

Oracle[®] Flow Manufacturing

User's Guide

Release 11*i*

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Oracle[®] Flow Manufacturing User's Guide, Release 11i

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Oracle Flow Manufacturing User's Guide, Release 11i

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Oracle Corporation welcomes your comments and suggestions on the quality and usefulness of this publication. Your input is an important part of the information used for revision.

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Preface

Audience for This Guide

Welcome to Release 11*i* of the Oracle Flow Manufacturing User Guide.

This guide assumes you have a working knowledge of the following:

- The principles and customary practices of your business area.
- Oracle Manufacturing

If you have never used Oracle Flow Manufacturing, we suggest you attend one or more of the Oracle Manufacturing training classes available through Oracle University.

- The Oracle Applications graphical user interface.

To learn more about the Oracle Applications graphical user interface, read the *Oracle Applications User Guide*.

See *Other Information Sources* for more information about Oracle Applications product information.

How To Use This Guide

This guide contains the information you need to understand and use Oracle Flow Manufacturing.

This preface explains how this user guide is organized and introduces other sources of information that can help you. This guide contains the following chapters:

- Chapter 1: Provides an overview of the features contained Flow Manufacturing.
- Chapter 2: Describes how to set up Flow Manufacturing.

- Chapter 3: Describes the sequence in which tasks are performed in Flow Manufacturing line design.
- Chapter 4: Describes the functionality in the Graphical Line Designer Workbench.
- Chapter 5: Provides information on how to use the mixed model map to design a balanced production.
- Chapter 6: Describes the functionality in the Line Scheduling Workbench including creating flow lines and scheduling algorithms.
- Chapter 7: Describes the functionality in the Graphical Kanban Workbench.
- Chapter 8: Describes Oracle Flow Manufacturing Reports.
- Appendix: Details the default navigator path for each Oracle Flow Manufacturing window.

Documentation Accessibility

Our goal is to make Oracle products, services, and supporting documentation accessible, with good usability, to the disabled community. To that end, our documentation includes features that make information available to users of assistive technology. This documentation is available in HTML format, and contains markup to facilitate access by the disabled community. Standards will continue to evolve over time, and Oracle Corporation is actively engaged with other market-leading technology vendors to address technical obstacles so that our documentation can be accessible to all of our customers. For additional information, visit the Oracle Accessibility Program Web site at <http://www.oracle.com/accessibility/>.

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Other Information Sources

You can choose from many sources of information, including online documentation, training, and support services, to increase your knowledge and understanding of Oracle Flow Manufacturing.

If this guide refers you to other Oracle Applications documentation, use only the Release 11*i* versions of those guides.

Online Documentation

All Oracle Applications documentation is available online (HTML or PDF).

- **Online Help** - The new features section in the HTML help describes new features in 11*i*. This information is updated for each new release of Oracle Flow Manufacturing. The new features section also includes information about any features that were not yet available when this guide was printed. For example, if your administrator has installed software from a mini-packs an upgrade, this document describes the new features. Online help patches are available on MetaLink.
- **11*i* Features Matrix** - This document lists new features available by patch and identifies any associated new documentation. The new features matrix document is available on MetaLink.
- **Readme File** - Refer to the readme file for patches that you have installed to learn about new documentation or documentation patches that you can download.

Related User's Guides

Oracle Flow Manufacturing shares business and setup information with other Oracle Applications products. Therefore, you may want to refer to other user's guides when you set up and use Oracle Flow Manufacturing.

You can read the guides online by choosing Library from the expandable menu on your HTML help window, by reading from the Oracle Applications Document Library CD included in your media pack, or by using a Web browser with a URL that your system administrator provides.

If you require printed guides, you can purchase them from the Oracle Store at <http://oraclestore.oracle.com>.

Guides Related to All Products

Oracle Applications User's Guide

This guide explains how to enter data, query, run reports, and navigate using the graphical user interface (GUI) available with this release of Oracle Flow Manufacturing (and any other Oracle Applications products). This guide also includes information on setting user profiles, as well as running and reviewing reports and concurrent processes.

You can access this user's guide online by choosing Getting Started with Oracle Applications from any Oracle Applications help file.

User Guides Related to This Product

Oracle Bills of Material User's Guide

This guide describes how to create various bills of materials to maximize efficiency, improve quality and lower cost for the most sophisticated manufacturing environments. By detailing integrated product structures and processes, flexible product and process definition, and configuration management, this guide enables you to manage product details within and across multiple manufacturing sites.

Oracle Business Intelligence System Implementation Guide

This guide provides information about implementing Oracle Business Intelligence (BIS) in your environment.

BIS Online Help

This information is provided as online help only from the BIS application and includes information about intelligence reports, Discoverer workbooks, and the Performance Management Framework.

Oracle Cost Management User's Guide

This guide describes how to use Oracle Cost Management in either a standard costing or average costing organization. Cost Management can be used to cost inventory, receiving, order entry, and work in process transactions. It can also be used to collect transaction costs for transfer to Oracle Projects. Cost Management supports multiple cost elements and multiple subelements. It also provides comprehensive valuation and variance reporting.

Oracle General Ledger User's Guide

This guide explains how to plan and define your chart of accounts, accounting period types and accounting calendar, functional currency, and set of books. It also describes how to define journal entry sources and categories so you can create journal entries for your general ledger. If you use multiple currencies, use this manual when you define additional rate types, and enter daily rates. This manual also includes complete information on implementing Budgetary Control.

Oracle HRMS Documentation Set

- *Using Oracle HRMS - The Fundamentals* explains how to set up organizations and site locations.
- *Managing People Using Oracle HRMS* explains how to enter and track employee data.
- *Running Your Payroll Using Oracle HRMS* explains how to set up payroll, do withholding, run statutory reports, and pay employees.
- *Managing Compensation and Benefits Using Oracle HRMS* explains how to set up Total Compensation, including 401(k), health, and insurance plans.
- *Customizing, Reporting, and System Administration in Oracle HRMS* explains how to customize the system and design reports.

Oracle Inventory User's Guide

This guide describes how to define items and item information, perform receiving and inventory transactions, maintain cost control, plan items, perform cycle counting and physical inventories, and set up Oracle Inventory.

Oracle Master Scheduling/MRP and Oracle Supply Chain Planning User's Guide

This guide describes how to anticipate and manage both supply and demand for your items. Using a variety of tools and techniques, you can create forecasts, load these forecasts into master production schedules, and plan your end-items and their component requirements. You can also execute the plan, releasing and rescheduling planning suggestions for discrete jobs, repetitive schedules, and flow schedules.

Oracle Order Management User's Guide

This guide describes how to enter sales orders and returns, copy existing sales orders, schedule orders, release orders, create price lists and discounts for orders, run processes, and create reports.

Oracle Purchasing User's Guide

This guide describes how to create and approve purchasing documents, including requisitions, different types of purchase orders, quotations, RFQs, and receipts. This guide also describes how to manage your supply base through agreements, sourcing rules and approved supplier lists. In addition, this guide explains how you can automatically create purchasing documents based on business rules through integration with Oracle Workflow technology, which automates many of the key procurement processes.

Oracle Quality User's Guide

This guide describes how Oracle Quality can be used to meet your quality data collection and analysis needs. This guide also explains how Oracle Quality interfaces with other Oracle Manufacturing applications to provide a closed loop quality control system.

Oracle Work in Process User's Guide

This guide describes how Oracle Work in Process provides a complete production management system. Specifically this guide describes how discrete, repetitive, assemble-to-order, project, flow, and mixed manufacturing environments are supported.

Oracle Workflow Guide

This guide explains how to define new workflow business processes as well as customize existing Oracle Applications-embedded workflow processes. You also use this guide to complete the setup steps necessary for any Oracle Applications product that includes workflow-enabled processes.

Installation and System Administration

Oracle Applications Concepts

This guide provides an introduction to the concepts, features, technology stack, architecture, and terminology for Oracle Applications Release 11*i*. It provides a useful first book to read before an installation of Oracle Applications. This guide also introduces the concepts behind Applications-wide features such as Business Intelligence (BIS), languages and character sets, and Self-Service Web Applications.

Installing Oracle Applications

This guide provides instructions for managing the installation of Oracle Applications products. In Release 11*i*, much of the installation process is handled using Oracle Rapid Install, which minimizes the time to install Oracle Applications, the Oracle8 technology stack, and the Oracle8*i* Server technology stack by automating many of the required steps. This guide contains instructions for using Oracle Rapid Install and lists the tasks you need to perform to finish your installation. You should use this guide in conjunction with individual product user's guides and implementation guides.

Upgrading Oracle Applications

Refer to this guide if you are upgrading your Oracle Applications Release 10.7 or Release 11.0 products to Release 11*i*. This guide describes the upgrade process and lists database and product-specific upgrade tasks. You must be either at Release 10.7 (NCA, SmartClient, or character mode) or Release 11.0, to upgrade to Release 11*i*. You cannot upgrade to Release 11*i* directly from releases prior to 10.7.

Maintaining Oracle Applications

Use this guide to help you run the various AD utilities, such as AutoUpgrade, AutoPatch, AD Administration, AD Controller, AD Relink, License Manager, and others. It contains how-to steps, screenshots, and other information that you need to run the AD utilities. This guide also provides information on maintaining the Oracle applications file system and database.

Oracle Applications System Administrator's Guide

This guide provides planning and reference information for the Oracle Applications System Administrator. It contains information on how to define security, customize menus and online help, and manage concurrent processing.

Oracle Alert User's Guide

This guide explains how to define periodic and event alerts to monitor the status of your Oracle Applications data.

Oracle Applications Developer's Guide

This guide contains the coding standards followed by the Oracle Applications development staff. It describes the Oracle Application Object Library components needed to implement the Oracle Applications user interface described in the *Oracle Applications User Interface Standards for Forms-Based Products*. It also provides

information to help you build your custom Oracle Forms Developer 6i forms so that they integrate with Oracle Applications.

Oracle Applications User Interface Standards for Forms-Based Products

This guide contains the user interface (UI) standards followed by the Oracle Applications development staff. It describes the UI for the Oracle Applications products and how to apply this UI to the design of an application built by using Oracle Forms.

Other Implementation Documentation

Oracle Applications Product Update Notes

Use this guide as a reference for upgrading an installation of Oracle Applications. It provides a history of the changes to individual Oracle Applications products between Release 11.0 and Release 11i. It includes new features, enhancements, and changes made to database objects, profile options, and seed data for this interval.

Multiple Reporting Currencies in Oracle Applications

If you use the Multiple Reporting Currencies feature to record transactions in more than one currency, use this manual before implementing Oracle Flow Manufacturing.

Multiple Organizations in Oracle Applications

This guide describes how to set up and use Oracle Flow Manufacturing with Oracle Applications' Multiple Organization support feature, so you can define and support different organization structures when running a single installation of Oracle Flow Manufacturing.

Oracle Workflow Guide

This guide explains how to define new workflow business processes as well as customize existing Oracle Applications-embedded workflow processes. You also use this guide to complete the setup steps necessary for any Oracle Applications product that includes workflow-enabled processes.

Oracle Applications Flexfields Guide

This guide provides flexfields planning, setup and reference information for the Oracle Flow Manufacturing implementation team, as well as for users responsible

for the ongoing maintenance of Oracle Applications product data. This manual also provides information on creating custom reports on flexfields data.

Oracle eTechnical Reference Manuals

Each eTechnical Reference Manual (eTRM) contains database diagrams and a detailed description of database tables, forms, reports, and programs for a specific Oracle Applications product. This information helps you convert data from your existing applications, integrate Oracle Applications data with non-Oracle applications, and write custom reports for Oracle Applications products. Oracle eTRM is available on Metalink

Oracle Manufacturing APIs and Open Interfaces Manual

This manual contains up-to-date information about integrating with other Oracle Manufacturing applications and with your other systems. This documentation includes API's and open interfaces found in Oracle Manufacturing.

Oracle Order Management Suite APIs and Open Interfaces Manual

This manual contains up-to-date information about integrating with other Oracle Manufacturing applications and with your other systems. This documentation includes API's and open interfaces found in Oracle Order Management Suite.

Oracle Applications Message Reference Manual

This manual describes all Oracle Applications messages. This manual is available in HTML format on the documentation CD-ROM for Release 11i.

Training and Support

Training

Oracle offers a complete set of training courses to help you and your staff master Oracle Flow Manufacturing and reach full productivity quickly. These courses are organized into functional learning paths, so you take only those courses appropriate to your job or area of responsibility.

You have a choice of educational environments. You can attend courses offered by Oracle University at any one of our many Education Centers, you can arrange for our trainers to teach at your facility, or you can use Oracle Learning Network (OLN), Oracle University's online education utility. In addition, Oracle training professionals can tailor standard courses or develop custom courses to meet your

needs. For example, you may want to use your organization structure, terminology, and data as examples in a customized training session delivered at your own facility.

Support

From on-site support to central support, our team of experienced professionals provides the help and information you need to keep Oracle Flow Manufacturing working for you. This team includes your Technical Representative, Account Manager, and Oracle's large staff of consultants and support specialists with expertise in your business area, managing an Oracle8i server, and your hardware and software environment.

Do Not Use Database Tools to Modify Oracle Applications Data

*Oracle STRONGLY RECOMMENDS that you never use SQL*Plus, Oracle Data Browser, database triggers, or any other tool to modify Oracle Applications data unless otherwise instructed.*

Oracle provides powerful tools you can use to create, store, change, retrieve, and maintain information in an Oracle database. But if you use Oracle tools such as SQL*Plus to modify Oracle Applications data, you risk destroying the integrity of your data and you lose the ability to audit changes to your data.

Because Oracle Applications tables are interrelated, any change you make using Oracle Applications can update many tables at once. But when you modify Oracle Applications data using anything other than Oracle Applications, you may change a row in one table without making corresponding changes in related tables. If your tables get out of synchronization with each other, you risk retrieving erroneous information and you risk unpredictable results throughout Oracle Applications.

When you use Oracle Applications to modify your data, Oracle Applications automatically checks that your changes are valid. Oracle Applications also keeps track of who changes information. If you enter information into database tables using database tools, you may store invalid information. You also lose the ability to track who has changed your information because SQL*Plus and other database tools do not keep a record of changes.

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Oracle Corporation develops and markets an integrated line of software products for database management, applications development, decision support, and office

automation, as well as Oracle Applications, an integrated suite of more than 160 software modules for financial management, supply chain management, manufacturing, project systems, human resources and customer relationship management.

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Thank you for using Oracle Flow Manufacturing and this user's guide.

Oracle values your comments and feedback. At the end of this guide is a Reader's Comment Form you can use to explain what you like or dislike about Oracle Flow Manufacturing or this user's guide. Mail your comments to the following address or call us directly at (650) 506-7000.

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Overview of Flow Manufacturing

This chapter will give you an overview of the features contained in Oracle Flow Manufacturing, including:

- [Overview of Flow Manufacturing](#) on page 1-2
- [Demand Management](#) on page 1-3
- [Line Design and Balancing](#) on page 1-4
- [Line Scheduling and Sequencing](#) on page 1-6
- [Production Execution](#) on page 1-7
- [Kanban Planning and Execution](#) on page 1-9
- [Flow Workstation](#) on page 1-11

Overview of Flow Manufacturing

Flow manufacturing is a manufacturing approach with the objective of building the highest quality product in the shortest possible time at the lowest cost. To achieve this objective, flow manufacturing employs the following practices:

- Building to customer demand rather than building to a forecast
This practice reduces finished goods inventories, reduces cost, and increases customer satisfaction.
- Linear manufacturing rather than batch production
This practice reduces work in process inventory, rework, and scrap and increases product quality as quality and assembly problems are immediately addressed.
- Mixed model production rather than process layout
This practice allows a mix of products to be produced on one production line in the same day, which allows the manufacturer to respond to the demand generated by customer orders.
- In-process quality rather than inspecting quality into the product after assembly
This practice builds quality into the product during the production process resulting in less rework, less scrap, lower cost, and higher customer satisfaction.
- JIT Replenishment of component materials rather than receipts of MRP forecasted demands.
This practice reduces the amount of component inventory and reduces costs.
- Uses rate-based production rather than work orders
This practice simplifies shop floor activities and reduces cost.
- Labor flexibility rather than labor specialization
This practice increases productivity and reduces costs.
- Backflush material and costs upon completion rather than at each operation
This practice helps to simplify shop floor activities and reduce costs.

Oracle Flow Manufacturing includes a comprehensive set of features that support the entire flow process from line design and balancing to production execution. It enables implementation of the demand pull system using kanbans for both raw material and in-process assemblies. The planning process is streamlined using flow schedules to sequence and schedule mixed model production. Oracle Flow

Manufacturing provides a framework to create effective partnerships between the various business units of the enterprise, including engineering, production, planning, distributors, suppliers, and customers.

The features provided by Oracle Flow Manufacturing are classified into the following categories:

- Demand Management
- Line Design and Balancing
- Line Scheduling and Sequencing
- Production Execution
- Kanban Planning and Execution

Demand Management

Demand management is a factor during both the initial design of flow production lines and the daily execution of the rate-based schedules. During the design phase, the objectives of demand management are to group similar products into families, which allows for planning at an aggregate level and to develop a peak daily volume for all products that will be used for line balancing and kanban planning. During production execution, the objectives are to increase responsiveness to customer demand and to maximize resource use.

Oracle Flow Manufacturing uses the demand management tools provided in Oracle MPS/MRP, Supply Chain Planning and Advanced Planning and Scheduling to plan production volumes.

Line Design

Line design is based upon the anticipated demand for a product or product family. This anticipated demand represents the peak daily volume. All production resources, machines, and labor are then calculated based on these volumes. Additionally, these demand figures and factory schedule hours are used to derive the takt time, or rate that products must be produced to meet the schedule. This figure represents the rate that products must leave the end of the line in order to meet customer demand. See: [Product Synchronization](#) on page 3-2

Kanban Planning

Oracle Flow Manufacturing uses a kanban pull replenishment system to signal material requirements and pull material from its defined source as needed to meet

daily customer demand. The objective of the kanban replenishment system is to continuously improve the production with zero stock outs, shorter lead times, reduced inventory, and minimal supervision. The statement of demand used to balance flow lines to peak daily demand is generally used size kanbans of components. The use of a MPS or MRP plan for kanban items gives visibility to the long term plan. This plan is then communicated to trading partners, including marketing and suppliers.

In Oracle Flow Manufacturing, any number of baseline and simulation kanban plans can be created in which kanban quantities for each item or kanban location can be calculated and stored. Optimal kanban quantities can be calculated for the desired demand schedule. See: [Kanban Planning Oracle Master Scheduling/MRP, and Oracle Supply Chain Planning User's Guide](#)

Production Execution

In a flow manufacturing environment, daily production rates tend to be based on customer demand, including marketing orders. Flow lines are balanced with machines and resources to produce at the takt needed to meet the peak daily volume. By design, the daily customer demand should be less than that peak, ensuring that customer demand will be met. However, the mixed and demand represented in daily customer orders are not necessarily in the same ratios as the peak daily volumes design for. To manage the demand fluctuations, Oracle Flow Manufacturing uses simple flow schedules to schedule and sequence sales orders.

Line Design and Balancing

Line design and balancing is the foundation of a flow production line. The objective is to balance lines for mixed model production at the expected peak demand that take the least possible time to execute. This is accomplished through flat product structures and simple processes which can be communicated visually to meet customer demand daily. Line design includes grouping products into product families, defining the processes and events required to produce each product, and re-grouping events into line operations to approximate takt time.

Effective flow line design and balanced production smoothes production and eliminates bottlenecks. Flow lines are designed to reduce production time and resource costs by identifying value add events and eliminating non-value events. Simplified processes are designed to reduce overhead costs by optimizing floor space utilization. This simplified design also helps increase communication on the production floor through visual management tools. Quality is improved by implementing quality into the process, instead of inspecting in at the end.

Product Synchronization

Product synchronization defines the processes used to make each product and the sequence of events within each process. Events are granular tasks within the process that define the physical activities on the line. Each event is assigned the machine and labor times used to perform the event.

Product synchronization tasks are performed in Oracle Flow Manufacturing using flow routings. Flow routings support both processes and sequence of events. In addition flow routings can be used to define the network of processes including feeder lines, rework loops, and both primary and alternate processes required to produce an item. This will help model the line as is to the system. Flow routings and the routing network are also used to calculating the total product cycle time. Total product cycle time is the longest time path on the production line, including feeder lines, required to make the product.

See Also

[Creating a Routing](#) *Oracle Bills of Material User's Guide*.

[Product Synchronization](#) on page 3-2

Mixed Model Map

The Mixed Model Map is the tool that Oracle Flow Manufacturing uses to achieve balanced flow lines. The Mixed Model Map combines the information from the products assigned to a specific line, including their routing, product family grouping, and forecasted demand. This information is displayed on the Mixed Model Map in tabular form. The takt time is calculated from the daily production requirements (demand) and the available production hours in a day. The summary portion of the Mixed Model Map displays the machine and labor resources needed to meet the takt time. Since takt time establishes the rhythm of the line, all the processes along the line are streamlined to complete within the takt time. This ensures that each product moves from process to process within the takt time, which maintains the steady production rate necessary to meet the demand. See: [Overview of Mixed Model Map](#) on page 5-2

Line Balancing

While engineering provides information on product routings in the form of processes and sequence of events, manufacturing faces the challenge of organizing work on a production line so that bottlenecks are minimized and work cells are balanced. As a result, manufacturing evaluates the feasibility of reorganizing the

events into groups that approximate takt time. Managing the imbalances often leads to analysis that includes the questions:

- Can non-value-added work be reduced or eliminated?
- Can the work be broken into smaller units?
- Can the work be grouped into larger units?
- Should resource (machine, labor) capacity be increased?
- Should in-process inventory be increased?
- Is an additional line needed?

Once the current line has been set up with items, organizations, the flow line, a forecast, and the product routings defined, the line can be balanced through iterative processes using the Mixed Model Map.

Operation Method Sheets

Operation Method Sheets (OMS) provide the needed information to shop floor personnel for performing an operation on the line. This information can include pictures of the assembly process, required materials, and written work instructions. These are the primary tools used to perform the operations and are especially critical on lines making many models.

Oracle Flow Manufacturing supports Operation Method Sheets using the Attachments feature. Multimedia documents can be attached to, and maintained for, each line operation on the flow routing of each item.

Line Scheduling and Sequencing

In flow manufacturing, line scheduling is equal to line design and balancing in terms of importance. A line well designed to meet average daily demand that is scheduled improperly can cause excessive change-overs, large peaks in demand to kanbans, or unbalanced demand on resources. Each of these will undermine the line's ability to perform to takt. Oracle Flow Manufacturing allows for the creation and use of simple scheduling rules to schedule either sales or planned orders for the flow line. The objective of line scheduling is to sequence production to maximize resource utilization and minimize delays.

Line scheduling allows for:

- Creation of a scheduling rule based on pre-defined sequencing criteria and scheduling algorithms

- Viewing of all unscheduled orders for your line and choose which orders you want to schedule
- Scheduling the line and viewing the final flow schedule.

Scheduling rules determine the logic used to create flow schedules from orders. They are a combination of sequencing criteria and scheduling algorithms that can help you pull demand forward or backward in time, in order to meet takt for each day.

Scheduling Algorithms

Scheduling algorithms are used to smooth demand by restricting the number of each assembly that is scheduled in any given day. Demand smoothing is important because the line is designed based on an average daily mix. However, seldom if ever will a line produce exactly the mix for which it was designed. Demand smoothing ensures that the mix is maintained as closely as possible, which helps the line to operate more efficiently and achieve takt time on a daily basis.

Note: Line Scheduling does not schedule a portion of a product: the algorithm rounds decimal quantities up to whole units before scheduling.

Sequencing Criteria

Sequencing criteria is used to determine the priority in which sales orders are scheduled.

See Also

[Setting Up Line Scheduling Workbench](#) *Oracle Master Scheduling/MRP, and Oracle Supply Chain Planning User's Guide*

[Line Scheduling Workbench](#) *Oracle Master Scheduling/MRP, and Oracle Supply Chain Planning User's Guide*

Production Execution

As through-put time and inventory levels are driven down during implementation of Oracle Flow Manufacturing, the need for and value of detailed production information becomes less critical. This creates the opportunity to eliminate or streamline production execution transactions. One of the tools provided by Oracle

Flow Manufacturing to help in this process is the Work Order-less Completion transaction.

Mixed Model Map

The Mixed Model Map is the tool that Oracle Flow Manufacturing uses to achieve balanced flow lines. After lines have been designed and during the production cycle, the Mixed Model Map becomes a tool to evaluate the impact of the current production schedule on the resources, operational times and in-process kanbans. In this mode, the summary portion of the Mixed Model Map displays the machine and labor resources needed to meet the takt time for the current production load. The baseline comparison highlights where labor resources can be removed to allow for flexing and where extra resources or overtime may be needed to produce to demand.

Work Order-Less Completions

Production is recorded with the Work Order-less Completion transaction against flow schedules created with the Line Scheduling Workbench. Completions can be either unscheduled or scheduled against a flow schedule. The system backflushes all components and performs resource and overhead transactions upon recording completion of the finished product. Additionally, Oracle Flow Manufacturing allows assembly completions to be recorded without having to create work orders, a job or repetitive schedule, or a flow schedule.

Work order-less completions do the following:

- Backflush pull and push components
- Charge resources and overhead based on the flow routing

See Also

[Work Order-less Completions](#), *Oracle Work in Process User's Guide*

Manufacturing Costing

The costing method of the organization determines whether mixed manufacturing methods can be used. Costing in a flow environment is usually done using standard costing methods. Average costing may also be used, particularly when used in conjunction with project manufacturing. Cost variances are collected and posted during the Work Order-less Completion transaction.

Component Picking

You can perform component picking transactions for flow schedules using the rules based system in Oracle Warehouse Management. Flow manufacturing environments use kanban signals to control the replenishment of components on the line. However, the picking functionality can be used for slower moving or randomly used planned components to create move orders for supply push components. The Component Pick Release window is used to select requirements and create move orders. It is a graphical workbench that displays fields applicable to the job or schedule type accessed. The features in component picking for flow schedules include:

- There is a distinct Component Pick Release window for the Flow Manufacturing mode.
- The source for material picked is based on Oracle Inventory allocation rules entered on the Picking Rules window. Or, if Oracle Warehouse Management is installed, rules based picking recommendations.
- Material must be defined at a valid line operation.
- The status of the line must be Open.
- Move orders are generated when all quantities for the flow schedule components can be filled.
- Components must be a supply type of Push.
- Move orders are only generated when the flow schedule components can be filled. If the components are not on-hand, backorders are not created.
- You can run the pick release multiple times until the requirement is filled since move orders are not generated for flow schedules with component shortages.

For more information on picking and pick release, refer to the Material Control chapter of the *Oracle Work in Process User's Guide*.

Kanban Planning and Execution

A key objective of flow manufacturing and JIT production is to minimize inventory and increase inventory turns. Raw material is pulled into production as needed to meet demand and the pulled material is replenished using a kanban signal. The minimum amount of material possible, based on replenishment time is held at the line in kanban bins. As each bin is emptied, a signal is issued to replenish the bin and the next bin is used to pull the material.

There are many kanban systems in use today but the most commonly used are (i) the two-bin (two card) system and (ii) multi-bin (multi card) system. Oracle Flow Manufacturing supports both these systems for planning and execution during production.

Calculation of Kanban Size and Number of Cards

Oracle Flow Manufacturing calculates the optimal number of kanbans needed in each kanban location. It can calculate the number of kanbans needed when a bin quantity is specified or it can calculate the kanban size if the number of bins are specified. Oracle Flow Manufacturing allows the simulation of multiple kanban plans. Kanbans currently in use can be compared and adjusted against kanban requirements for consistently varying demands. This process helps in both maintaining minimal material inventory and continuity of material flow from the supplier to the production line.

Pull Sequences

Oracle Flow Manufacturing helps you define the kanban locations for each item along with the supply source information. The supply source can be suppliers, other production lines, other inventory organizations in the enterprise, or other kanban locations in the same organization. A complete chain of demand-supply pull sequences can be defined for kanban planning.

Non-Replenishable Kanbans

Non-replenishable kanbans are used to meet unexpected peaks in demand. For demand variations that are infrequent and unplanned, Oracle Flow Manufacturing allows non-replenishable kanban cards. These cards are created for specific items in specific quantities as needed. Non-replenishable kanbans cycle through the system only once, after which they are removed from production.

Kanban Execution

Oracle Flow Manufacturing generates appropriate events for each kanban signal. For kanbans that are sourced through suppliers, the system can generate requisitions and purchase orders. Sourcing rules can also be used to create blanket releases against purchase contracts. Internal requisitions can be generated for inter-organization replenishments.

Oracle Flow Manufacturing supports different statuses of kanban cards to help track their release cycle. Supported statuses include Full, Empty, In-Process, In-Transit, Hold, and others. Kanban Cards can also be accumulated and released together when a minimum order quantity greater than the kanban size is specified.

A number of modifiers such as safety stock days and lot multiplier allow you to create a smooth signaling and replenishment system.

Flow Workstation

The Flow Workstation is a graphical workbench used to integrate Oracle Flow Manufacturing with Oracle Work in Process transactions. You can track work throughout the shop floor, and complete scheduled and unscheduled assemblies. The Flow Workstation features enable you to:

- View the linearity, load, and properties of the selected line
- View a line operation's open schedules and events, unscheduled assemblies, and attachments previously appended to a job such as drawings or instructions
- View component and resource information required for schedules and events
- Perform completions for line operations, flow schedules and unscheduled assemblies
- Access windows directly from the workstation to perform shop floor transactions

The Flow Workstation window consists of two panes. One pane displays the hierarchical tree format. The other pane displays tabbed regions with detailed information corresponding to the branch selected on the tree.

See Also

[Flow Workstation Window](#), *Oracle Work in Process User's Guide*.

[Flow Workstation Menus](#), *Oracle Work in Process User's Guide*.

[Flow Workstation Branches and Tabs](#), *Oracle Work in Process User's Guide*.

[Flow Manufacturing Integration with Work in Process](#), *Oracle Work in Process User's Guide*.

Flow Manufacturing Setup

This chapter describes the processes involved in setting up Oracle Flow Manufacturing, including:

- [Overview of Setting Up](#) on page 2-2
- [Setup Objectives](#) on page 2-3
- [Setup Steps](#) on page 2-5

Overview of Setting Up

This chapter outlines the required Oracle Flow Manufacturing setup steps, in a logical sequence. For detailed instruction and data field considerations, see the Oracle Flow Manufacturing Implementation Manual. For other modules that interact with Oracle Flow Manufacturing, please refer to the User's Guide and Implementation Manual of the appropriate Oracle application for more detailed explanation of setup requirements and alternatives.

Setting up Oracle Flow Manufacturing follows the business process for a flow implementation and relates directly to the tasks performed in the implementation. The following setup steps must be applied with full understanding of the Oracle Flow Manufacturing functionality and your production processes to ensure an effective implementation. The sequence in which the setup is done is important since there are data dependencies.

Setup Prerequisites

- Naming Convention Definition
- Setup Profile Options
- Setup Organization
- Setup Item Flexfield
- Inventory Parameters Setup
- Cost Accounts Creation
- Subinventories
- BOM Parameters Setup
- Purchasing Setup
- Order Entry Setup

Item Templates

- Flow Finished Good (Flow Assembly) Template
- Flow Component Template

Demand Management

- Products and Parts Setup
- Bills Setup

- Planning Setup

Line Design and Balancing

- Flow Line Setup
- Product Synchronization Setup

Line Scheduling

- Scheduling Rules

Production Execution

- Work Order-less Completion
- Quality Collection Plan

Kanban Planning and Execution

- Pull Sequence Setup
- Sourcing Rules Setup
- Assignment Sets Setup

Setup Objectives

Flow manufacturing requires teamwork and organization. The teamwork and organization must start in the planning and setup stages of implementation. Oracle Flow manufacturing setup steps may be classified into logical groups assigned to each of the Business Processes to achieve specific implementation objectives.

Setup Prerequisites

The ten setup objectives of Prerequisites are:

- **Naming Convention Definition** to define a naming convention adequate for the implementation.
- **Setup Profile Options** to create an organization
- **Setup Organization** to create the name of the organization
- **Setup Item Flexfield** to activate Flexfields for organization

- **Inventory Parameters Setup** to define the inventory parameters needed to be able to create items.
- **Cost Accounts Creation** to open accounts later needed for WIP accounts.
- **Subinventories** to create at least one subinventory for the flow line
- **BOM Parameters Setup** to define BOM parameters and locations.
- **Purchasing Setup** to setup suppliers and purchasing functionality.
- **Order Entry** to setup Order Entry in order to receive product orders.

Item Templates

The two setup objectives for the Item Templates are:

- **Flow Finished Good Template**, sometimes called **Flow Assembly**, to define the standard template for creation of Finished Good items.
- **Flow Component Template** - to define the standard template for creation of Flow Components items. A Flow Component can be Buy, Make, or Phantom.

Demand Management Setup

The three setup objectives of Demand Management are:

- **Products and Parts**- to define the products and parts to be produced and group them in a logical way to facilitate demand forecasting and production assembly.
- **Bills**- to create a bill of materials for the products and parts to include their family relationship, their location in the flow line and the source of their supply in order to do proper backflushes
- **Planning**- to identify and create the appropriate planning tools which will apply expected demand to the product family structures, item demand locations and item supply locations to calculate the flow line capacity and rates.

Line Design and Balancing Setup

The two setup objectives of line design and balancing are:

- **Flow Line Setup** - to define the flow lines, production resources and departments.
- **Product Synchronization Setup** - to define the activities and processes in the flow line and to produce a management tool to balance the resources and processes to meet demand.

Line Scheduling Setup

The objective of line scheduling setup is to define your scheduling rules

Production Execution Setup

The primary setup objective of production execution is Work Order-less Production- to meet daily production requirements simply.

Kanban Planning and Execution Setup

The primary setup objective of kanban planning and execution is to define the flow line's replenishment chain which will execute the flow of the requested material, just in time, in the expected quantity to the place it's needed.

Setup Steps

Demand Management Setup Steps

In designing a flow line, a company analyses the market forecast for the products and takes a look at the long term forecast. Since production planning occurs at the aggregate level, creating a production plan involves grouping products into product families. These groupings are based on products' similarities in design, manufacturing process, and resource usage.

In demand management you can assign planning percentages to members of the product family and use the relationship between a product family item and its members in:

- Forecast explosion
- Consumption
- Master Scheduling
- Capacity and Materials Planning

In production planning you can explode product family forecasts down to the product family members based on the planning percentages and effectivity dates for the member items.

