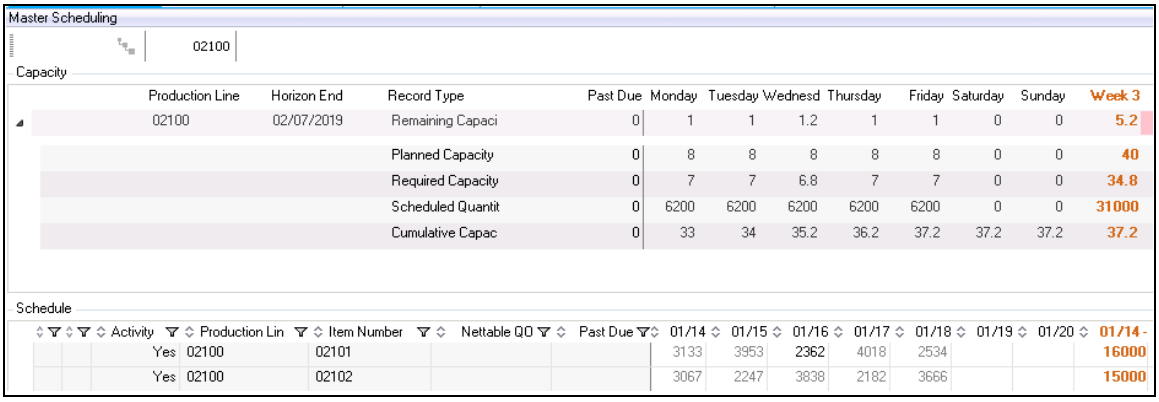
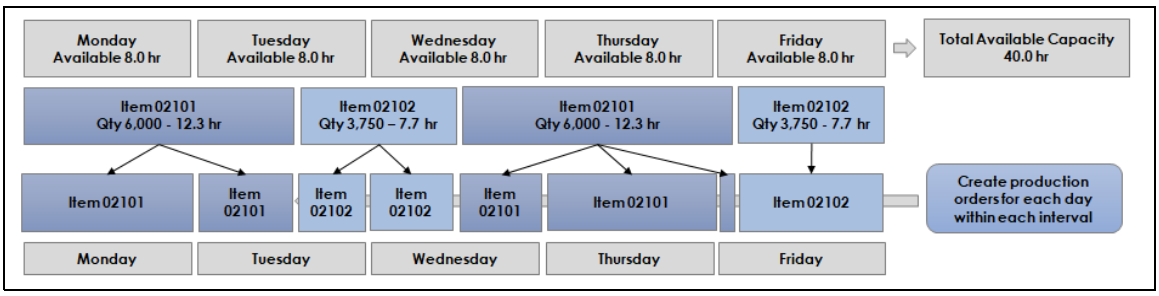


Fig. 9.14
Multiple Production Orders

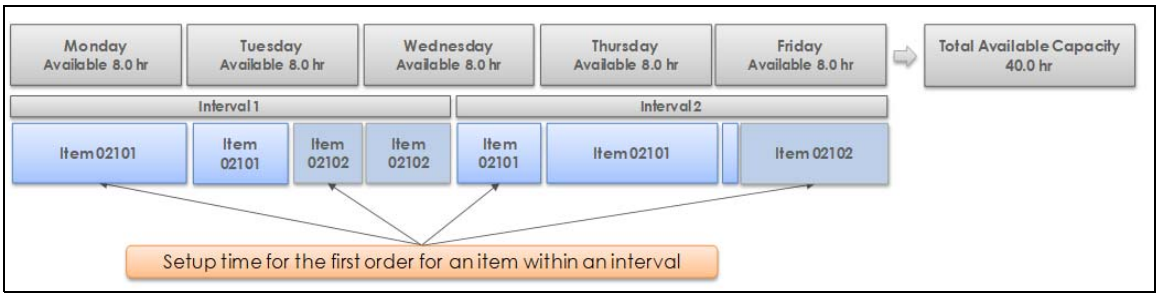


Important When the production of an item spans more than one day, it results in multiple production orders. Be especially careful not to confuse the **number of production orders** created for an item, with the **number of intervals** the item within a time bucket.

Required Capacity and Setup Time

The required capacity for each day is determined by the setup and run times for orders. When the production of an item within an interval spans more than one day, setup time is included in the first order for the item within the interval. Other orders for the item within the interval do not include setup time.

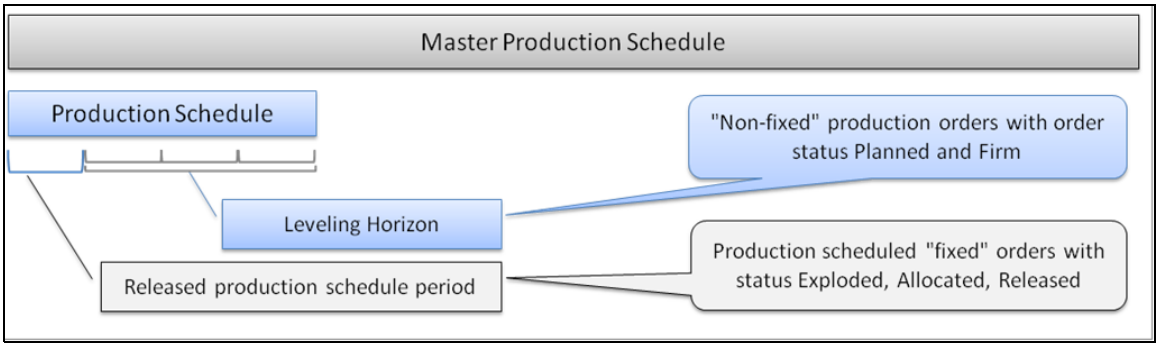
Fig. 9.15
Required Capacity and Setup Time



Production Orders and Leveling Horizon

Leveling should be applied within the production scheduling horizon. The focus of the leveling horizon should be beyond the immediate, short-term portion of the released master production schedule.

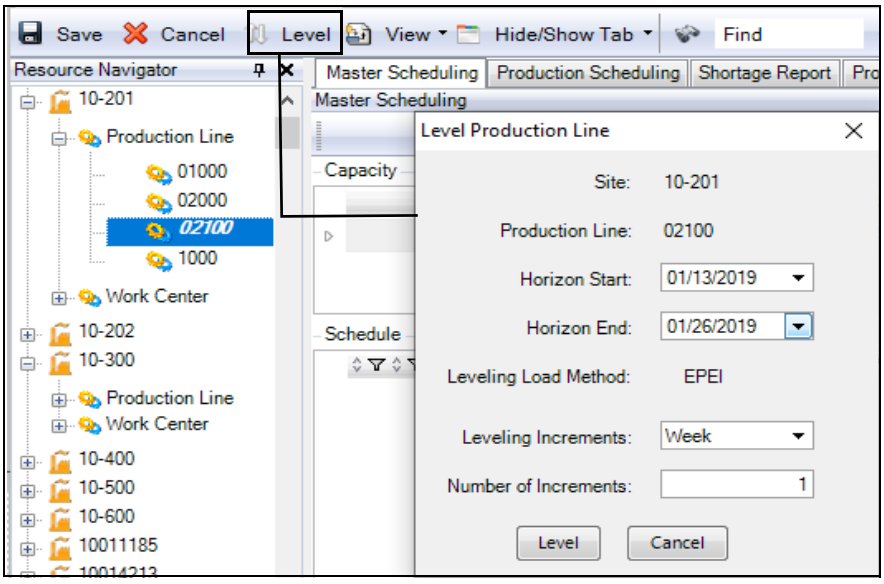
Fig. 9.16
“Fixed” versus “Non-fixed” Orders



The leveling horizon is the period during which leveling calculations are performed and orders can be automatically scheduled by the leveling process. The leveling horizon typically contains “non-fixed” production orders with status Planned, or Firm, that can be automatically rescheduled by the leveling process. It is preceded by the released production schedule period which contains “fixed” production orders order status Exploded, Allocated, and Released that are not automatically rescheduled.

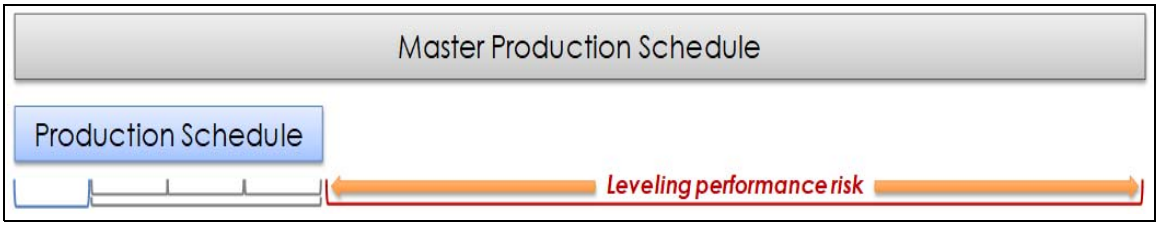
The leveling horizon is defined by the Horizon Start and Horizon End dates.

Fig. 9.17
Leveling Horizon



Important When the leveling horizon contains both “fixed” and “non-fixed” orders, the leveling process first loads the fixed orders using backward scheduling, then it loads and automatically level schedules the non-fixed orders, using the remaining capacity within a scheduling bucket.

Fig. 9.18
Extending Leveling Horizon



Warning Extending the leveling horizon beyond the production schedule may result in excessive processing times. Although there may be reasons for leveling the entire master production schedule, the processing time may not be acceptable.

Leveling Horizon and Time Buckets

Leveling, Production Lines, and Kanban Processes

Leveling requires that all of the items for a production line must be either:

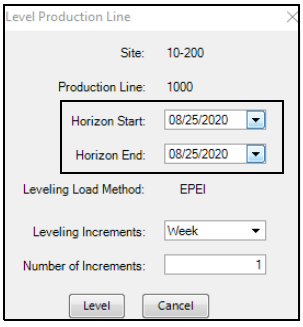
- Kanban items identified with a Kanban Process that is identified with the production line, or
- Non-Kanban and Kanban items that are not identified with a Kanban Process that is identified with the production line.

This is to assure the consistent application of measures to determine how schedules are leveled.

Leveling Horizon Parameters

The leveling horizon is determined by the Horizon Start and Horizon End dates, together with the number and size of time increments (daily, weekly, monthly), specified by the Level Production Line parameters.

Fig. 9.19
Leveling Production Line Parameters



Select Level on the MSW/PSW to set parameters for leveling a production line.

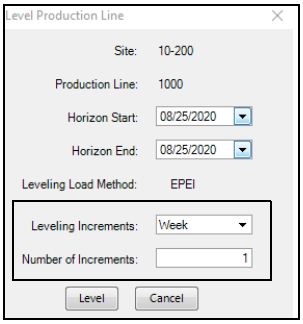
- Horizon Start cannot be before the current date.
- Horizon End cannot be after the end of the MPS horizon.

The end of the MPS horizon is determined by choosing Option|Preferences on the MSW, then updating values in History Horizon and Future Horizon.

Time Bucket Parameters

Time buckets for the leveling calculation are determined by a kind of time period, corresponding to a day, week, or month, together with the number of increments (days, weeks, or months) that are needed that make up a time bucket.