Sales orders for member items consume the forecast for the member items as well as for the product family. Throughout the application, processing is done at both the aggregate and detail level. The setup objectives of demand management and production planning are achieved through the successful implementation of:

- Products and Parts Setup
- Bills Setup
- Planning Setup

Products and Parts Setup The objectives of products and parts setup are to create both the finished good and component items and to group the products and parts in logical product families to facilitate demand forecasting and production assembly. To implement Oracle Flow Manufacturing it necessary to set up:

- Create Items
- Product Family
- Product Family Members
- Categories and Category Sets

Bills Setup The objective of bills setup is to create a bill of materials for the products and parts but more importantly to assign a subinventory to each item in the BOM. Remember that the most fundamental setup requirement for Oracle Flow Manufacturing is that the subinventory assigned in the pull sequence for an item matches perfectly with the subinventory assigned in the BOM or item master for the same item. Pull sequences are defined in the kanban planning and execution section.

Planning Setup The setup objectives of planning are to identify and create the appropriate planning tools which will apply expected demand to the product family structures, item demand locations and item supply locations to calculate the flow line capacity and rates. To implement Oracle Flow Manufacturing it necessary to set up planning capabilities:

- Forecasting
- Master Demand Schedules

Line Design and Balancing Setup Steps

In a flow manufacturing environment, products are produced on a flow line to meet customer demand. Typically one flow line makes a mix of products. The exact mix depends on how much flex was built into the line design. Factors that determine flex include employees certified to work multiple processes (operations) and machines that can perform more than one function.

You can define and update, but not delete, production lines. A production line describes a unique set of processes or line operations that produce one or more of

your products. You can associate production lines with work order-less completions.

In line design and balancing, we will define items and inventory organizations, create the flow line, and set up the production synchronization tools to balance the line. The setup objectives of line design and balancing are achieved through the successful implementation of:

- Items and Organizations
- Flow Lines
- Product Synchronization

Flow Line Setup The flow line is an organization of resources and departments. Once the flow line is defined, processes and activities (events) are applied to create operations on the flow line. Oracle Flow Manufacturing then provides a planning tool, the Mixed Model Map to calculate process times and volumes to balance resources and events and optimize flow line efficiency.

The setup objective of flow lines is to define the flow line, production resources and departments. To implement Oracle Flow Manufacturing it necessary to set up:

- Flow Lines
- Resources
- Departments

Product Synchronization Setup product synchronization is an approach to defining the processes, and sequence of events within each process, to manufacture a product. The objectives of product synchronization are to organize the flow line activities and processes in balance with the resources to schedule smooth production while meeting daily demand.

At this point, you have defined the organizations, departments, resources and items to be produced on the flow line. The objective now is to:

- Identify the route each item will pass through towards completion.
- Produce a Mixed Model Map to balance the resources and processes to meet demand.

In order to implement these objectives through Oracle Flow Manufacturing you will define and set up:

- Standard Events
- Standard Processes

- Flow Routings
- Standard Operations

Event and Resource Functions in a Standard Processes Understanding Oracle functionality and your production processes are critical to the successful implementation of flow manufacturing. To illustrate the relationship of Standard Processes, Resources and Events, assume a line worker has two work events to perform to install handle bars on a bike.

- Mount bar to frame
- Bolt to frame

The standard process would be Install Handle Bars. The resource assigned to the process would be one line worker. The events assigned to the process would be to mount and bolt.

Flow Routing Functions in Product Synchronization Perform product synchronization in Oracle Flow Manufacturing using flow routings. Flow routings support both processes and sequence of events. In addition, you can use flow routings to define the network of processes including feeder lines, rework loops and primary/alternate processes required to produce an item.

You can also use flow routings and the routing network to calculate the total product cycle time. The total product cycle time is longest time path on the production line (including feeder lines) in making the product.

Planning Percentage Functions in Product Synchronization You can assign planning percentages to each of the operations, including primary/alternate operations and rework loops, to use in the calculation of required material and resources to balance a production line.

Line Scheduling Setup Steps

The primary objective of Line Scheduling is to synchronize production with customer demand. This objective is achieved through the successful implementation of the Line Scheduling Workbench. To schedule your production, you must first setup the scheduling rules you will use to prioritize your demand for scheduling purposes

Scheduling Rules Setup If you are creating a custom rule, this value is user-defined. The following rules are provided in the system:

- Mixed Model - mixed model by order request date

- Level Daily Rate- level daily rate by order request date
- Request Date- order request date with no leveling
- Schedule Date - order schedule date with no leveling
- Promise Date - order promise date with no leveling

Production Execution Setup Steps

The primary objective of setting up production execution is to meet daily production requirements simply. This objective is achieved through the successful setup of Work In Process Setup Parameters. You can complete assemblies using the work order-less completions form without having to create a job or repetitive schedule. Additionally, if you require quality collection plans for work order-less completions, they will be set up at this time.

Work in Process Setup

Set up the following parameters as shown:

Discrete Tab

- **Default Discrete Class Flow**
- **Default Lot Number Type** Based on inventory rules
- **Respond to sales order changes** Always

Move transaction tab

- **Require scrap account** No
- **Allow creation of new operations** Yes
- **Allow moves over move shop floor status** Yes

Backflush defaults

- **Supply subinventory** User defined
- **Supply locator** User defined
- **Lot selection method** Expiration date
- **Lot verification** Exceptions only

Other

- **Component ATP rule** Standard

- **Default over completion tolerance%** n/a

Kanban Planning and Execution Setup Steps

An item that is pulled through the kanban system, rather than pushed by the planner, is called a kanban-released item, or simply a kanban item. The kanban location for a kanban item is the designated location where that item is stored and where replenishment is delivered. For every kanban item, there is a pull sequence- a series of kanban locations that models the actual replenishment network on the shop floor or through external suppliers, specifying the sequence to follow to obtain the kanban item.

The setup objectives of kanban planning and execution are achieved through the successful implementation of the flow line replenishment chain.

Replenishment Chain Setup The objective of setting up the kanban replenishment chain is to execute the flow of the materials through the line. The steps required to implement the replenishment chain are to set up:

- Pull Sequence
- Sourcing Rules
- Assignment Sets

Purchasing Blanket PO, ASL, Sourcing Rules and Quotation Setup You may enter the supplier/supplier site on the pull sequence. If you have completed the pull sequence setup with the proper supplier/supplier site information, then it is carried over to the requisition via the requisition import process. However, if you do not enter the supplier and supplier site information on a pull sequence and a replenishment signal is generated, then the resulting requisition can pull the source information from a valid source document.

Line Design and Balancing Procedures

The sequence in which tasks are performed in flow manufacturing line design varies. This section provides a broad overview of the necessary steps to enable flow manufacturing including:

- [Product Synchronization](#) on page 3-2
- [Flow Manufacturing Line Balance](#) on page 3-5
- [Defining Flow Manufacturing Standard Processes](#) on page 3-6
- [Defining Flow Manufacturing Standard Events](#) on page 3-7
- [Defining Flow Manufacturing Standard Line Operations](#) on page 3-9
- [Creating a Flow Routing](#) on page 3-10
- [Creating a Routing Network](#) on page 3-15
- [Calculating Operation Times](#) on page 3-17
- [Operation Times Calculations](#) on page 3-18
- [Calculating Total Product Cycle Time](#) on page 3-19
- [Calculating Operation Yields](#) on page 3-21
- [Operation Yields Calculations](#) on page 3-21

Product Synchronization

Product Synchronization is the process of defining your product's process flow. This is done through the flow routing where you are able to define processes, events and operations for your flow line. You can then define the process network, add process yield information, and calculate operation times, yields and total product cycle time.

You must define standard processes and standard operations before adding them to your flow routing.

Events, Processes, and Line Operations

Events represent the detailed work content of your line. You can assign resources and times to events.

Processes are generally logical groupings of events that represent what is being done on the shop floor before going to flow. They can equal the discrete routing operations (assembly, welding, machining, test, and so forth). They can also be at an even lower level than that—especially in an assembly environment (assemble fan, add engine, inspect welds, and so forth). You may want to define processes first to give you a chance to take a look at the balance of your shop before moving to flow, using the mixed model map. It gives you a starting point to divide or group work to equal takt. You are not required to define processes.

Operations are balanced groupings of events, and represent the workstations on your flow line. They may be more detailed than processes such as when one process is divided into several operations. Or, operations may be more generic such as when several processes are grouped into a single operation. This may be the case in a low volume assembly shop. Operations must be defined in order to be able to scrap assemblies through work order-less completions, to use the flow workstation, and to perform feeder line synchronization.

Attention: To reduce data entry, you can copy the product family flow routing to the product level flow routings. You can then modify as needed. Processes and line operations that are copied from the family to the member will retain any references to corresponding standard processes or line operations.

■ To create product synchronization for standard items

1. Navigate to the Flow Routing window.

2. Optionally, create a flow routing for an item.

Routing (S1)

Item: **MC97160** **Plastic Cover** UOM: **Ea**

Alternate: Capable To Promise

Line: **Laptops** Total Cycle Time: **.279**

Revision: **A** Date: **19/FEB/2001** []

Display: **Future and Current**

All Events

Main WIP Operation Times Description

Seq	Code	Referenced	Department	Process Seq	Process	Line Op Seq	Line Op	Effective	Di:	[]
10	FAB1	<input checked="" type="checkbox"/>	METAL_FAB	10	FAB1	10	LOP1	20/JAN/1998		
20	FAB2	<input checked="" type="checkbox"/>	METAL_FAB	10	FAB1	10	LOP1	20/JAN/1998		
30	ASY1	<input type="checkbox"/>	ASSEMBLY	30	ASY1	20	LOP2	20/JAN/1998		
40	ASY2	<input checked="" type="checkbox"/>	ASSEMBLY	40	ASY2	30	LOP3	20/JAN/1998		
50	TST1	<input checked="" type="checkbox"/>	TESTING	40	ASY2	30	LOP3	20/JAN/1998		

Routing Details Routing Network Event Resources

3. Assign the processes and events that you have defined.

Note: Processes should either be copied or referenced from the standard processes. Events can be flow routing specific and do not have to be copied or referenced.

4. Assign resources to non-standard events.

Note: To edit the resources for a standard event, deselect the referenced check box.

5. Optionally, enter Process Yields.

6. Create a routing network.

See: [Creating a Routing Network](#) on page 3-15

7. Calculate operation yields.

8. Calculate operation times.

9. Calculate total cycle time (TPCT).

10. Optionally, create a forecast, master demand schedule, and / or master production schedule with demands for the items.

Note: This step is not part of the product synchronization procedure and can be performed at any time before generating the mixed model map.

■ To create product synchronization for product family items

1. Navigate to the Flow Routing window.

2. Optionally, create a flow routing for the product family item. Assign the processes and events that you have defined.

Note: Processes should either be copied or referenced from the standard processes while events can be flow routing specific and do not have to be copied or referenced.

3. Assign resources to the non-standard events.

Note: Processes should either be copied or referenced from the standard processes. Events can be flow routing specific and do not have to be copied or referenced.

4. Optionally, enter Operation Yields.

5. Calculate Operation Yields.

6. Calculate Operation Times.

7. Calculate total cycle time (TPCT).

8. Create a flow routing for the members of the product family. You can copy the family routing to the members, then edit as needed. Recalculate Yields, Operation Times, TPCT.
9. Optionally, create a forecast, master demand schedule, and/or master production schedule with demands for the members of the product family.

Note: This step is not part of the product synchronization procedure and can be performed at any time before generating the mixed model map.

Flow Manufacturing Line Balance

► To balance a flow manufacturing line

1. Generate a mixed model map for a line, product family, or forecast. You can also assign a boost percentage, number of days, and number of hours per day for the line.

The mixed model map will reveal the line takt time, process takt times, weighted average times, and son on. See: [Entering Mixed Model Map Parameters](#) on page 5-2

2. Create line operations for the current line.

You can do this by selecting the Tools menu in the Mixed Model Map window. The line identification will default to the standard operations window and the operation type will be set to line operation.

3. Assign line operations to the product level routings.

You can do this by selecting Routing from the Tools menu.

Attention: You can copy or reference all of the line operations for the current line into the routing to reduce data entry effort.

4. Regroup events on each product level routing into line operations to approximate takt time.

You can do this by assigning the line operation in the Parent Line Op field of the event.

5. Create a routing network for operations.

6. Optionally, add yields to operations.
7. Recalculate yields, operation time and total cycle time, using operations instead of processes.

Regenerate the mixed model map by line operatin to review and confirm that the line is balanced. The mixed model map will also show the resource (machine/labor) and IPK requirements. See: [Entering Mixed Model Map Parameters](#) on page 5-2

Once your line is balanced, select Save as Baseline from the Tools menu to save this mixed model map. This map can be used to compare resource and IPK requirements against future runs of the of the same line. See: [Saving a Baseline](#) on page 5-2

Defining Flow Manufacturing Standard Processes

Standard Processes can be created and used only with Oracle Flow Manufacturing. Processes are generic activities that often comprise of multiple events which are performed in a specific sequence.

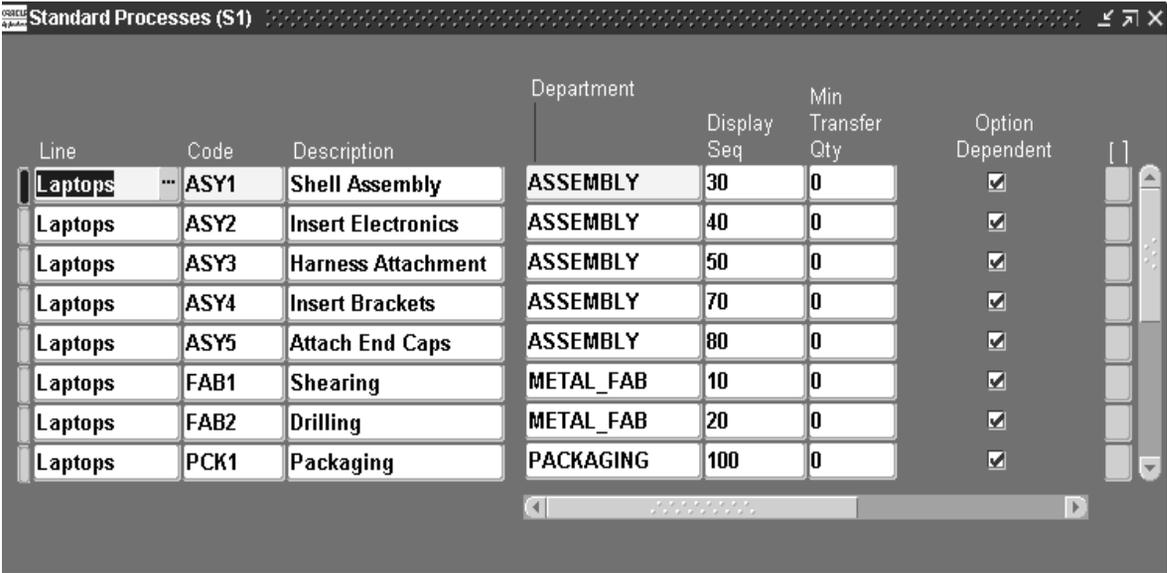
Note: Processes and standard processes can be created and used only with Oracle Bills of Material.

Prerequisites

To define flow manufacturing processes, you must first define a line in Oracle Work in Process. See: *Defining Production Lines, Oracle Work in Process User's Guide*.

► To define a Standard Process for a flow manufacturing line

- 1. Navigate to the Standard Processes window



- 2. Enter the line identifier, sequence number, code and description.
- 3. Select a department.
- 4. Optionally, enter a display sequence and minimum transfer quantity.

See Also
[Creating a Routing Network](#) on page 3-15

Defining Flow Manufacturing Standard Events

Standard Events can be created and used only with Oracle Flow Manufacturing.

Note: Events and standard events can only be created and used with Oracle Bills of Material.

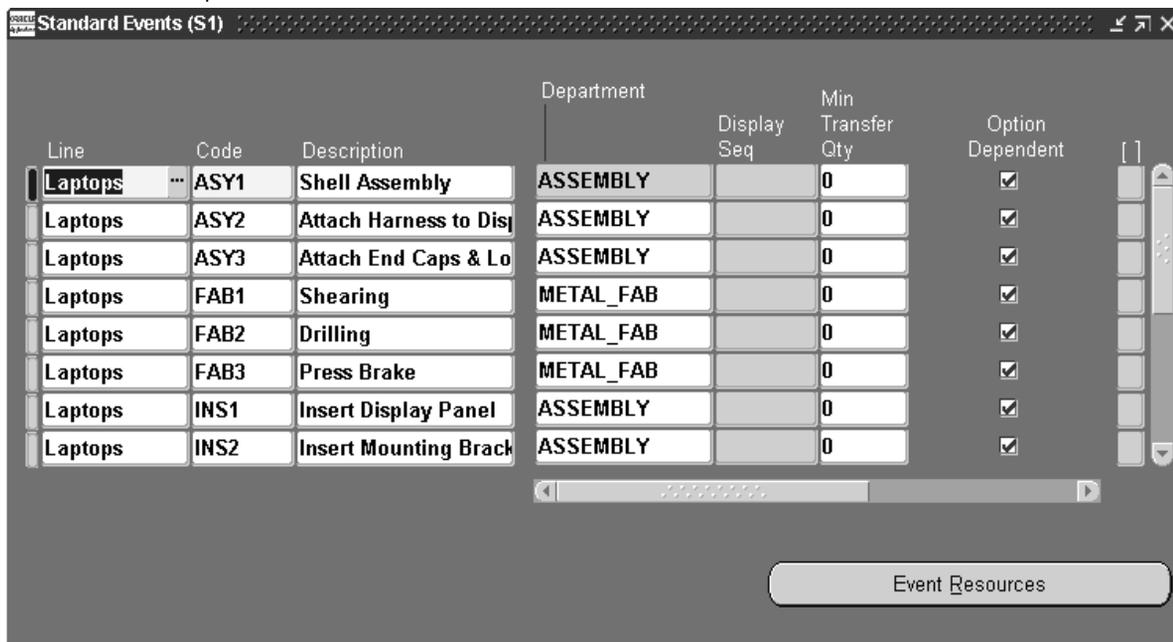
Note: When using Oracle Flow Manufacturing, the Operation Sequence on the Bill of Materials refers to the Event Sequence.

Prerequisites

To define flow manufacturing line operations, you must first define a line in Oracle Work in Process. [Defining Production Lines](#), *Oracle Work in Process User's Guide*.

► To define a Standard Event for a flow manufacturing line

1. Navigate to the Standard Events window



2. Enter the code and description.
3. Choose the Event Resources button to define resources.

Note: When defining events, you must choose whether a resource is scheduled or not scheduled. In Flow, a non-scheduled resource is a resource that is used in parallel to a scheduled resource.

Un-scheduled resources are included in the total time for the resource type (labor or machine), but is not included in the total elapsed time for the process. Scheduled resources are included in both.

Therefore, in the case of parallel processes, the activity with the longest resource time should be scheduled because the system elapsed time calculation should always consider the longest resource time.

See Also

[Creating a Routing Network](#) on page 3-15

[Defining Flow Manufacturing Standard Processes](#) on page 3-6

[Calculating Operation Times](#) on page 3-17

Defining Flow Manufacturing Standard Line Operations

Standard operations for flow manufacturing allows you to create line operations for a regular manufacturing line as well as a flow manufacturing line. In Oracle Flow Manufacturing, Operations are used to group events into balanced work groups. They are generally defined and assigned after viewing the Mixed Model Map although they can be entered at any time.

Note: Operations and standard operations can only be created and used with Oracle Bills of Material.

Note: When using Flow Manufacturing, the Operation Sequence on the BOM actually refers to the Event sequence.

Prerequisite

To define flow manufacturing line operations, you must first define a line in Oracle Work in Process.

To define a Standard Line Operation for a flow manufacturing line

1. Navigate to the Line Operations window.

The screenshot shows the 'Line Operations (S1)' window with a table of operations. The table has columns for Line, Code, Description, Department, Display Seq, Min Transfer Qty, and Option Dependent. The data is as follows:

Line	Code	Description	Department	Display Seq	Min Transfer Qty	Option Dependent
Laptops	LOP1	Shell Fabrication	METAL_FAB	10	0	<input checked="" type="checkbox"/>
Laptops	LOP2	Shell Assembly	ASSEMBLY	20	0	<input checked="" type="checkbox"/>
Laptops	LOP3	Test Station 1	TESTING	30	0	<input checked="" type="checkbox"/>
Laptops	LOP4	Final Assembly	ASSEMBLY	40	0	<input checked="" type="checkbox"/>
Laptops	LOP5	Test Station 2	TESTING	50	0	<input checked="" type="checkbox"/>
Laptops	LOP6	Packaging	PACKAGING	60	0	<input checked="" type="checkbox"/>
						<input type="checkbox"/>
						<input type="checkbox"/>

2. Enter the line identifier, sequence numbers, code and description.
3. Select a department and optionally choose the remaining options1

See Also

[Defining Flow Manufacturing Standard Processes](#) on page 3-6

Creating a Flow Routing

To create a product synchronization you can design a flow routing including events, processes, and line operations.

Attention: You cannot create flow routings for planning or pick-to-order items.

- You must define at least one department before you can create a routing.
- You must define a line.
- BOM Allowed must be set to Yes for the item you are creating a routing for.

Note: You can create a routing manually, copy an existing routing, or reference a common routing. See: Copying Bills and Routings and Referencing Common Bills and Routings

► **To create a flow routing**

1. Navigate to the Routing window.
2. Select the item for which you are creating a flow routing.

Note: You can create a flow routing for a product family item.

Attention: For ATO Items, the ATO Model Flow Routing will be used for line balancing, and will be used to create the configured routings during auto-create config. Therefore, define a routing for the model that contains all possible events, processes and operations for all possible options in your model. Then assign the model routing as a common routing for all option classes.

3. You can assign an existing routing, copy a routing, or create a new one.
 - To assign a common routing, choose Assign Common Routing from the Tools menu and select an item to copy.
 - To copy an existing flow routing, choose Copy Routing From in the Tools menu and select an item to copy.
 - To create a new routing, select the Events, Processes, or Line Operations tab to define the elements of your flow routing.
4. If you are creating an alternate flow routing, enter an alternate. For a primary flow routing, do not enter an alternate. See: Primary and Alternate Routings

Note: To create a standard (non-flow) routing for the same item, you must first switch to the Bills of Material responsibility.

5. Enter the line for which you are creating the flow routing.

6. If you are updating an existing flow routing, enter the routing revision and the effective date.

Note: Items can have flow and non-flow routings. To define non-flow revisions, you must switch to the Bills of Material Responsibility.

7. Optionally, enter a total cycle time for the flow routing.

The total cycle time can be manually input now or can be calculated by the application after you have defined processes and events.

8. If you would like this item to be considered in the capable to promise capacity check, select the Capable to Promise button.

Note: Capable to Promise (CTP) describes an available to promise calculation that considers both available material and capacity of manufacturing and distribution resources. You are able to define one and only one CTP routing for each item.

9. Select a display option to display All, Current, or Future and Current operations effective as of the revision date you specify.

10. There are three ways to set up events, processes, and operations:

- Choose the Process tab and enter the first process sequence and code. Choose the Events button and enter all events for that process. Close and repeat for all processes. When you are ready to balance your line, choose the operations tab to enter operation sequences and codes. Then assign events to the operations through either the event tab or the routing network designer.

Note: The sequence number determines the order in which the processes are displayed in the Mixed Model Map.

- Choose the Process tab, and enter in all process sequences and codes. Optionally, choose the Operations tab, and enter all operation sequences

and codes. Choose the Events tab, and enter in each event in sequence, assigning each to a process, and optionally operation.

- Choose the Process tab, and enter in the desired processes. Optionally, choose the Operations tab and enter the desired operations. Choose Events, and enter the desired events. Use the Routing Network Designer to assign events to a process, and optionally, to line operations.

Attention: In Oracle Flow Manufacturing, the operation sequence on the BOM refers to the event sequence on the routing where the part is used.

Note: The operation sequence and code must be unique for each flow routing.

11. If you are using non-standard events or editing standard events, choose the Event Resources button from the Events tab and define resource values. For an event, you can also define a department, parent process, and parent line operation.

Note: Processes and line operations must already be assigned to the routing before you assign them to events. See: Three Ways to Setup Events, Processes, and Operations.

12. Enter an effective date range.
13. For operations in ATO model and option class flow routings only, indicate whether the event is option dependent. An event is option dependent when the event is dependent on the choice of an optional component. The default is enabled. A configured routing will contain all selected components and their related events, all mandatory components and their related events, and all events which are not assigned to a specific component.

Note: All processes and operations will always appear on the configured routing, regardless of whether or not any events assigned to them are included.

Note: You can attach Operation Method Sheets (OMS) to routing events. This will enable you to create custom OMS for ATO items.

14. Choose the WIP tab to indicate whether to backflush components on shop floor moves at this operation. A backflush transaction automatically pulls operation pull components from inventory. Work in Process also pulls all Operation pull components at non-backflush operations preceding this operation using the previous completed backflush operation. The default is Enabled.
15. Choose the Operation Times tab to define or view operation times and yields.
16. To view rolled-up operation times, select Calculate Operation Times from the Tools menu. Optionally, enter user defined times. Either can be used in Mixed Model Map calculations.
17. Switch to the Operation Times tabbed region and optionally enter operation yield values for processes and/or line operations.

Note: Operation yield values are required to perform calculation of cumulative and reverse cumulative operation yields.

18. Create a routing network.
19. Once the routing network is created, calculate cumulative yield, reverse cumulative yield, and net planning percent, by selecting Calculate Operation Yields from the Tools menu. Choose Update Events to add these yields and calculations to events. This is required if you want kanban planning to consider process yields when calculating kanban sizes.

Note: You can also manually insert these values.

20. To calculate Total Product Cycle Time, choose Total Cycle Time from the tools menu.
21. To enter completion subinventory and locator information, view a common flow routing, or enable the routing for use in the Mixed Model Map choose the Routing Details button to open the Routing Details window.

Note: If this item is a member of a product family, it will be specified in the Product Family field of the Routing Details window. This field is read-only.

Note: For an item to be eligible for display and use in the Mixed Model Map for a line, you must have a routing enabled for Mixed Model Map. You can only select one routing per item to be included in a mixed model map.

22. While in the Routing Details window, optionally, enter a priority. Lowest priority routing will be used for backflushes and during auto-create config on ATO items.
23. Save your work.

Creating a Routing Network

In defining product synchronization you must specify the network of processes through which the item is routed. This includes specifying alternate processes, planning percent, rework loops, rework percentage, and feeder lines. The Routing Network Designer is a graphical tool that allows users to define a product routing network as a visual network of operations and flows.

Prerequisites

- You must have defined events and either processes or line-operations.
- If you are using a copied routing, you must first save the routing before you can see and edit the routing network.

■ To create a flow routing network:

1. From the Routing window, choose Routing Network.
2. Choose to view either processes or line-operations by selecting the appropriate tab.

When the Routing Network Designer window appears, all of the processes or line operations are listed in the left canvas and graphically represented on the right.

Note: When you first open the window, the graphics for all processes or operations will be on top of each other. Simply drag them to another portion of the drawing canvas to begin defining your network.

Attention: You cannot mix processes and line operations in the same window.

3. Choose Connector at the top of the screen to create a link between any two processes/line operations.
4. Then select a process or line operation and drag to the process or line operation you are linking.

A window displays, enter the connection type and the percentage of material from is moving from the source.

Note: If you drag a connection and drop it on a part of the canvas or where there are no processes/line operations, the entire drag-and-drop sequence is cancelled.

Note: The total outgoing primary and alternate path percentages must be less than or equal to 100%. If you try to make a path in which the total outgoing percentage to greater than 100%, you will get an error.

5. You can associate an event with a process/line operation by dragging the event to a process or line-operation directly above the events.

If you have not already associated events with processes or line operations, the events are listed on the bottom left of the window.

If you have already associated events to processes and/or line operations, you can drill down into a process or line operation to view the events composing the process/line operation. Events are moved from process to process by dragging and dropping.

When you drag and drop events around the Routing Network Designer tree, the times on the process and Line Operation nodes change dynamically.

6. You can access node information through two buttons located on the right of the tool bar.

Description: enables you to view the description on the nodes.

Times: enables you to view the machine, labor and elapsed times on the nodes of the tree. You can toggle between User Times or Machine Calculated Times views.

Note: Any event can be associated with one and only one process or line operation.

7. Save your work.

Calculating Operation Times

You can calculate machine time, labor time, and elapsed time for your processes, line operations, and events defined in your flow routing. You can also enter your own machine times, labor times and elapsed times in the Flow Routing window.

Prerequisites

You must first define any events, processes and line operations to be included in your flow routing.

■ To calculate operation times

1. Navigate to the Flow Routing window.
2. Place your cursor in the Total Cycle Time field in the header.
3. Select Calculate Operation times from the Tools menu. Choose to calculate either process times or operation times.

Note: In the Flow Routing window the unit of measure for all times is hours.

Note: You must re-perform the operation times and total product cycle time calculations any time you make a change to events, processes or operations.

Note: You can also enter your own machine times, labor times, and elapsed times in the Flow Routing window. To do so, manually enter this information in the User Machine Time, User Labor Time, and User Elapsed Time fields. You determine when creating a mixed model map, whether the calculations are based on rolled-up or user entered times.

Operation Times Calculations

The operation times calculations are based on resources in the Flow Routing which have the resource unit of measurement (UOM) in the UOM class associated with the BOM profile option, BOM: HOUR UOM.

Calculated Labor Time

Calculated labor time per event is the sum of both scheduled and unscheduled labor resource usage rates for the event. Calculated Labor Time per process or operation is the sum of the labor times for all the events underneath each process or

operation. If you entered events by lot, it will temporarily convert the number to an item basis for the purposes of this calculation.

Note: For ATO model routings: The program goes to the multi-level BOM for the model, and searches for the planning percentage on items that are assigned to specific routing events. It then multiplies the calculated labor time for this event by the planning percent to get a weighted value for the event time. If an event is NOT assigned to any part on the multi-level BOM, planning percent is assumed to be 100%

This will work only if you define a routing for the ATO model, and then use it as a common routing for all the option classes underneath it.

Each Option on the routing must belong to a unique event in order for operation calculations to be successful.

Calculated Machine Time

Calculated Machine Time is the same as Calculated Labor time, only it uses the scheduled and unscheduled machine resources for each event.

Calculated Elapsed Time

Calculated Elapsed Time for each event is the sum of the scheduled Labor and Machine usage rates for each event. Elapsed time per process or operation is the sum of the elapsed times for all the events underneath each process or operation. If you entered events by lot, it will temporarily assumes the time entered is per item for the purposes of this calculation.

Times for ATO model routings are adjusted based on the planning percent of the item assigned to an event, as described in calculated labor times.

Calculating Total Product Cycle Time

You can calculate the total product cycle time (TPCT) for your line. TPCT is the sum of all elapsed event times along the longest path on your Flow Line.

Prerequisites

- You must first define the events, processes and/or line operations to be included in your flow routing.
- You must first create a routing network for either processes or operations.
- You must first calculate operation times

■ To calculate Total Product Cycle Time

1. Navigate to the Flow Routing window.
2. Place your cursor in the Total Cycle Time field in the header.
3. Select Calculate Total Cycle Time from the Tools menu. Choose to calculate either process times or operation times.

Note: The Total Product Cycle time is always calculated using the rolled-up (system calculated) elapsed times, even if you entered manual elapsed times. You can manually enter a Total Cycle Time as well.

Note: You must re-perform the operation times and total product cycle time calculations any time you make a change to events, processes or operations.

Note: In the Flow Routing window, the unit of measure for all times is hours.

Hint: Once the routing network and the Total Cycle Time for a routing is finalized for each item on your flow line, return to the organization item master and update the fixed lead time to equal your total cycle time. The Takt time (which is displayed on the MMM) for the line should be entered in the variable lead time.

Calculating Operation Yields

The system will calculate the cumulative yield, reverse cumulative yield and net planning percent for each process and line operation. This information is used in mixed model map calculations and kanban planning.

Prerequisites

- Optionally, enter a value for yield at some or all processes or line operations¹
- You must define a routing network for either the processes or the line operations¹

► To calculate operation yields

1. Navigate to the Flow Routing window.
2. Place your cursor in the Total Cycle Time field in the header.
3. Select Calculate Operation Yields from the Special menu.
4. Select process or operation. Choose update events to translate yields and net planning percent to events.

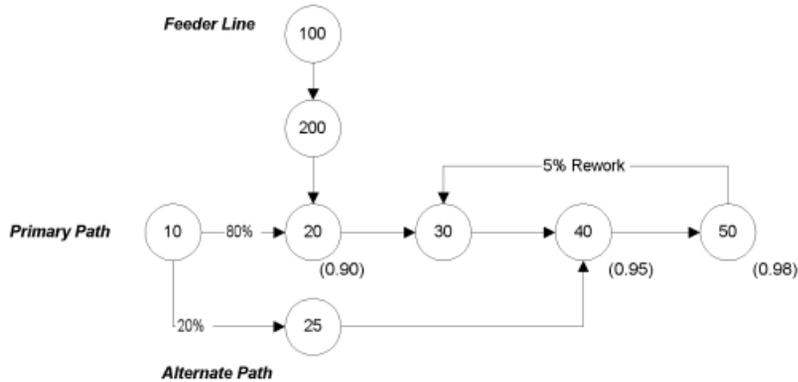
Attention: You must update events (manually or by choosing to update events when you perform the calculations) if you want kanban planning to consider yields when sizing kanbans.

Attention: If you have yields in your line, you must either calculate or manually enter operation yields for each process/line operation for the mixed model map results to be accurate.

Operation Yields Calculations

The system will calculate the cumulative yield, reverse cumulative yield and net planning percent for each process and line operation. This information is used in

mixed model map calculations and kanban planning. Please see the diagram below for an illustration of the set-up used in the example calculations.



In the above example, the primary path is operation 10 through 50. The numbers in parenthesis are the yields for the operation number above it, as entered by the user. The percentages on the network paths represent the network percent assigned to each path via the routing network designer. Blank paths assume 100% network percentages. (The incoming network percentage for the first operation and the outgoing network percentage for the last operation is always 100%.

Attention: Any alternate path must skip at least one operation (or process) on the main line in order for the yield and planning percent calculations to work properly.

Net Planning Percent

The system calculates the net planning percent by using the following formula.

$$N_c = S (P_p * I_c) + S_r (I_o * W_o)$$

Where:

N = Net Planning Percent, in decimal format

S = sum over all paths

P = Planning Percent = $(P_p * I_c)$ (system calculated - not displayed)

Note: Planning percent for the first operation is always 100%.