Fig. 9.20
Time Bucket Parameters



The size of the time bucket is the multiple of the leveling increment and the number of increments.

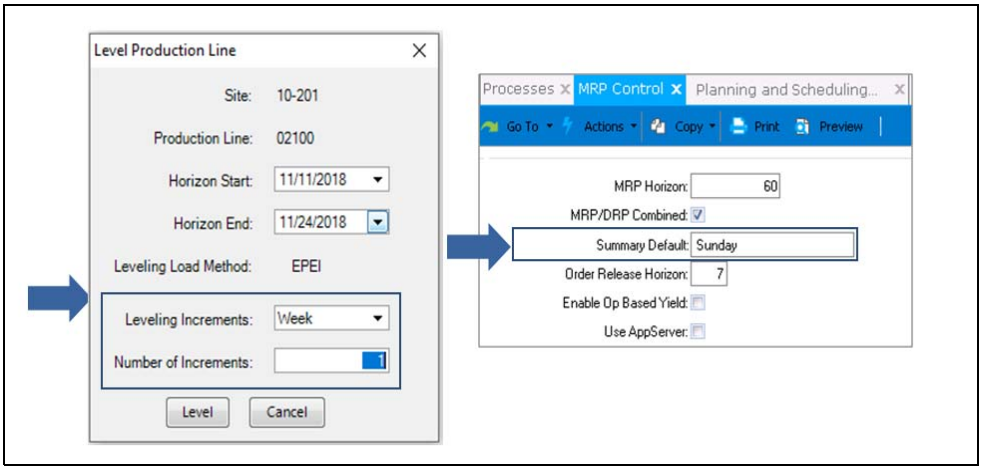
- Leveling Increments: Select Day, Week, or Month to determine the unit for a time bucket.
- Number of Increments:
  - Enter the number of increments that make up a single time bucket.
  - Enter 1 if the time bucket is a single day, week, or month.
  - Enter 0 if the entire MPS horizon is one significant bucket.

Horizon Dates and Leveling Increment of “Week”

When using an increment of Week, set the **Horizon Start** date to a day that corresponds to the day defined in MRP Control (23.24) for the **Summary Default** day parameter, and set **Horizon End** date to a day that corresponds to the day prior to the **Summary Default**.

The starting day for a time bucket is determined by the value of Summary Default in MRP Control.

Fig. 9.21
Leveling Increment



Time Buckets within the Scheduling Horizon

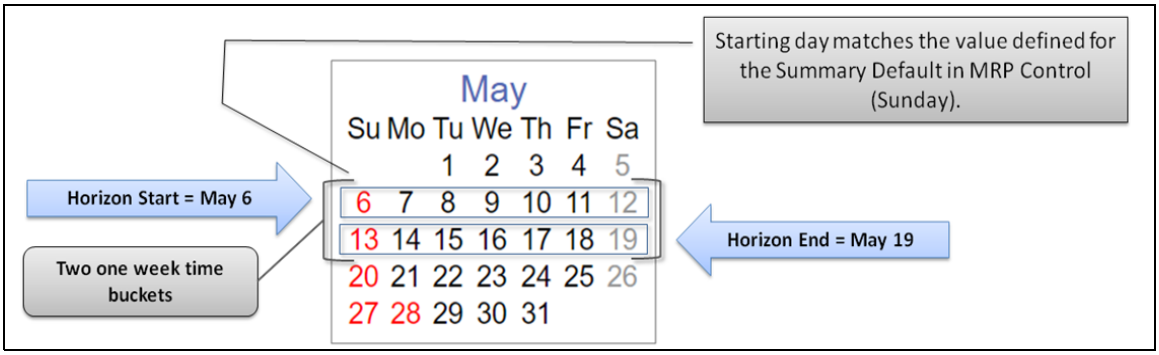
Within the scheduling horizon, between the horizon start and end dates, there can be more than one time bucket.

- Leveling Increment set as Week
- Number of Increments set as 1

Example

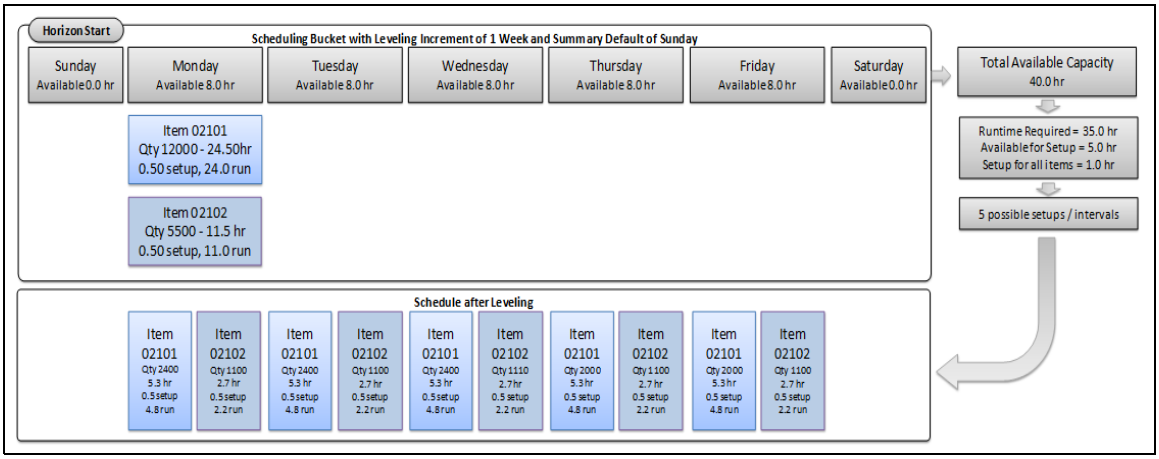
In this example, the scheduling horizon consists of two one-week leveling buckets. Each bucket consists of 7 days. The starting date for each bucket falls on Sunday, the Summary Default date defined in MRP Control.

Fig. 9.22
Time Buckets



The figure below shows how orders scheduled at the beginning of the week are leveled over a one-week period beginning on Sunday (the Summary Default date).

Fig. 9.23
Full Period

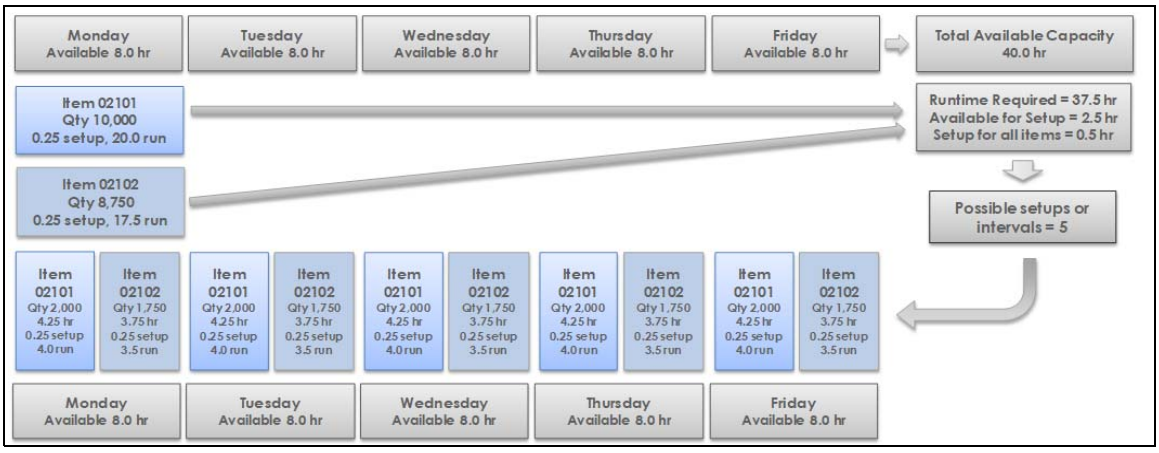


Relationships Between the EPEI and Setup Time

Leveling determines the number of EPE intervals for a time bucket. The number of setups and intervals increases as the available time for setup within the time bucket increases, as a factor of the required runtime. As the required runtime for the time bucket decreases, the available time for setup and the number of setups and intervals increases.

- The fewest number of intervals for a time bucket is 1, with each item being set up and produced a single time within the time bucket.
- The maximum number of intervals within an interval can be high, with items scheduled multiple times in a single day.

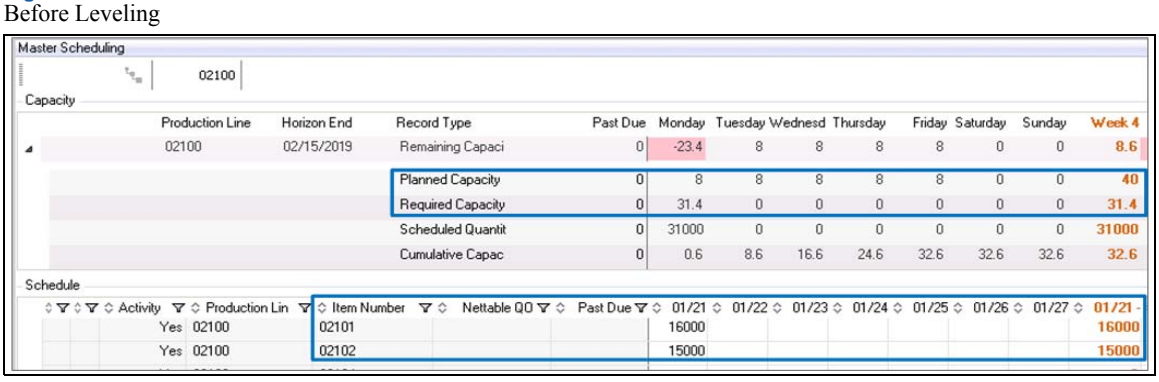
Fig. 9.24
EPEI and Setup Time



If the EPEI or minimum number of intervals is 0.2, then each part is produced 5 times within the time bucket.