I = Incoming Network Percent, in decimal format (From Routing Network)

Note: Incoming network percent for the first operation is always 100%.

p = previous operation

c = current operation

Sr = Sum over all rework loops within which is this operation

W = Rework percent (from the routing network)

o = Operation originating the rework

In other words, the system calculates the net planning percent by taking the sum over all primary and alternate paths of the product of the network percentages along that path, then adds a rework calculation if the operation is within the rework loop. The planning percent and incoming network percent for the first operation on the primary path is always 1. The planning percent for the Feeder line is always the same as the operation to which they feed.

The rework calculation is equal to the planning percent of the rework's originating operation, times the rework percent coming from that operation (in this example, OP50 is the originating operation for the rework, and it's planning percent is 100%, and the rework loop is 5%. Therefore the rework calc is $100\% * 5\% = 5\%$. This value is added to all operations in the loop (30, 40 and 50)

The number of paths are determined by working backwards along primary and alternate paths from the end of the line (so in the example, operations 30, 40 and 50 each have two paths due to the alternate path.

Attention: If a rework loop returns to an operation that is also fed by a feeder line, the feeder line will include the rework loop percent in the Net Planning Percent.

Operation	Incoming Network Percent <i>(from routing network)</i>	Planning % Calculation	+ Rework Calculation	Net Planning Percent
10	100	1 * 1	+ 0	1
20	80	1* 0.80	+ 0	0.84
25	20	1* 0.20	+ 0	0.20
30	100	(1 * 0.80 * 1)	+ 1 * .05	1.05
40	100	(1 * 0.80 * 1 * 1 + 1 * 0.20 * 1)	+ 1 * .05	1.05
50	100	(1 * 0.80 * 1 * 1 * 1 + 1 * 0.20 * 1 * 1)	+ 1 * .05	
100	feeder - so it uses network % from 20	0.80	+ 0	0.80
200	feeder - so it uses network % from 20	0.80	+ 0	0.80

Cumulative Yield

The cumulative yield for the first operation along the main line and any feeder lines is the yield entered by the user. The system calculates the cumulative yield for all other operations using the following formula:

$$C_c = Y_c * S (C_p * P_p * I_c / P_c)$$

Where:

C = Cumulative Yield

Y = Yield (User entered)

S = sum over all paths

P = Planning Percent, in decimal format (P = Net Planning % - Rework Calc)

I = Incoming Network Percent, in decimal format (From Routing Network)

p = previous operation

c = current operation

For example, operation 20 in the example above:

$$C_{20} = Y_{20} * S(C_{10} * P_{10} * I_{20} / P_{20}) = 0.90 * (1 * 1 * 0.8 / 0.8) = 0.9$$

Starting from the front of the line, the results for the example are:

Operation	Yield (User Entered)	Incoming Network % (from routing network)	Plan. % (from table above)	Cumulative Yield Calculation	Cumulative Yield
10	blank	100	1	1	1
20	0.90	80	0.8	$0.90 * (1 * 1 * 0.8 / 0.8)$	0.90
25	blank	20	0.2	$1 * (1 * 1 * 0.2 / 0.2)$	1
30	blank	100	0.8	$1 * (0.9 * 0.8 * 1 / 0.8)$	0.9
40	0.95	100	1	$0.95 * ((0.9 * 0.8 * 1 / 1) + (1 * 0.2 * 1 / 1))$	0.874
50	0.98	100	1	$0.98 * (0.874 * 1 * 1 / 1)$	0.8565
100	blank	100	1	1	1
200	blank	100	1	$1 * (1 * 1 * 1 / 1)$	1

Reverse Cumulative Yield

The reverse cumulative yield for the last operation along the main line is the yield entered by the user. The system calculates the reverse cumulative yield for all other operations using the following formula:

$$R_c = Y_c * S(O_c * R_n)$$

Where:

R = Reverse Cumulative Yield

Y = Yield (User entered)

O = Outgoing Network Percent, in decimal format (From Routing Network)

Note: Outgoing network percent for the first operation is 100%.

n = next operation

c = current operation

S is the sum over all outgoing paths

For example, operation 20 in the example above:

$$R_{20} = Y_{20} * S(O_{20} * R_{30}) = 0.90 * (1 * 0.931) = 0.8379$$

Starting from the end of the line, the results for the example are:

Operation	Yield (User Entered)	Outgoing Network % (from routing network)	Reverse Cumulative Yield Calculation	Reverse Cumulative Yield
50	0.98	100	0.98	
40	0.95	100	$0.95 * (1 * 0.98)$	0.98
30	blank	100	$1 * (1 * 0.931)$	0.931
20	0.9	100	$0.9 * (1 * 0.931)$	0.8379
25	blank	100	$1 * (1 * 0.931)$	0.931
10	blank	80 and 20	$1 * ((0.8 * 0.8379) + (0.2 * 0.931))$	0.85652
200	blank	100	$1 * (1 * 0.838)$	0.8379
100	blank	100	$1 * (1 * 0.838)$	0.8379

Graphical Line Designer Workbench

This chapter describes the functionality in the Graphical Line Designer Workbench including:

- [Overview of the Graphical Line Designer Workbench](#) on page 4-2
- [Navigating on the Graphical Line Designer Workbench](#) on page 4-2
- [Accessing Graphical Line Designer Workbench Windows](#) on page 4-7
- [Adding a New Item Routing](#) on page 4-16
- [Copying and Common Flow Routings](#) on page 4-19
- [Using the Routing Details Window](#) on page 4-26
- [Creating the Graphical Network](#) on page 4-27
- [Modifying the Line Operation Tree and Process Tree](#) on page 4-33
- [Modifying Line Operations, Processes, Events, and Connections](#) on page 4-34
- [Creating Routings in the Template Routings View](#) on page 4-38
- [Mass Changes on Item Routings](#) on page 4-40
- [Component Assignments on the Bill of Material](#) on page 4-46

Overview of the Graphical Line Designer Workbench

The Graphical Line Designer Workbench offers an integrated user interface for performing product synchronizations. This workbench enables the automatic creation of standard processes, standard events, and standard operations by using defaulted information. The features in the Graphical Line Designer Workbench include:

- You can drag and drop icons onto a canvas to add processes, events and line operations to the item routing.
- As processes, events and line operations are added to a routing, they are also automatically added to the line as a standard entity.
- Routing calculations are automatically performed every time a change is made to the routing.

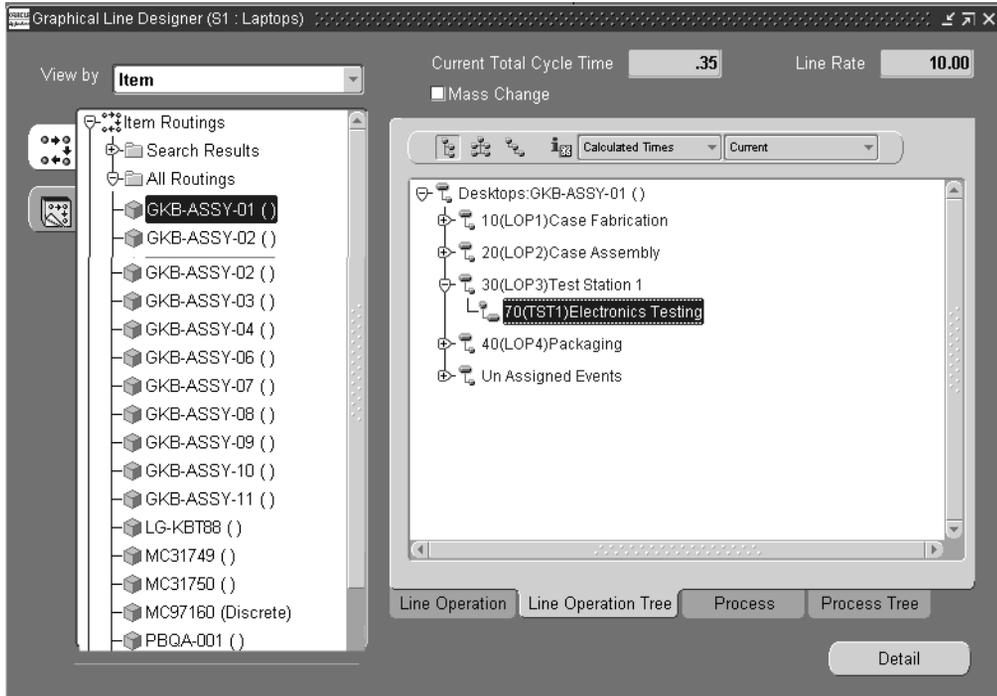
See Also

[Product Synchronization](#) on page 3-2

Navigating on the Graphical Line Designer Workbench

The Graphical Line Designer Workbench is comprised of two panes. The left pane is the tree hierarchy and the right pane displays the graphical network.

The View By list box allows you to change the way you view data in the tree, either by Item or Product Family.



There are two tree tabs located to the left of the tree hierarchy that enable you to toggle between the Item Routings and Template Routings views on the right pane. The Item Routings tab displays the routings for all items assigned to the designated line, while the Templates tab gives access to product family routings that can be used as templates for copying information into routings. The right pane contains the data that is associated with the selected item on the tree. When an item is selected four tabs at the bottom of the window provide access to windows displaying Line Operation network, Line Operation Tree, Process network, and Process Tree.

Workbench Toolbars

In the right pane canvas, there are two toolbars containing icons used for creating and modifying your graphical network. One toolbar displays when you are in the Line Operation or Process windows.



This toolbar contains icons for:

- *Connector*: Enables you to create links between entities on the canvas
- *Pointer*: Allows you to move existing entities on the canvas
- *Process*: Enables you to add a new process to the routing
- *Line Operation*: Enables you to add a new line operation to the routing
- *Event*: Enables you to add a new event to the routing

The other toolbar displays when you are in the Operation Tree or Process Tree windows.



It contains three icons that allow you to change the display view of the tree including:

- *Vertical Style*: The tree is displayed in an up-and-down format by routing, line, line operation code, and description.
- *Organizational Chart Style*: The tree is displayed in a hierarchical box format. The routing is at the top level, the lines, line operation codes, and descriptions are graphically displayed below the routing.
- *Interleaved Style*: The tree is displayed in an indented hierarchical box format. The routing is at the top level and displayed on the left of the pane—the line, line operation codes, descriptions are graphically displayed to the right of the routing.
- *Showtime*: Toggles the view of the event, line operation and process times when viewing the data in a tree format.

This toolbar also contains two pull down menu boxes. One box allows you to choose views on the pane by either current, future and current or all events on the routing.

The Times box has two selections, Calculated Times and User Times. This enables you to choose whether to view the operation time that is calculated by the system or entered in manually.

Tools Menu and Pop-up Menus

The Graphical Line Designer Workbench enables you to access other manufacturing functionality. These options are available, depending upon the currently active window and other conditions, in the Tools menu and pop-up menus.

The Tools Menu

Standard Events: Accesses the Standard Events window. It displays all standard events for a particular line. See: [Defining Flow Manufacturing Standard Events](#) on page 3-2

Standard Processes: Accesses the Standard Processes window. It displays all standard processes for a particular line. See: [Defining Flow Manufacturing Standard Processes](#) on page 3-2.

Standard Line Operation: Accesses the Standard Line Operations window. It displays all standard line operations for a particular line. See: [Defining Flow Manufacturing Line Operations](#) on page 3-2.

Mixed Model Map: Accesses the Mixed Model Map window enabling you to generate a mixed model map. See: [Entering Mixed Model Map Parameters](#) on page 5-2.

Resource Where Used: Accesses the Resource WhereUsed window in Oracle Bills of Material for viewing the operation and routings that use a particular resource. See: [Viewing a Resource Usage](#), *Oracle Bills of Material User's Guide*.

Routing Revisions: Accesses the Routing Revisions window to view the changes for a particular routing. See: [Viewing Routing Revisions](#) on page 3-2.

Switch to Primary: Allows you to switch the selected alternate with the primary routing.

Items: Accesses the Master Item window in Oracle Inventory where you can define and update items and the attributes associated with them . See: [Defining Items](#), *Oracle Inventory User's Guide*.

Product Family Members: accesses the Product Family window, enabling you to group products that have a similarity in resource usage, design, and manufacturing processes. See: [Assigning Product Family Members](#), *Oracle Bills of Material User's Guide*.

Bills of Material: Accesses the Bills of Material window that contains information on the parent item, components, attachments, and descriptive elements. See: [Creating a Bill of Material](#), *Oracle Bills of Material User's Guide*.

Indented Bills: Accesses the Indented Bill of Material window in Oracle Bills of Material where you can view an indented (multilevel, exploded) manufacturing or engineering bill of material. See: [Viewing an Indented Bill of Material](#), *Oracle Bills of Material User's Guide*

Lines: Accesses the Production Lines window in Oracle Work in Process. See: [Defining Production Lines](#), *Oracle Work in Process User's Guide*.

Departments: Accesses the Departments window in Oracle Bills of Material. See: [Defining a Department](#), *Oracle Bills of Material User's Guide*.

Pop-up Menus

You can access windows and functions in the pop-up menus by right-clicking on an icon in the right pane, or a node in the tree hierarchy.

The following choices are available, depending upon the currently active window and other conditions, by right-clicking on an operation, process, event, or connection icon in the right pane:

- *Cut*: Enables you to remove an operation, process, event, or any connections to it from the item routing.
- *Paste*: Enables you to restore an operation, process, event, or connection you have just cut from the item routing.
- *Delete*: Enables you to permanently remove the operation, process, event, and any connections to it from the item routing.
- *Properties*: Accesses the Operation, Process or Event window. For example, if you select an event, the Event window opens.
- *Standard*: Accesses the Standard Line Operations, Standard Processes or Standard Events window—depending on which entity you have selected. For example, if you select a process, the Standard Processes window opens.

The choices available in the pop-up menu in the tree hierarchy include the applicable Tools menu and Workbench menu options. There are two additional menu options available in the tree hierarchy:

- *New*: Accesses the Add Item Routing window enabling you to create new routings. See: [Adding a New Item Routing](#) on page 4-16.

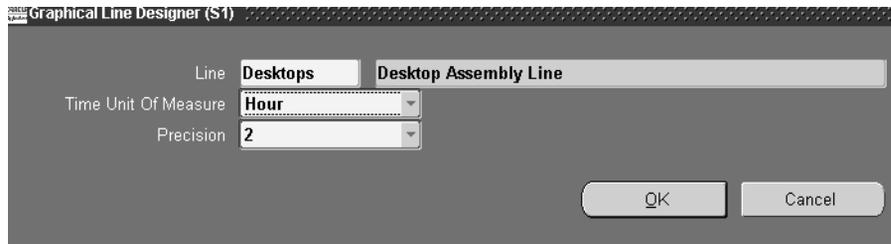
- *Routing Details*: Accesses the Routing Details window enabling you to view specifics or to add information to a routing. See: [Using the Routing Details Window](#) on page 4-26.

Accessing Graphical Line Designer Workbench Windows

► To access windows for creating product synchronizations:

1. Select the Graphical Line Designer from the Flow menu.

The Select window displays.



2. In the Line field, select the assembly line you want to view on the workbench.
3. In the Time Unit of Measure field, select the unit of measure you are using for routing calculations.

Your choices are hour, minute, or second.

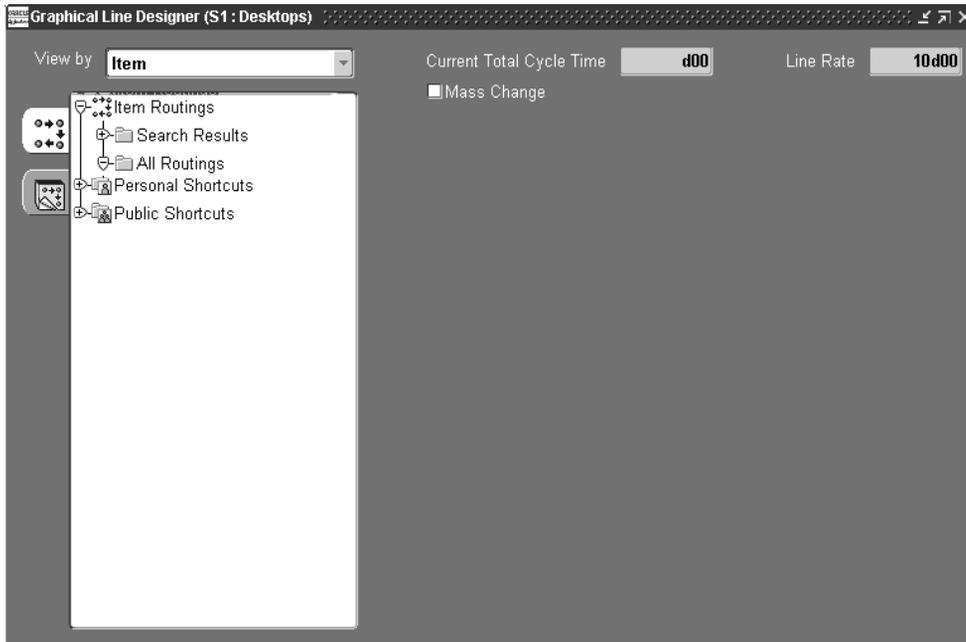
4. In the Precision field, select a value for the number of decimal places you want displayed in routing calculations.

Your choices are 1, 2, 3, 4. For example, if you enter 2—two decimal places display.

5. Choose OK.

The Graphical Line Designer displays.

In the initial view the Item Routing tree tab is selected and the tree hierarchy is collapsed. The two tree tabs located to the left of the tree hierarchy allow you to toggle between the Item Routings and Template Routings views on the right pane.

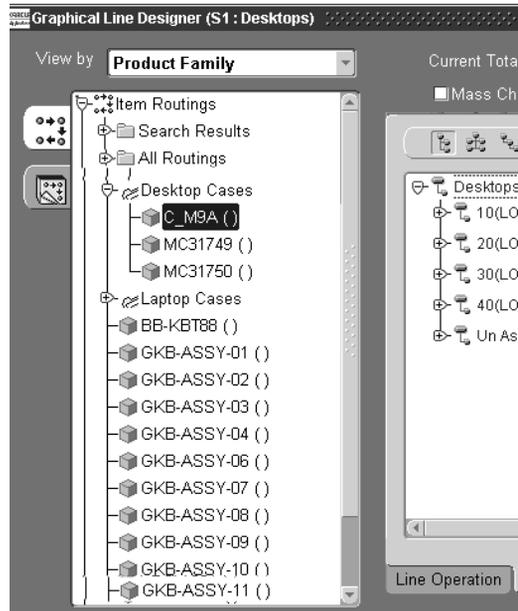


The Item Routings tab displays the routings for all items assigned to the line designated. In the initial view the right pane is blank, when you select an item, the graphical network displays.

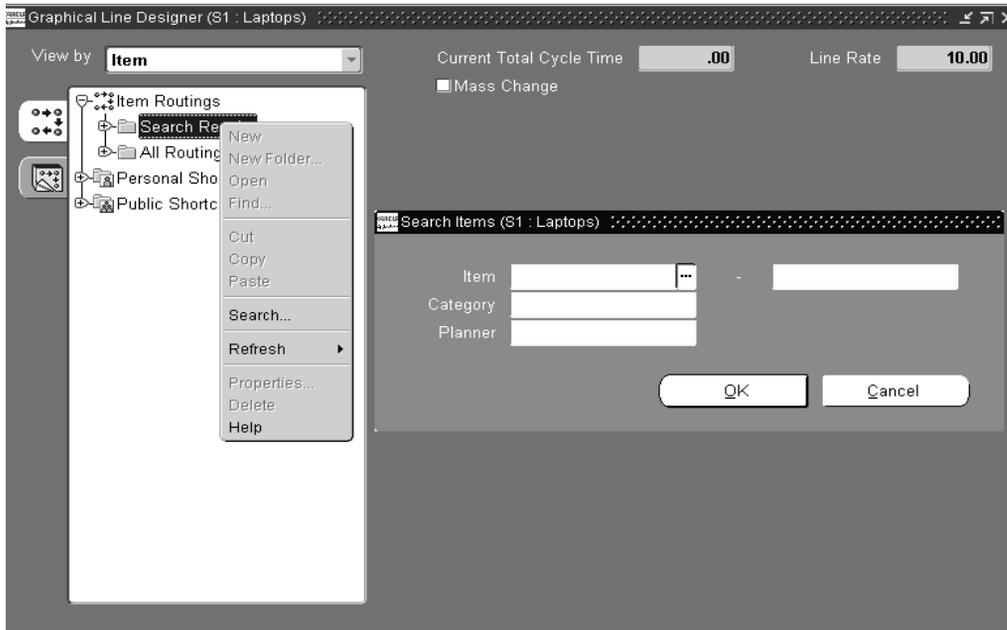
- The View By list box is used to select the way you want to view data in the tree.
- The Current Total Cycle Time field displays for this item. It is calculated automatically every time you change tabs, add entities on the routing, or change items. See: [Calculating Total Product Cycle Time](#) on page 3-2.
- The Line Rate value defaults from the line definition.

In the Item Routing node, you can search for routings using the Search Results node, or view all the routings in the All Routings node.

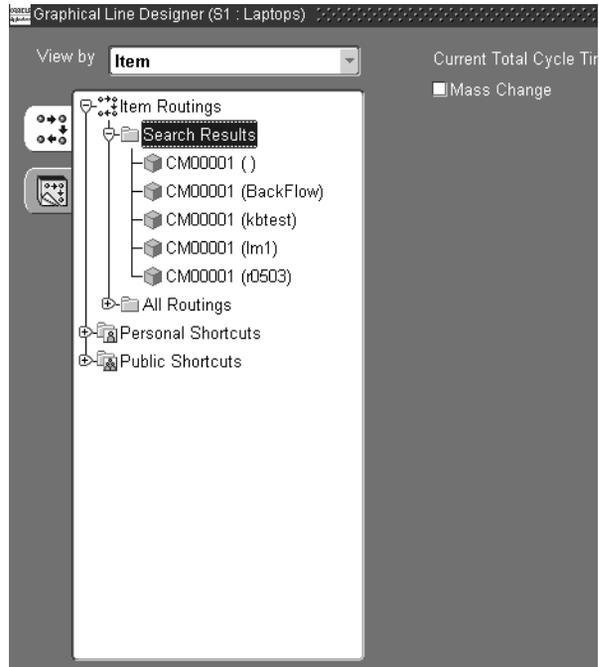
6. In the View By list box, select to view data in the tree by Item or Product Family.
If you choose product family and the items are assigned to a product family, the product family displays in between the line and item.



7. If you want to find a specific record, or range of records, select the Search Results node and right-click with your mouse to display the pull-down menu.
8. Select Search to display the Search Items window.



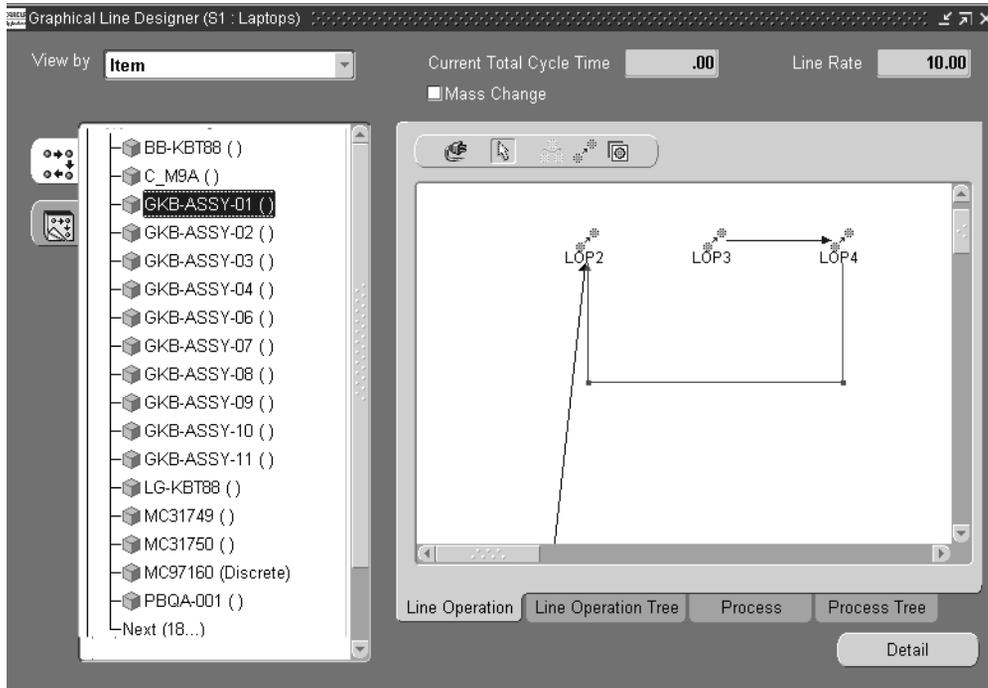
9. Enter search criteria; you can search by item, category, planner, or any combination of these values.
10. Choose OK to display the results of your query under the Search Results node.



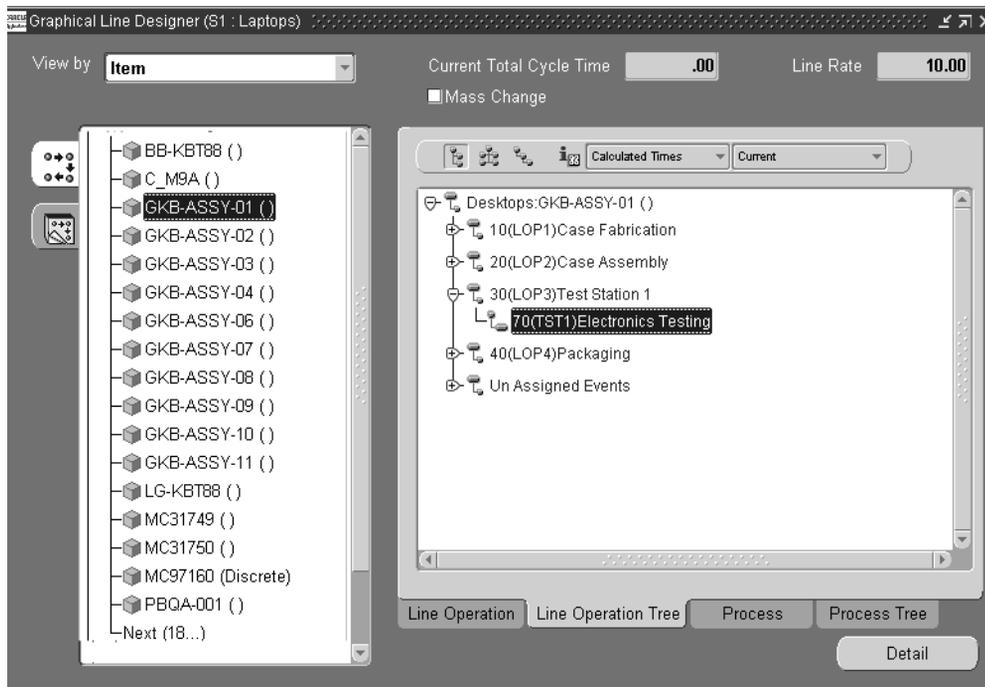
11. To display information in the right pane, select a node detail on the tree.

The graphical network displays a view of the line operation network in the first window tab, Line Operation.

You can add, change, delete, or move the icons in the graphical network. See: [Creating the Graphical Network](#) on page 4-27.



12. Select the Line Operation Tree tab.
13. Left-click with your mouse to select a node detail on the tree hierarchy.
In the right pane the top level of the routing for this item displays.



14. Expand the items on the routing to display the operations in the routing.

You can change the tree format to one of three styles. See: [Workbench Toolbars](#) on page 4-3. The icons in the tree will change to match those on the toolbar for the three entities. The last node at the bottom of the tree is named Unassigned Events. This a place holder for all the events that are on the routing but are not assigned to any line operation. For example, an event may be unassigned because you defined processes first, and have not assigned the events to the operations.

You can add, change, delete, or move the icons in the tree. See: [Modifying the Line Operation Tree and Process Tree](#) on page 4-33.

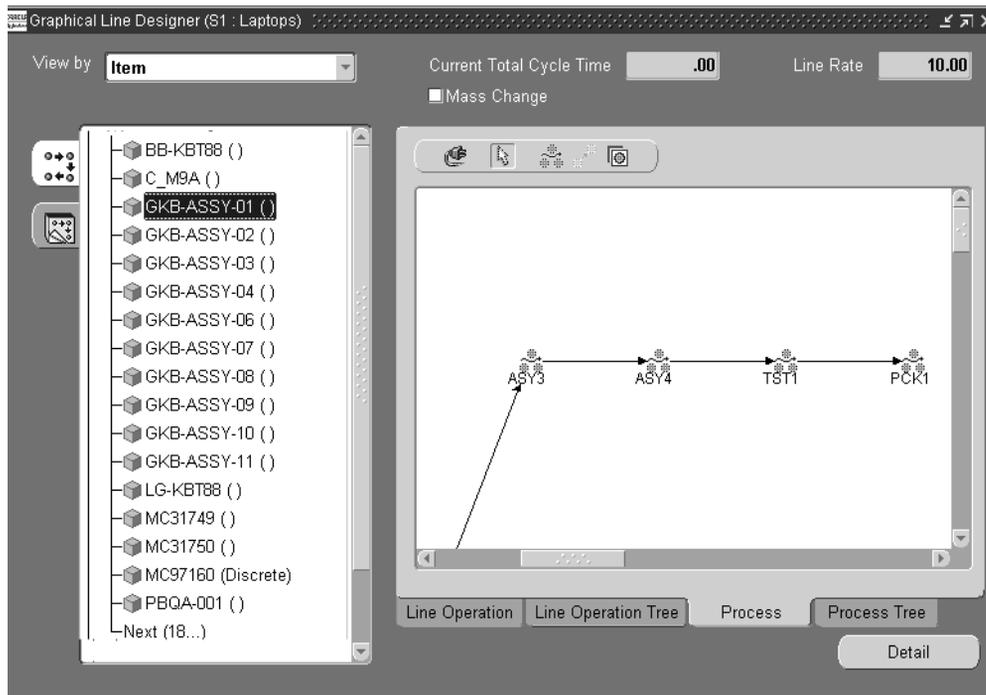
The code and description are listed for each line operation and event.

The toolbar enables you to view the line operations and events on the routing by current, future and current, or all events. You can also see the times associated with each line operation and event.

15. Select the Process tab.

The graphical network displays a view of the process.

You can add, change, delete, or move the icons in the graphical network. See: [Creating the Graphical Network](#) on page 4-27.



16. Select the Process Tree tab.
17. Select a node detail on the tree hierarchy, and left-click with your mouse.

In the right pane the top level of the routing for this item displays.

18. Expand the items on this routing to display the processes in the routing.

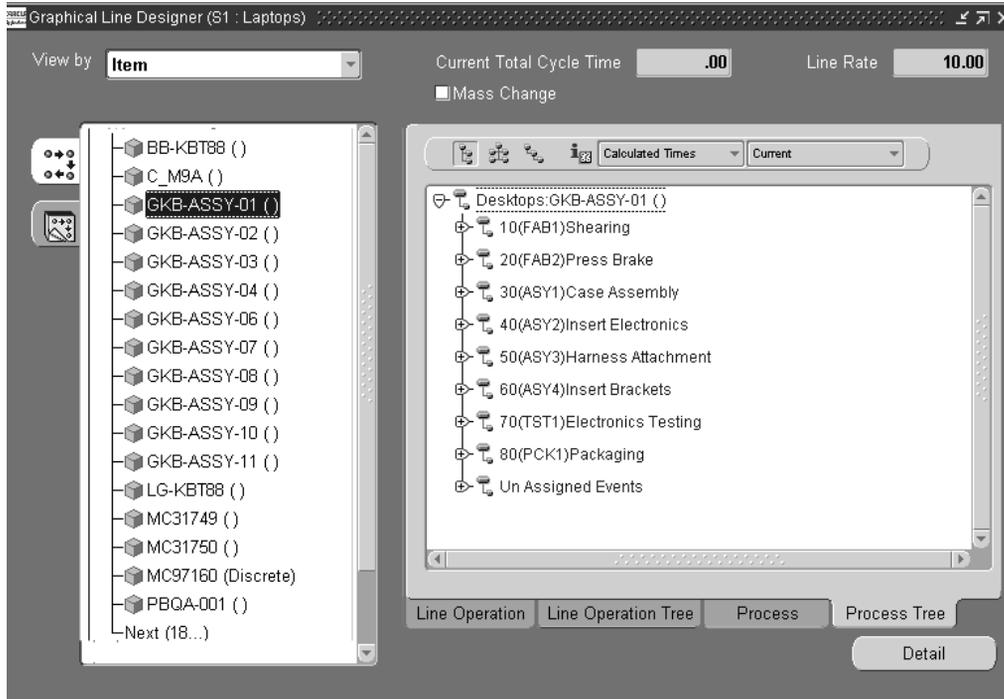
You can change the tree format to one of three styles. See: [Workbench Toolbars](#) on page 4-3. The icons in the tree will change to match those on the toolbar for the three entities.

The last node at the bottom of the tree is named Unassigned Events. This a place holder for all the events that are on the routing but are not assigned to any process. For example, an event may be unassigned because you defined the operations first, and have not assigned the events to the processes.

You can add, change, delete, or move the icons in the tree. See: [Modifying the Line Operation Tree and Process Tree](#) on page 4-33.

The code and description are listed for each process and event.

The toolbar has an option that enables you to see the times associated with each process and event.



Adding a New Item Routing

The Add Item Routing window enables you to create new routings on the Graphical Line Designer Workbench. You have three options in creating routings. You can create a routing as an entirely new routing, copy it from another item or a template, or assign a common routing as a reference for the new routing.

► To add a new item routing:

1. Navigate to the Graphical Line Designer Workbench.
2. Select the top node on the tree hierarchy, Item Routings, and right-click with your mouse.

The pop-up menu displays.

3. Choose New.

The Add Item Routing window displays.

4. To create a new routing, select an item from the list of values in the Item field, and enter any appropriate information in the Alternate, Capable to Promise, Revision, and Date fields.

See: [Creating a Routing](#), *Oracle Bills of Material User's Guide*.

5. To create a routing by copying one from another item or a template, choose Copy From Item/Template in the Routing Source region.

Your current Organization information displays.

In the Item field, select the routing to be used as a template from the list of values. See: [Creating Routings in the Template Routings View](#) on page 4-38.

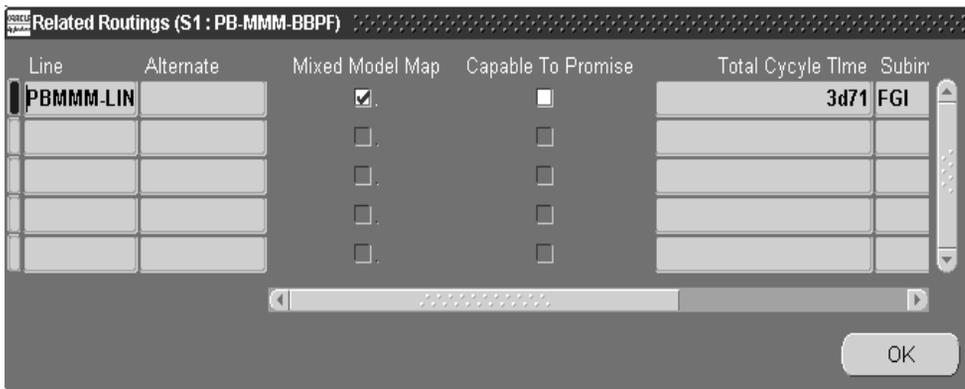
Enter the any appropriate information in the Alternate, Revision, Engineering Routing, and Date fields. See: [Creating a Routing](#), *Oracle Bills of Material User's Guide*.

Select a Copy Option, your choices are:

Current: components or operations effective on the revision date.

Future and Current: includes current and all future components and operations.

6. To create a routing from a common routing, choose Assign Common Routing. Any two items that are of the same bill type can share common bills and routings. See: [Referencing Common Bills and Routings](#), *Oracle Bills of Material User's Guide*.
7. Select the routing you want to use from the list of values.
8. Optionally, you can choose Related Routings to view a list of the other routings that have been defined for this item on all the lines in this organization.



9. Choose OK to close the Related Routings window.
10. Choose OK to close the Add Item Routing window.

The new routing appears at the bottom of the routings list on the tree hierarchy, and it is highlighted. If this is a new routing, the right pane canvas is blank. If the routing was created from a template or a common routing, the right pane displays the inherited routing information.

11. Save your work.

Copying and Common Flow Routings

You can select an item on the navigation tree, and then copy that item's routing to other items—or create routings that are common to it.

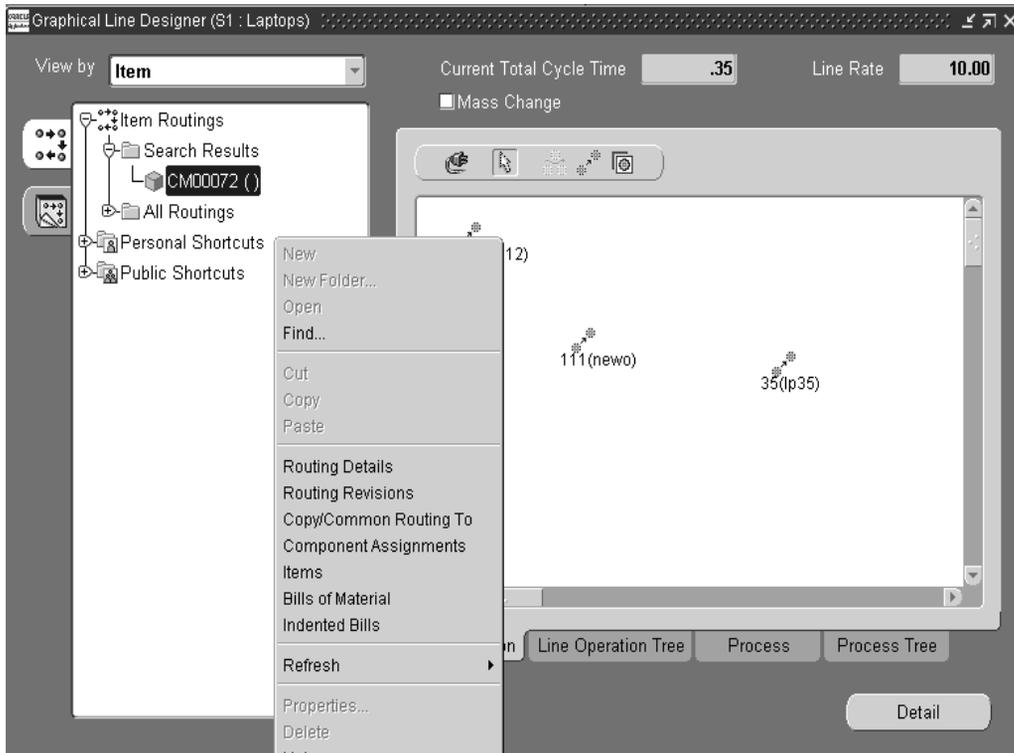
Note: If an item already has a primary routing, the copy common transaction is not created.

You can also copy a routing to another flow line. When you select items and copy the routing to another flow line—all relevant standard operations, processes, and events are duplicated. See: [Copying a Routing to a Different Flow Line](#) on page 4-22

► To copy or common a flow routing:

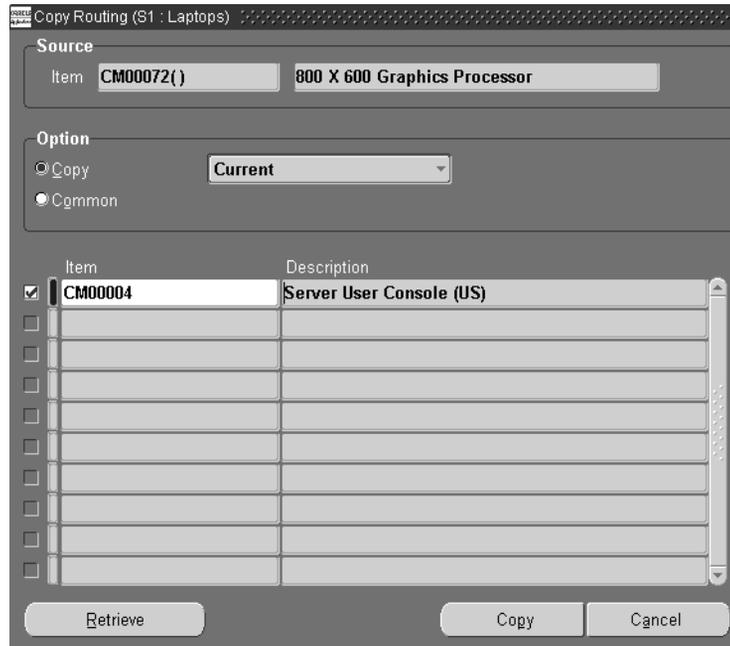
1. Select the node detail for the item you want to copy to other items, then right-click with your mouse.

The pop-up menu displays.



2. Select Copy/Common Routing to.

The Copy Routing window displays. The Source region displays the Item name and description.



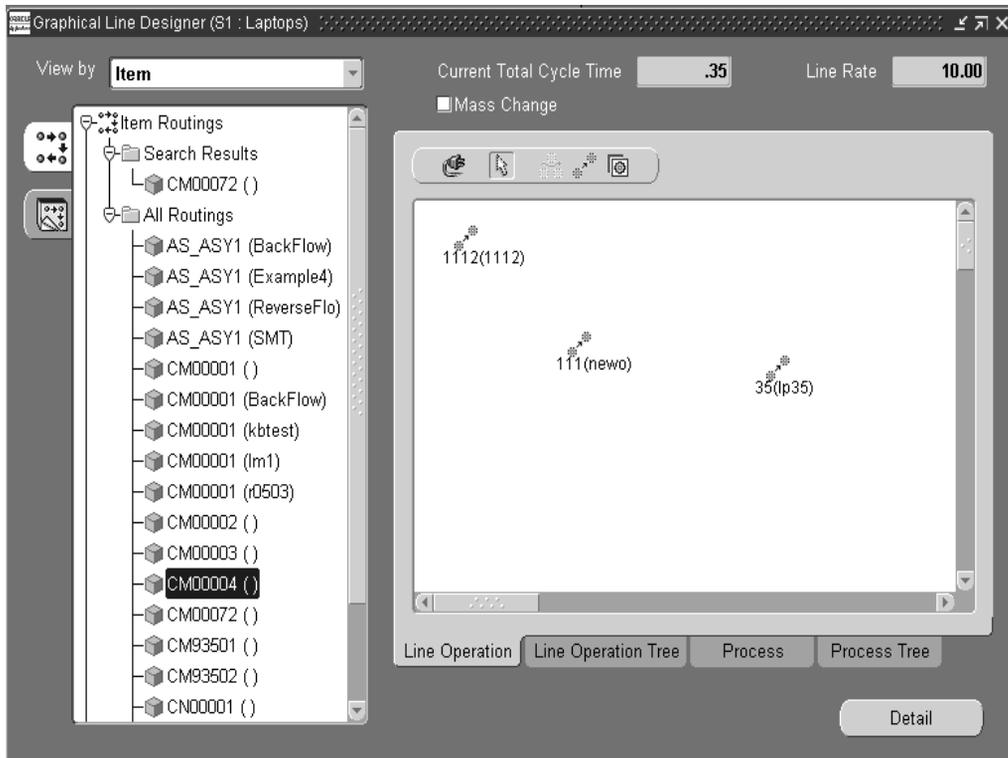
3. In the Option region, choose either Copy or Common.
 - Use Copy for copying this item's routing to one or more items. Select Current, or Future and Current to indicate the effective date. The system uses the effective date on the Routings window for the operation code.
 - Use Common to create one or more routings that are commoned to this routing.
4. In the multi-row Item region, select the items where the Source item is copied.
5. To add multiple items, choose Retrieve.

Add Item Retrieve window displays. This window restricts your search for items according to your specifications.
6. Select your search criteria.

You can search by any combination of values including item, product family, category, or planner.
7. Choose OK to display the list on the Copy routings window.

8. Choose Copy.

You will receive a confirmation message when the transaction is completed. You can view the copied routing for the item on the hierarchical tree and right pane of the Graphical Line Designer Workbench.



Copying a Routing to a Different Flow Line

You can copy a routing to a different flow line, enabling you to maintain multiple design models. All standard operations, processes, and events on the selected routing are copied to the line. When you perform the copy function:

- Both flow lines must be within the same inventory organization
- You have the option to duplicate the bill of material
- Only current and future versions of the routing and bill of material are copied

- When copying a referenced routing, the original routing referenced is copied

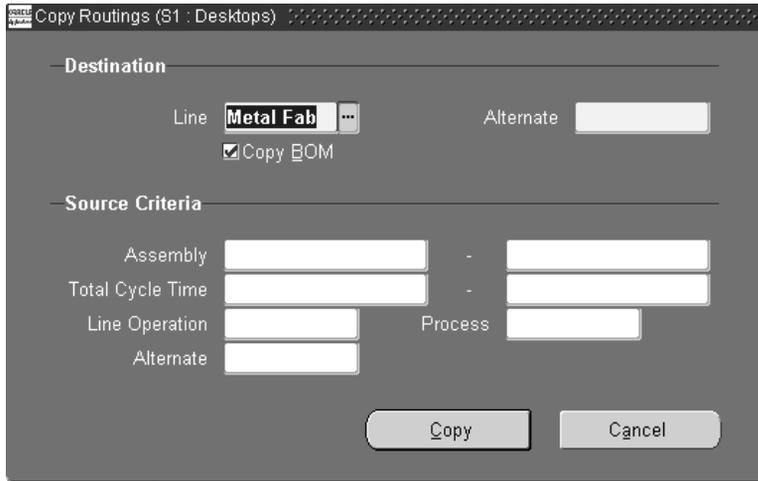
► **To copy a routing to another flow line:**

1. Navigate to the Graphical Line Designer Workbench.
2. Select the All Routings node, and right-click with your mouse to display the pop-up menu.



3. Select Copy Routings To.

The Copy Routings window displays.



4. In the Destination region, select the line where the data will be copied.

5. In the Alternate field, enter the alternate destination designator.

Flow routings names must be unique; the alternate designator is the new identifier for this copied routing. Either select an existing alternate designator from the list of values, or enter a new alternate name.

6. Optionally, you can copy the bill of material information by checking the Copy BOM check box.

7. In the Source Criteria region, specify the assembly to be copied in the Assembly field. Or select a range of criteria for copying.

You can specify a range by assembly name, total product cycle time, alternate designator, or line operation and process.

8. Choose Copy

The selected routing information is copied to the destination line with the given alternate designator and includes standard line operations, processes, events, and event resources.

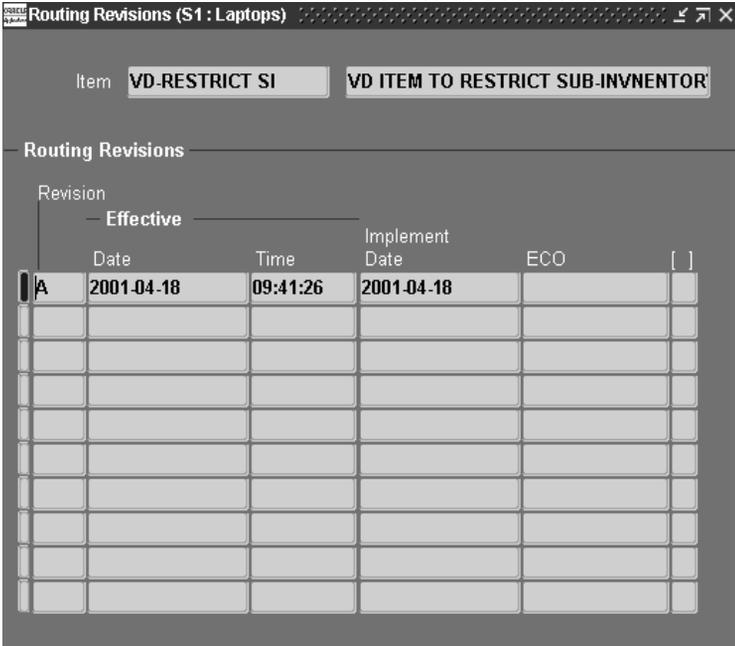
Viewing Routing Revisions

The Routing Revisions enables you to view all the revisions and changes for a particular routing.

► To view the revisions for a specific routing:

- 1. Select a routing detail on the tree hierarchy
- 2. From the Tools menu or the pop-up menu, select Routing Revisions.

The Routing Revisions window displays. This window lists all the revisions and information for a specific routing. See: [Creating a Routing Revision](#), *Oracle Bills of Material User's Guide*.



Changing from an Alternate to a Primary Routing

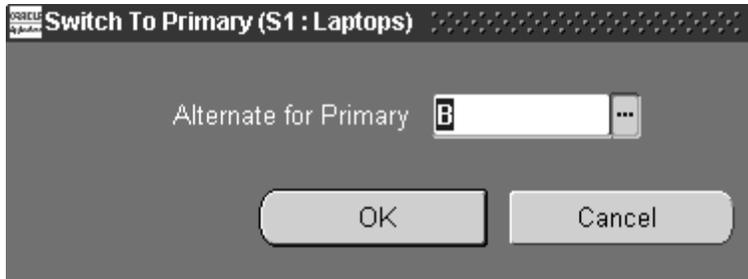
■ **To change your routing from an alternate routing to a primary routing:**

1. Select a routing on the tree hierarchy that is an alternate routing.

The tree hierarchy displays alternate routings by designating the alternate name in parenthesis on the tree.

2. From the Tools menu or the pop-up menu, select Switch to Primary.

The Switch to Primary window appears with the alternate designation displaying. You can choose this routing, or select another routing from the list of values.



3. Save your work.

See: [Switching Between Primary and Alternate Routings](#), *Oracle Bills of Material User's Guide*.

Using the Routing Details Window

You can access the Routing Details window for a particular routing to view specifics or to modify information.

■ **To view or modify routing details:**

1. Navigate to the Graphical Line Designer Workbench.
2. Left-click with your mouse to select a node detail on the tree.

The graphical network displays a view of the line operation in the first window tab, Line Operation.

3. Choose Detail.

The Routing Details window displays.

Routing Details (Laptops : MC24713)

Revision Date Capable To Promise
 Priority Mixed Model Map

Completion

Subinventory Locator

Comment

Common Routing

Display

Line Operations Processes Events

Code	Seq	Department	Yield	Cumulative Yield	Reverse Cumulative
LOP1	10	METAL_FAB		1d00	
LOP6	11	PACKAGING			
LOP2	20	ASSEMBLY		1d00	
LOP3	30	TESTING		1d00	

OK Cancel

You can change several of the fields on this window including: Date, Capable to Promise, Mixed Model Map, Priority, Subinventory, Locator, Comment, and Display. See: [Creating a Routing Revision](#), *Oracle Bills of Material User's Guide*.

In the tabbed region, you can also modify Yield, User Labor, or User Machine Times for any line operation, process, or event.

4. Save your work.

The routing calculations are performed automatically.

Creating the Graphical Network

Product Synchronization is the process of defining your product's process flow. This is done through the flow routing where you are able to define processes, events and operations for your flow line. The Graphical Line Designer Workbench provides icons in the toolbar that you can drag and drop onto the right pane canvas to create the product synchronization. This graphical interface allows you to create, delete,

cut, and paste line operations, processes, events—and their connections. You can also add new item routings, see: [Adding a New Item Routing](#) on page 4-16.

■ To add a new line operation on the Graphical Line Designer Workbench:

1. Select the Line Operation tab to display this window in the left pane.
2. Select the Operation icon from the toolbar.

This icon is only available in the Line Operation window of the workbench.

3. Left-click with your mouse on the right pane, in the section of the canvas where you want to locate this line operation.

The Line Operation window displays. The information in the top region of the window is defaulted from where you positioned the icon on the workbench. You can change Display Sequence and Description information.

You have the option of entering a new code in the Code field, this creates a new standard line operation code which is added to the routing. Or you can select a code from the list of values, which adds the existing standard code to the routing.

4. Enter values in the Routing Specific Details region.

If the Referenced check box is checked, the information displayed for the Descriptions field is referenced from the standard line operation. To edit, deselect the referenced check box.

For information on Yield, Cumulative Yield, User Machine Time, Elapsed User Time fields, see: [Mixed Model Map Calculations](#) on page 5-10

For information on Net Planning Percent, Cumulative Yield, and Reverse Cumulative Yield, see: [Operation Yields Calculations](#) on page 3-2.

You can access the Line Operation window through the pop up menu if you want to modify this data for a standard line operation.

5. Choose OK to close the window and perform routing calculations.

The new line operation displays on the canvas.

6. Save your work.

■ To add a new process on the Graphical Line Designer Workbench:

1. Select the Process tab to display this window in the right pane.

2. Select the Process icon from the toolbar.

This icon is only available in the Process window of the workbench.

3. Left-click with your mouse on the right pane, in the section of the canvas where you want to locate this process.

The Process window displays.

Process (S1 : Laptops)

Display Sequence: Code:

Description:

Department: []

Routing Specific Details

Referenced

Yield	<input type="text"/>	Net Planning Percent	<input type="text" value="100d00"/>
Cumulative Yield	<input type="text" value="1d00"/>	Reverse Cumulative Yield	<input type="text" value="1d00"/>
User Machine Time	<input type="text" value="d00"/>	User Labor Time	<input type="text" value="d00"/>
Elapsed User Time	<input type="text" value="d00"/>		

OK Cancel

The information in the top region of the window is defaulted from where you positioned the icon on the workbench. You can change Display Sequence and Description information.

4. Enter values in the Routing Specific Details region.

If the Referenced check box is checked, the information displayed for the Description field is referenced from the standard process. To edit, deselect the referenced check box.

For information on Net Planning Percent, Cumulative Yield, and Reverse Cumulative Yield, see: [Operation Yields Calculations](#) on page 3-2.

You can access the Standard Processes window through the pop up menu if you want to modify this data for a standard process.

5. Choose OK to close the window and perform routing calculations.

The new process displays on the canvas.

6. Save your work.

► **To add a new event on the Graphical Line Designer Workbench:**

1. Select either the Line Operation or Process tab to display one of these windows in the right pane.

2. Select the Event icon from the toolbar.

This icon is only available in the Line Operation and Process windows of the workbench.

3. Left-click with your mouse on an existing line operation or process in the right pane.

The Event window displays.

Event (S1 : Laptops)

Display Sequence: 60 Code: PCK1

Description: Packaging

Department: PACKAGING

Process: PCK1 Line Operation: LOP4

Routing Specific Details

Referenced Option Dependent

Yield: [] Net Planning Percent: 150d00

Cumulative Yield: 1d00 Reverse Cumulative Yield: 1d00

Effectivity Date: 2002-03-10 Disable Date: []

Seq	Resource	UOM	Basis	Usage	Available 24 Hours	Schedule
10	LBR-PACK1	HR	Item	d05	<input type="checkbox"/>	Yes
					<input type="checkbox"/>	
					<input type="checkbox"/>	
					<input type="checkbox"/>	

OK Cancel

4. Enter values in the Routing Specific Details region.

If the Referenced check box is checked, the information displayed for the Description field is referenced from the standard event. To edit, deselect the referenced check box.

For information on Net Planning Percent, Cumulative Yield, and Reverse Cumulative Yield, see: [Operation Yields Calculations](#) on page 3-2.

You can access the Standard Events window through the pop up menu if you want to modify this data for a standard process.

You can change the flag indicating whether the event is option dependent. An event is option dependent when the event is dependent on the choice of an optional component.

Optionally, indicate whether the resource is available 24 hours a day. You cannot assign shifts to a resource that is available 24 hours a day.

5. Choose OK to close the window and perform routing calculations.
The new process displays on the canvas.
6. Save your work.

Defining a Network Connection

The Network Connection window is used when adding or modifying a connection on the Graphical Line Designer. This window is accessed through the pop up menu on the right pane.

■ To add a network connection on the Graphical Line Designer Workbench:

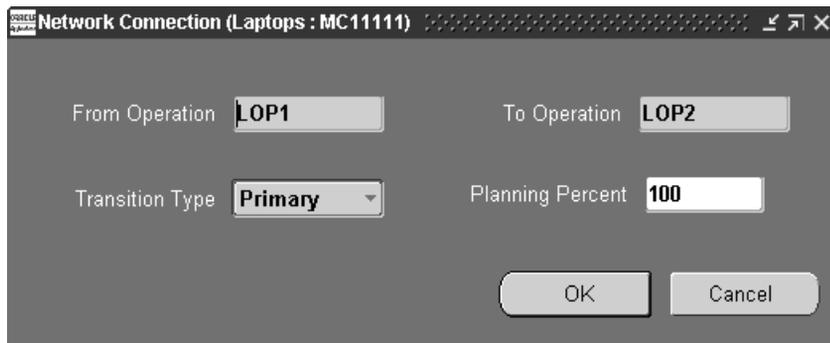
1. Navigate either to the Line Operation network or Process network window on the right pane of the Line Designer.

2. Select the Connections icon from the toolbar.

This icon is only available in the Line Operation and Process windows of the workbench.

3. Left-click and hold with your mouse on the right pane, on the process or line operations where you want to start this connection—and drag the line to the process or line operation you want to it to join.

The Network Connection window displays. In the Operation From and To fields, the operation codes that you connected on the canvas automatically display.



4. You can use the defaulted values in the Transition Type and Planning Percent fields, or enter other values.

Transition type values are primary alternate, and rework.

The planning percent is the percentage of product that follows this network path.

5. Choose OK to close the window and perform routing calculations.
The new connection displays on the canvas.
6. Save your work.

Modifying the Line Operation Tree and Process Tree

The Line Operation Tree and Process Tree windows display your product synchronizations for your routing network in a tree hierarchy format. The Graphical Line Designer Workbench enables you to modify the routing network tree—you can create, delete, cut, and paste line operations, processes, and events.

■ To modify components on the Line Operation Tree and Process Tree:

1. Select either the Line Operation Tree or Process Tree tab to display the hierarchical view of the routing network.
2. Left-click with your mouse to select a node detail on the tree hierarchy.
In the right pane the top level of the routing for this item displays.
3. Expand the items on the routing to display the operations or processes in the routing.

The code and description are listed for each line operation and event.

You can change the tree format to one of three styles. The toolbar has an option that enables you to see the times associated with each line operation and event. See: [Workbench Toolbars](#) on page 4-3.

The last node at the bottom of the tree is named Unassigned Events. This a place holder for all the events that are on the Routing but are not assigned to any line operation or process. For example, an event may be unassigned because you defined processes first, and have not assigned the events to the operations.

4. Select a detail on the tree and right-click to display the pop up menu.
The pop up menu displays, depending on the conditions, several options: Cut, Paste, Delete, Properties, and Standard.
5. Select an event and drag it to another line operation.
Routing calculations are automatically performed.
6. Save your work.

Modifying Line Operations, Processes, Events, and Connections

The Line Operation window is used when adding or modifying a line operation on the Graphical Line Designer. It contains routing specific details. This window is accessed through the pop up menu on the right pane.

■ To modify a line operation on the Graphical Line Designer Workbench:

1. Navigate to the Line Operation Tree or Line Operation network window on the right pane of the Line Designer.

2. Select the line operation you want to modify on the right pane canvas.

If you are adding a new line operation, see: [Creating the Graphical Network](#) on page 4-27.

3. Right-click on the operation icon in the right pane to display the pop up menu.

See: [Tools Menu and Pop-up Menus](#) on page 4-5.

4. Select Properties.

The screenshot shows a dialog box titled "Line Operation (S1 : Laptops)". It has several input fields and a section for routing details. The fields are: Display Sequence (30), Code (LOP3), Description (Test Station 1), and Department (TESTING). The "Routing Specific Details" section includes a checked "Referenced" checkbox and fields for Yield, Cumulative Yield (1d00), User Machine Time (d00), Elapsed User Time (d00), Net Planning Percent (150d00), Reverse Cumulative Yield (1d00), and User Labor Time (d00). At the bottom right are "OK" and "Cancel" buttons.

The Line Operation window displays. The information is defaulted from the icon on the workbench. You can change Display Sequence, Yield, User Machine Time, User Labor Time information. To change the description, uncheck the Referenced box. See: [Creating the Graphical Network](#) on page 4-27.

5. Choose OK to close the window and perform routing calculations.

6. Save your work.

The Process window is used when adding or modifying a process on the Graphical Line Designer. It contains routing specific details. This window is accessed through the pop up menu on the right pane.

■ To modify a process on the Graphical Line Designer Workbench:

1. Navigate to the Process Tree or Process network window on the right pane of the Line Designer.
2. Select the process you want to modify on the right pane canvas.
If you are adding a new process, see: [Creating the Graphical Network](#) on page 4-27.
3. Right-click on the process icon in the right pane to display the pop up menu.
See: [Tools Menu and Pop-up Menus](#) on page 4-5.
4. Select Properties.

The screenshot shows the 'Process (S1 : Laptops)' dialog box. It has a title bar with a small icon and the text 'Process (S1 : Laptops)'. The main area contains several input fields and a section for routing details. At the top, there are fields for 'Display Sequence' (value: 10), 'Code' (value: FAB1), 'Description' (value: Shearing), and 'Department' (value: METAL_FAB). Below this is a section titled 'Routing Specific Details' which contains a checked checkbox for 'Referenced' and several numerical input fields: 'Yield', 'Cumulative Yield' (value: 1d00), 'User Machine Time' (value: d00), 'Elapsed User Time' (value: d00), 'Net Planning Percent' (value: 100d00), 'Reverse Cumulative Yield' (value: 1d00), and 'User Labor Time' (value: d00). At the bottom right, there are 'OK' and 'Cancel' buttons.

The Process window displays. The information is defaulted from the icon on the workbench. You can change Display Sequence, Yield, User Machine Time, User Labor Time information. To change the description, uncheck the Referenced box. See: [Creating the Graphical Network](#) on page 4-27.

5. Choose OK to close the window and perform routing calculations.

6. Save your work.

The Event window is used when adding or creating an event on the Graphical Line Designer. It contains routing specific details. This window is accessed through the pop up menu on the right pane.

To modify an event on the Graphical Line Designer Workbench:

1. Navigate either to the Line Operation Tree or Process Tree window on the right pane of the Line Designer.
2. Select the event you want to modify on the right pane canvas.
If you are adding a new event, see: [Creating the Graphical Network](#) on page 4-27.
3. Right-click on the event in the right pane to display the pop up menu.
See: [Tools Menu and Pop-up Menus](#) on page 4-5.
4. Select Properties.

The Event window displays. The information is defaulted from the icon on the workbench. You can change Display Sequence, Effectivity Date, and Disable Date information. If you uncheck the Referenced box, you can change

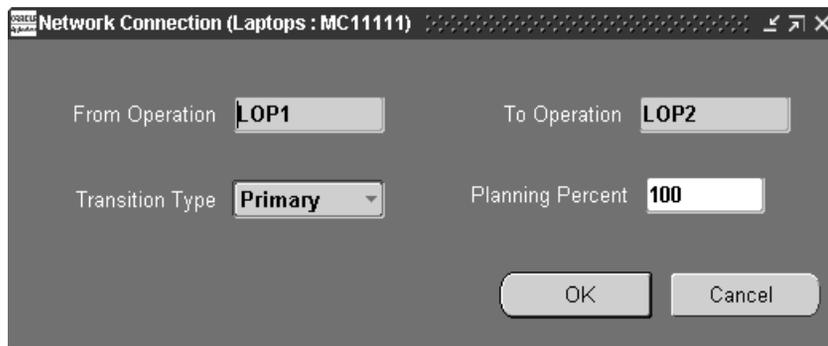
description and resource information. See: [Creating the Graphical Network](#) on page 4-27.

5. Choose OK to close the window and perform routing calculations.
6. Save your work.

The Network Connection window is used when adding or creating a connection on the Graphical Line Designer. This window is accessed through the pop up menu on the right pane.

■ To modify a network connection on the Graphical Line Designer Workbench:

1. Navigate either to the Line Operation network or Process network window on the right pane of the Line Designer.
2. Select the connection you want to modify on the right pane canvas.
3. Right-click on the icon in the right pane to display the pop up menu.
See: [Tools Menu and Pop-up Menus](#) on page 4-5.
4. Select Properties.



The Network Connection window displays and you can change the values, see: [Defining a Network Connection](#) on page 3-2.

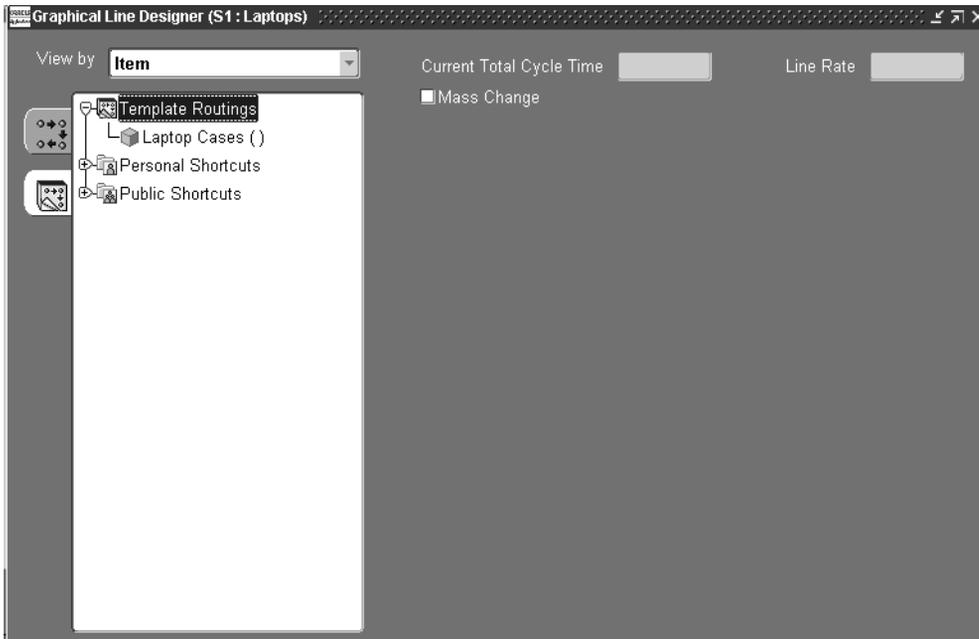
5. Save your work.

Creating Routings in the Template Routings View

The Template Routings tree tab provides access to Product Family Routings that can be used as templates for copying elements to an item routing you are creating. You can define a routing for a product family the same way as performed in the Item Routings view of the workbench, and can perform all the same functions as in the routings region.

► Using product family routings as templates:

1. Choose the Template Routings tree tab.
2. Select Template Routings node detail on the tree, and left-click with your mouse.

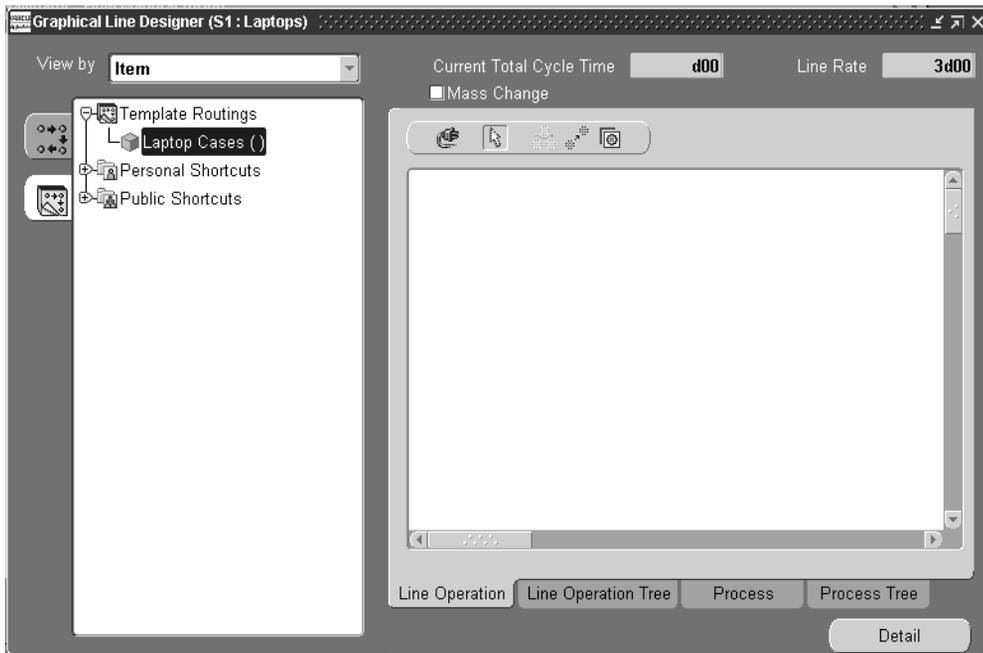


The Template Routings tab displays the routings for all Product Families assigned to the line designated. In the initial view the right pane is blank.

3. Select routing under the Template routings tree.

Or you can create a new product family routing. In the Add Item Routing window, use the option to create an entirely new routing. See: [Adding a New Item Routing](#) on page 4-16.

After you select a routing, a blank Line Operation window displays in the right pane. This blank window is the canvas used as a template.



4. Use the toolbar to add icons to create a routing network.
See: [Creating the Graphical Network](#) on page 4-27.
5. Save your work.