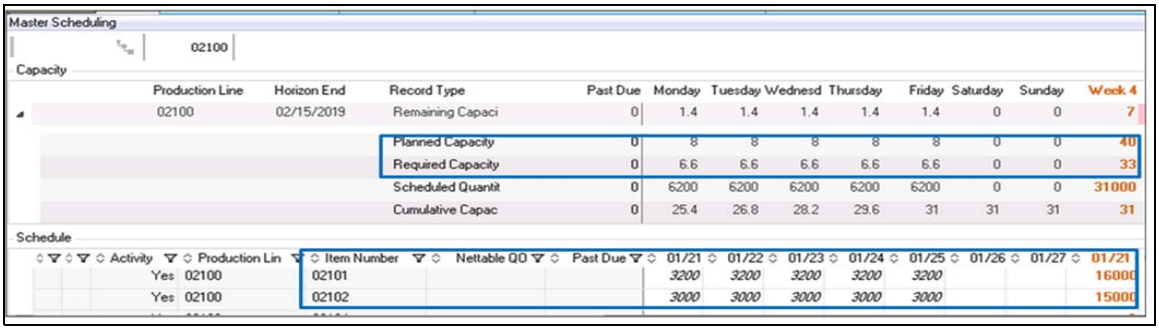
Summary Schedule Before Leveling

Fig. 9.25
Before Leveling



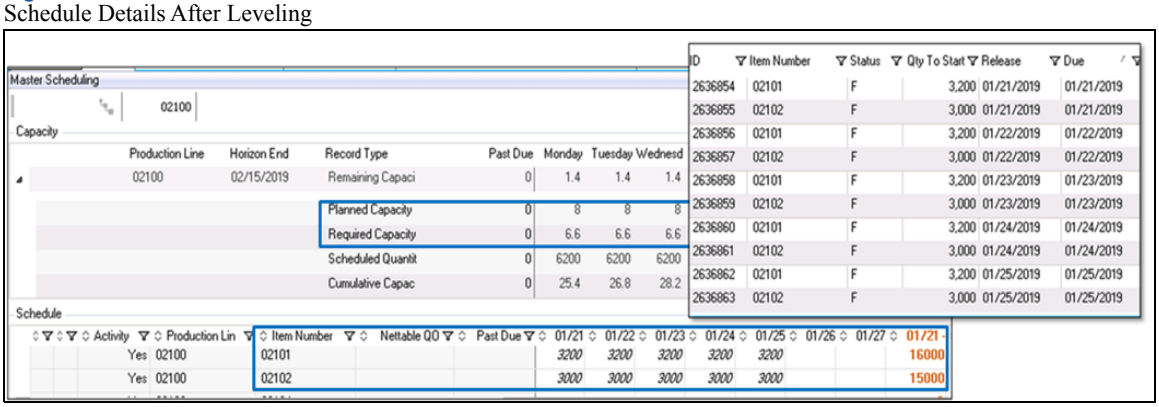
Summary Schedule After Leveling

Fig. 9.26
After Leveling



Schedule Details After Leveling Illustrating Maximum Capacity

Fig. 9.27
Schedule Details After Leveling



Example: EPEI Leveling with 2 hours Available Capacity for Setup

In this example the production quantities are higher, therefore the required capacity is only slight lower than production capacity.

- Planned capacity: 40 hours
- Required capacity for run time: 38 hours
- Total time to setup all items for a single interval of 0.5 hour
- Time available for setup 2 hours resulting in 4 intervals for time bucket

Summary Schedule Before Leveling

Fig. 9.28
Before Leveling

Capacity

	Production Line	Horizon End	Record Type	Past Due	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Sunday	Week 4
	02100	02/16/2019	Remaining Capaci	0	-30.5	8	8	8	8	0	0	1.5
			Planned Capacity	0	8	8	8	8	8	0	0	40
			Required Capacity	0	38.5	0	0	0	0	0	0	38.5
			Scheduled Quantit	0	38000	0	0	0	0	0	0	38000
			Cumulative Capac	0	-14.5	-6.5	1.5	9.5	17.5	17.5	17.5	17.5

Schedule

Activity	Production Lin	Item Number	Nettable QO	Past Due	01/21	01/22	01/23	01/24	01/25	01/26	01/27	01/21 -
Yes	02100	02101			18000							18000
Yes	02100	02102			20000							20000

Summary Schedule After Leveling

This example illustrates how little excess capacity can result in higher EPEI, fewer intervals, and fewer orders. The calculated EPEI for week is 0.25, which results in 4 intervals for a one-week bucket and 12 orders for the week (not exceeding the maximum daily capacity).

Fig. 9.29
After Leveling

Capacity

	Production Line	Horizon End	Record Type	Past Due	Monday	Tuesda
	02100	02/16/2019	Remaining Capaci	0	-0.1	-0.
			Planned Capacity	0	8	
			Required Capacity	0	8.1	8.
			Scheduled Quantit	0	7600	760
			Cumulative Capac	0	15.9	15.

Schedule

Activity	Production Lin	Item Number	Nettable QO	Past Due	01/21	01/
Yes	02100	02101			4500	450
Yes	02100	02102			3100	310

D	Item Number	Status	Qty To Start	Release	Due	Production Order
2637232	02101	F	4,500	01/21/2019	01/21/2019	143173
2637233	02102	F	3,100	01/21/2019	01/21/2019	143174
2637234	02102	F	1,900	01/22/2019	01/22/2019	143175
2637235	02101	F	4,500	01/22/2019	01/22/2019	143176
2637236	02102	F	1,200	01/22/2019	01/22/2019	143177
2637237	02102	F	3,800	01/23/2019	01/23/2019	143178
2637238	02101	F	3,800	01/23/2019	01/23/2019	143179
2637239	02101	F	700	01/24/2019	01/24/2019	143180
2637240	02102	F	5,000	01/24/2019	01/24/2019	143181
2637241	02101	F	1,900	01/24/2019	01/24/2019	143182
2637242	02101	F	2,600	01/25/2019	01/25/2019	143183
2637243	02102	F	5,000	01/25/2019	01/25/2019	143184
2495938	02101	P	18,000	01/24/2019	01/28/2019	10230014

The interval segments for items sequenced scheduled across the week, organized by day. When interval that spans more than one day, production for an item can be split into multiple production orders.

Example: EPEI Leveling with 10 hours Available Capacity for Setup

In this example, production quantities are lower, therefore the required capacity is significantly lower than production capacity.

- Planned capacity: 40 hours
- Required capacity for run time: 30 hours
- Total time to setup all items for a single interval of 0.5 hour
- Time available for setup 10 hours with 20 intervals for time bucket

Summary Schedule Before Leveling

Fig. 9.30
Before Leveling

Capacity

	Production Line	Horizon End	Record Type	Past Due	Tonday	Tuesday	Wednesd	Thursday	Friday	Saturday	Sunday	Week 4
	02100	02/16/2019	Remaining Capaci	0	-22.1	8	8	8	8	0	0	9.9
			Planned Capacity	0	8	8	8	8	8	0	0	40
			Required Capacity	0	30.1	0	0	0	0	0	0	30.1
			Scheduled Quantit	0	29600	0	0	0	0	0	0	29600
			Cumulative Capac	0	-6.1	1.9	9.9	17.9	25.9	25.9	25.9	25.9

Schedule

Activity	Production Lin	Item Number	Nettable QO	Past Due	01/21	01/22	01/23	01/24	01/25	01/26	01/27	01/21 -
Yes	02100	02101			15000							15000
Yes	02100	02102			14600							14600

Summary Schedule After Leveling

This example illustrates how greater capacity results in a lower EPEI, more intervals, and a higher number of orders. The calculated EPEI for week is 0.05, which results in 20 intervals for a one-week bucket and 46 orders for the week (not exceeding maximum daily capacity).

Fig. 9.31
After Leveling

Capacity

	Production Line	Horizon End	Record Type	Past Due	Tonday	Tuesday	Wednesd	Thursday	Friday	Saturday	Sunday	Week 4
	02100	02/16/2019	Remaining Capaci	0	-0.2	0.1	0.1	-0.2	0.1	0	0	-0.1
			Planned Capacity	0	8	8	8	8				
			Required Capacity	0	8.2	7.9	7.9	8.2				
			Scheduled Quantit	0	5920	5920	5920	5920				
			Cumulative Capac	0	15.8	15.9	16	15.8				

Schedule

Activity	Production Lin	Item Number	Nettable QO	Past Due	01/21	01/22	01/23	01/24
Yes	02100	02101			3112	3112	3112	2824
Yes	02100	02102			2808	2808	2808	2986

ID	Item Number	Status	Qty To Start	Release	Due	Production Order
2637178	02101	F	722	01/21/2019	01/21/2019	143127
2637179	02102	F	702	01/21/2019	01/21/2019	143128
2637180	02101	F	721	01/21/2019	01/21/2019	143129
2637181	02102	F	702	01/21/2019	01/21/2019	143130
2637182	02101	F	721	01/21/2019	01/21/2019	143131
2637183	02102	F	702	01/21/2019	01/21/2019	143132
2637184	02101	F	721	01/21/2019	01/21/2019	143133
2637185	02102	F	702	01/21/2019	01/21/2019	143134
2637186	02101	F	227	01/21/2019	01/21/2019	143135
2637187	02101	F	494	01/22/2019	01/22/2019	143136
2637188	02102	F	702	01/22/2019	01/22/2019	143137
2637189	02101	F	721	01/22/2019	01/22/2019	143138
2637190	02102	F	702	01/22/2019	01/22/2019	143139
2637191	02101	F	722	01/22/2019	01/22/2019	143140
2637192	02102	F	702	01/22/2019	01/22/2019	143141
2637193	02101	F	721	01/22/2019	01/22/2019	143142
2637194	02102	F	702	01/22/2019	01/22/2019	143143
2637195	02101	F	454	01/22/2019	01/22/2019	143144
2637196	02101	F	267	01/23/2019	01/23/2019	143145
2637197	02102	F	702	01/23/2019	01/23/2019	143146
2637198	02101	F	721	01/23/2019	01/23/2019	143147
2637199	02102	F	702	01/23/2019	01/23/2019	143148

The interval segments for items sequenced scheduled across the week, organized by day. When interval that spans more than one day, production for an item can be split into multiple production orders.

When there is insufficient capacity to perform one setup for all items, the system displays a warning message, stating how much more capacity is required. If you choose to continue, the system calculates the total load required for one setup, spreads the extra capacity required (that is, the difference between the total load required and the available capacity) over the available working days, and performs leveling.

Leveling Intervals: Calculated EPEI and Minimum Interval Parameter

Leveling using EPEI can be highly effective when there is a limited range in the calculated EPEI, resulting in stable production intervals. This can be achieved when there is limited variability in the resource load from production schedules and in production capacity. As the variability in either the load or capacity increases, the calculated EPEI can approach very small values.

- Production orders may have an order quantity as small as 1.
- It is possible to have tens or even hundreds of orders for every item each day.
- Scheduling when not using Kanban can become very difficult.

Fig. 9.32
Small Order Quantity

Production Line	Horizon End	Record Type	Past Due	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Week 37
02100	09/07/2019	Remaining Capaci	0	0	0	0	0	0	0	0	0
		Planned Capacity	0	8	8	8	8	8	8	0	48
		Required Capacity	0	8.3	7.3	7.8	8.3	7.3	8.3	0	47.5
		Scheduled Quantit	0	5833	5833	5833	5833	5833	5835	0	35000
		Cumulative Capac	0	23.7	24.3	24.5	24.2	24.8	24.5	24.5	24.5

in	Item Number	Days On Han	Nettable QO	Past Due	09/08	09/09	09/10	09/11	09/12	09/13	09/14	09/08 -
	02101	0			2500	1250	1250	2500	1250	1250		10000
	02102	0			2083	3333	2084	2082	3333	2085		15000
	02103	0			1250	1250	2499	1251	1250	2500		10000

ID	Item Number	Status	Qty To Start	Release	Due	Component Status	Production Orde
2884424	02101	F	1,250	09/08/2019	09/08/2019	No Status	84805
2884427	02101	F	1,250	09/08/2019	09/08/2019	No Status	84808
2884431	02101	F	1,250	09/09/2019	09/09/2019	No Status	84812
2884435	02101	F	1,250	09/10/2019	09/10/2019	No Status	84816
2884439	02101	F	1,250	09/11/2019	09/11/2019	No Status	84820
2884442	02101	F	1,250	09/11/2019	09/11/2019	No Status	84823
2884446	02101	F	1,250	09/12/2019	09/12/2019	No Status	84827
2884450	02101	F	1,250	09/13/2019	09/13/2019	No Status	84831

Maintain the Minimum Interval parameter in Production Line Maintenance (16.1.1) and Item Production Line Maintenance (16.1.4). Use the Minimum Interval parameter to:

- Control how frequently items are produced within a time bucket when leveling production, thereby reducing the number of orders that are created by leveling.
- Prevent leveling from creating more production orders for items within a time bucket than is manageable, particularly when the available capacity within a time bucket might be high.

The minimum interval:

- Is the shortest number of hours for producing an item.
- Determines the frequency which an item is produced.

Leveling with the Minimum Interval Parameter

The minimum interval can be set to a period of time such as a shift, a day, or week. Setting the minimum interval to the number of hours for a workday, prevents leveling from creating more than one order for an item for a day, when the calculated EPEI would otherwise result in multiple orders for a day or shift. The leveling process uses the:

- Minimum interval instead of EPEI for scheduling items within a time bucket when the calculated EPEI is less than the minimum interval.
- Greater of the minimum interval set for the item and production line, the production line, and the calculated EPEI.
- Calculated EPEI when minimum interval is set to 0.

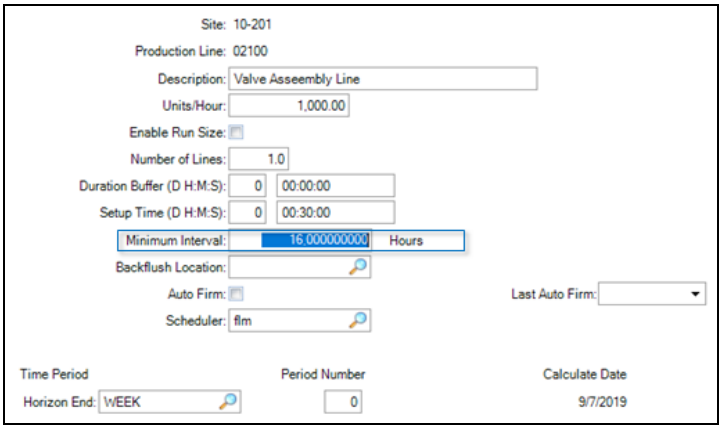
As a rule, set Minimum Interval for a production line, rather than setting it for items on a production line. Use the Minimum Interval for an item only when there is an exception for that item.

Minimum Interval Parameter for Production Line

As a general rule, set Minimum Interval for a production line, rather than setting it for items on a production line.

- Set Minimum Interval in hours to determine the smallest production interval for leveling every item.
- When the value for minimum interval is 0, the smallest production interval is determined by the EPEI calculation.

Fig. 9.33
Minimum Interval in Hours



In this example, the production line is set up with the goal of limiting production to 3 intervals per week. This is done by setting the Minimum Interval to 16 hours for a 48-hour work week.

Fig. 9.34
Example of Minimum Interval for Production Line

Production Line	Horizon End	Record Type	Past Due	unday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Week 37
02100	09/07/2019	Remaining Capaci	0	0	0	0	0	0	0	0	0
		Planned Capacity	0	8	8	8	8	8	8	0	48
		Required Capacity	0	6.8	6.3	6.8	6.3	6.8	6.8	0	40
		Scheduled Quantit	0	5833	5833	5833	5833	5833	5835	0	35000
		Cumulative Capac	0	25.2	26.8	28	29.7	30.8	32	32	32

in	Item Number	Days On Han	Nettable QO	Past Due	09/08	09/09	09/10	09/11	09/12	09/13	09/14	09/08 -
	02101	0			3334		3333		3333			10000
	02102	0			2499	2501	2498	2502	2498	2502		15000
	02103	0				3332	2	3331	2	3333		10000

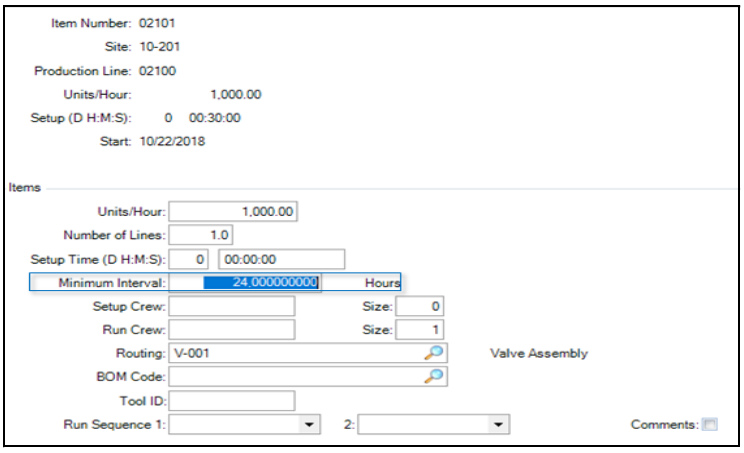
There are multiple orders for an item within an interval when production spans more than one day. When this happens, setup appears on only the first order for the item within an interval.

Minimum Interval Parameter for an Item

As a general rule, set Minimum Interval for an item only when there is an exception for that item.

- Set Minimum Interval in hours to determine the smallest production interval for a particular item.
- Use this function when the minimum interval is not determined by either the minimum interval set for the production line or the EPEI calculation.

Fig. 9.35
Minimum Interval Parameter for an Item



In this example, item 02101 on production line 02100 is set up with the goal of limiting production to 2 intervals per week. This is done by:

1. Setting the minimum interval for the production line to 0 to use EPEI to determine the interval for the production line.
2. Setting the minimum interval for item 02101 to 24 hours for a 48-hour work week.

Fig. 9.36
Example of Using Minimum Interval for an Item

Production Line	Horizon End	Record Type	Past Due	Sunday	Monday	Tuesday	Wednesd	Thursday	Friday	Saturday	Week 37
02100	09/07/2019	Remaining Capaci	0	0	0	0	0	0	0	0	0
		Planned Capacity	0	8	8	8	8	8	8	0	48
		Required Capacity	0	6.8	5.2	5.7	6.8	7.8	12.2	0	44.5
		Scheduled Quantit	0	5833	4167	4166	5833	5833	9168	0	35000
		Cumulative Capac	0	25.2	28	30.3	31.5	31.7	27.5	27.5	27.5

in	Item Number	Days On Han	Nettable QO	Past Due	09/08	09/09	09/10	09/11	09/12	09/13	09/14	09/08 -
	02101	0			5000			5000				10000
	02102	0			833	2917	1875	624	3333	5418		15000
	02103	0				1250	2291	209	2500	3750		10000

Leveling Tips

Use leveling when scheduled production and its required capacity do not exceed the planned (available) capacity for a production line.

Exercise caution when the available capacity is much higher than the required capacity:

- To avoid a schedule that consists of too many orders for an item within a day.
- Setup items with a Kanban Process and a defined minimum EPEI to prevent level scheduling with many orders with small quantities for each day.

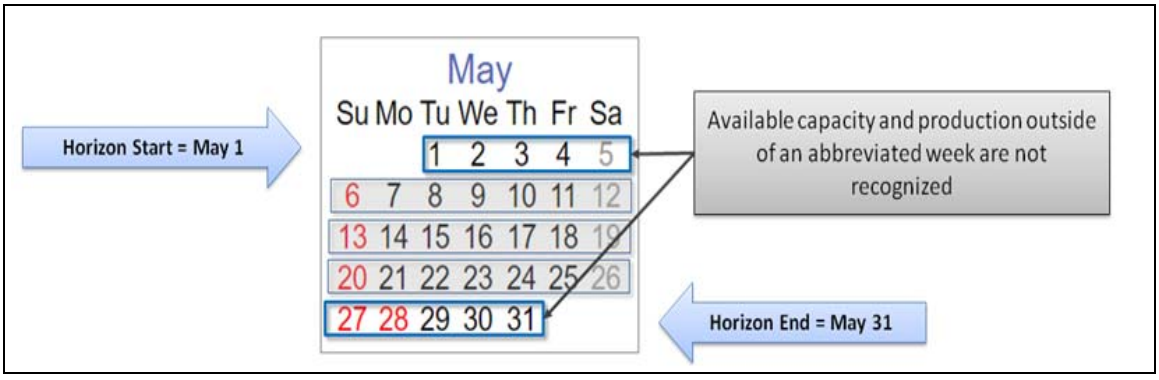
Leveling Horizon Dates with Partial Time Buckets

Be careful to select values for the Horizon Start and Horizon End dates that correspond to the Summary Default day when using increments based on “week”, to avoid partial time buckets. When there is a partial time bucket, the calculation of EPEI and takt time, and leveling are determined for a period that is shorter than a full time bucket. It does not recognize the available capacity and production that fall on days that fall outside of the partial time bucket that would otherwise fall within a full time bucket.

A partial bucket with fewer days can appear at the beginning and/or end of a scheduling horizon. This happens when either the Horizon Start day of the week does not match the value for the Summary Default day of the week defined in MRP Control, or the Horizon End day does not match the day prior to the Summary Default day of the week defined in MRP Control.

In this example, the value for the Summary Default day is Sunday. The horizon begins with a partial week consisting of the four days (Tuesday to Friday) and ends with a partial week consisting of three days (Tuesday to Thursday), with Monday being an exceptional non-working day.

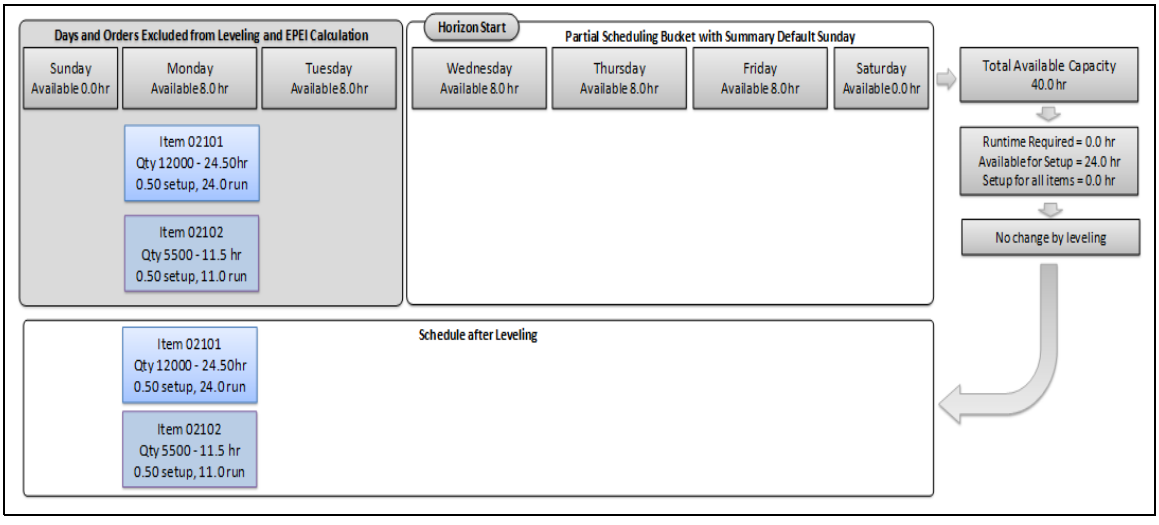
Fig. 9.37
Partial Time Bucket



Leveling of the first bucket does not recognize any available capacity and production for April 29th and 30th. Leveling of the last bucket does recognize any available capacity and production for June 1st and 2nd. Capacity and production orders that fall within the same week, but before the Horizon Start are excluded by leveling.