This routing is now available to use when creating a new routing, see: [Adding a New Item Routing](#) on page 4-16.

Mass Changes on Item Routings

You can simultaneously make changes, edits, and deletions to multiple flow lines. Work performed in the graphical pane can be updated for all items on the line, or in the product family. To enable this functionality, check the Mass Change check box on the graphical pane of the Graphical Line Designer Workbench.

- In the View by Item mode, you can mass change all item routings on that production line.
- In the View by Product Family mode or the Template Routing tree tab view, you can mass change routings that belong to the same product family.

Changes are still created by selecting an icon or menu item, and making the changes on the related line operation, process, event, or connection property window. However, in the mass change mode, you can also:

- Populate changes to a range of other item routings after you save the transaction

Note: You cannot create new operations or processes using mass change functionality.—use the Add Item Routing window. See: [Adding a New Item Routing](#) on page 4-16.

- Update operation information for user machine time, user labor time, and yield
- Revise outgoing network connections from the node for planning percentages and transition type allocations

► To make mass changes to item routings:

1. Navigate to the Graphical Line Designer Workbench.
2. Check the Mass Change check box on the graphical pane.
3. Select the line operation, process, event, or connection icon, and make the changes in the related window. See: [Creating the Graphical Network](#) on page 4-27.

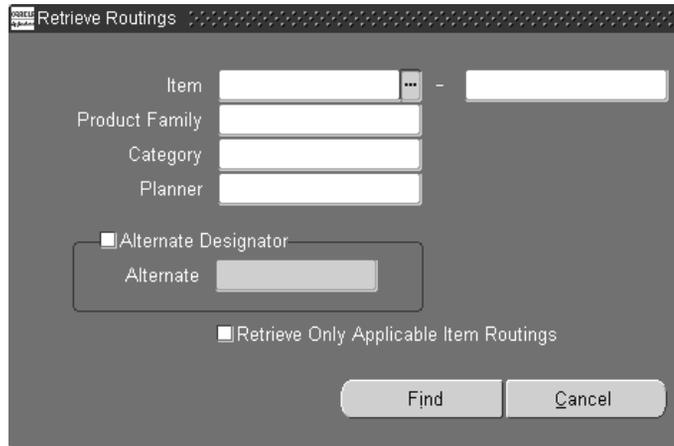
4. Choose OK on the related line operation, process, event, or connection window to save the transaction and display the Apply Changes window.

When first viewed in a session, this window does not display data. The applied values from your query default for the subsequent operation changes.

You can also access this window from the Tools menu by selecting Item Selection List.



5. Enter the specific items and applicable alternate designators that you want to change.
6. You can also search for item routings by choosing Retrieve to display the Retrieve Routings window.



7. Select search criteria in Retrieve Routings window.

You can search by item or range of items, product family, category, planner, and alternate designator.

8. Check the Retrieve Only Applicable Items check box to display only eligible item routings.

Eligible item routings are in context to the changes:

- For event changes or deletions, routings with line operations or processes referencing that specific event. When adding the event, routings with line operations or processes that do not already have that event.
- For line operation and process changes, routings with those specific line operations and processes.

If you do not select this check box, and all search criteria fields are empty—when you choose Find all items routings display.

Note: Even though you can display all routings, updates occur only on applicable routings.

9. Choose Find to display your search on the Apply Changes window.

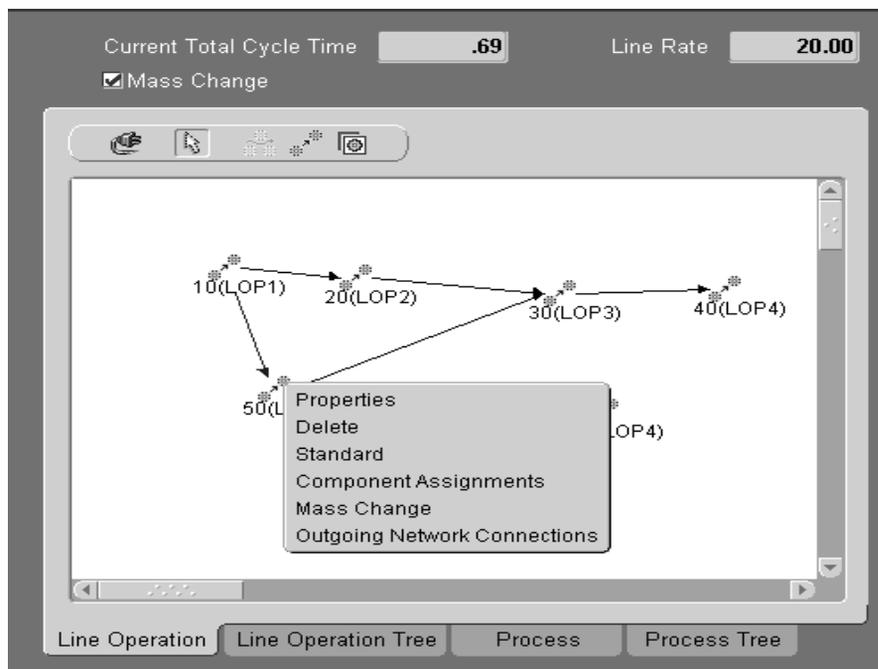
Uncheck the items you do not want included in the mass update.

10. Choose Apply to process the mass change.

You can view the routing changes on the graphical pane of the Graphical Line Designer Workbench.

► **To update operation user time and yield information:**

1. Navigate to the Graphical Line Designer Workbench, and check the Mass Change check box.
2. Select an operation, and right-click with your mouse to display the pop-up menu.



3. Select Mass Change to display the Operations window.

	User Machine Time	User Labor Time	Yield
Current Value	1.26	.80	.99
Change By			
Value			
+/- Percent			
+/- Value			

4. In the Change By region, enter applicable changes for the Value fields.

You can enter a new value in the Value field for User Machine Time, User Labor Time, and Yield.

Alternately, for the User Machine Time and User Labor Time columns, you can enter either a value or percentage to add or subtract from the current value. For example:

If the Current Value for User Machine Time on operation LP50 is 1.26
 And you enter .4 in the +/- Value field
 The system adds .4 to 1.26, to equal 1.66

When you apply your change, the system updates the User Machine Time on all LP50 operations to their current value +.4.

5. Choose OK to display the Apply Changes window.
6. Review your Apply Changes item list.

You can choose Retrieve to display the Retrieve Routings window for your search criteria; and use the Retrieve Only Applicable Items check box for eligible items. Choose Find to display your search on the Apply Changes window, and uncheck any items you do not want included in the mass update.

7. Choose Apply to update your changes.

Eligible items are those with values in the applicable fields for the selected operation.

Note: Even though you can display all routings, updates occur only on applicable routings.

■ **To update outgoing network connections:**

1. Navigate to the Graphical Line Designer Workbench, and check the Mass Change check box.
2. Select a node on the graphical pane, and right-click with your mouse to display the pop-up menu.
3. Select Outgoing Network Connections to display the Network Connections window.

To Operation	Transition Type	Planning Percent
LOP2	Primary	85
LP50	Alternate	15

OK Cancel

4. Enter changes in the Planning Percent fields.
The total planning percent must equal 100 in order to update item routings.
5. Choose OK to display the Apply Changes window.
6. Review your Apply Changes item list.
You can choose Retrieve to display the Retrieve Routings window for your search criteria; and use the Retrieve Only Applicable Items check box for eligible items. Choose Find to display your search on the Apply Changes window, and uncheck any items you do not want included in the mass update.

7. Choose Apply to update your changes.

Eligible item routings are those with same the geometry match including:

- The same specified network connection
- The same outgoing network connections defined for the To Operation
- Transition type and destination must match the current item routing
- If you check the Match Planning Percentage check box, both the planning percents and the node geometry must match

Note: Even though you can display all routings, updates occur only on applicable routings.

Component Assignments on the Bill of Material

You can associate the components on the bill of material with the routing events where the components are consumed. This association links one or more sub-inventory and locator combinations to line operations—and then automatically updates the material control portion of the parent bill of material.

These functions are performed on the Update Components window. This window is accessed from the Graphical Line Designer Workbench by selecting the item routing in the hierarchical tree; or the line operation, process, or event in the graphical pane. A bill of material must exist for the selected routing in order to display this window.

► To assign components to a bill of material:

1. Navigate to the Graphical Line Designer Workbench.
2. Select either an item routing on the hierarchical tree; or a line operation, process, or event in the graphical pane.
3. Right-click with your mouse to display the pop-up menu, and select Component Assignments.

The Update Component window displays.

Information defaults on the Components region of the window depending on your selection. For example, if you access the window from the line operation or process—the line operation and any associated events display. If you access the window from the event—the line operation and all instances of this event display. And if you select the item routing, all line operations and events display.

Update Components (S1 : Desktops : MC31749)

Display Option **Assigned**

Line Operation -

Event

Component -

Components

Event	Line Operation	Item Seq	Component	Subinventory	Mass Assignment Selection	
						Locator
50 (AS31)	20 (LOP2)	100	CM23596	KB4	<input type="checkbox"/>	
70 (TST1)	10 (LOP1)	10	CM23596	KB4	<input type="checkbox"/>	KB4.1.1..
70 (TST1)	10 (LOP1)	20	CM23597	KB4	<input type="checkbox"/>	
70 (TST1)	10 (LOP1)	30	CM31542	KB1	<input type="checkbox"/>	1.1.1..
70 (TST1)	10 (LOP1)	40	SC19312	KB1	<input type="checkbox"/>	1.1.1..
70 (TST1)	10 (LOP1)	50	CM93501	KB1	<input type="checkbox"/>	1.1.1..
70 (TST1)	10 (LOP1)	50	CM96713	KB1	<input type="checkbox"/>	1.1.1..

Mass Assignments

Event Subinventory Locator

4. You can also use the upper region of the window to enter criteria for a new query.
 - In the Selection Option field, choose the display mode for the Components region of the window. Your display choices are:
 - Assigned—the assigned components within the context of other specified parameters. This is the default option.
 - Unassigned—this mode enables you to assign components not designated for the given routing.
 - All—all components both assigned and unassigned, within the context of other specified parameters.
 - Select a value, or range of values in the Line Operation field.
 - Select a value in the Event field.
 - Select an item number, or range of components in the Components field.

5. Choose Find to displays the results of your query. on the Components region.
6. You can manually change the Event, Subinventory, and Locator values for any component listed.

The component attributes are displayed for event, line operation, item sequence, component name, subinventory location, and locator.

7. Check the Mass Assignments check box if you want update the records in your query in mass update mode.

Several different mass update transactions are available including:

- Activates the Mass Assignment Selection check boxes for each component on the Components region. Select components by checking the Mass Assignment Selection check boxes in individual rows. This field is disabled when the Mass Assignments check box is not checked.
 - Choose Select All to activate all the records on the window.
 - Choose Unselect All to deactivate all the records on the window.
8. The Mass Assignments check box also enables the Mass Assignments region on the window. You can enter values in the Event, Subinventory, and Locator fields.
 9. Check the records in the Components region you want to update.
 10. Choose Assign to update the applicable records and fields on the Components region.
 11. Choose OK to update the component assignment to the bill of material for the item routing selected.

All specified components on the window are updated on the item routings's bill of material. The Graphical Line Designer Workbench displays again.

If you selected Mass Change on the Graphical Line Designer Workbench—the Apply Changes window displays. See: [Mass Changes on Item Routings](#) on page 4-40.

12. Save your work.

Mixed Model Map

This chapter provides information on how to use the mixed model map to design a balanced production. Topics in this chapter include:

- [Overview of Mixed Model Map](#) on page 5-2
- [Entering Mixed Model Map Parameters](#) on page 5-2
- [Generating a Mixed Model Map](#) on page 5-4
- [Saving a Baseline](#) on page 5-7
- [Querying a Saved Baseline](#) on page 5-8
- [Placing a Mixed Model Map on the Navigator](#) on page 5-9
- [Placing a Mixed Model Map on the Navigator](#) on page 5-9
- [Mixed Model Map Calculations](#) on page 5-10

Overview of Mixed Model Map

Line design is the process of defining a production line, the products that you make on the line, the operations that you perform to make these products, and the resources and materials consumed at each step. The mixed model map helps you to create and monitor your line design. To balance a line against a specified demand, you will use the mixed model map which calculates the following at each process or line operation:

- Process volume
- Machine, labor, and total times
- Machine, labor, and total weighted times
- Machine and labor requirements
- Line, Process, and Operational Takt Time
- In-process kanban (IPK) requirements

In the Mixed Model Map the resource requirements are displayed in the summary table. You can also view details of the resources in the Resource Detail window.

See Also

[Entering Mixed Model Map Parameters](#) on page 5-2

[Saving a Baseline](#) on page 5-7

[Placing a Mixed Model Map on the Navigator](#) on page 5-9

[Mixed Model Map Calculations](#) on page 5-10

Entering Mixed Model Map Parameters

Prerequisites

- You must create at least one line before you can create a mixed model map.
- You must have at least one flow routing for that line enabled for the Mixed Model Map. All enabled routings must have operation times and yields calculated or entered manually.
- You must have a demand schedule defined for the products on the line (forecast, MPS, MDS, flow schedule)

► To enter mixed model map parameters

1. Navigate to the Mixed Model Map window.

The screenshot shows the 'Mixed Model Map (S1)' window. It is divided into two main sections: 'Select' and 'Display Options'.

Select Section:

- Line:** Desktops (selected), Desktop Assembly Line
- Family:** (empty)
- Demand Type:** Actual Production (selected)
- Demand Name:** (empty)
- Start Date:** 11-JUL-2002
- End Date:** 12-JUL-2002
- Demand Days:** 2
- Hours Per Day:** 8
- Boost:** (empty) %

Display Options Section:

- Process/Line Operation:** Line Operation (selected)
- Sort Order:** Display Sequence (selected)
- Time:** Rolled-Up Time (selected)
- In Process Kanban Value:** Total (selected)
- Time Unit Of Measure:** Hour (selected)

At the bottom right, there are two buttons: 'Clear' and 'Generate'.

2. In the Select region, select the line for generating a mixed model map.
3. Optionally, enter a family name if you want to restrict the display to a specific Product Family.
4. In the Demand Type field, select a value representing the source of this demand. The Demand Name displays for forecasted values. Your choices are:
 - Forecast—an estimate of future demand
 - MDS—master demand schedule, the anticipated forecasted ship schedule
 - MPS—master production schedule, the anticipated forecasted build schedule
 - Actual Production—demand generated from existing sales
5. Select start and end dates to calculate the number of demand days. The default is the beginning of the demand period.

6. In the Demand Days field, the value is calculated by the difference in the date fields entered. Or the value can originate from the forecasted demand.
7. Enter the hours per day that you are working.
8. Optionally, enter a boost percentage to increase or decrease your demand.
9. In the Display Option region, choose options for viewing the generated mixed model map. You can balance the line by line operation or process. Select Line Operation or Process to determine what displays on the matrix.
10. Select the Sort Order; choices are Display Sequence or Code.
11. In the Time field, select what machine or labor time values are used for the calculation.
 - Rolled-Up Time uses the value derived from the Usage field on the Event Resources window.
 - User Entered is the value entered on the Routings window, in the Operation Times tab, in the User Labor Time or User machine time fields.
12. Select the calculate for In Process Kanban Value. Your choices are either the entire process, or for each individual machine.

The number of machines is specified at the department associated with the process.
13. Select a unit of measurement for the time values displayed in the mixed model map.

Generating a Mixed Model Map

► To generate a mixed model map

1. Navigate to the Mixed Model Map window.

Enter Mixed Model Map parameters.
2. Choose Generate.

Mixed Model Map (S1)

Line **Desktops** Family Demand

TAKT **0.01** Hours Per Day **8** Boost %

Elapsed Time | Machine Time | Labor Time | Process Volume

Average Daily Demand	LOP1	LOP2	LOP3	LOP4	LP50
Product					
MC31749	333.00	0.14	0.08	0.00	0.47
MC31750	666.50	0.24	0.13	0.00	0.32
Total Of Demand	999.50				
Weighted Time	0.21	0.11	0.00	0.37	0.00

Summary | Baseline Variance | Baseline

Machines Needed	12.13	0	0	2.08	0
Machines Assigned	4	0	0	1	0
Labor Needed	13.72	11.73	0	44.38	0
Labor Assigned	51	19	0	19	0
In Process Kanbans Needed	960.77	927.09	0	977.99	0

The Mixed Model Map window displays the takt time hours available for the line.

In the first tabbed region in the upper part of the window, the information is displayed by elapsed time, machine time, labor time, and process volume.

In the second tabbed region in the lower part of the window, you can view baseline data.

- The Summary tab displays machine and labor values that are needed and assigned.
- The Baseline Variance tab displays a bar graph, you can choose to view variance by machines needed, labor needed, or in process kanbans needed. The baseline value for each process is shown in yellow as a column. If more resources (machines, labor, or in process kanbans) are needed than the current baseline value, the variance appears in red and a positive variance value is shown above the column in red. If fewer resources are needed than the current baseline value, the variance appears in blue and a negative variance value is shown above the column in blue.

- The Baseline tab displays the required machine, labor, and in process kanban values.
3. You can select a record on the mixed model map, and access details of that record. You can either view, define, or query in windows through the following options on the Tools menu:
 - *Standard Processes* - Standard Processes window
 - *Standard Line Operations* - Standard Line Operations window
 - *Flow Routings* - Routings window
 - *Forecast Entries* - Item Forecast Entries window
 - *Master Demand Schedule Entries* - Item Master Demand Schedule Entries window
 - *Master Production Schedule Entries* - Item Master Production Schedule Entries window
 - *Kanban Planner Workbench* - Kanban Workbench window
 - *View Baseline* - View Baseline window
 - *Save as Baseline* - Saves this mixed model map as the baseline calculation
 - *Resource Details* - Resource Details window

Resource Details Window

In the Mixed Model Map the resource requirements are displayed in the summary table. You can view resource, activity, line operation, resource type, and usage in the Resource Detail window. This enables you to make decisions on how best to move and adjust the resources. by displaying machine and labor details.

► To view resource details in the mixed model map:

1. Select Resource Details from the Tools menu.
2. Use the Find Resource Details region to choose selection criteria.

You can view all resources by choosing Find. Or you can filter your selection by selecting values, or any combination, in the Resource, Line Operation, Activity, or Resource Type fields—and then choose Find.

► **To save a baseline:**

- After you have generated a mixed model map, choose Save as Baseline from the Tools menu.
- In the Saved Baseline window you can select the Find button to view all of the saved baselines

Attention: If you have a previously saved baseline for this family and line, it will be replaced when you save it again.

Querying a Saved Baseline

You can bring up a saved baseline to compare calculations with different variables or over a period of time. The View BaseLine window displays the calculated machine, labor, and in process kanbans values you saved from the Mixed Model Map window.

► **To query a saved baseline:**

1. Navigate to the Mixed Model Map window.
2. Select View Baseline from the Tools menu to display the View Baseline window.
The window displays the parameters used to generate the map. You can view the machine, labor, and in process kanbans by both processes and line operations.
3. Close this window to return to the Mixed Model Map window, or choose Delete to delete this saved record.

View Baseline (S1)

Line: Desktops Family:

Demand Type: Actual Production Demand:

Start Date: 11-JUL-2002 End Date: 12-JUL-2002

Demand Days: 2 Hours Per Day: 8

Sort Order: Display Sequence Boost:

Time: Rolled-Up Time In Process Kanban Value: Total

Summary

Processes:

	FAB1	FAB2	ASY1	ASY2	ASY3
Machines Needed	5.33	3.81	7.29	0.00	0.00
Labor Needed	5.52	4.07	7.50	7.29	8.33
In Process Kanbans Needed	901.25	864.23	920.63	839.50	859.50

Delete Baseline

Note: To view all saved maps, navigate to the Line field and select the query button.

Placing a Mixed Model Map on the Navigator

You can save a baseline to your Navigator desktop for easy access.

Prerequisites

You must create a Mixed Model Map before you can place it on the navigator. See: [Entering Mixed Model Map Parameters](#) on page 5-2 and [Generating a Mixed Model Map](#) on page 5-4.

► To place a Mixed Model Map on the navigator

1. Generate a Mixed Model Map or query the baseline you would like to save to the Navigator.
2. Choose Place on Navigator from the file menu.

Note: Place on Navigator option is only available when you are in the Mixed Model Map matrix window.

Mixed Model Map Calculations

The mixed model map enables you to design and monitor each part of the line design process. The mixed model map bases calculations on the date range entered in the Mixed Model Map window if this date range falls within the forecast date range. Otherwise the forecast date range will be used.

Line Takt Time

Line Takt time is calculated as follows:

hours per day * time conversion factor * number of demand days
divided by total demand * (1 + boost percent)

Hint: Once your line is balanced, return to the organization item master and update the variable lead time to equal your Line Takt Time. The Total Product Cycle time (which is displayed on the routing for each item) should be entered in the fixed lead time field on the item master attributes.

Process Volume

Process volume is calculated as follows:

total demand * average net planning percent * (1 + boost percent)
divided by average reverse cumulative yield

Note: A process volume is calculated for a product and a process (or line operation). If the reverse cumulative yield is 0, the system will assume it is 1.

Machine Weighted Time

Machine weighted time is calculated as follows:

sum of (process volume * machine time)
divided by the sum of process volume

Labor Weighted Time

Labor weighted time is calculated as follows:

sum of (process volume * labor time)
divided by sum of process volume

Elapsed Weighted Time

Elapsed weighted time is calculated as follows:

sum of (process volume * elapsed time)
divided by the sum of process volume

Note: Machine, labor, and elapsed weighted times are calculated by process (or line operation). For example, if your mixed model map displays five processes, then the mixed model map will calculate five machine weighted times, one for each process.

Machines Needed

Machines needed is calculated as follows:

machine weighted time
divided by operation takt time

Note: The mixed model map calculates the number of machines needed by process or line operation.

Machines Assigned

Machines assigned is the total number of machine resources in the department(s) that the events are assigned to.

For example: OP10 is assigned to DEPT1, and there are two events underneath it. One event uses machine MCH1 for 0.25 hours and is assigned to DEPT1. The other event uses MCH2 for 0.1 hours and is assigned to DEPT2.

The program will look at DEPT1, note the total MCH1 resources assigned. It then goes to DEPT2, and notes the total MCH2 resources assigned. These two numbers are added together and displayed as machines assigned.

Note: The number of resources assigned is the TOTAL available in the department(s), not the total available for that operation. IE - If you use the same machine resource at multiple events in the same line, or in multiple lines, the machines assigned will be overstated for each occurrence of the resource. The only way to avoid this is to assign a department to each operation/process and all its events.

Labor Needed

Labor needed is calculated as follows:

labor weighted time
divided by operation takt time

Note: The mixed model map calculates labor needed by process or line operation.

Labor Assigned

This is the total number of labor resource units in the department(s) that the events are assigned to. It is calculated in the same manner as Machines Assigned.

Note: The number of resources assigned is the TOTAL available in the department(s), not the total available for that operation. IE - If you use the same labor resource at multiple events in the same line, or in multiple lines, the labor assigned will be overstated for each occurrence of the resource. The way to avoid this is to assign a department to each operation/process and all its events.

In Process Kanbans (IPKs) Needed

IPKs Needed is calculated as follows:

(elapsed weighted time - line takt time) * hours/day * time conversion factor
divided by elapsed weighted time * line takt time

Note: The mixed model map calculates the number of IPKs needed by process (or line operation).

In Process Kanbans Needed by Machine

In Process Kanbans needed by machine is calculated as follows:

in process kanbans needed
divided by the number of machines

Note: Operational takt time is calculated for a process or line operation, unlike the line takt time which is calculated for the entire line.

Operation Takt Time

Operation Takt Time is calculated using the following formula:

number of days * hours per day * time conversion factor
divided by the sum of process volumes

Takt Time for Assigned

Takt time for assigned is the time per unit that each operation will achieve given the number of resources assigned. (Also called the Operational Cycle Time)

Takt Time for Assigned is calculated using the following formula:

Machine Weighted Time / Machines Assigned

If machines assigned is equal to 0, then takt time for assigned is 0.

Note: This number is relevant only if you assign a department to each operation or process and all of its events.

Line Scheduling

This chapter describes all the elements available in the Line Scheduling Workbench – the planning interface for Oracle Flow Manufacturing. The following topics are discussed in this chapter.

- [Overview of Line Scheduling Workbench in Flow Manufacturing](#) on page 6-2
- [Defining Scheduling Rules](#) on page 6-3
- [Line Scheduling Workbench Options Window](#) on page 6-9
- [Viewing Unscheduled Orders](#) on page 6-11
- [Viewing, Creating, and Modifying Flow Schedules](#) on page 6-12
- [Scheduling Calculations](#) on page 6-20
- [Line Scheduling Workbench Tools Menu](#) on page 6-22
- [Other Features](#) on page 6-30

Overview of Line Scheduling Workbench in Flow Manufacturing

Flow Manufacturing integrates and synchronizes work processes in a continuous flow, optimizing all resources - people, machines, and materials. This system lets you synchronize production to customer demand, with minimal inventory. Flow Manufacturing utilizes production lines and rate based schedules instead of work orders to drive production – production occurs on lines that have been designed and balanced to synchronize your activities with customer demand.

Flow production lines are designed to support mixed model production of families of products, allowing you to deliver mass customization to your customers. Line design is the process of defining a production line, the products that you make on the line, the operations that you perform to make these products, and the resources and materials consumed at each step. You balance a line by arriving at the TAKT time or cycle time. This defines the pace at which products reach the end of the line. Since TAKT time establishes the rhythm of the line, all the processes along the line are streamlined and balanced to complete within this cycle time.

Line scheduling is the process of sequencing and scheduling the work to be done on your balanced flow lines. You create flow schedules to represent the volume and mix of products to be produced. The objective of line scheduling is to synchronize production as tightly as possible to customer demand, as well as establishing an achievable pace and consistent flow of products throughout the production process and supply chain.

The Line Scheduling Workbench is used by schedulers to create and manage flow schedules. You can simulate the assignment of work to production lines, and schedule work on specific lines. While you can view all scheduled orders (such as discrete jobs, repetitive schedules, and flow schedules) through the workbench windows, the only type of work you can create and schedule in the workbench is a flow schedule.

The Line Scheduling Workbench Options window is the interface to the other planning windows in line scheduling. The functions available through the workbench are:

- Viewing Unscheduled Orders

You can view unscheduled orders in the Line Scheduling Workbench Unscheduled Orders window. You have the option to display the unscheduled planned orders or sales orders. These unscheduled orders can be converted into flow schedules.

- Creating and Maintaining Flow Schedules

You can create and modify schedule quantities and dates of flow schedules.

- **Prioritizing and Sequencing Flow Schedules**

You can schedule your flow schedules either by using the scheduling rules provided, or ones that you have defined.
- **Flow Schedule Completion**

You can perform completion transactions for scheduled flow schedules when production is finished.
- **Mixed Model Map**

The Mixed Model Map window can be accessed from the workbench. This window is used to monitor your line design by balancing a line against a specified statement of demand.
- **Roll Flow Schedules**

You can roll flow schedules forward, based on undercompletions and overcompletions, in order to adjust future production.
- **Deleting Flow Schedules**

You can delete flow schedules in order to provide a clean slate for new schedule generation.
- **Checking the Availability of Components**

You can access the ATP Results window to view component availability.
- **Viewing Resource Load in Relationship to Available Capacity**

You can view a graphical representation of the required load of the line and its associated resources.

Defining Scheduling Rules

A scheduling rule determines the logic used to set the timing of the flow schedules. The rule is comprised of an algorithm and the criteria used in sequencing the flow schedules. Oracle Flow Manufacturing provides several types of scheduling rule options. Pre-defined scheduling rules combine a system algorithm with sequencing criteria. In addition, there are two methods to create your own rules.

Scheduling Rule Options

- **Pre-Defined Rules**

Pre-defined scheduling rules combine a system algorithm and one sequencing criteria. Five pre-defined rules are provided.

- **System-Defined Rules**

User-defined scheduling rules allow you to combine a system algorithm with one or more of the system provided criteria.

- **User-Defined**

You can also create your own rules defined by modifying the custom line scheduling procedure that is executed at the time of scheduling flow lines.

Scheduling Algorithms

Three algorithms are provided for line scheduling:

No Level Loading

Flow schedules are sequenced according to criteria, and the demand is placed in the days of the scheduling horizon. Starting with the first available day, demand is scheduled until capacity is reached.

Criteria Order is used to determine the sequence of the flow schedules. Beginning with the line with lowest sequence (or highest priority), lines are scheduled in ascending order.

Order modifiers can be used, on planned order types only, to define the quantity of flow schedules.

Level Daily Rates

The total demand is spread evenly across the scheduling horizon. In this algorithm the production rate for each item is calculated for each day. Therefore, items with higher demand have a higher production rate.

Production rate for an item on a particular day is determined by multiplying the available capacity on that day by the demand ratio for the item.

Mixed Models

Similar to the Level Daily Rate algorithm, demand is spread evenly across the scheduling horizon. In this algorithm the production rate for different items is calculated in order to establish a production rule pattern for a mix of items.

Sequencing Criteria

You can sequence flow schedules using one or more of the following values:

- Order Entry Date
- Order Priority
- Order Promise Date
- Order Request Date
- Order Schedule Date
- Production Sequence Forward
- Production Sequence Reverse

The criteria is listed in the order of priority. For example, you can sequence by Order Request Date and Order Entry Date. The Order Request Date has priority 1, the Order Entry Date has priority 2. If two different flow schedules have the same order request date, then the order with the earliest order entry date is scheduled first.

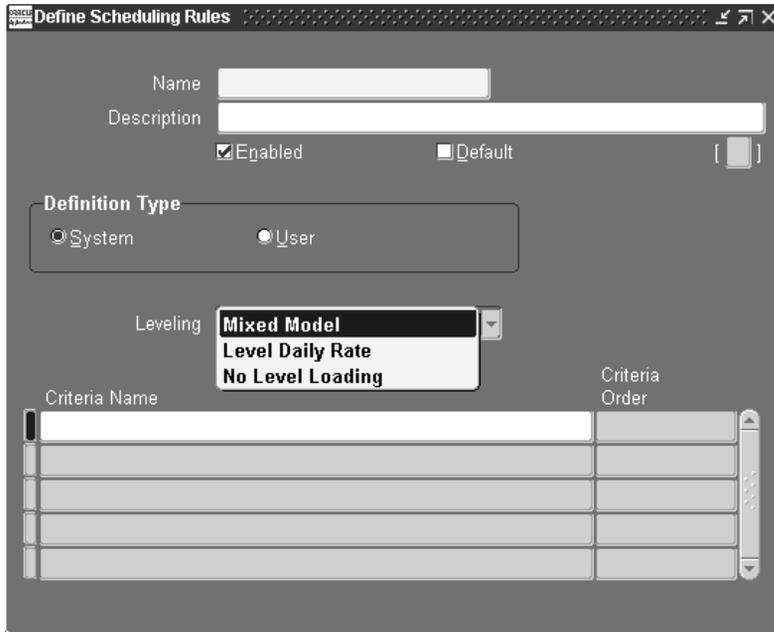
Criteria are only applied to unscheduled sales orders. For unscheduled planned orders, the generated Planned Order Due Date value is the only criteria used for sequencing.

See Also

[Define Scheduling Rules Window](#) on page 6-5

Define Scheduling Rules Window

You can view scheduling rules and sequencing criteria, as well as define your own custom rules in this window.



To view existing scheduling rules:

1. Navigate to the Define Scheduling Rules window.
2. From the Query menu choose Enter, and then choose Run.
Use the Arrow keys to page through the list of scheduling rules.

To define system-defined or user-defined scheduling rules:

1. Navigate to the Define Scheduling Rules window.
2. Enter the name of the scheduling rule in the Name field.

If you are creating a custom rule, this value is user-defined. The following rules are provided in the system:

- Mixed Model - mixed model by order request date
- Level Daily Rate- level daily rate by order request date
- Request Date- order request date with no leveling
- Schedule Date - order schedule date with no leveling

- Promise Date - order promise date with no leveling
- Production Sequence Forward - order schedule date, order production date sequence in ascending order with no level loading
- Production Sequence Reverse - order schedule date, order production date sequence in descending order with no level loading

3. Enter the description of the rule in the Description field.

For rules you create, it is beneficial to have the name and description reflect the algorithm being used.

4. Uncheck the Enabled check box if you are disabling an existing rule, otherwise leave it marked.

This is a Yes/No flag indicating whether this rule is currently in use.

5. Select the Default check box if this rule is to be your default scheduling rule.

This is Yes/No flag indicating if this is the default rule. The default rule is used unless it is overridden; there can only be one default rule for scheduling.

6. If this is a system-defined rule, choose the System Defined option button. Otherwise, if this rule is to be defined by a user procedure, proceed to Step 9.

This option button enables the region for rules using system provided algorithms and sequencing criteria.

7. Select an algorithm in the Leveling box.

The system algorithm values in this box are:

- No Level Loading—sequencing is calculated only by priority criteria
- Level Daily Rate—the calculation is the ratio of total demand for each item, multiplied by the line rate
- Mixed Model—daily demand is calculated from different products and different lot sizes

8. In the Criteria Name box, select criteria values from the list of values.

Enter one or more values in order of priority. For example, if you select Order Request Date first, and then Order Entry Date—the order with the earliest request date and earliest order entry date is scheduled first.

- Order Entry Date
- Order Priority

- Order Promise Date
 - Order Request Date
 - Order Schedule Date
 - Production Sequence Forward
 - Production Sequence Reverse
9. For user procedures, choose the User Defined option button.
This option button sets the rule to user-defined. To add custom line scheduling logic, modify the Custom_Schedule procedure (MRPPCLSS.pls/MRPPCLSS.pls).
 10. Save your work.

Line Scheduling Workbench Options Window

The Line Scheduling Workbench Options window is the starting window from which to access line scheduling options. From this window you can access the other windows to view unscheduled orders, create flow schedules, view and modify existing schedules.

The screenshot shows the 'Line Scheduling Workbench Options (M1)' window. The 'Line' dropdown is set to 'Plastic', and the 'Plastic Production Line' text field is populated. The 'Schedule Group' field is empty. The 'Daily Production Rate' is set to '6'. Under the 'Unscheduled Orders' section, the 'Type' is 'Sales Orders' and the 'Order Dates' range from '01/21/2002 00:00:00' to '01/21/2002 23:59:59'. Under the 'Scheduling' section, the 'Rule' is 'Mixed Model' and the 'Schedule Dates' range from '01/21/2002 00:00:00' to '01/21/2002 23:59:59'. The 'Flex Tolerance' checkbox is unchecked. The window includes buttons for 'Create Flow Schedules', 'Unscheduled Orders', and 'Flow Schedule Summary'.

To view unscheduled orders, create flow schedules, or modify existing schedules:

1. Navigate to Scheduling Workbench.

After selecting an organization, the Lines window appears.

2. Select a production line.

The Line Scheduling Workbench Options window displays information on the selected line. You can access the other windows using the defaulted information, or you can enter other values.

The Daily Production Rate is information for this production line. It is the calculation of the Hourly Production Rate multiplied by the number of work hours for this line. See: Set Up Steps, *Oracle Work in Processing User's Guide*

3. Optionally select a Schedule Group value.

The Schedule Group is defined in Work in Process. The value entered here is used as a default for any schedules created.

4. In the Unscheduled Orders region, select the Type and Order Date ranges for unscheduled orders.

You can select Sales Orders or Planned Orders. Sales orders are created from Order Management transactions; Planned Orders are created from all production MPS, MRP, and DRP plans.

Note: If you create multiple plans marked as production – the Production flag is checked on the Master Production Schedules window or the MRP Names window– you can create duplicate flow schedules.

5. In the Scheduling region select a scheduling rule.
6. Select beginning and ending date values.

Flow schedules are created for the date ranges that you select. See: [Creating Flow Schedules](#) on page 6-17

7. Check the Flex Tolerances check box if you want to enable flexible tolerance fences in your scheduling calculations.

Flexible tolerance fences provide temporary increases to capacity to handle increases in orders. The line rate is adjusted by the tolerance fence percentage before scheduling rules are applied. Tolerance fences are set up when creating line definition. See: *Defining Tolerance Fences, Oracle Work in Process User's Guide*.

8. Click one of the three buttons:
 - *Unscheduled Orders*: Use this button to display the Unscheduled Orders window.

- *Create Flow Schedules*: Use this button to create new flow schedules. Schedules are created for the values selected on the Line Scheduling Workbench Options window.
- *Flow Schedule Summary*: Use this button to view existing schedules in the Flow Schedule Summary window. You can navigate to a detail level from this window.

Viewing Unscheduled Orders

The Unscheduled Orders window is used to view unscheduled orders. It shows all demand that has not been converted into flow schedules. You can also change certain values and create flow schedules directly from this window. See: [Creating Flow Schedules](#) on page 6-17.

To view unscheduled orders:

1. Navigate to the Line Scheduling Workbench Options window.

Assembly	Order Date	Unscheduled Qty	Qty to Schedule	Schedule Number	Order
HOUSING	22/FEB/2001 00:00:00	6	6		

Implement: 1

2. You can use the default information on this window, or enter values. See: [Line Scheduling Workbench Options Window](#) on page 6-9.#

3. Choose Unscheduled Orders.

The Find Unscheduled Orders window appears. You can enter search criteria.

You can also select the Folder menu to customize your display and save your Find criteria. See: Customizing the Presentation of Data in a Folder, *Oracle Applications User's Guide*.

4. Choose Find.

The Unscheduled Orders window shows all orders for the selected order type and date range.

Viewing, Creating, and Modifying Flow Schedules

You access both flow schedule summary and detail information from the Line Scheduling Workbench Options window. This allows you to view, create, and change flow schedules. The Flow Schedule Summary window shows schedule information grouped by assembly and date, showing the planned and completed quantities at an aggregate level. You can then navigate to the *Inventory* window for more information on the assembly and its components.

Note: Oracle Project Manufacturing feature of model/unit effectivity is supported in the Line Scheduling Workbench. If this feature is enabled, the Unit Number field is visible when viewing unscheduled orders and passed on to new flow schedules created. See: Model/Unit Effectivity, *Oracle Project Manufacturing Implementation Manual*.

Flow Schedule Summary Window

The Flow Schedule Summary window is used to view flow schedule information. This window shows the planned and completed quantities at an aggregate level. You can then navigate to the *Inventory* window for more information on the assembly and its components.

Note: Only flow schedules can be maintained through this window. Repetitive schedules and discrete jobs are displayed but cannot be modified.

To view or modify flow schedules at a summary level:

1. Navigate to the Line Scheduling Workbench Options window.
2. You can use the default information on this window, or enter values. See: [Line Scheduling Workbench Options Window](#) on page 6-9.

Schedule quantities can be modified in both the summary and detail windows. However, only schedules that do not have details (such as schedule group, project, or task) can be modified at the summary level.

3. Choose Flow Schedule Summary

The Flow Schedule Summary window shows schedules, in a bucketed format, from the start dates selected on the Line Scheduling Workbench Options window. You can scroll back or forward in this window.

Three types of order information can be viewed. You can select the types displayed on this window through Preferences in the Tools Menu. See: [Preferences](#) on page 6-29

- Planned quantity is calculated when the flow schedule is created, this amount can be changed.
- Completed quantity is updated when you perform a completion on this schedule.
- Variance is the difference between Planned and Completed quantities.

Assembly	Type	Total	19/FEB/2001	20/FEB/2001	21/FEB/2001	22/F
MC24713	Planned	2100	0	640	640	
	Completed	0	0	0	0	
	Variance	2100	0	640	640	
MC97160	Planned	3150	0	960	960	
	Completed	0	0	0	0	
	Variance	3150	0	960	960	
Total Planned Quantity		5250	0	1600	1600	
Total Completed Quantity		0	0	0	0	
Total Variance		5250	0	1600	1600	

Description: Plastic Base

Buttons:

- To modify a flow schedule quantity, change the Planned quantity in the date column selected. However, only schedules that do not have details (such as schedule group, project, or task) can be modified at the summary level.

The Total and Total Planned Quantity for this assembly reflect the changes you just made.

This window offers the feature of spreading weekly quantities across the valid workdays. Enter a value in the Total field, and choose Tab.

The new total quantity will spread even across all the workdays and display in the window.

- Save your work.

There are three buttons in this window used to access the following windows:

- Unscheduled Orders*: Use this button to display the Unscheduled Orders window.
- Capacity Graph*: Use this button to view the capacity profile at the line level for individual resources, for the flow schedules selected.
- Details*: Use this button to display the Flow Schedule Details window for the assemblies and dates selected. The number after the word Detail indicates how

many records are selected. You can select multiple assemblies on this window for viewing on the detail window. See: *Selecting Multiple Records, Oracle Applications User's Guide*.

See Also

Spreading Totals in the Planning Horizon, *Oracle Master Scheduling/MRP and Oracle Supply Chain Planning User's Guide*

[Viewing Load in Relationship to Capacity](#) on page 6-31

Flow Schedule Details Window

The Flow Schedule Details window allows you to view and modify flow schedules at the detail level of the assembly.

Note: Only flow schedules can be maintained through this window. Repetitive schedules and discrete jobs are displayed but cannot be modified.

To view or modify flow schedule details:

1. Navigate to the Flow Schedule Summary window.
2. Select one or more assemblies. You can select specific dates or use all the dates.
3. Choose Details.

The Flow Schedule Details window displays information on the assemblies selected in the summary window.

Assembly	Ordered Quantity	Order Number	Order Line	Order Requested Date	Unit Number
MC97160	0	1635.(Standar	1	20/FEB/2001	11
MC97160	0	1639.(Standar	2	20/FEB/2001	11
MC97160	0	1639.(Standar	2	20/FEB/2001	11
MC97160	0	1639.(Standar	2	20/FEB/2001	11
MC97160	0	1639.(Standar	2	20/FEB/2001	11

Capacity Graph Unscheduled Orders Component Availability: 1

4. To modify a flow schedule, select and change the values in the records.
5. Save your work.

The buttons in this window are used to access the following windows:

- *Capacity Graph*: Use this button to view the capacity profile at the line level for individual resources, for the flow schedules selected.
- *Unscheduled Orders*: Use this button to display the Unscheduled Orders window.
- *Component Availability*: Use this button to access the ATP Results window to show the status of material used on your lines. The number in the button indicates how many records are selected.

Attention: Component availability checking is permitted only for items with the Check ATP item attribute set to Yes. See: Order Management Attribute Group, *Oracle Inventory User's Guide*

See Also

[Viewing Load in Relationship to Capacity](#) on page 6-31

Creating Flow Schedules

You can create flow schedules the following ways:

- Use the Create Flow Schedules button on the Line Scheduling Workbench Options window. When you choose this button flow schedules are created for all unscheduled orders that fall within the date ranges if the capacity is adequate.

Note: If the scheduling rule is set to Do Not Schedule, unscheduled orders are converted to flow schedules according to order dates. All unscheduled orders in the specified date range are converted to flow schedules – schedule dates, capacity, and sequencing criteria are ignored.

- Use the Implement button on the Unscheduled Orders window. Flow schedules are created for all unscheduled orders that you have selected on this window. These orders are scheduled without regard to the line capacity or scheduling rules.
- Modify the schedule on the Flow Schedules Summary window. If a schedule quantity is added to a day that does not already have a flow schedule, one is created.
- You can add a new record on the Flow Schedules Details window.

To create flow schedules from the Line Scheduling Workbench Options window:

1. Navigate to the Line Scheduling Workbench Options window.
2. You can use the default information on this window, or enter values. See: [Line Scheduling Workbench Options Window](#) on page 6-9.

Flow schedules for a given line are sequenced within a Schedule Group, schedules without a schedule group are sequenced together.

The Order Date ranges are used for the period of time to consider demand for scheduling. Flow schedules are created for unscheduled orders that fall within this date range – if the capacity is adequate.

3. Choose Create Flow Schedules.

Flow schedules are created from unscheduled orders by considering the following elements:

The demand for the order type within the specified date range in the Unscheduled Orders window.

The orders topmost in priority, based on sequencing criteria

The line capacity for the date range. If there is not enough capacity, the order remains unscheduled.

The results of this process are shown in the Flow Schedule Summary window.

If you choose Unscheduled Orders, you can see the orders that were not converted into flow schedules.

4. Save your work.

To convert unscheduled orders to flow schedules:

1. Navigate to the Unscheduled Orders window.

2. Select the records to implement into flow schedules.

You can make any modifications or adjustments to the details of your records. You can select multiple assemblies on this window for viewing on the detail window. See: *Selecting Multiple Records, Oracle Applications User's Guide*.

Flow schedules are created for all unscheduled orders that you have selected on this window. These orders are scheduled without regard to the line capacity or scheduling rules

3. Choose Implement.

4. Choose OK. Otherwise, to cancel this transaction, choose Cancel.

5. Choose Yes to view the Flow Schedule Details window with the new schedule record. Choose No to view the Unscheduled Orders window.

After the new schedule is created, the demand does not appear on the Unscheduled Orders window.

6. Save your work.

To create flow schedules by modifying information on the Flow Schedules Summary window:

1. Navigate to the Flow Schedules Summary window.

Only schedules without details (such as schedule group, project, or task) can be modified at the summary level. If details exist, the Flow Schedule Details window appears.

2. Enter the new planned quantity, or scroll to the date you to modify and update quantity. You can only modify the Total Planned Quantity, not the completed or variance value.
3. Save your new record.

If a schedule quantity is added to a day that does not already have a flow schedule, a new record is created for that day.

Attention: If the quantity is changed to 0, the flow schedule is deleted – but you cannot delete flow schedules with partial or full completion status.

To create flow schedules by adding a new record on the Flow Schedule Details window:

1. Navigate to the Flow Schedule Details window.
2. Enter the record information and save your record.

You can add flow schedules only for the line you have specified on the Line Scheduling Workbench Options window.

Scheduling Calculations

How Scheduling is Calculated

Scheduling rules determine the timing of the flow schedules. using the following logic in the calculation routine:

- Sequence is determined by the criteria in the rule.

Demand is sequenced using the criteria in the scheduling rule. The priority of each criteria determines the order in which it is applied.

- The first flow schedule created goes to the first available date in the scheduling horizon.

Flow schedules are created for orders starting with the first available due date that has capacity. Flow schedules are not created for orders than cannot be scheduled within the scheduling horizon.

- This process of attaining the line rate for each day continues until the end of the scheduling horizon.

Capacity is calculated for the day using the line rate, subtracting the existing workload (flow schedules, discrete jobs, repetitive schedules) for that day. When available capacity for the day is attained, schedules are slated for the next day until the end of the scheduling horizon.

- If you are using flexible tolerance fences, scheduling begins after the last day indicated from the Days in Advance value.

Tolerance fences provide temporary increases to capacity above their normal operating rate to handle rises in orders.

Algorithms

The scheduling rule is comprised of an algorithm and the criteria used in sequencing the flow schedules. Oracle Flow Manufacturing provides three algorithms described here.

- No Level Loading

If you select a scheduling rule that has no level loading, the criteria defined in the scheduling rule is used to prioritize and sequence the orders. Orders are scheduled with capacity considerations beginning with the first available date of the scheduling date range. If the entire quantity of the sales order cannot be

satisfied on a date, the remaining quantity is scheduled on subsequent days where capacity is available.

- Level Daily Rate

If you choose to schedule for each day using the level daily rate, each item is scheduled at a rate in regard to the demand ratio of the item. The demand ratio of an item equals the total demand of the item divided by the grand total demand.

- Mixed Model

This algorithm establishes a pattern to manufacture items in order to meet demand. The pattern distributes units according to the demand of each item for each day.

See Also

Scheduling Calculations and Examples, *Oracle Master Scheduling/MRP and Oracle Supply Chain Planning User's Guide*

Line Scheduling Workbench Tools Menu

The following are functions available in the Tools Menu for maintaining flow schedules. This menu is available through any of the windows in the Line Scheduling Workbench.

- Completions
- Mixed Model Map
- Roll Flow Schedules
- Delete Flow Schedules
- Preferences

Completion of Flow Schedules

You can complete flow schedules through the Work Order-less Completions window. Choose Completions from the Tools menu to display the window. The details of the schedules you selected are defaulted in the Work Order-less Completions window.

Scheduled	Assembly	Line	Schedule Group	Build Seq.	Schedule Num.
<input checked="" type="checkbox"/>	25398	LINE1	SGROUP1		
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>					

See Also

Performing Work Order-less Completions, *Oracle Work in Process User's Guide*

Mixed Model Map

You can access the Mixed Model window from the Tools menu. The Mixed Model Map helps you to create and monitor your line design by balancing a line against a specified forecast.

You can use the Mixed Model Map to compare line information with demand requirements. This provides information to adjust resources on the line to meet the demand. The output of the Mixed Model Map will give you the line rate.

See Also

[Overview of Mixed Model Map](#) on page 5-2

Roll Flow Schedules

You must maintain flow schedules so that production schedule information is accurate; and planning information such as Available-To-Promise and demand for components is current. The Roll Flow Schedules program is designed to allow you to adjust future schedules based on actual performance in the past. You adjust the quantity on future production schedules based on the completion quantities and past production. You can change schedules for a line, a range of lines, or for all lines at once.

Attention: MRP calculations does not consider flow schedules with past due dates. Use the Roll Flow Schedules window to update your flow schedules in order to keep your MRP accurate.

Note: The Feeder Line Synchronization program ignores flow schedules created from the Roll Flow Schedules program. You must roll schedules on both the parent and feeder lines.

Three options are available for adjusting schedules:

Close All Past Schedules

This option closes all open past due schedules.

Note: Schedules are automatically closed when the completion quantity is greater than or equal to the planned quantity.

Closed flow schedules cannot be changed or rolled with details, and they are denoted with gray fields. You can close individual or a group of schedules. For example, a customer might reduce the order quantity because a delivery date can not be made. The original schedule is closed and the program does not roll the excess quantity no longer needed.

Roll With Details

This option rolls any open schedules within the specified date range to a single date. The new schedules maintain the original schedule details including the order information, build sequence, and alternate bill of material or routing information. The rolled schedules are scheduled at specific times if no schedules exist on the rolled to date.

Note: The original schedules are closed after the roll. Therefore the same schedule number cannot be rolled multiple times, nor can you change the original schedule once it has been rolled.

Spread Evenly Without Details

You can spread schedules without order information evenly across multiple days, for use in a repetitive environment, allowing you to:

- Calculate variance and roll by line and item
- Consider both the planned quantity and the completed quantity when rolling over-completions
- Schedule specific times for the rolled schedules if no schedules exist on the specific rolled day

Attention: When rolling flow schedules with out details, if you roll the same flow schedules multiple times, it is possible to create excess supply.

To roll flow schedules forward:

1. Select Roll Flow Schedules from the Tools menu.

The Roll Flow Schedules Parameters window appears.

2. Select an Option.

Your choices are:

Close All Past Due Schedules

Roll with Details

Spread Evenly Without Details

3. Select an Output option.

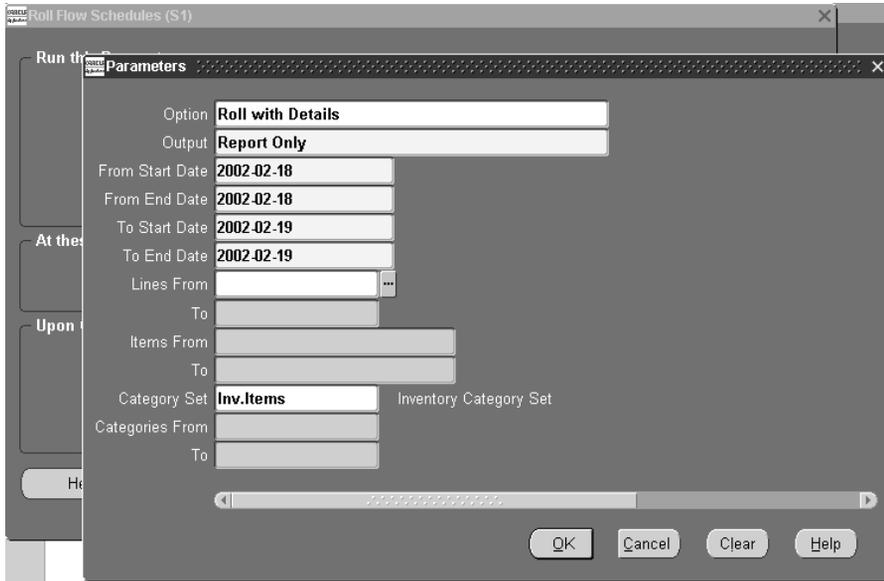
The values for Output are:

Report Only creates a report but does not update your flow schedules. This could be used to simulate the effects on your schedule.

Report and Update creates a report and rolls the dates forward on your schedules.

4. Select a range of Start and End Dates From.

Flow schedules that do not have completion dates within this range are not rolled forward. You cannot enter a date in the From Start Date greater than today.



5. Select a range of Start and End Dates To.
6. You can select a range of flow schedule lines to consider in the Lines From and To fields.

Attention: If you do not specify lines, item numbers, or categories all flow schedules that fall within the specified date ranges are rolled forward.

7. Select a range of assembly items to consider in the Items From and To fields.
8. Select a range of Category Sets From and To.
9. Choose OK.
10. Choose Submit Request.

See Also

Submitting a Request, *Oracle Applications User's Guide*

Deleting Flow Schedules

You can delete flow schedules in order to provide a clean slate for new schedule generation. Flow schedules can be deleted as long as the following conditions are true:

- There has been no completion performed, that is, the quantity completed must equal 0.
- The schedule is open.
- There is no pending completion against it in Material Transactions Interface.

If the deleted flow schedule is associated with a sales order, then that portion of the sales order is again considered as an unscheduled sales order.

Run this Request...

Name **Delete Flow Schedules**

Parameters

Start Date 16-FEB-01

End Date 16-FEB-01

Lines From Laptop Assembly Line

To Laptop Assembly Line

Items From

To

Category Set Inventory Category Set

Categories From

To

To delete flow schedules:

1. Select Delete Flow Schedules from the Tools menu.

The Delete Flow Schedules Parameters window appears.

2. Select a range of Dates Start and From.
Flow schedules that do not fall within this range of dates are not deleted.
3. Optionally, select a range of Lines From and To.

Note: If you do not specify lines, item numbers, or categories all eligible flow schedules that fall within your specified date ranges are deleted.

4. Optionally, select a range of Items From and To.
5. To delete flow schedules by category, select a value in the Category Set field, and enter a range of categories Category From and To.
6. Choose OK.
7. Choose Submit Request.

See Also

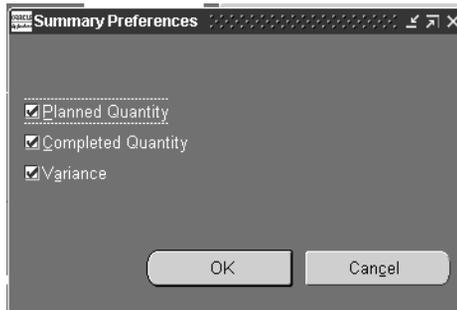
Submitting a Request, *Oracle Applications User's Guide*

Defining Category Sets, *Oracle Inventory User's Guide*

Preferences

The Preferences window is used to change the quantity types that show on the Flow Schedule Summary window.

The Planned quantity is originally calculated when the flow schedule is created using the rule and available capacity. The Completed quantity is updated when you perform a completion on this schedule. The Variance is the difference between Planned and Completed quantities.



Other Features

Component Availability

You can access Available To Promise information through the ATP Results window and view the status of material used on your flow schedules. Component availability checking is permitted only for items with the Check ATP item attribute set to Yes. See: Order Management Attribute Group, *Oracle Inventory User's Guide*

To display the ATP Results window:

1. Navigate to the Flow Schedule Details window.

The screenshot shows the 'ATP Results' window with the following data:

Org	Item/Resource	Type	UOM	Required Quantity	Required Date	Available Quantity	Projected Transactable
S1	CM93501	Item	Ea	150	22/FEB/2001	0	
S1	CM93502	Item	Ea	150	22/FEB/2001	0	
S1	CM23594	Item	Ea	150	22/FEB/2001	0	0
S1	CM23593	Item	Ea	150	22/FEB/2001	0	
S1	CM23595	Item	Ea	300	22/FEB/2001	4900	4900
S1	CM31542	Item	Ea	150	22/FEB/2001	0	

Below the table, the 'Request Item' is set to 'CM93501' and the description is 'Mounting Bracket Left Hand'. The window also includes buttons for 'Supply/Demand', 'Period ATP', and 'Open'.

2. Select assemblies for viewing component information.
3. Choose Component Availability.

The ATP Results window appears. The components for each flow schedule are listed individually on separate rows. See: Viewing ATP Results, *Oracle Inventory User's Guide*

Viewing Load in Relationship to Capacity

You can view the capacity profile at the line level prior to scheduling your flow schedules. The graph shows the load by item for the line and its resources. The capacity displayed is for the routings of the flow schedule assemblies and the dates selected.

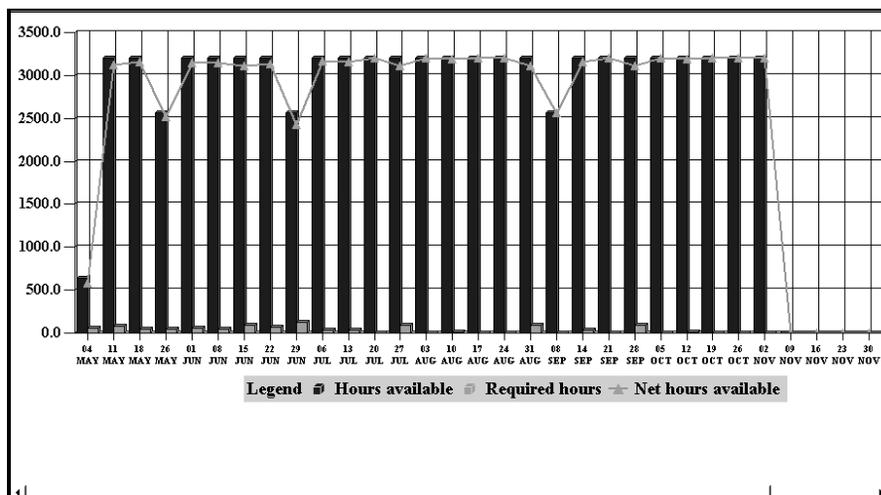
To display the planning data in a graph:

1. On the Flow Schedule Summary or the Flow Schedule Details window, select the assemblies and dates to view.

If you do not select assemblies or dates, all information on the window is displayed in the graph.

2. Choose Capacity Graph.

The data for the graph is the same as the data displayed in the window from which you generated the graph.



Feeder Line Synchronization

In manufacturing environments where many types of items are produced, the total amount for different configurations of a product may not be sufficient to support a Kanban replenishment system. Oracle Flow Manufacturing resolves this situation by enabling you to create schedules for lines that are directly derived from parent

assembly line schedules. These feeder lines use sequence information from the parent assembly schedules so that you can synchronize the higher and sub-assembly material with production.

The feeder line synchronization program calculates the date and time the subassembly is delivered to the particular line operation. This date is then be used as the completion date for the subassembly line. The start time for the subassembly is calculated by subtracting the lead time from the completion date and time. Lead time is obtained from fixed lead time and variable lead time on the organization item. This allows you to synchronize subassembly lines to deliver product exactly when needed by the main line.

You cannot create new synchronized schedules if corresponding schedules already exist on the feeder line. You also cannot re-synchronize rolled schedules. This eliminates potentially creating over production of the subassembly.

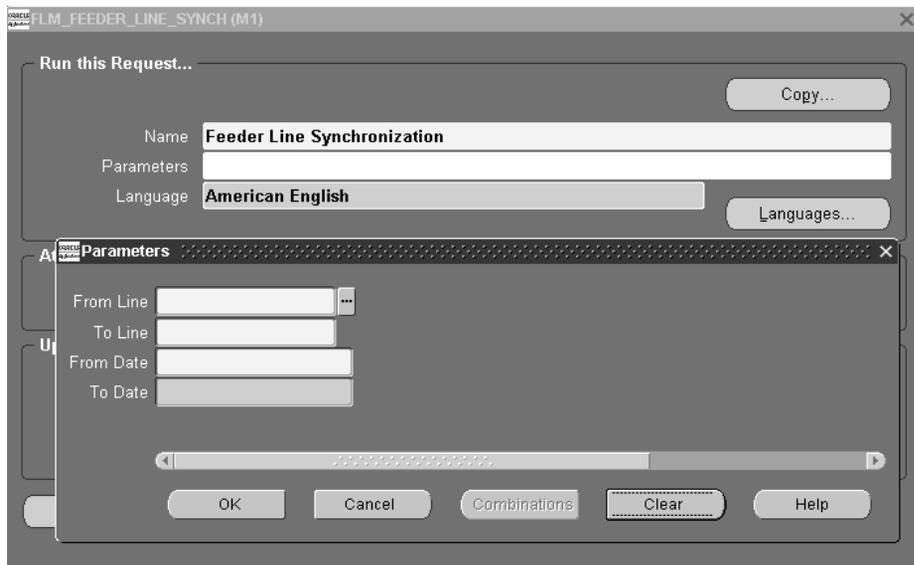
Prerequisites

- Create flow routings and routing networks for both the parent and subassembly items. See: *Creating a Flow Routing, Oracle Flow Manufacturing User's Guide*, and *Creating a Routing Network, Oracle Flow Manufacturing User's Guide*
- Define the operation sequence for the subassembly on the bill of material of the parent item. This must be equal to the event sequence on the parent routing of the event consuming the subassembly.

See: *Defining Flow Manufacturing Standard Events, Oracle Flow Manufacturing User's Guide*

- Define the variable lead time on the organization item master for each item to equal the takt time of each line, respectively. See:
 - Generating a Mixed Model Map, Oracle Flow Manufacturing User's Guide*
 - Generating a Mixed Model Map: page.*
- Define the fixed lead time on the organization item master for each item to equal the total product cycle time (TPCT) or the takt time of the line multiplied by the number of operations along the longest primary path of the line. See:
 - Creating a Flow Routing, Oracle Flow Manufacturing User's Guide*
 - Creating a Flow Routing: page,* and
 - Updating Organization Level Items, Oracle Inventory User's Guide*
 - Updating Organization Level Items: page.*

- Define the maximum hourly rate on the line definition for both the parent and feeder line the same as the standard daily running rate for each line, respectively. See: Defining Production Line, *Oracle Work in Process User's Guide*



To create flow schedules that synchronize feeder lines with parent assembly lines:

1. Navigate to the Feeder Line Synchronization window.

The Parameters window appears.

2. Select a parent line or range of Lines From and To.
3. Select a range of Dates From and To.

This is the date range of the start dates of the parent assembly schedule; it is used to determine which parent schedules are synchronized.

The completion date of the feeder line flow schedule is calculated as the difference between the parent assembly's scheduled completion date and the sum of the operation times. This is the sum of the operation times from the consuming operation to the end of the parent line.

4. Choose OK.

5. Choose Submit Request.

See Also

Submitting a Request, *Oracle Applications User's Guide*

[Feeder Line Synchronization](#) on page 6-31

Purging Flow Schedules

Closed flow schedules should be purged on a periodic basis to remove unneeded records and maintain database performance. A concurrent program purges according to parameters specified.

Flow schedules are purged if they meet the following criteria:

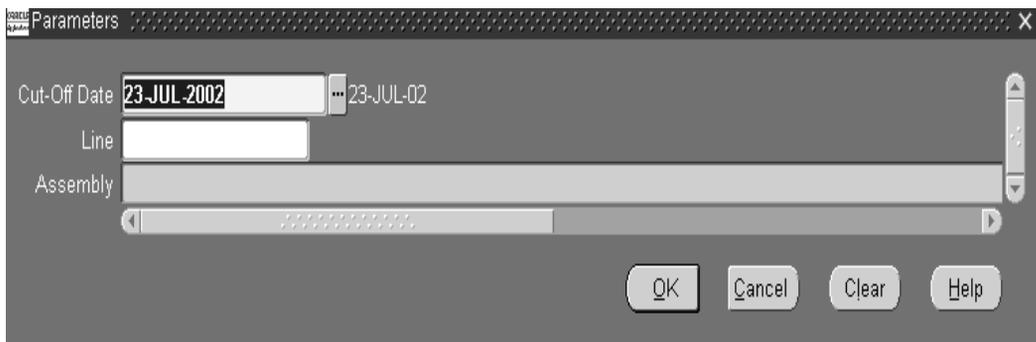
- Status of the flow schedule is closed
- Scheduled completion date of the flow schedule is in a closed accounting period
- All material transactions have been purged

■ To purge flow schedules:

1. Navigate to the Purge Flow Schedules window.

The Parameters window displays.

2. Select the effective date to use for purging schedules in the Cut-Off Date field.
Flow schedules with a completion date prior to the cutoff date are purged.
3. Optionally, you can select a value in the Line field to purge specific flow lines.



4. You can also select a specific assembly in your purging criteria.
5. Choose OK to display the Purge Flow Schedule request window.
6. Choose Submit to create this request.

Graphical Kanban Workbench

This chapter describes the functionality in the Graphical Kanban Workbench including:

- [Overview of the Graphical Kanban Workbench](#) on page 7-2
- [Navigating on the Graphical Kanban Workbench](#) on page 7-2
- [Accessing the Production Region](#) on page 7-5
- [Adding an Item to the Tree](#) on page 7-9
- [Modifying and Creating Pull Sequences on the Graphical Network](#) on page 7-10
- [Pull Sequence Window](#) on page 7-12
- [Using a Template to Create a Pull Sequence](#) on page 7-13
- [Accessing the Planning Region](#) on page 7-18
- [Viewing Kanban Demands](#) on page 7-24
- [Changing and Viewing Kanban Details](#) on page 7-25
- [Viewing and Changing Summary Pull Sequences](#) on page 7-28
- [Updating Production](#) on page 7-33
- [Purging Kanban Cards and Pull Sequences](#) on page 7-33

Overview of the Graphical Kanban Workbench

The Graphical Kanban Workbench combines kanban setup, kanban planning, pull sequence definition, and planning simulation in one interface. The graphical interface includes the following features:

- Graphical view the pull sequence network
- Graphical view the demand pattern for monitoring requirements
- You can define pull sequence, and have the capability to mass add pull sequences for items
- You can add items under locator control and specify point of use, point of supply, or both as locator sources
- You can perform simulation replans and updates to production
- You can view comparison of kanbans by variances in size, or the number of cards between the two kanban plans being analyzed

See: [Overview of Kanban Replenishment](#), *Oracle Inventory User's Guide*.

Navigating on the Graphical Kanban Workbench

The Graphical Kanban Workbench is comprised of two panes. The left pane is the tree hierarchy. There are two tree tabs located to the left of the tree hierarchy that allow you to toggle between the Production and Planning views. The View By list box enables you to change the way you view data in the tree.

The right pane displays the Production or Planning regions in a graphical view of the kanban network. The right pane contains the data that is associated with the selected item on the tree. Or it displays the template windows used for creating templates for your kanban network.

Color Representation

The arrow on the replenishment chain canvas represents the pull sequence between point of use and a point of supply. One or more cards are generated for a pull sequence. A color on the arrow is used to easily identify the card status on the pull sequence. The following values are used in the graphical replenishment network in the right pane:

- *Black*: Cards have not been generated for the pull sequence
- *Green*: There are cards in the pull sequence that are in the active status

- *Blue*: Some cards in this pull sequence are on hold, and none are active
- *Red*: All of the cards are canceled

Workbench Toolbar

The right pane canvas displays a toolbar when you are in the Production region. It contains icons used for creating and modifying your graphical network.



This toolbar contains icons for:

- *Connector*: Enables you to create links between entities on the canvas
- *Pointer*: Enables you to move existing entities on the canvas
- *Organization*: A point of supply that is in another organization
- *Supplier*: A point of supply that is a supplier
- *Subinventory*: A point of user or point of supply that is a subinventory
- *Production*: A point of supply that is a flow line, repetitive line, or discrete production area

Tools Menu and Pop-up Menus

The Graphical Kanban Workbench enables you to access other manufacturing functionality. These options are available, depending upon the currently active window and other conditions, in the Tools menu and pop-up menus.

Tools Menu

Forecast/Schedule: Accesses the Item Forecast Entries window where you can review information for items in a forecast set. See: [Defining a Forecast](#), *Oracle Master Scheduling/MRP and Oracle Supply Chain Planning User's Guide*.

Kanban Cards: Accesses the Kanban Cards Summary window to view, define, and update kanban cards, see: [Defining Kanban Cards](#), *Oracle Inventory User's Guide*.

Print Kanban Cards: Accesses the request window for printing kanban cards for a specific item or for all items. see: [Printing Kanban Cards](#), *Oracle Inventory User's Guide*.

Generate Kanban Cards: Accesses the Generate Kanban Cards window, see: [Generating Kanban Cards](#), *Oracle Inventory User's Guide*.

Pull Sequence: Accesses the Pull Sequences Summary window to view, update, and define the source of replenishment for a kanban item, see: [Defining Kanban Pull Sequences](#), *Oracle Inventory User's Guide*.