The following diagram shows how orders scheduled at the beginning of the week are not leveled when Horizon Start falls later in the week.

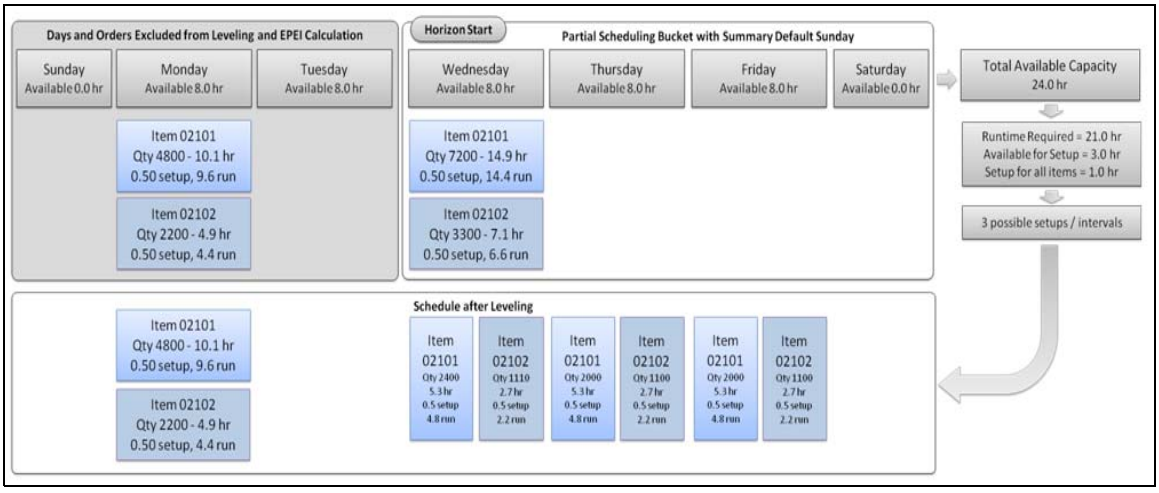
Fig. 9.38
Partial Period with Horizon Start (1)



Leveling is limited to the capacity and production orders within a partial time bucket.

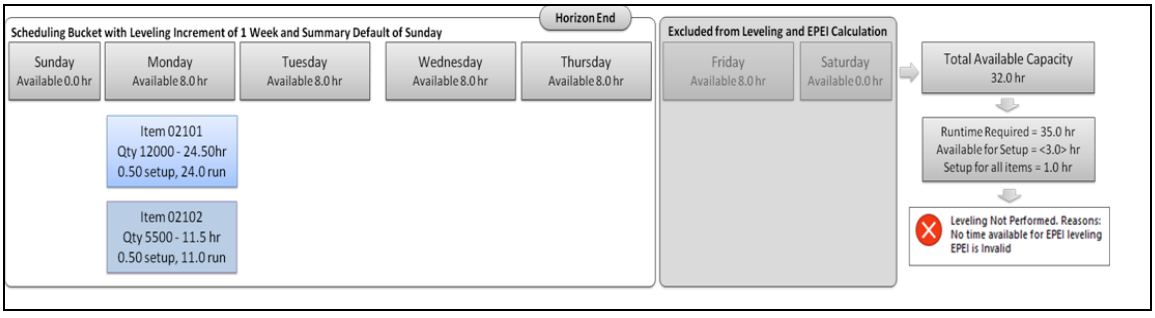
The following diagram shows how orders scheduled at the beginning and middle of the week are leveled differently when Horizon Start falls later in the week.

Fig. 9.39
Partial Period with Horizon Start (2)



Capacity and production orders that fall within the same week, but after the Horizon End are excluded by leveling. The figure below shows how orders scheduled at the beginning of the week cannot be scheduled Horizon End falls in such a way to reduce the capacity for the week.

Fig. 9.40
Partial Period with Horizon End



Setup for EPEI Calculation and Leveling

For a production line, all of the items must be set up:

- For the production line alone with the setup time and run rate or
- For the production line together with a Kanban process with the setup time and cycle time

Required Setup for Production Lines and Items

The required setup includes:

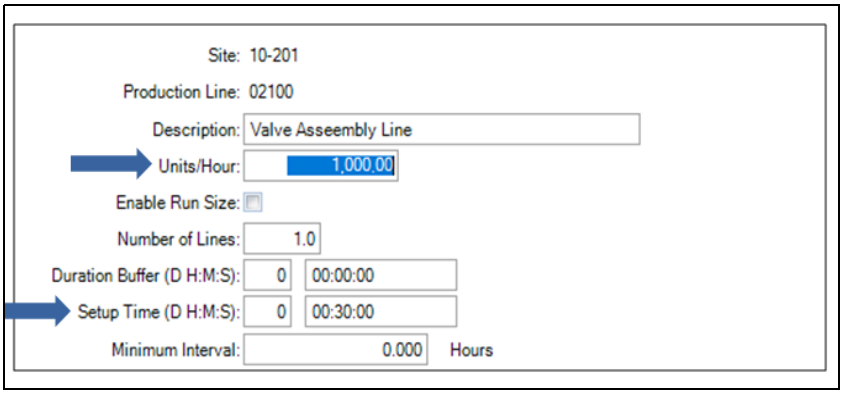
- Production lines with production rate (units/hour) and setup time.
- Items and production lines with production rates and setup times when they are different than defined for the production line itself.
- Production line calendar.

These are needed for the proper calculation of required capacity from the setup time and run rate for items and the production line (including items for a Kanban process). The required capacity appears in the MSW Capacity panel.

Set up production lines with:

- Setup time
- Run rate (Units/Hour)
- Minimum Interval (optional)

Fig. 9.41
Required Setup for Production Line

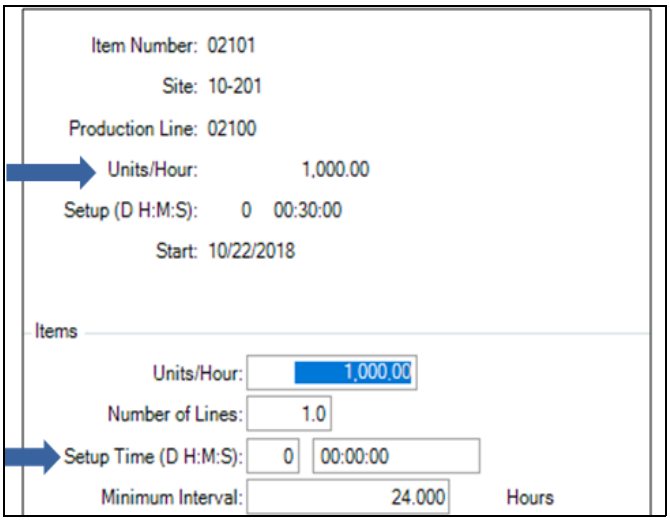


Note You can link multiple items to one production line for manufacturing. You can also specify attributes and options for each item, such as setting different Setup Time values. When you use the MSW to level a production line item whose specific setup time is 0, the system uses the Setup Time value defined for the production line during EPEI calculations.

Set up the item and production line with:

- Setup time when different than for the production line itself
- Run Rate when different than for the production line itself
- Minimum Interval (optional)

Fig. 9.42
Required Setup for Item and Production Line



Optional Setup for a Kanban Process

The setup of a Kanban process and items is optional and is not appropriate for push production items that are not replenished using Kanban or pull replenishment.

Pros:

- Minimum EPEI for an item and Kanban process is an alternative to the Minimum Interval for a production line.
- The leveling interval is determined by the larger of Minimum EPEI or calculated EPEI when EPEI Auto is Yes.
- Fixed EPEI is used instead of the calculated EPEI or Minimum EPEI when EPEI is not selected (set to No).

Cons:

- Requires implementation of Kanban.

Set up the production line and items, together with a Kanban process and item.

- Enter the Production Line for the process, after setting up the production line and items.
- Uptime% and number of Resources determine total available time.
- EPEI Display Options determines how the value for Min EPEI appears for items and the Kanban process. If you set EPEI Auto to No and enter a value in the EPEI field in the Kanban Process Detail frame, the entered EPEI indicates the EPEI interval and is expressed in the unit selected for EPEI Display Option (Days, Weeks, Months, and so on). The system then uses this value together with the available time and calendar setup to calculate the number of changeovers in a leveling bucket.

Fig. 9.43
Kanban Process Maintenance (17.1.3.1)

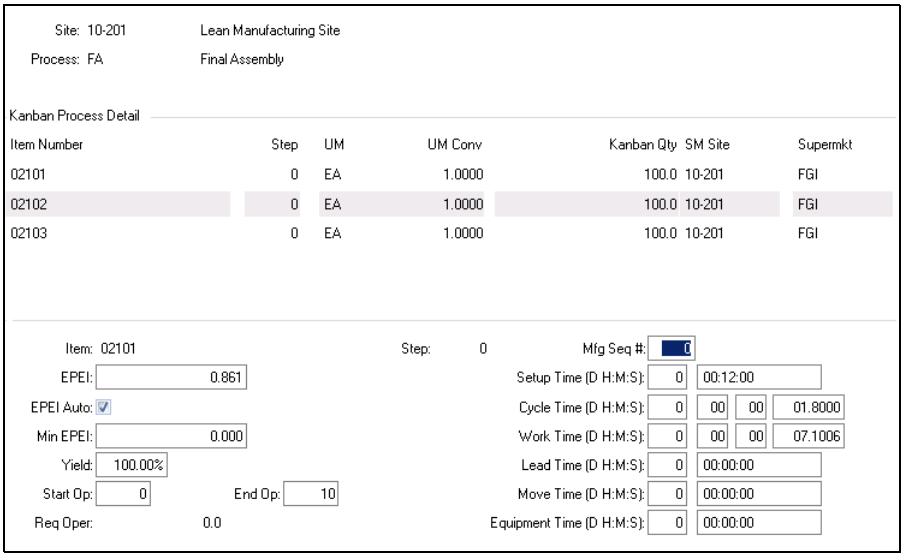
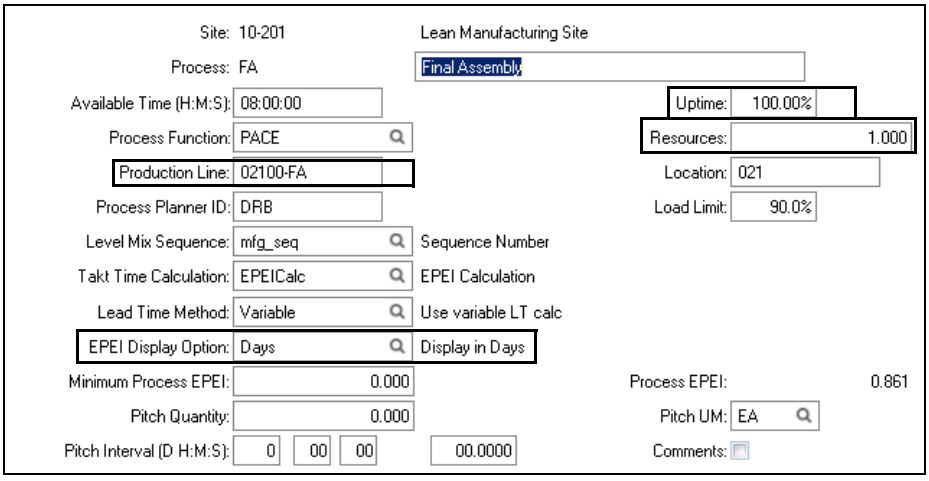