Pop-up Menus

You can access windows and functions in the pop-up menus by right-clicking on an icon in the right pane, or a detail in the tree hierarchy.

These options are available, depending upon the currently active window and where your cursor is located when you right-click in the right pane:

- *Location*: Accesses the Location window for the replenishment source for a kanban location
- *Delete Location*: Enables you to remove unconnected locations
- *Pull Sequence*: Accesses the Pull Sequence window to view, add, or modify pull sequence information
- *Delete Pull Sequence*: Enables you to remove the pull sequence; a pull sequence can only be deleted if the color is black, signifying that there are no cards associated with it
- *Kanban Cards*: Accesses the Kanban Cards Summary window to view, define, and update kanban cards
- *Place Kanban Cards On Hold*: Enables you to change the kanban cards to inactive by changing the status to hold
- *Activate Kanban Cards*: Enables you to change the status of kanban cards from hold back to active
- *Cancel Kanban Cards*: Cancels all the cards associated with a pull sequence; items can be received using the card but not replenished
- *Delete Kanban Cards*: Deletes all the kanban cards associated with a pull sequence, this option is only available if all cards have been canceled indicated by the color red of the link
- *Generate Kanban Cards*: Accesses the Generate Kanban Cards window

The pop-up menu options in the tree hierarchy pane are the same as those available in the Tools menu and Workbench menu. The one unique option is the selection of New.

New: Enables you to add a new items' replenishment chain, see: [Adding an Item to the Tree](#), on page 7-9

Accessing the Production Region

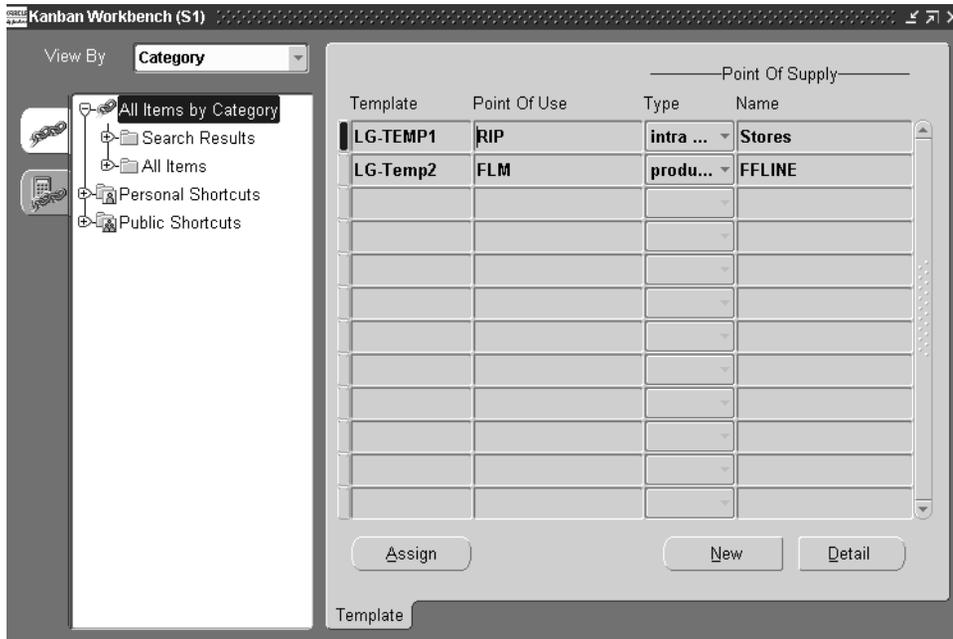
The Production region tree displays all the items that already have pull sequences defined, and the right pane consists of the detail kanban chain diagram.

This graphical detail view shows the replenishment chain. The replenishment chain for an item shows all pull sequences that belong to that item.

► To view kanban production information on the Graphical Kanban Workbench:

1. Select Graphical Kanban Workbench on the Flow menu.
2. In the View By list box, select viewing criteria for the kanban data.

Your choices are: Category, Buyer Code, Planner Code, Supplier, Location, Line Operation, and Process. In the View by Line Operation or Process mode, the hierarchical tree displays all flow lines and you can expand the tree to see line operations and processes on the selected line. In the line operation and process views, the Unreplenished node provides a listing of bill of material components without defined pull sequences.

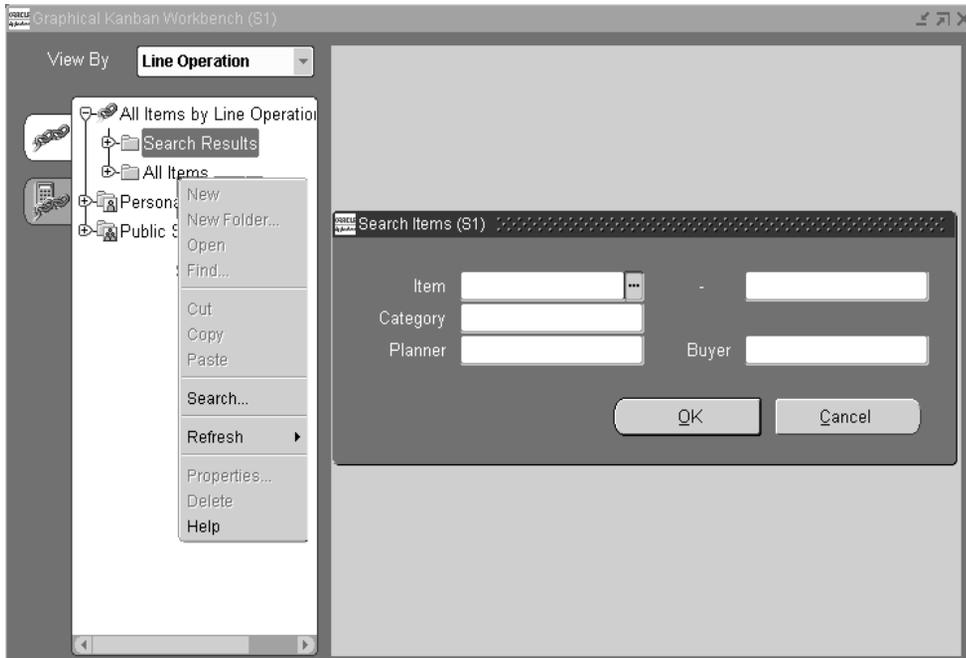


3. Select the Production tree tab.

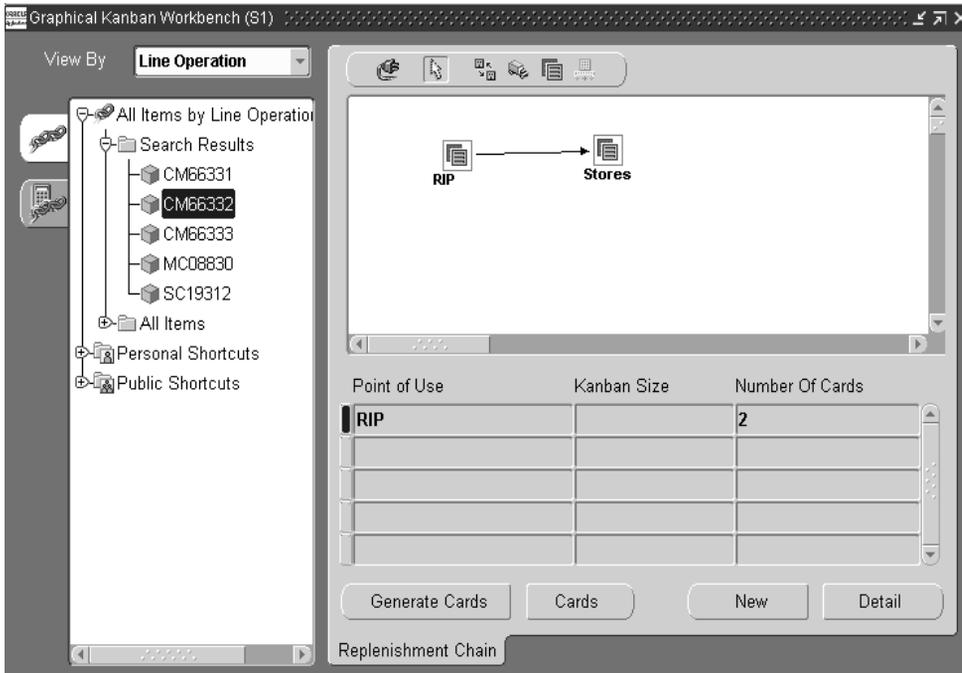
In the initial view, the workbench displays the Template window used for creating new kanban networks. See: [Using a Template to Create a Pull Sequence](#) on page 7-13

In the All Items by node, you can search for records using the Search Results node, or view all the records in the All Items node.

4. If you want to find a specific record, or range of records, select the Search Results node and right-click with your mouse to display the pull-down menu. Select the Search menu option.



5. Enter search criteria; you can search by item, category, planner, buyer, or any combination of these values.
6. Choose OK to display the results of your query under the Search Results node.



7. Select a node detail on the tree.

The tree displays all the items that have the pull sequence defined for the specified plan. The graphical view the pull sequence network displays in the right pane.

You can add, change, delete, or move the icons in the graphical network. See: [Modifying and Creating Pull Sequences on the Graphical Network](#) on page 7-10

8. There are four buttons on this window that enable you to navigate to other kanban windows.
 - *Generate Cards*: Accesses the Generate Kanban Cards window, see: [Generating Kanban Cards](#), *Oracle Inventory User's Guide*.
 - *Cards*: Accesses the Kanban Cards Summary window to view, define, and update kanban cards, see: [Defining Kanban Cards](#), *Oracle Inventory User's Guide*.
 - *New*: Accesses the Pull Sequence window to fill in fields to create a new pull sequence, see: [Pull Sequence Window](#) on page 7-12

- *Detail:* Accesses the Pull Sequence window to view, update, and define this pull sequence, see: [Pull Sequence Window](#) on page 7-12.

Adding an Item to the Tree

The tree hierarchy displays all the items that have a replenishment chain. You can add new items using the Item window.

■ To add an item to the replenishment chain:

1. On the tree hierarchy, select the top level node where you want to add another item.
2. Right click with you mouse on your selection to display the pop-up menu.
3. Select New.

The Item window displays.



The screenshot shows a dialog box titled "Item" with a close button (X) in the top right corner. The dialog contains two text input fields. The first field is labeled "Item" and contains the text "CM96717". The second field is labeled "Description" and contains the text "Screws.Steel.32.Phillips". At the bottom right of the dialog, there are two buttons: "OK" and "Cancel".

4. Enter an item, or select from the list of values.
5. Choose OK

The item appears at the bottom of the list for the top level item, the right canvas is blank.

Modifying and Creating Pull Sequences on the Graphical Network

Pull Sequences are used to view, update, and define the source of replenishment for a kanban planned item in a kanban location. You can use the Graphical Kanban Workbench to create, move, and delete pull sequences.

► To create pull sequences for items defined on the tree:

1. Select a node detail on the tree.

The tree hierarchy only displays items that already have pull sequences defined. The replenishment chain displays in the right pane.

2. Select a kanban source type icon from the toolbar, and select a location to place the pull sequence on the right pane canvas See: [Workbench Toolbar](#) on page 7-3

The Location window displays with different fields, depending on your replenishment source:

- If you select Organization, select the source organization and subinventory. If the organization, subinventory, or item is under locator control, you must also enter a stock locator. See: [Assigning a Completion Subinventory and Locator](#), *Oracle Bills of Material User's Guide*.

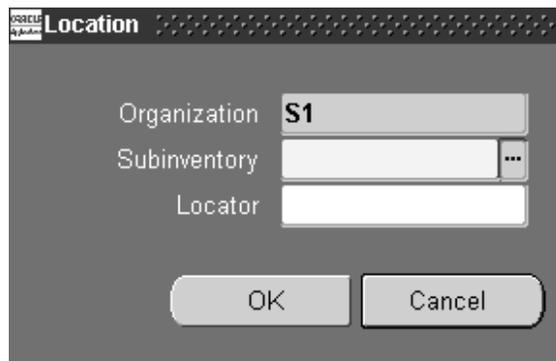
The image shows a screenshot of the 'Location' dialog box in Oracle. The dialog box has a title bar with the text 'Location'. Below the title bar, there are three input fields: 'Organization' with a dropdown arrow, 'Subinventory' with a dropdown arrow, and 'Locator' with a text input field. At the bottom of the dialog box, there are two buttons: 'OK' and 'Cancel'.

- If you select Supplier, you can optionally select the supplier and supplier site. If you do not select a supplier, Oracle Purchasing will choose the supplier based on sourcing rules when it creates a purchase order/blanket release.



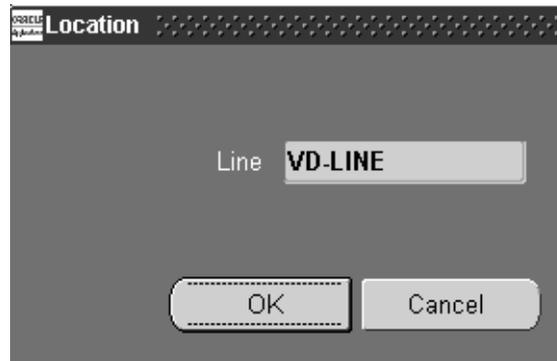
The screenshot shows a dialog box titled "Location" with the Oracle logo in the top left corner. It contains two input fields: "Supplier" with a dropdown arrow and "Supplier Site". At the bottom, there are "OK" and "Cancel" buttons.

- If you select Subinventory, select the source subinventory, and stock locator if applicable.



The screenshot shows a dialog box titled "Location" with the Oracle logo in the top left corner. It contains three input fields: "Organization" with the value "S1", "Subinventory" with a dropdown arrow, and "Locator". At the bottom, there are "OK" and "Cancel" buttons.

- If you select Production, optionally enter the line code.



3. Select the Connector icon to join the objects together to form a replenishment chain. Select the location and drag from the point of supply to the point of use.

Connect the objects together—starting with the sub-inventory/locator closest to your production. When you create the link, the Pull Sequence window appears. Enter details about the Point of Use and in the Point of Supply. See: [Pull Sequence Window](#) on page 7-12.

4. Save your work.

Pull Sequence Window

Use the Pull Sequence window to view, update, and define the source of replenishment for a kanban item in a kanban location. A pull sequence groups information for an item defining a kanban location, source information, and planning parameters. An item can have multiple pull sequences that make up a replenishment chain. The kanban calculation program determines the optimal number of kanban cards or size according to the values you enter in the Pull Sequence window for size, cards, demand, lead time to replenish.

► To view and modify pull sequence detail information:

1. Navigate to the Pull Sequence window.
2. Select a value in the Point of Use Subinventory field and a Locator, if applicable.
This is the location where material is used.

Pull Sequence

Item Name **CM23591** **Molded Plastic Shell - Top**

Point Of Use Subinventory **RIP** Locator

Point of Supply

Type **Intra Org**

Supplier Site

Organization **S1 Chicago Subassembly Plant**

Subinventory **Stores** Locator

Line Code

Kanban

Planning Only []

Calculate **Kanban Size** Size **20**

Number Of Cards **3** Minimum Order Qty

Planning

Lead Time

Lot Multiplier Safety Stock Days

Generate Cards OK Cancel

3. In the Point of Supply region, indicate the type of pull sequence and the source. Depending on the source type indicated in the Type field, you must supply information in the following fields for, Supplier, Site, Organization, Subinventory, and Line Code. See: [Changing and Viewing Kanban Details](#) on page 7-25
4. Choose Generate Cards if you want to create kanban cards for this pull sequence.
See: [Generating Kanban Cards](#), *Oracle Inventory User's Guide*.
5. Save your work.

Using a Template to Create a Pull Sequence

Templates enable you to mass add pull sequences for many items. There are several options available when creating pull sequences from templates— you can use an existing template and assign other items, create an entirely new template and assign items, or you can change the details of an existing template. After creation, the

6. To add multiple items, choose Retrieve.

Add Items Criteria window displays. This window restricts your search for items according to your specifications.

7. Select your search criteria.

You can search by any combination of values including product family, parent assembly, component, backflush subinventory, or category

In the Item Attributes region, you also have the option to use item attributes in your search criteria including buyer code, planner code, make or buy status, or release time fence.

The screenshot shows the 'Add Items Criteria' window with the following fields and values:

- Product Family: []
- Parent Assembly: []
- Component: []
- Backflush Subinventory: **FloorStock**
- Category: []
- Item Attributes:
 - Buyer Code: []
 - Planner Code: []
 - Make/Buy: []
 - Release Time Fence: []
- Locator:
 - Point Of Use: **Bill Of Material**
 - Point Of Supply: []

Buttons: Clear, Cancel, Find

8. Select values in the Locator region if you want to use locator records in the selection criteria.

Point of Use is where the item is used on the flow line. Your choices are:

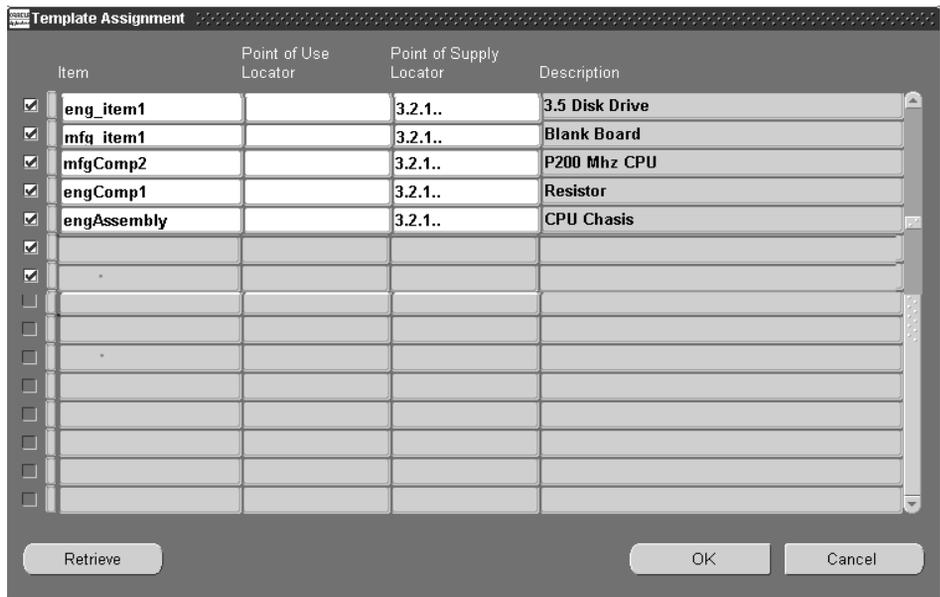
- Bill Of Material
- Pull Sequence

- Default—the search uses both bill of material and pull sequence records after using the other selection criteria entered on the window

Point of Supply is the stock location. You can search for locator records by the row, rack, bin, project, or task.

9. Choose Find.

The items that met your criteria appear in the Template Assignment window. You can deselect items by unchecking the check box. Optionally, you can add a Point of Use Locator or Point of Supply Locator



10. Choose OK to save this retrieval.

The Template window displays again.

► **To create a new template and assign items:**

1. Navigate to the Graphical Kanban Workbench.
2. Select All Items in the Tree Hierarchy.

The right pane displays the Template window. This window displays any existing template information in a multiple row format.

3. Choose New

The Pull Sequence template window displays.

4. Enter a unique value in the Template name field.
5. Add information to the fields on this window, see: [Pull Sequence Window](#) on page 7-12
6. Save your work.
The Template window displays again.
7. Assign items to this template, see: [Pull Sequence Window](#) on page 7-12.

► **To change the details of an existing template:**

1. Navigate to the Graphical Kanban Workbench.
2. Select All Items in the Tree Hierarchy.
3. Select the template in the multi row table, and choose Detail.

The Pull Sequence template window displays with the name of this template in the Template name field.

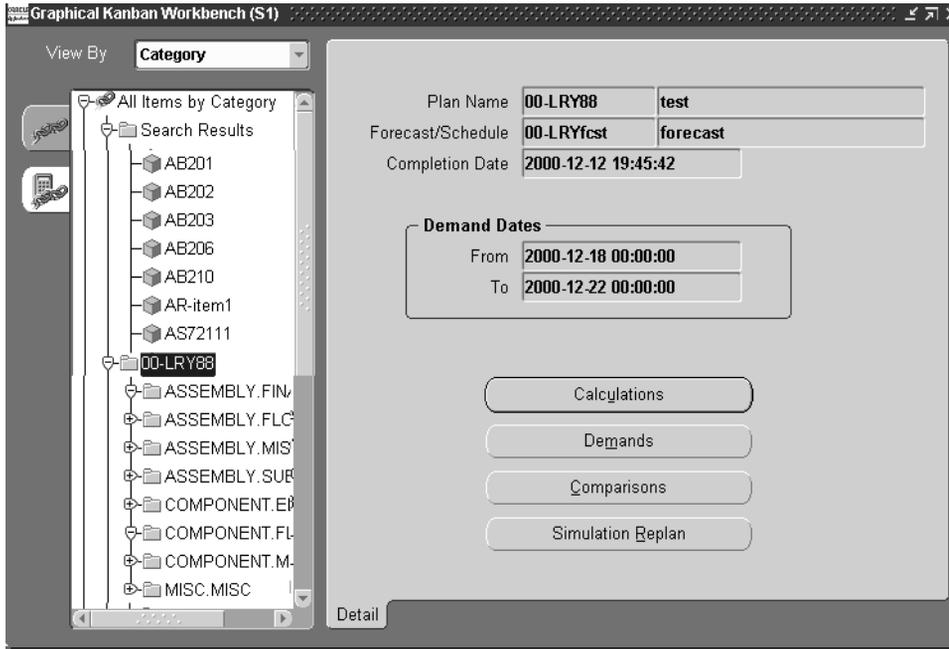
You can change any of the fields on this window, see: [Pull Sequence Window](#) on page 7-12.

4. Save your work.
The Template window displays again.

Accessing the Planning Region

The Planning region is used for kanban planning. The tree hierarchy displays the kanban plan and all the items that already have pull sequences defined and demand from this plan. The right pane displays detailed information for the specified plan. In this region you can view kanban demands, compare kanbans, and perform simulation replans.

4. Select a plan node on the tree.



The Plan Detail displays in the right pane, pertaining to the detail information of the specified plan.

For a description of the fields on this window, see: [Using the Kanban Calculation Program](#), *Oracle Master Scheduling/MRP and Oracle Supply Chain Planning User's Guide*.

5. There are four buttons on this window that enable you to navigate to other kanban windows:
 - *Calculations*: Accesses the Kanban Details window to view the pull sequences that resulted from the calculations performed in the plan. See: [Changing and Viewing Kanban Details](#) on page 7-13.
 - *Demands*: Accesses the View Kanban Demand window. See: [Viewing Kanban Demands](#) on page 7-13.
 - *Comparisons*: Accesses the Compare Kanban Plans window, see: [Viewing and Updating Kanban Calculations](#), *Oracle Master Scheduling/MRP and Oracle Supply Chain Planning User's Guide*.

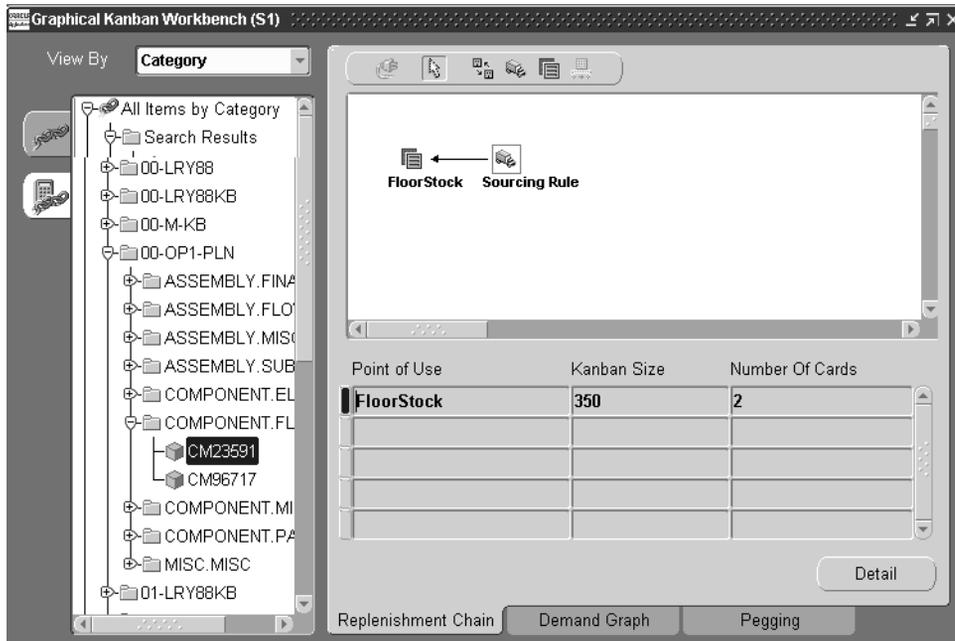
- *Simulation Replan*: Submits a request to the kanban calculation program to generate a new simulation plan based on the new values entered.

■ **To view plan replenishment information on the Graphical Kanban Workbench:**

1. Select the Planning tree tab.
2. In the View By list box, select viewing criteria for the kanban data.
Your choices are: Category, Buyer Code, Planner Code, Supplier, and Location.
3. Select a node detail on the tree.

The tree displays all the items that have the planning pull sequence for the specified plan.

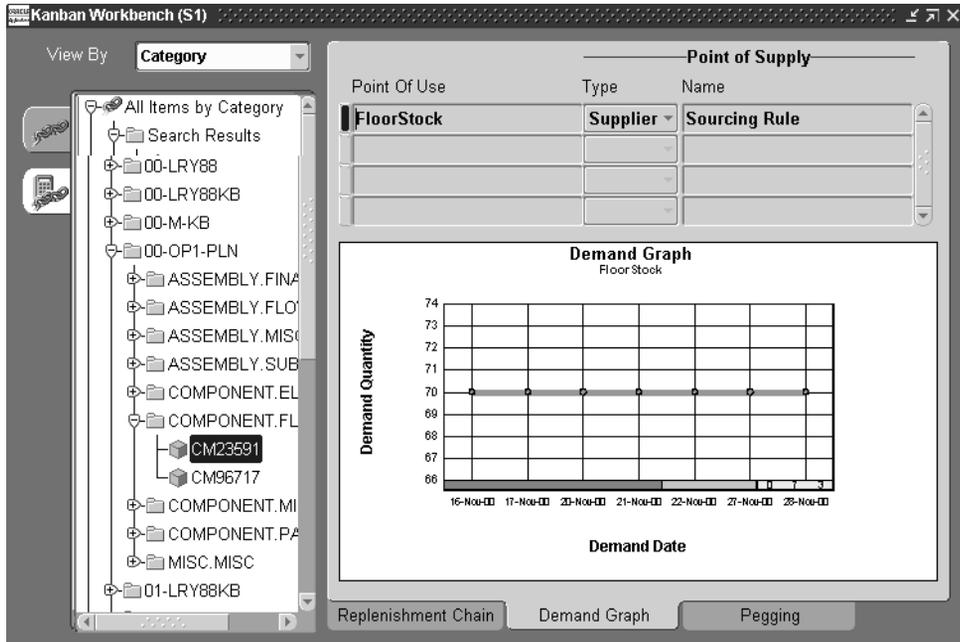
The Replenishment Chain tab displays. This is a graphical view the replenishment chain for the specified plan selected on the tree. The table displays the calculated size and the number of cards to each pull sequence. See: [Calculation Formula](#), *Oracle Master Scheduling/MRP and Oracle Supply Chain Planning User's Guide*.



4. You can modify pull sequence information in this pane by Choosing Detail.
See: [Pull Sequence Window](#) on page 7-12.

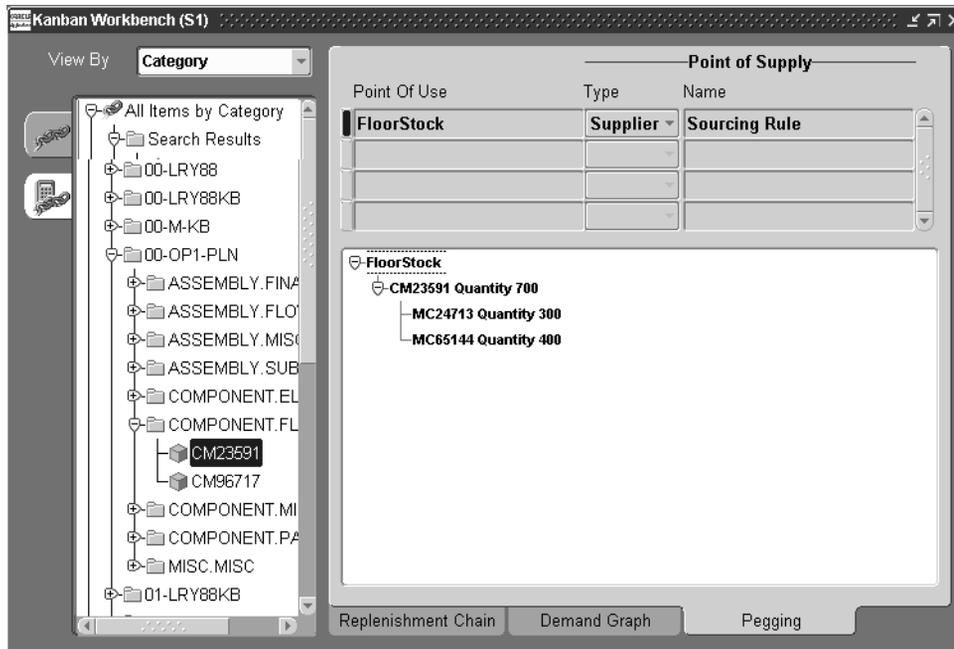
5. Select the Demand Graph tab.

The graphical view of the demand pattern of a simulation kanban item displays. This can be used to monitor increases in demand.



6. Select the Pegging tab.

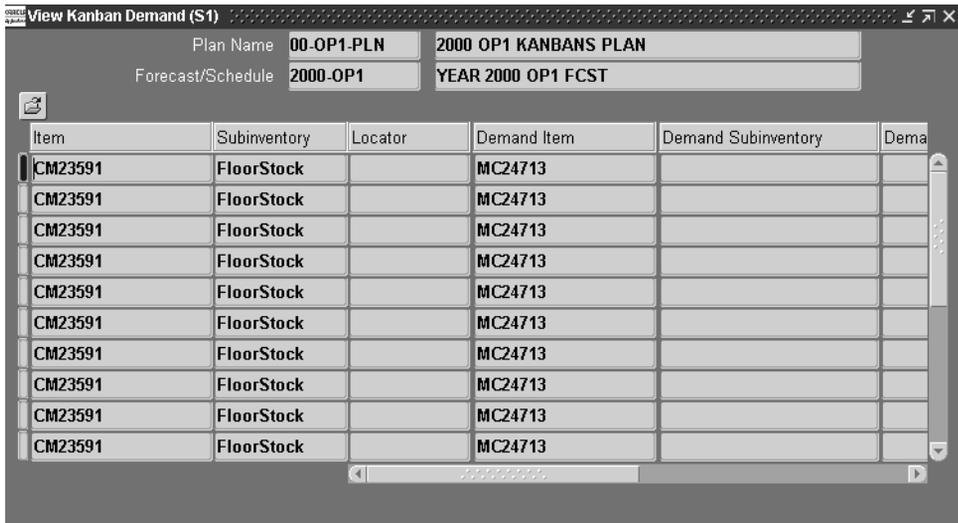
You can use the graphical pegging feature to analyze the impact of changing a supply or demand order at any level of your bill of material. Pegging traces supply information for an item to its corresponding end demand details.



Viewing Kanban Demands

The View Kanban Demand window displays the demand distribution for the specified plan. This window is accessed from the Plan Detail window, displaying the detail information pertaining to the chosen plan. You can also view this

information in a graphical format in the Demand Graph tab of the Graphical Kanban Workbench.



The screenshot shows a window titled "View Kanban Demand (S1)". At the top, there are two rows of input fields: "Plan Name" with values "00-OP1-PLN" and "2000 OP1 KANBANS PLAN", and "Forecast/Schedule" with values "2000-OP1" and "YEAR 2000 OP1 FCST". Below this is a table with the following columns: "Item", "Subinventory", "Locator", "Demand Item", "Demand Subinventory", and "Dema". The table contains 10 rows of data, all with "CM23591" in the "Item" column, "FloorStock" in the "Subinventory" column, and "MC24713" in the "Demand Item" column. The "Dema" column is partially visible and appears to be empty.

Item	Subinventory	Locator	Demand Item	Demand Subinventory	Dema
CM23591	FloorStock		MC24713		
CM23591	FloorStock		MC24713		
CM23591	FloorStock		MC24713		
CM23591	FloorStock		MC24713		
CM23591	FloorStock		MC24713		
CM23591	FloorStock		MC24713		
CM23591	FloorStock		MC24713		
CM23591	FloorStock		MC24713		
CM23591	FloorStock		MC24713		
CM23591	FloorStock		MC24713		

Changing and Viewing Kanban Details

The Kanban Detail window enables you to view and update source, quantity and size, and planning information. You can also change or view pull sequence information in a graphical format on the Kanban Graphical Workbench.

■ To edit or view kanban detail information

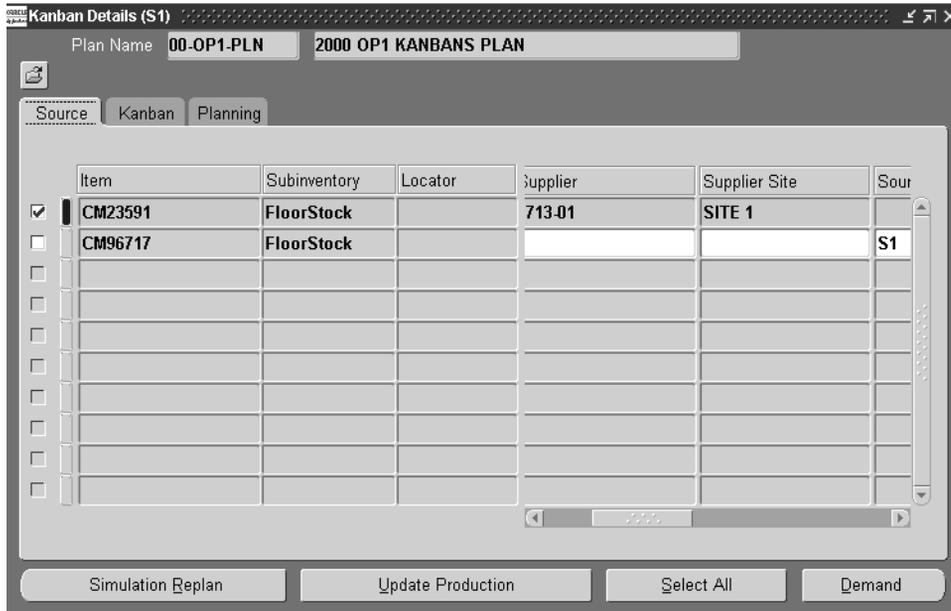
1. Navigate to the Kanban Detail window.