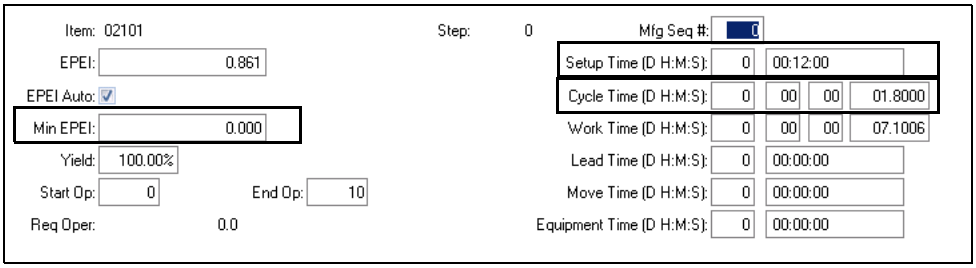
Fig. 9.44
Kanban Process Maintenance (17.1.3.1)



Note There is no look-up browse or validation for Production Line.

Setup for Items for a Kanban Process

Fig. 9.45
Kanban Process Maintenance (17.1.3.1)

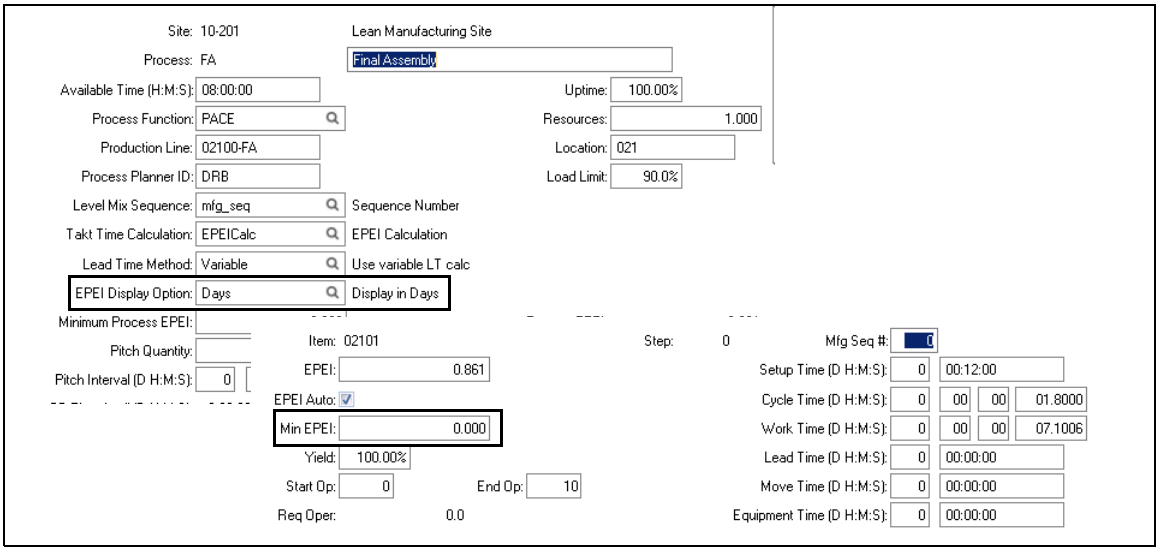


- The cycle time is used as run time together with setup time to determine the time required for production.
- EPEI is not used when EPEI Auto is selected.
- Leveling recognizes the value for Min EPEI when calculating the EPEI.
- Min EPEI can be set to 0.000 or value expressed for the unit selected for EPEI Display Option (Days, Weeks, Months, and so on).
- Min EPEI is expressed for the unit selected for EPEI Display Option for the Kanban process.

Setup for Minimum EPEI

Setting the minimum EPEI can limit the size of the EPEI used for scheduling, thereby limiting the number of orders scheduled within an interval. The minimum EPEI can be set up for items that are defined for a Kanban process and production line. Set the Minimum EPEI for a Kanban process to limit the number of orders created within an interval. The EPEI time bucket is determined by the EPEI Display Option for the Kanban process.

Fig. 9.46
Kanban Process Maintenance (17.1.3.1)



The setting for the EPEI Display Options parameter determines how the value for Min EPEI appears for items and the Kanban process. EPEI is not used when EPEI Auto is selected. Set Min EPEI to a value expressed for unit selected for EPEI Display Option (Days, Weeks, Months).

Note The minimum EPEI cannot be configured for items and a production line, when the production line and items are not defined for a Kanban process.

Minimum Interval is applied to non-Kanban items during leveling. You can define the minimum interval for a production line using Production Line Maintenance. You can also define a specific minimum interval for each item on the production line using Item Production Line Maintenance.

Calendars and Calendar Exceptions

Create calendars for the production line. The system considers holidays, overtime, and downtime. Holidays reduce available time; overtime increases available time; and shift adjustments, like downtime, reduce available time.

Fig. 9.47
Production Line Calendar Maint (16.1.13.1)

Site: 10-201
Production Line: 02100

Shift: 1

	Hours	Start Time	Productivity
Sunday	0.00	00:00	100.00%
Monday	8.00	08:00	100.00%
Tuesday	8.00	08:00	100.00%
Wednesday	8.00	08:00	100.00%
Thursday	8.00	08:00	100.00%
Friday	8.00	08:00	100.00%
Saturday	0.00	00:00	100.00%
Shift Total	40.00		
All Shifts	40.00		

Chapter 10

Days on Hand

The following topics describe how to view and leverage days on hand (DOH) within the workbenches.

Introduction 196
Introduces DOH in the workbenches.

DOH Setup 196
Tells you how to set up DOH in the workbenches.

Viewing DOH 198
Tells you where within the workbenches panels and frames to find DOH calculation results.

DOH Processing 199
Describes processing, including calculations and examples, that occur when you include days on hand in your production through the workbenches.

Introduction

The Planning and Scheduling Workbenches are integrated with functions that let you consider days on hand (DOH) features, functions, and calculations when scheduling and planning production.

The DOH calculation determines the number *of working days* that the projected available balance (PAB) can supply demand. It serves as a useful metric for planners, buyers, and materials managers for gaining insight into supply of inventory for critical materials, visibility of potential supply problems, and/or visibility of excess inventory.

DOH Features

The following topics describe the DOH capabilities added to the workbenches.

- Optional DOH inclusion

  You can decide whether to include DOH calculations or not when scheduling and planning production by setting an option in the Workbenches Options |Preferences window.
- You can optionally select DOH or POH for the Product Structure.

  Choose to display either projected on hand (POH) or DOH in the Product Structure Projected On Hand Panel.

  See “DOH Setup” for more information.
- DOH calculations run for all item types, including kanban items.
- DOH visibility

  You can view DOH in the workbenches via the following:
  - Schedule Grid
  - Supply/Demand Panel
  - Product Structure Projected on Hand Panel

The following topics describe how to set up, invoke, interpret, and view DOH data in the workbenches.

DOH Setup

DOH calculations are based on the current MSW setup, so you only need to decide whether to run DOH calculations and whether to display DOH in the Product Structure Projected on Hand panel. No additional setup is required.

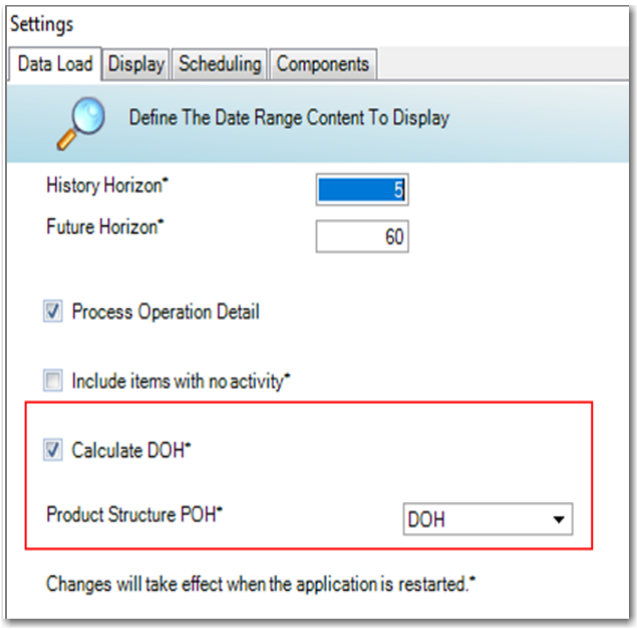
Setting Data Load Preferences

There are two fields in the Data Load tab that let you set DOH options:

- Calculate DOH
- Product Structure POH

Note To select the Data Load options, in the workbenches main screen, select Options | Preferences | Data Load.

Fig. 10.1
DOH Options in Data Load Preferences



Calculate DOH. When checked, the system calculates DOH in workbench panels while loading data. When you select the field, the change takes effect when you restart the application. Select this field to display the days on hand in the:

- MSW Schedule Grid
- Supply/Demand Panel
- Product Structure Projected on Hand Panel

Important You select *both* Calculate DOH and set Product Structure POH to DOH to display the days on hand in the Product Structure Projected on Hand Panel.

When DOH displays in the MSW Schedule Grid, the DOH calculations are based on nettable quantities (see “DOH Calculations Based on Nettable Quantity on Hand”).

When DOH displays in the Supply/Demand Panel, the DOH calculations are based on projected available balance (see “DOH Calculations Based on Projected Available Balance”).

Product Structure POH. Select either POH or DOH to view the resulting data in the Product Structure Projected on Hand tab:

POH: Check this option to display POH quantities for a component—BOM component—of a product structure to ensure that you have enough materials to support the plan/schedule.

POH calculations are based on the POH calculations for the Supply/Demand panel; see “Working with Supply/Demand Panel Data” on page 61. When any POH for an item is below safety stock, POH status is below safety stock. When below safety stock, POH is shaded yellow in the workbenches in the Schedule Grid. When any POH is less than zero, the POH status is set to a negative status. When POH is negative within the firm schedule period, the POH is shaded red in the Schedule Grid. See “Visual Indicators” on page 18 for more information on colors and their meaning.

DOH: Select this option to display days on hand for components in a BOM hierarchy when you also set Calculate DOH in the Data Load Preferences panel. The system calculates DOH based on projected available balance. For calculation information and resulting displayed DOH, see “DOH Calculations” on page 199.

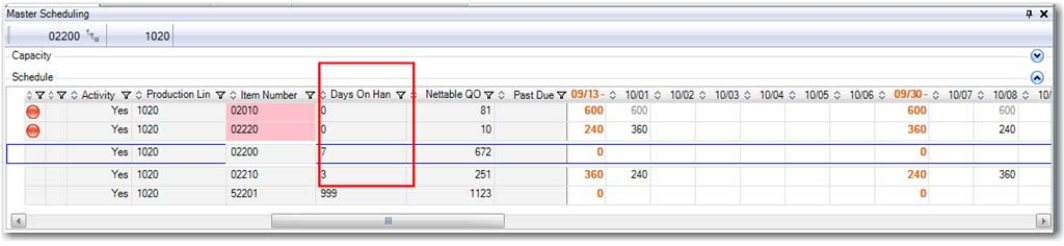
Viewing DOH

The following topics discuss ways to view DOH in the workbenches:

Schedule Grid

The DOH data shows you how many days the current stock can fully cover demand. This lets you see how much inventory you have relative to a day’s activity.

Fig. 10.2
DOH in Schedule Grid

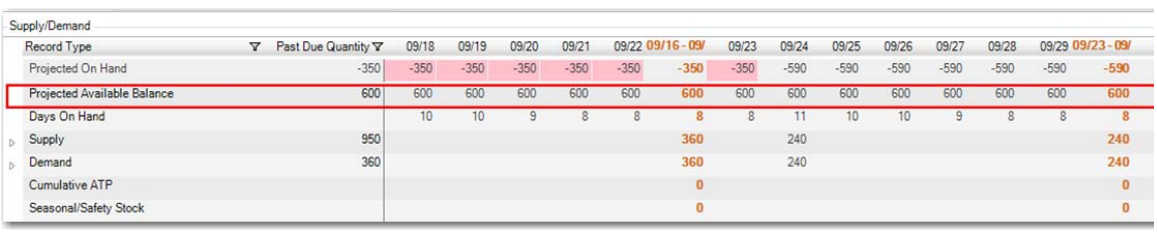


Supply/Demand Panel

The Calculate DOH field in the Data Load tab of Preferences also displays data in the Supply/Demand panel. In the Supply/Demand panel, you can see the DOH data for each calculated day in the Days on Hand row.

Note You can expand and then view the Supply/Demand panel below either the MSW Schedule grid or the Product Structure Projected On Hand panel.

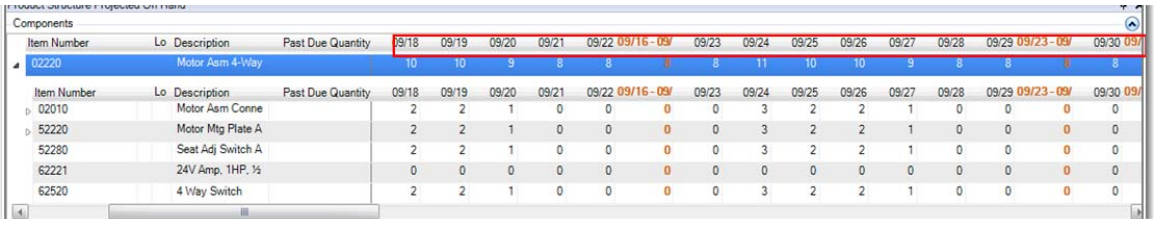
Fig. 10.3
DOH in Supply/Demand Panel



Product Structure Projected on Hand Panel

When you set the Product Structure POH field in the Preferences to POH, the Product Structure Projected on Hand panel displays POH data for components of the item of focus in the Schedule grid. When you set the field for DOH and set the Calculate DOH field, the system displays DOH data in the BOM-structured display. The DOH data displays in a row for the item of focus in the MSW Schedule grid; see Figure 10.4.

Fig. 10.4
DOH in Product Structure Projected on Hand Panel



Components

Item Number	Lo	Description	Past Due Quantity	09/18	09/19	09/20	09/21	09/22	09/16 - 09/	09/23	09/24	09/25	09/26	09/27	09/28	09/29	09/23 - 09/	09/30	09/
02220		Motor Asm 4-Way		10	10	9	8	8	8	8	11	10	10	9	8	8	8	8	
Item Number	Lo	Description	Past Due Quantity	09/18	09/19	09/20	09/21	09/22	09/16 - 09/	09/23	09/24	09/25	09/26	09/27	09/28	09/29	09/23 - 09/	09/30	09/
02010		Motor Asm Conne		2	2	1	0	0	0	0	3	2	2	1	0	0	0	0	
52220		Motor Mtg Plate A		2	2	1	0	0	0	0	3	2	2	1	0	0	0	0	
52280		Seat Adj Switch A		2	2	1	0	0	0	0	3	2	2	1	0	0	0	0	
62221		24V Amp, 1HP, ½		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
62520		4 Way Switch		2	2	1	0	0	0	0	3	2	2	1	0	0	0	0	

QAD ERP that Displays DOH

In QAD ERP, you can also use:

- Browse collections that provide aggregate DOH data for use in trend analysis
- DOH-related operational metrics that provide graphical views with drill-down capabilities

Refer to the Inventory Control chapter of the *QAD Master Data User Guide* for more information on browse collections. Refer to the Manufacturing Dashboard chapter of the *QAD Manufacturing User Guide* for more information on DOH data in role-based dashboards.

DOH Processing

When running DOH, note that the system:

- Calculates DOH including today, depending on the type of DOH calculation the system uses; see “DOH Calculations”
- Calculates DOH based on both historical past due demand and future demand
- Only considers quantity on hand based on today and the future
- Only considers safety stock and seasonal builds of today for total demand; however, it does not consider scheduled receipt quantities

Safety Stock and Seasonal Build

Seasonal build can be different each day. When calculating DOH, the system calculates safety stock and seasonal build for the calculated day. For example, when the system determines whether tomorrow's demand can be fully covered, the safety stock and seasonal builds for the calculation is tomorrow's demand. When tomorrow’s demand can be fully covered, and the system continues to check whether the day after tomorrow’s demand can be fully covered, the calculation uses safety stock and seasonal build of the day after tomorrow.

DOH Calculations

There are two types of DOH calculations in the workbenches:

- DOH Calculations Based on Nettable Quantity on Hand

  DOH data in the MSW Schedule grid uses the DOH calculations that are based on nettable quantity on hand.
- DOH Calculations Based on Projected Available Balance

In the Supply/Demand panel and the Product Structure Projected on Hand panel, DOH calculations are based on projected available balance, not nettable quantity on hand.

DOH Calculations Based on Nettable Quantity on Hand

When DOH calculations are based on nettable quantity on hand, today is considered. The system considers all the demand within the future horizon as well as the past due demand, and determines the number of working days the stock can fully cover. In the calculation, safety stock and seasonal build are considered but schedule receipt quantity is not taken into account.

The system first compares nettable quantity on hand to past due demand plus safety stock and seasonal build.

DOH displays as 0 (zero) when:

- Nettable quantity on hand is 0.
- Nettable quantity on hand is less than or equal to past due demand plus safety stock and seasonal build.

If nettable quantity on hand is greater than past due demand plus safety stock and seasonal build, the calculation then compares nettable quantity on hand to past due demand and today's demand, plus today's safety stock and seasonal build:

- When the quantity on hand is less than this quantity, the system displays DOH data and stops the calculation.
- When the quantity on hand is not less than this quantity, the system determines whether the newly added demand belongs to a working day, and if so, the system increases DOH. In this case:
  - If the quantity on hand is equal to past due demand and today's demand, plus today's safety stock and seasonal build, the system determines whether there is other demand within the horizon. When there is none, the system ends the calculation; when demand exists, the system continues to compare quantity on hand to past due, today's, and the next day's demand, plus the next day's safety stock and seasonal build.
  - When the quantity on hand is greater than past due demand and today's demand, plus today's safety stock and seasonal build, the system continues to compare quantity on hand to past due, today's, and the next day's demand, plus the next day's safety stock and seasonal build.

The system continues the calculation and comparison until the end of the future horizon.

DOH displays as 999 when the nettable quantity on hand is greater than the total demand plus safety stock and seasonal build.

DOH Calculations Based on Projected Available Balance

For calculations based on projected available balance, today is excluded because today's supply and demand are already considered in projected available balance.

The calculation first compares projected available balance of a calculated day to demand plus safety stock plus seasonal build. DOH displays a 0 (zero) when:

- There is no demand after the calculated day and the projected available balance is less than or equal to safety stock and seasonal build.
- Projected available balance of the calculated day is 0.

DOH displays as 999 when the projected available balance is greater than the total demand, plus safety stock and seasonal build.

The system continues the calculation by comparing projected available balance of the calculated day to the next day's demand, plus safety stock and seasonal build. When the projected available balance is:

- Less than the quantity, the system displays DOH data and stops the calculation.
- Equal to the quantity, the system increases DOH when the next day is a working day, then determines if there are other demands within the horizon. When no, the system ends the calculation; when yes, the system continues to compare projected available balance to the demand of the next day and the day after next day, plus the day after next day's safety stock and seasonal build.
- Greater than the quantity, and the next day is working day, the system increases DOH and continues to comparing the projected available balance to demand for the next day and day after next, plus safety stock and seasonal build.

DOH Examples

This section contains examples of DOH displayed in the Supply/Demand panel. The calculations are based on projected available balance. You must set Calculate DOH in the Preferences Data Load panel, then stop and restart the workbenches to see the DOH in the Supply/Demand panel.

Example 1

In the following Supply/Demand panel example, the projected available balance for each day of the Days on Hand row was compared to demand plus safety stock and seasonal build. See "DOH Calculations Based on Projected Available Balance" on page 200.

Considering supply, you can see that on 7/11, the projected available balance is 95; the inventory is used up on 7/19 and cannot fully cover the demand. So DOH is 5 on 7/11.

On 7/19, since there is no demand after the calculated day and the projected available balance is equal to safety stock and seasonal build, DOH displays as 0 for 7/19.

Fig. 10.5
Example 1

Supply/Demand

	Past Due Qty	7/11	7/12	7/13	7/14	7/15	7/16	7/17	7/18	7/19	7/20
Projected Available Balance	55	95	90	90	90	90	15	20	20	5	5
Days on Hand	5	5	4	3	3	3	2	2	1	0	0
Supply		40						5			
Demand			5				75			15	
Seasonal/Safety Stock		5	5	5	5	5	5	5	5	5	5

DOH is 0 as there is no demand after the calculated day and Projected Available Balance is equal to safety stock + seasonal build.

Example 2

The Supply/Demand panel in this example shows that the system considers supply on 7/17 after the demand rises to 75 on 7/16. Since there are other demands within the horizon, the system continues to compare projected available balance to the demand in the days following the increase in demand.