The Kanban Detail window displays, initially in the Source tab view.

2. Select a pull sequence.

You can change subinventory, location, description, and source type.

If the subinventory or item is under locator control, you must also enter a stock locator.



The replenishment source type for a kanban location can be:

- Inter-Org is replenished by another another kanban location.
- Intra-Org is replenished by a kanban location in the same organization, select the source organization and the subinventory for this source type.
- Production is replenished by a production line, you can optionally enter the line code.
- Supplier is replenished by an external source, you can optionally select the supplier and supplier site. If you do not select a supplier, Oracle Purchasing will choose the supplier based on sourcing rules.

See: [Overview of Kanban Replenishment](#), *Oracle Inventory User's Guide*.

- 3. In the Kanban tabbed region, the calculation method displays. You can change this value.

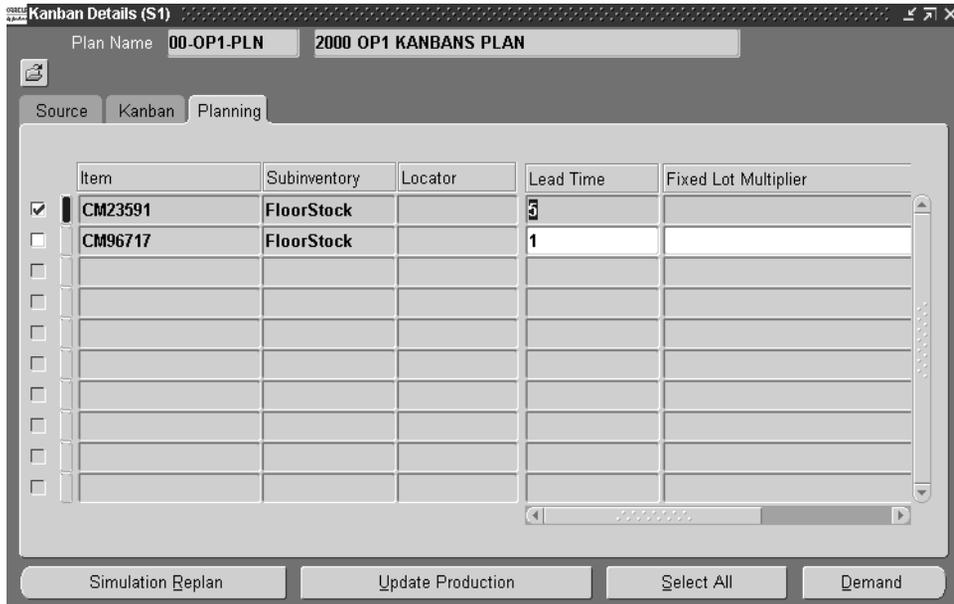
If you select Do Not Calculate, enter a value in the Size and Number of Cards fields.

If you select Kanban Size, enter a value in the Number of Cards field and optionally enter a value in the Minimum Order Qty field.

If you select Number of Cards, enter a value in the Size field, and optionally enter a value in the Minimum Order Qty field.



4. In the Planning tabbed region, the Lead Time for this location displays. Optionally enter information in the Allocation Percent, Fixed Lot Multiplier, and Number Of Safety Stock Days fields.



5. Save your work.
6. There are four buttons on this window that enable you to do the following:
 - *Simulation Replan* submits a request for kanban replanning.
 - *Demand* displays the View Kanban Demand window, see: [Viewing Kanban Demands](#) on page 7-13.
 - *Update Production* updates your production information with this kanban.
 - *Select All* selects all the details on this window.

Viewing and Changing Summary Pull Sequences

You have the ability to view a summary of all pull sequences of the item numbers assigned to planners, suppliers, subinventory locations, line operation, process, or buyers. The Pull Sequence Summary window groups pull sequences and displays the Point of Use, Point of Supply, and Average Lead Time. This enables you to

navigate to windows to view the number of pull sequences for the selected criteria, make changes or delete multiple pull sequences simultaneously.

The summary pull sequence view is available both in the Production and the Planning areas. In the Planning Area you can add and delete mass pull sequences. However, in the Production area, changes are not allowed to pull sequences that have released or canceled cards.

► To view, delete, or modify summary pull sequence information:

1. Navigate to the Graphical Kanban Workbench, and select viewing criteria in the View by list box.
2. In the View By list box, select viewing criteria for the kanban data.

The pulls sequence summary view is available for are: Buyer Code, Planner Code, Supplier, Location, line operation, process.

Point of Use	Point of Supply	Average Lead Time
FGI	Im-line1	1
FGI	ABC Supplier	1
FGI	ABC Supplier REDWOO	5
FGI	Little Hea	4

Buttons: Regenerate, Detail

Label: Pull Sequence Summary

3. Select a node on the hierarchical tree to display the pull sequences on the graphical pane.

- Select a pull sequence on the graphical pane, right-click with your mouse to display the pop-up menu.
The number next to the pull sequence indicates how many records are in the summary view. The menu choices enable you to view, delete, or modify pull sequences.
- Select View Pull Sequences to display all pull sequences the view you selected.
The Pull Sequences window displays.

Item	Point of Use Locator	Point of Supply Locator	Number Of Cards	Kanban Size
-comp1			3	3
-comp4			3	3
-comp5			3	3

The Point of Use and Point of Supply Subinventory display. The multi-row region of the window displays all items used in the pull sequence, their associated point of use and point of supply subinventory locators, the number of kanban cards for each item, and the kanban card size.

- Choose OK to close this window and return to the Graphical Kanban Workbench.

7. Select Delete Pull Sequences to display the Pull Sequences window.

The multi-row region of the window displays all items used in the pull sequence, their associated point of use and point of supply subinventory locators, the number of kanban cards for each item, and the kanban card size.

Pull Sequences (S1)

Point Of Use Point Of Supply

Item	Point of Use Locator	Point of Supply Locator	Number Of Cards	Kanban Size
<input type="checkbox"/> .comp1			3	3
<input checked="" type="checkbox"/> .comp4			3	3
<input checked="" type="checkbox"/> .comp5			3	3
<input type="checkbox"/>				

8. Mark the check box next to the items you want to delete.
9. Choose Delete.
10. Select Modify Pull Sequences.

The Change Pull Sequences window displays. This window has six tabbed regions including Kanban Size, Number of Cards, Minimum Order, Lead Time, Lot Multiplier, and Safety Stock. The multi-row region of the window displays all items used in the pull sequence, the corresponding subinventory, and the calculation method.

Item	Subinventory	Locator	Calculate	Current	New
<input checked="" type="checkbox"/> -comp1	FGI		Kanb...	3	5
<input checked="" type="checkbox"/> -comp4	FGI		Kanb...	3	3
<input checked="" type="checkbox"/> -comp5	FGI		Kanb...	3	3
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>					
<input type="checkbox"/>					

Changes

Percent (+/-)
 Value (+/-)
 Constant

11. For each item you are changing, ensure that the check box next to it is marked.

12. Select the tabbed region needed for the specific changes.

Each tabbed region contains a Current and New field for the corresponding changed values. For example, if you are viewing the Kanban Size tab, the number in the Current field is the kanban size. Similarly, if you are in the Number of Cards tab, the value in the Current field is the number of kanban cards for this item in the pull sequence.

13. Enter the new value for the modification you are creating.

14. Optionally, in the Changes region, you can enter a global change for all records on the window by adding a value or percentage to the current value. Mark the Percentage, Value, or Constant radio button.

15. Enter the value you want to add or subtract to the current value.

The value you enter adds or subtracts to the current value. If you mark Percentage, a percent is added. If you mark Value, that number is added. And if you mark Constant, the value is changed to the new number.

For example, the value in the Current field for Safety Stock is 3 for the first item, and 2 for the second item. If you mark the Value radio button, and enter 3—when you apply your modification, the first item changes to 6 and the second item changes to 5.

16. Choose Apply to create your global change on this window.
17. Choose OK to save this record.

Updating Production

Once you have made adjustments to your replenishment chain in the planning region, you need to update production in order to reflect the changes in your production plans and kanban cards.

► To update production with replenishment information:

1. Navigate to the Compare Kanban Plans or Kanban Details window.
2. Select the pull sequences you want to update.
3. Choose Update Production

You can also print new kanban cards after you update production. See: [Printing Kanban Cards](#), *Oracle Inventory User's Guide*.

Purging Kanban Cards and Pull Sequences

Kanban cards are created based on the information of the corresponding pull sequence. Over time, unused cards and pull sequences can accumulate in your database and may affect the performance of the kanban system. You can purge unused pull sequences and kanban cards by submitting a concurrent program. The concurrent function purges according to the parameters specified, and creates a report.

► To purge kanban cards and pull sequences:

1. Navigate to the Purge Pull Sequences window.
The Parameters window displays.
2. In the Type field, select whether you want a summary or detailed report generated.

Both formats of the report list the number of cards, the number of pull sequences deleted, and exception messages. The detailed version also lists locator, item, and the number of cards deleted per category.

3. In the Item From and To fields, you can select a range of pull sequence item numbers.
4. In the Subinventory From and To fields, you can select a range of point of use subinventories for the pull sequences you want to purge.

The screenshot shows a 'Parameters' dialog box with the following fields and values:

- Type: Summary
- Item From: (empty)
- To: (empty)
- Subinventory From: (empty)
- To: (empty)
- Source Type: Supplier
- Line: (empty)
- Supplier: (empty)
- Organization: (empty)
- Subinventory: (empty)
- Delete Cards: Cancelled Cards Only

Buttons at the bottom: OK, Cancel, Clear, Help.

5. In the Source Type field, select the source type of the pull sequence. You choices are inter-organization, supplier, intra-organization, and production.
6. Optionally, you can add more search criteria for the source type selected. This information includes:
 - Flow line for production pull sequences
 - Supplier for supplier pull sequences
 - Organization for inter-organization pull sequences
 - Subinventory for both inter-org and intra-org pull sequences
7. Select a kanban card delete option in the Delete Cards field.

Your choices are Canceled cards only to delete all cancelled kanban cards. Or Canceled and Active-New cards to delete any card with a status of active and a supply status of new.

8. Choose OK to display the Purge Pull Sequence request window.
9. Choose Submit to create this request.

All the pull sequences and kanban cards that satisfy the criteria are deleted and the total number of records purged is displayed on the report

Pull sequences are deleted if:

- The point of use subinventory and locator defined on the pull sequence does not exist on any bill of material or WIP Supply location in the organization item attributes (unreferenced pull sequences). Pull sequences that are unreferenced are printed as exceptions on the report.
- The point of use subinventory and locator defined on the pull sequence does not exist as the point of supply on any other pull sequence.
- Kanban cards do not exist for the pull sequence.

Reports and Processes

This chapter tells you what you need to know about Oracle Flow Manufacturing Reports and Processes, including:

- [Schedule Report](#) on page 8-2
- [Linearity Report](#) on page 8-4

Schedule Report

The Schedule Report displays the scheduled production of all assemblies for a line within a given date range. The purpose of the schedule report is to provide personnel on the shop floor ready access to the production plan and sequence of assemblies.

The report includes line name, scheduled completion date, build sequence, assembly name, UOM, quantity, schedule group, schedule number, order number, order line, and order requested date.

Setting the Display BOM to Yes explodes the Bills of Material and shows the following for all components of each assembly: operation sequence, component number, component UOM, quantity per revision, ECO number, and whether the component is optional. The Display Optional Items Only parameter is linked with the Display BOM parameter. Setting the Display Optional Items Only to Yes results in the report displaying only optional components for the BOM.

Report Submission

Navigate to the Scheduling Reports window. Select Flow Schedule Report.

Report Parameters

From Line

Select the single line or the first line in the range you wish to review. The list of values displays all active lines in the organization. This is an optional parameter.

To Line

Select the final line in the range to be displayed, if you are requesting data for a range of lines. The list of values displays all active lines in the organization. Tab through this field to request date for a single line. This is an optional parameter.

From Date

Choose the start date from which you wish to view line data, if you want a date other than the default value of the system date. The date must be greater than the system date. This is a required parameter.

To Date

Choose the end date through which you wish to view line data, if you want a date other than the default value of the system date. This is a required parameter.

Schedule Group

Select a specific schedule group to limit the data shown. The default is to show data for all schedule groups within the line(s) selected. This is an optional parameter.

Display BOM

Enter Yes to include the Bill of Material for the first level of all components for each assembly in the report. Phantom items are displayed and the Bill of Material will explode until it reaches a non-phantom item. The default is No.

Display Optional Items Only

This field is active only when Display BOM is set to Yes. Enter Yes to display only optional items in the BOM.

Linearity Report

The Linearity Report provides a performance monitoring tool that compares planned and actual production on a daily basis for the selected date range. The report displays the planned production rate, the actual production rate, the variance, and the linearity index for selected lines and, optionally, schedule groups and assemblies over a given time range.

Variance can be either positive or negative. The linearity index tracks the absolute value of variance as deviation. The formula for linearity index is:

linearity index = {1 - [total deviations/total planned rate]} * 100

The higher the linearity index, the more closely matched the actual production rate is to the planned rate.

The Linearity Report can be run with two different sort options and two levels of detail. The report options include: Linearity Report by Week (Summary), Linearity Report by Week (Detail), Linearity Report by Line (Summary), and Linearity Report by Line (Detail). Detail reports include information by assembly in addition to the information provided on Summary reports. The sort order for Week-based reports is: week of > line > schedule group. The sort order for Line-based reports is: line > schedule group > week of.

Summary reports include the following information: date from to date to, week of, line, schedule group, planned production, actual production, variance, linearity index, day #, summary for line, summary for week, and weekly total.

Detail reports include the following information: date from to date to, week of, line, schedule group, assembly, planned production, actual production, variance, linearity index, day #, summary for schedule group, summary for line, summary for week, summary for schedule group, and weekly total.

Report Submission

Navigate to the Productivity Reports window. Select Flow Linearity Report.

Report Parameters

Report Option

Select Summary or Detail. If Detail is selected, the report will include information for individual assemblies. The default value is Summary.

Sort Option

Select whether the data should be sorted by Week or by Line. The default value is Week. The sort order for Week-based reports: week of > line > schedule group. The sort order for Line-based reports: line > schedule group > week of.

From Line

Select the single line or the first line in the range you wish to review. The list of values displays all active lines in the organization. This is an optional parameter.

To Line

Select the final line in the range to be displayed, if you are requesting data for a range of lines. The list of values displays all active lines in the organization. This is an optional parameter.

From Date

Choose the start date from which you wish to view line data, if you want a date other than the default value of the system date. This is a required parameter.

To Date

Choose the end date through which you wish to view line data, if you want a date other than the default value of the system date. This is a required parameter.

Schedule Group

Select a specific schedule group to limit the data shown. The default is to show data for all schedule groups within the line(s) selected. This is an optional parameter.

Windows and Navigation Paths

This appendix shows the default navigator path for each Oracle Flow Manufacturing window.

Windows and Navigator Paths

For windows described in other manuals:

See...	Refer to this manual for a complete form description
BOM	<i>Oracle Bill of Materials User's Guide</i>
INV	<i>Oracle Inventory User's Guide</i>
MRP	<i>Oracle Master Scheduling/MRP User's Guide</i>
WIP	<i>Oracle Work in Process User's Guide</i>
SYS	<i>Oracle System Administrator's Guide</i>
User	<i>Oracle Applications User's Guide</i>

Window Name	Navigation Path
Add Item Routing	FLM > Product Sync > Graphical Line Designer > Pop-Up Menu > New
Alternates	FLM > Setup > Bills > Alternates
Attribute Controls	FLM > Setup > Items > Attribute Controls
Bill of Materials Parameters	FLM > Setup > Bills > Bill of Materials Parameters
Bills	FLM > Bills > Bills FLM > Reports > Bills
BOM Comparisons	FLM > Bills > BOM Comparisons
Category Sets	FLM > Setup > Items > Categories > Category Sets
Catalog Groups	FLM > Setup > Items > Catalog Groups
Category Accounts	FLM > Setup > Items > Categories > Category Accounts
Category Codes	FLM > Setup > Items > Categories > Category Codes
ChangeOrganization	FLM > Other > ChangeOrganization
Compare Kanban Plans	FLM > Kanbans > Graphical Kanban Workbench > Planning Region > Comparisons
Comparison	FLM > Reports > Comparison
Default Category Set	FLM > Setup > Items > Categories > Default Category Set

Window Name	Navigation Path
Delete Groups	FLM > Delete Groups
Delete Groups	FLM > Reports > Delete Groups
Delete Items	FLM > Products & Parts > Delete Items
Department	FLM > Lines > Department
Department Classes	FLM > Setup > Bills > Department Class
Disable Import of Configurator Model	FLM > Other > Configurator > Disable Import of Configurator Model
Documents	FLM > Products & Parts > Documents FLM > Bills > Documents
Event	FLM > Product Sync > Graphical Line Designer > Line Operation or Process tab > Toolbar > Event icon
Feeder Line Synchronization	FLM > Line Scheduling > Feeder Line Synchronization
Flow Routings	FLM > Product Synchronization > Flow Routings
Flow Workstation	FLM > Production > Flow Workstation
Generate Kanban Cards	FLM > Kanbans > Kanban Setup > Generate Kanban Cards
Graphical Kanban Workbench	FLM > Kanbans > Graphical Kanban Workbench
Graphical Line Designer	FLM > Product Sync > Graphical Line Designer
Import	FLM > Bills > Import
Indented Bills	FLM > Bills > Indented Bills
Item	FLM > Kanbans > Graphical Kanban Workbench > Pop-Up Menu > New
Item Types	FLM > Setup > Items > Item Types
Item Where Used	FLM > Bills > Item Where Used
Kanban Cards	FLM > Kanbans > Kanban Setup > Kanban Cards
Kanban Details	FLM > Kanbans > Graphical Kanban Workbench > Planning Region > Calculations
Launch	FLM > Kanbans > Kanban Planning > Launch

Window Name	Navigation Path
Line Operation	FLM > Product Sync > Graphical Line Designer > Line Operation tab > Toolbar > Line Operation icon
Lines	FLM > Lines > Lines
Location	FLM > Kanbans > Graphical Kanban Workbench > Toolbar > Source Type icon
Locations	FLM > Setup > Bills > Locations
Mass Changes	FLM > Bills > Mass Changes
Master Items	FLM > Products & Parts > Master Items
Mixed Model Map	FLM > Product Synchronization > Mixed Model Map
Names	FLM > Kanbans > Kanban Planning > Names
Network Connection	FLM > Graphical Line Designer > Line Operation or Process tab > Toolbar > Connection icon
Organization Items	FLM > Products & Parts > Organization Items
Populate Configurator Models	FLM > Other > Configurator > Populate Configurator Models
Print Kanban Cards	FLM > Kanbans > Kanban Setup > Print Kanban Cards
Process	FLM > Graphical Line Designer > Process tab > Toolbar > Process icon
Product Family	FLM > Products & Parts > Product Family
Product Family Members	FLM > Products & Parts > Product Family Members
Productivity	FLM > Reports > Productivity
Pull Sequence	FLM > Kanbans > Kanban Setup > Pull Sequence FLM > Graphical Kanban Workbench > Replenishment Chain tab > Detail
Refresh Configurator Models	FLM > Other > Configurator > Refresh Configurator Models
Related Routings	FLM > Graphical Line Designer > Pop-Up Menu > New > Add Item Routing > Related Routings
Requests	FLM > Other > Requests
Resource Groups	FLM > Setup > Bills > Resource Groups
Resources	FLM > Lines > Resources

Window Name	Navigation Path
Routing Details	FLM > Graphical Line Designer > Detail
Routing Revisions	FLM > Graphical Line Designer > Tools > Routing Revisions
Routings	FLM > Reports > Routings
Scheduling	FLM > Reports > Scheduling
Scheduling Rules	FLM > Setup > Scheduling Rules
Scheduling Workbench	FLM > Line Scheduling > Scheduling Workbench
Setup	FLM > Reports > Setup
Standard Events	FLM > Product Synchronization > Standard Events
Standard Line Processes	FLM > Product Synchronization > Standard Line Processes
Standard Processes	FLM > Product Synchronization > Standard Processes
Status Codes	FLM > Setup > Items > Status Codes
Switch to Primary	FLM > Product Sync > Graphical Line Designer > Tools > Switch to Primary
Template Assignment	FLM > Kanbans > Graphical Kanban Workbench > Assign > Add Items Criteria
Templates	FLM > Setup > Items > Templates
View Kanban Demand	FLM > > Kanbans > Graphical Kanban Workbench > Demand Graph tab
WIP Accounting Classes	FLM > Setup > Bills > WIP Accounting Classes
WIP Parameters	FLM > Setup > Bills > WIP Parameters
Work Order-less Completions	FLM > Production > Work Order-less Completions
Workbench	FLM > Kanbans > Kanban Planning > Workbench

Glossary

A

Allocation Percent

See kanban allocation percent.

Areas

Areas represent either a section of the plant floor or an entire plant facility. You can use inventory organizations to define areas.

assemble-to-order (ATO)

An environment where you open a final assembly order to assemble items that customers order. Assemble-to-order is also an item attribute that you can apply to standard, model, and option class items.

assembly scrap

A process which allows you to scrap both scheduled and unscheduled flow assemblies from any flow operation. Operation Pull, Assembly Pull, and Assembly Push components, their associated costs, and all labor and machine resources used at all events prior to the scrap line operation are automatically backflushed.

ATO

See **assemble-to-order**.

C

Calculation Formula

One of the most important tasks of a Kanban planning system is determining the optimal number of Kanban cards. The Kanban planning software takes care of this calculation provided you enter correct values for Kanban size, average daily demand for the Kanban item, and the lead time to replenish one Kanban. We provide a package that you can use to customize the calculation. See the Oracle Manufacturing, Distribution, Sales and Service Open Interfaces Manual. By default, the standard calculation is: $(C - 1) * S = D * (L + SSD)$ where: C is the number of Kanban cards S is the Kanban size D is the average daily demand L is the lead time (in days) to replenish one Kanban. If you think through the Kanban process, you will see why this formula works best when the demand for the Kanban item is steady. In addition to this basic formula, when the calculation program calculates Kanban size, it takes into account the values for the following order modifiers (specified in the pull sequence), in the following order: Supply Days, Minimum Order Quantity, and Lot Multiplier. For example, suppose you have specified the Minimum Order Quantity for a particular item to be 50. You want the formula to calculate the Kanban size (S), so you enter values for S, D, and L. Even though—strictly based on the values you enter for C, D, and L—the formula should yield 40, the actual Kanban size will be 50 because of your order modifier, assuming the Lot Multiplier is a factor of 50.

Note: The program uses order modifiers only when calculating the Kanban size. If you specify the Kanban size and want the program to calculate the number of Kanban cards, the program does not use order modifiers.

Card Status

See kanban card status

CFM

Continuous Flow Manufacturing.

CFM Schedule

Work Order-less Schedule. In this document this would mean both the Scheduled and Unscheduled Flow Schedules.

cumulative yield

Product of the yields at each operation, process, or event on a flow line.

D

Down-time

Time when a resource is scheduled for operation but is not producing for reasons such as maintenance, repair, or setup.

Dual Card Kanban

A demand pull signal that uses a “move” and “produce” communication method. Generally, “move” cards are collected and when the “produce” lot size is reached, the “produce” card is used to create the replenishment. This procedure is generally used when a minimum order quantity is required as a result of long set up times or economic order cost.

E

efficiency

A productivity measure that focuses on actual performance against a standard. Expressed in a percentage figure, it is calculated by dividing actual resource time charged to a task by the standard resource requirements for the same task.

elapsed time

The clock time between start and completion. For example, if the build time of a resource is 10 hours, but you only schedule 5 hours of work a day, the elapsed time is 29 hours.

events

An event is an identifiable point in time among a set of related activities. Graphically, an event can be represented by two approaches: (1) in activity-on-node networks, it is represented by a node; (2) in activity-on-arc networks, the event is represented by the arc. In flow manufacturing, events are the lowest level of activities in a flow routing. Resources are assigned to events. Events can be grouped into processes and operations.

F

Feeder Line

A production line designed to feed sub-assemblies to a line producing higher level assemblies.

Feeder Line Synchronization

A concurrent process that allows you to synchronize sub-assembly flow schedules sequence with the parent assembly line flow schedule sequence.

first unit completion date

The date and time you plan to complete production of the first assembly on a repetitive schedule. This date equals the first unit start date plus the lead time.

first unit start date

The date and time you plan to begin production of the first assembly on a repetitive schedule. This date equates to the start of your lead time.

flexible tolerance fences

Used to represent the flexibility of supplier capacity. Shown as the percent increase or decrease over daily production rate available from a given supplier for a set amount of time.

flow line

##

The physical location where you manufacture a flow assembly, usually associated with a routing(s). You can build many different assemblies on the same line at the same time. Also known as assembly line or flow shop.

flow manufacturing

Manufacturing philosophy utilizing production lines and schedules instead of work orders to drive production. Mixed models are grouped into families and produced on lines balanced to the takt time.

flow routing

A sequence of manufacturing events that you perform to manufacture an assembly. In the flow routing, these events can be grouped in processes and balanced operations. A routing consists of an item, a series of events, processes and/or operations, a operation sequences, operation effective dates, and a flow routing network. You can also perform operation time, yield and total product cycle time calculations in the flow routing.

Flow Routings and Sequence of Events

Flow Routings define the production process of an assembly on the production line. You can use Flow Routings to define the processes and the sequence of events within each process. You can specify the setup, run, and move times for each event by associating the required resources.

flow routing network

A process-map of your processes and operations where you specify the primary path, alternate paths, feeder lines and rework loops within your flow line.

flow schedule

A schedule for your flow line that represents the volume and mix of products to be produced. Scheduling can be done based on customer orders and scheduling rules, with an objective of matching the customer orders as closely as possible while establishing an achievable pace and consistent flow of products through the flow line. Schedules DO NOT produce work orders.

flow workstation

The assigned location on a flow line where a worker performs the job. It could be a machine or a workbench.

K**kanban**

A method of Just-in-Time production that uses standard containers or lot sizes with a single card attached to each. It is a pull system in which work centers signal with a card that they wish to withdraw parts from feeding operations or suppliers. The Japanese word *kanban*, loosely translated, means *card*, *billboard*, or *sign*.

kanban allocation percent

Percent of independent demand for the kanban item that is to be supplied from a given pull sequence.

kanban card

The visual replenishment signal. It corresponds to a kanban bin. Replenishable kanban cards are based on pull sequences; non-replenishable cards can be created manually.

kanban card status

The current state of the kanban card - Active, on Hold, or Canceled.

kanban card supply status

Describes the current state in the replenishment process. Example: New, Empty, Full, Wait, In Process, In Transit.

kanban chain

A series of kanban pull sequences that model the replenishment network on the shop floor.

kanban items

An item that is pulled through the Kanban system, rather than pushed by the planner, is called a Kanban-released item, or simply Kanban item. Your planning system can have Kanban items as well as items released by the planner.

kanban location

The designated location where a kanban bin is stored (and where the replenishment is delivered). In Oracle, this is a combination of sub-inventory and locator.

kanban plan

A set of kanban pull sequences in which the size or number of cards is calculated based on a given demand schedule.

kanban pull sequence

A body of information that defines the kanban location, source information, and planning parameters required to calculate the kanban size for a given kanban bin. Replenishment chains are created by multiple pull sequences.

kanban replenishment lead time

The time it takes to replenish a given pull sequence.

kanban size

The number of items in each kanban bin.

L**labor time**

The sum of all labor resource times for a given event on a flow routing.

last unit completion date

The date and time you plan to complete production of the last assembly on a repetitive schedule. This date equates to the first unit completion date plus processing days.

last unit start date

The date and time you plan to begin production of the last assembly on a repetitive schedule. This date is the first unit start date plus processing days.

line balancing

Organizing work on the production line so that resources can be synchronized to daily demand.

line operations

Re-grouping of events on a flow routing to achieve approximate takt time. Line operations are line specific and are derived and defined during line balancing.

Line Scheduling Workbench

A form where a WIP scheduler can access the data and utilize a suite of tools to effectively manage flow schedules.

lines

Lines are manufacturing work areas where you manufacture families of products.

location

A shorthand name for an address. Location appears in address lists of values to let you select the correct address based on an intuitive name.

M**machine time**

The sum of all machine resource time for a given event on a flow routing.

mixed model map

Used to design balanced lines. The projected volume and mix of demand for a group of products is used to calculate weighted average work content times. These averages are compared to takt time to regroup events into balanced operations, and reallocate resources.

N

net planning percent

Percent of product that passes through a process or line operation. It equals the sum of the product of the network percentages at each operation along each path multiplied by 1 + the rework percent.

non-replenishable kanban

A non-replenishable Kanban is used to replenish a Kanban location once. This card is used typically for custom products, one-time customer orders or sudden spikes in demand.

O

operation time

In discrete manufacturing, operation time is the total of setup and run time for a specific task. In flow manufacturing, operation times includes the machine time, labor time, and elapsed time for events, processes, and line operations on your flow routing.

operation yield

The percent of material that passes through an operation, process or event on a flow line without being scrapped.

operational cycle time

See takt Time.

Operational Method Sheet Support

Operational Method sheets (OMS) are documents that describe the operation to be performed for an assembly. The information in the OMS often includes graphical representation of the process, material needed, and detailed work instructions. You can use attachments in Oracle Flow Manufacturing to attach OMS's to Line Operations in the Flow Routing.

P

Phantom

It is an item or a component which is never stocked and is used as a part in building the final item. A phantom may further be made up of phantoms.

Point of Use (POU)

Inventory located at a specific operation on a flow line where it will be used. Material is pulled from these locations via a Kanban signal. These locations are in turn, supplied from either raw material stores or ideally, directly from the supplier.

process

A set of Oracle Workflow activities that need to be performed to accomplish a business goal. **see Account Generator, process activity, process definition.**

Process

1) A planned series of actions or operations (e.g. mechanical, electrical, chemical, inspection, test) that advances a material or procedure from one stage of completion to another. 2) A planned and controlled treatment that subjects materials or procedures to the influence of one or more types of energy (e.g. human, mechanical, electrical, chemical, thermal) for the time required to bring about the desired reactions or results. In flow manufacturing, processes are very generic activities on a flow routing that often consist of several events that are performed in a specific sequence. They are specific to a line and are often defined during the as-is analysis on a flow line.

process network

You can use Flow Routings to represent the network processes on your production line. This network can include alternate processes, rework loops and feeder lines. You can assign yields and planning percentages for each of these processes to determine the optimal number of resource requirements.

process volume

In the Oracle Mixed Model Map, the quantity of an assembly that must pass through an operation or process to achieve the line demand volume. It equals the $(\text{demand times} * \text{average planning percent} * \text{boost\%}) / \text{average reverse cumulative yield}$.

processes and events

Processes are very generic activities (in other words painting) that often comprise of multiple events (in other words prepare the surface, polish the surface, paint the surface) which are performed in a specific sequence. Events are the actual physical tasks performed on the line. You can define standard processes and standard events that are used consistently across product families and production lines.

product family

A group of products with similar characteristics, often used in production planning. Flow product families often have similar product synchronization.

product structure

See **production line**

The physical location where you manufacture a repetitive assembly, usually associated with a routing. You can build many different assemblies on the same line at the same time. Also known as assembly line.

product synchronization (Sync)

Process of defining events, processes, and operations and assigning them to a flow routing in a specific sequence in which they are performed.

productivity

An overall measure of the ability to produce a good or a service. It is the actual output of production compared to the actual input of resources. Productivity is a relative measure across time or against common entities (labor, capital, etc.).

products and parts

Products and parts are similar to items defined in Oracle Manufacturing. The item type attribute can be used to identify different types of items (for example, finished goods, spare parts, and so on).

production lines

Production Lines are manufacturing work areas where you manufacture families of products. Oracle Flow Manufacturing lets you manage flow production activities by production line. You can use Flow Routings to define the production process of assemblies. You can also use the Mixed Model Map to calculate the line takt time.

pull sequences

See kanban pull sequence.

R**replenishable kanban**

A replenishable Kanban card cycles through the system until it is put on temporary hold or completely removed from the replenishment cycle by the user.

return from scrap transaction

This transaction is used for returning scrapped assemblies. In this document Return from Scrap transaction will mean CFM return from scrap.

reverse cumulative yield

Product of the yields at each operation, process, or event on a flow line starting with the last operation, process, or event.

roll flow schedules

An Oracle Manufacturing technique where you can copy the flow schedules you did not complete into the next available day or take over-completions and subtract the total from the quantities of future schedule.

routing network

Routing network defines the flow of work from one line operation to the next. It also specifies which path in the routing is an alternate or rework path. Routing networks, line operations, and events are the only entities considered in WIP.

S**sales order**

In this document a sales order by default means an ATO sales order.

scheduled flow schedule

These are flow schedules that are created by planning with a specific scheduled completion date.

scheduling rule

Basic rules that can be used consistently in a scheduling system. Scheduling rules usually specify the amount of calendar time to allow for a move, queue, load calculation, etc. Syn: scheduling algorithm.

scrap account

An account that you may use to charge scrap transactions.

scrap line operation

This is the line operation in the flow routing that the assembly is scrapped.

scrap transaction

This transaction is used for scrapping assemblies. In this document Scrap transaction will mean CFM scrap transaction.

T**takt time**

Operation cycle time the rate at which products need to be manufactured on the line. Aids in establishing the daily rate for the production line. $\text{takt Time} = \frac{\text{effective resource hours available per day}}{\text{Average daily demand}}$.

Total Product Cycle Time (TPCT)

The total time along the longest path of your flow routing. Calculated by taking the sum of the elapsed times along the longest primary path on the routing network.

unscheduled flow schedule

These are ad-hoc flow schedules that are created on the fly so that a completion or return can be performed for an assembly.

Utilization

A measure to describe how intense a resource is being used. Utilization measures the actual time used to the total available time. $\text{Utilization} = \frac{\text{actual time used}}{\text{total available time}}$. Actual time used is the total processing time and setup time in a given time period. Total available time is the total available hours in a given time period minus the total time the resource is down for repair or maintenance.

W**work order-less completion**

A process which allows you to complete both scheduled and unscheduled flow assemblies and automatically backflush Operation Pull, Assembly Pull and Push components, their associated costs, and labor and machine resources used without having to create a discrete job, repetitive schedule or flow schedule.

Y**yield**

See component yield, cumulative yield, operation yield, and reverse cumulative yield.

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