In the example, when the system calculates DOH on 7/16, the system does not summarize safety stock or seasonal build for 7/18 through 7/19. Instead, the system compares the demand of 7/17 (0 in the example), plus the seasonal build and safety stock of 7/17 (5 in the example).

When it is less than 15—which is the projected available balance of 7/16 when calculating DOH for that day—the system compares the demand of 7/17 and 7/18 plus the safety stock of 7/18. When the total demand plus safety stock and seasonal build is still less than 15, the system compares the demand of 7/17 through 7/19 plus safety stock and seasonal build of 7/19. Since the quantity is equal to the projected available balance, and there is no demand after that day, DOH is 3 on 7/16.

Fig. 10.6
Example 2

Supply/Demand

	Past Due Qty	7/11	7/12	7/13	7/14	7/15	7/16	7/17	7/18	7/19	7/20	7/21
Projected Available Balance	55	95	90	90	90	90	15	20	20	5	5	5
Days on Hand	5	6	5	4	4	4	3	999	999	999	999	999
Supply		40						5				
Demand			5				75			10		
Seasonal/Safety Stock		5	5	5	5	5	5	5	5	5	5	5

7/16 demand considered in DOH calculation

Example 3

The Supply/Demand panel in this example shows that on 7/13, the projected available balance is 90, and fully covers the demand until 7/19. Since there is no demand on 7/20 or 7/21 but a demand of 1 exists on 7/22, the DOH calculations include 7/20 and 7/21. So DOH is 6 on 7/13.

The example also shows that on 7/17 and beyond, DOH displays as 999 because the projected available balances on these days are greater than total demand plus safety stock and seasonal build.

Fig. 10.7
Example 3

Supply/Demand

	Past Due Qty	7/11	7/12	7/13	7/14	7/15	7/16	7/17	7/18	7/19	7/20	7/21	7/22	7/23
Projected Available Balance	55	95	90	90	90	90	15	20	20	10	10	10	9	9
Days on Hand	8	8	7	6	6	6	5	999	999	999	999	999	999	999
Supply		40						5						
Demand			5				75			10			1	
Seasonal/Safety Stock		5	5	5	5	5	5	5	5	5	5	5	5	5

Projected available balance greater than total demand + safety stock/seasonal build

Appendix A

Troubleshooting, Tips, and Errors

Use this appendix when issues arise in functionality.

Overview 204
Presents an overview of the type of information found in this appendix.

Errors 208
Describes errors that can display in the workbenches and provides solutions or workarounds to correct them.

Overview

The PSW, MSW, CAC, and other workbench features play a crucial role in your day-to-day scheduling operations. So when problems occur or issues arise, your workday is affected, and this, in turn, indirectly affects production.

You can take a number of basic steps to solve workbench problems on your own, or, at the very least, narrow down their causes. So the next time you encounter a misbehaving function, try performing the troubleshooting tips in this appendix.

You can also document the steps you take; that way, if a tech-support call becomes inevitable, you can eliminate what is not causing the problem.

Item Does Not Display in MSW

In MSW, the item for the order does not display.

Possible Causes

The item does not have a routing defined for it. Or, it may not have the following defined for it:

- It does not have a BOM defined.
- It does not have active supply/demand in the horizon you are viewing.

When you add an item to the production line, the system displays warnings when the routing or BOM does not exist for the item.

You can set preferences so that the system retrieves data without any supply, demand, production orders, or inventory activity. Check the setting by selecting Options, then Preferences, then Data Load. The setting defines the future and history horizon or controls whether the system retrieves data without any supply, demand, production orders, or inventory activity.

Solution

Set up a routing for the item in Routing Maintenance (14.13.1) and generate a production order routing for a production order containing this item. This creates the records needed to show the item in the Planning and Scheduling Workbenches.

If a routing is defined, alter the scheduling horizon through the Options drop-down menu by selecting Preferences, then the Search tab in the Planning and Scheduling Workbenches.

Also, in Item Planning Maintenance (1.4.7) or Enter Item Planning Data (.NET UI only), try setting the Purchase/Manufacturer code for the item to L.

Note If the message displays because you are scheduling orders on a production line or working with items that may only be manufactured discretely, you can overlook the warning and continue processing.

Item Number Displays, but Not Planned Orders

For a production line, the item number displays on the workbench, but none of the MRP planned orders for the item display.

Assumptions:

- MRP planned orders exist for the item number.
- The item number is defined as an L(ine) type item in Item Planning Maintenance (1.4.7).
- The item is set up on a production line.

Possible Causes

You defined a production line for an item after you ran MRP. The planned order created by MRP does not have the planned orders assigned to the production line.

You define the item on two or more production lines. The production line you are viewing is NOT the primary production line. Planned production orders are only defaulted on the primary production line.

Solution

Check primary production line for item. Regenerate MRP.

Repetitive Scheduled Order S Type Not Created

For a production line, you firm a planned order, but the system did not create a repetitive, S-type, scheduled order.

In MSW, it is possible to schedule a discrete production order on a production line.

Assumption: The item is set up on a production line.

Possible Causes

The item number is not defined in the item master (site master) as a Pur/Mfg item of L type.

Solution

Set the Pur/Mfg code to L in Item Data Maintenance (1.4.3). Pur/Mfg codes other than L default the firmed order as a discrete order.

Item Does Not Default as a Repetitive Scheduled Item

On a production line, the item does not default as a repetitive scheduled item.

Possible Cause

The Pur/Mfg code is not set to L for the item master.

Solution

Set the Pur/Mfg code to L in Item Master Maintenance (1.4.1).

MSW-Selected Item Does Not Display in PSW

Possible Cause

A filter has been applied to the MSW/PSW that hides a production line or item that is visible on one frame/grid and not another. The system will still select/focus on the item record, even if not visible.

Also, the sequencing horizon may be less than the MSW scheduling horizon.

If you are viewing items on a work center resource, the setting of the Pur/Mfg field does not have an impact on this issue; however, setting the BOM and routing does have an impact. Likewise, BOM/routing does not impact viewing an item on the production line, but the setting of the Pur/Mfg field does.

Solution

Remove the filter. The selected record displays as selected.

Change the horizons through the Options drop-down menu by selecting Preferences, then the Search tab in the Planning and Scheduling Workbenches. Verify that for both work center and production lines, there is an active supply/demand for the item within the search history/future horizon.

If viewing items on a production line, set the Pur/Mfg field to L in Item Data Maintenance (1.4.3).

Some Workbench Grids Do Not Show Past Due Data

The Schedule Grid, Supply/Demand Grid, and Capacity Grid do not show data related to past due orders.

Probable Cause

The Schedule Grid, Capacity Grid, and Supply/Demand Grid only show data related to past due orders when they are within the setting of the History Horizon field in the Search window of the Preferences option.

Solution

If you see past due orders but not the detail related to them, expand the history horizon value to see the related data (supply, demand, and so on).

Also, the Production Order Maintenance window within the workbench shows past due orders. Past due open production orders display first, regardless of the history horizon setting you have selected in your user preferences.

Item Highlighted in Red in MSW but No Shortage

The system highlights an item in red for a POH issue in the MSW workbench, but there are no shortages within the production line's scheduling horizon end date.

Probable Cause

This occurs because the item that is on that particular resource is also on other resources in the Schedule Grid. When this is the case, the system looks at the number of firm scheduling days for all resources for which the item is scheduled in the grid; then, it selects the number of firm days that is the highest to associate with the item. So, even though the specific work center that is highlighted may have zero (0) firm scheduling days, another resource for which the item is scheduled may have, for example two firm scheduling days, so the system uses the two firm scheduling days for the item status for the item, regardless of the resource with which the item is paired.

Solution

No solution required.

Completed Production Order and Item No Longer Display on Workbench

The MSW displays completed production orders where the production order due date is within the history/future horizon that you define through the Options drop-down menu by selecting Preferences, then the Search tab in the Planning and Scheduling Workbenches. When the item you produced has no other active supply/demand records (mrp_det) records, the item/order no longer displays on the workbench.

Probable Cause

If an item has no mrp_det records in the system for any of the sites, then that item and its production orders do not display. For example, if you have an item with just one production order in the system, and you receive the production order but do not close it, the production order can have a zero open quantity but an exploded status. Normally, the order displays as a search result, but once the production order was fully received, the system deleted the mrp_det record for that order. Since that was the only production order for the item and no other mrp_det records exist, that item and the order do not display.

Ensure that a routing exists in Routing Maintenance (14.13.1) and that a product structure (BOM) exists in Product Structure Code Maintenance (13.1).

Cannot Delete an E Status Co-/By-Product Order

You cannot delete an E(xploded) status co- or by-product order.

Problem

When you attempt to delete a co/by-product order with an E status, the system displays an error message during a subsequent save that informs you that you must perform a production order accounting close.

Solution

This is standard legacy functionality for co/by-products. When the order has an E status, you must run production order accounting close before you can delete the joint set. Or, you can set the status back to F(irm) to delete the order.

Errors

WO Record Locked By Another User

If you are working in MSW, then use Production Order Maintenance (16.3.1) to edit an order that MSW receives, then return to the MSW workbench to modify the order and attempt to save the order, the system displays a red icon in the MSW and an error message, informing you the record is locked by another user.

Additionally, when Production Order Control is locked, it may lock Production Order Maintenance, so that MSW cannot create new production orders when you leave the ID and Number fields blank. When this occurs, you may receive an error message.

Data Modified by Another User

You can receive an error message in the workbenches, indicating that another user modified data. When you receive this error while attempting to update records, the system does not let you update. You must refresh data by searching for records again before you update.

The error can display in the following situations:

- You are saving several orders in the workbenches; however, one record is open in the CHUI version.
- You open a production order record in MSW, then change that same production order in another program. After, you attempt to update the order along with several others in MSW and click save.
- You make changes as described above but from one of the following tabs: Detail, Comments, Date/Time, and Compliance.
- You open a planned order in the Production Order Maintenance window, delete demand, run MRP so that the system deletes planned orders, then save the planned order.
- You open a planned order, change demand so that the system creates new planned orders, run MRP, then save the planned order.

System Unable to Process Request

The system can display a message indicating that it cannot process a request. This can occur, for example, when the system is retrieving a large number of records for a search. When this happens, check the log file. Typically, the system cannot process requests because it has run out of memory.

When this occurs, try any or all of the following:

- Reboot the PC to clear memory usage.
- Change the search criteria to extract less data.

- Upgrade the PC with more memory 4 GB or more.

Product Information Resources

QAD offers a number of online resources to help you get more information about using QAD products.

QAD Forums (community.qad.com)
Ask questions and share information with other members of the user community, including QAD experts.

QAD Knowledgebase (knowledgebase.qad.com)*
Search for answers, tips, or solutions related to any QAD product or topic.

QAD Document Library (documentlibrary.qad.com)
Get browser-based access to user guides, release notes, training guides, and so on; use powerful search features to find the document you want, then read online, or download and print PDF.

QAD Learning Center (learning.qad.com)*
Visit QAD's one-stop destination for all courses and training materials.

*Log-in required

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