

11*i* Sequencing and Scheduling Flow Lines

Student Guide

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Preface

Profile

Before You Begin This Course

Before you begin this course, you should have the following qualifications:

- Thorough knowledge and proficiency in navigating Oracle applications
- Working experience with *a working experience of the manufacturing business process*

Prerequisites

- *Oracle Inventory*
- *Oracle Bills of Material and Oracle Engineering*
- *11i Overview of Flow Manufacturing (e-class)*
- *11i Overview of Managing Demand in a Flow Environment (e-class)*
- *11i Designing and Balancing Flow Lines*

How This Course Is Organized

This is an instructor-led course featuring lecture and hands-on exercises. Online demonstrations and written practice sessions reinforce the concepts and skills introduced.

Related Publications

Oracle Publications

Title	Part Number
<i>Oracle Inventory User's Guide</i>	<i>A83507-01</i>
<i>Oracle Bills of Material User's Guide</i>	<i>A75087-01</i>
<i>Oracle Master Scheduling/MRP and Oracle Supply Chain Planning User's Guide</i>	<i>A82941-01</i>
<i>Oracle Flow Manufacturing User's Guide</i>	<i>A69396-01</i>
<i>Oracle Work in Process User's Guide</i>	<i>A83598-01</i>

Additional Publications

- System release bulletins
- Installation and user's guides
- *read.me* files
- *Oracle Magazine*

Typographic Conventions

Typographic Conventions in Text

Convention	Element	Example
Bold italic	Glossary term (if there is a glossary)	The <i>algorithm</i> inserts the new key.
Caps and lowercase	Buttons, check boxes, triggers, windows	Click the Executable button. Select the Can't Delete Card check box. Assign a When-Validate-Item trigger to the ORD block. Open the Master Schedule window.
Courier new, case sensitive (default is lowercase)	Code output, directory names, filenames, passwords, pathnames, URLs, user input, usernames	Code output: <code>debug.set ('I', 300);</code> Directory: <code>bin (DOS), \$FMHOME (UNIX)</code> Filename: Locate the <code>init.ora</code> file. Password: User <code>tiger</code> as your password. Pathname: Open <code>c:\my_docs\projects</code> URL: Go to <code>http://www.oracle.com</code> User input: Enter <code>300</code> Username: Log on as <code>scott</code>
Initial cap	Graphics labels (unless the term is a proper noun)	Customer address (<i>but</i> Oracle Payables)
Italic	Emphasized words and phrases, titles of books and courses, variables	Do <i>not</i> save changes to the database. For further information, see <i>Oracle7 Server SQL Language Reference Manual</i> . Enter <code>user_id@us.oracle.com</code> , where <i>user_id</i> is the name of the user.
Quotation marks	Interface elements with long names that have only initial caps; lesson and chapter titles in cross-references	Select "Include a reusable module component" and click Finish. This subject is covered in Unit II, Lesson 3, "Working with Objects."
Uppercase	SQL column names, commands, functions, schemas, table names	Use the SELECT command to view information stored in the LAST_NAME column of the EMP table.

Convention	Element	Example
Arrow	Menu paths	Select File—> Save.

Brackets	Key names	Press [Enter].
Commas	Key sequences	Press and release keys one at a time: [Alternate], [F], [D]
Plus signs	Key combinations	Press and hold these keys simultaneously: [Ctrl]+[Alt]+[Del]

Typographic Conventions in Code

Convention	Element	Example
Caps and lowercase	Oracle Forms triggers	When-Validate-Item
Lowercase	Column names, table names	SELECT last_name FROM s_emp;
	Passwords	DROP USER scott IDENTIFIED BY tiger;
	PL/SQL objects	OG_ACTIVATE_LAYER (OG_GET_LAYER ('prod_pie_layer'))
Lowercase italic	Syntax variables	CREATE ROLE <i>role</i>
Uppercase	SQL commands and functions	SELECT userid FROM emp;

Typographic Conventions in Navigation Paths

This course uses simplified navigation paths, such as the following example, to direct you through Oracle Applications.

(N) Invoice > Entry > Invoice Batches Summary (M) Query > Find (B) Approve

This simplified path translates to the following:

1. (N) From the Navigator window, select Invoice > Entry > Invoice Batches Summary.
2. (M) From the menu, select Query > Find.
3. (B) Click the Approve button.

Notations :

(N) = Navigator

(M) = Menu

(T) = Tab

(I) = Icon

(H) = Hyperlink

(B) = Button

Typographical Conventions in Help System Paths

This course uses a “navigation path” convention to represent actions you perform to find pertinent information in the Oracle Applications Help System.

The following help navigation path, for example—

(Help) General Ledger > Journals > Enter Journals

—represents the following sequence of actions:

1. In the navigation frame of the help system window, expand the General Ledger entry.
2. Under the General Ledger entry, expand Journals.
3. Under Journals, select Enter Journals.
4. Review the Enter Journals topic that appears in the document frame of the help system window.

Getting Help

Oracle Applications provides you with a complete online help facility.

Whenever you need assistance, simply choose an item from the Help menu to pinpoint the type of information you want.

To display help for a current window:

1. Choose Window Help from the Help menu, click the Help button on the toolbar, or hold down the Control key and type 'h'.

A web browser window appears, containing search and navigation frames on the left, and a frame that displays help documents on the right.

The document frame provides information on the window containing the cursor. The navigation frame displays the top-level topics for your responsibility, arranged in a tree control.

2. If the document frame contains a list of topics associated with the window, click on a topic of interest to display more detailed information.

3. You can navigate to other topics of interest in the help system, or choose Close from your web browser's File menu to close help.

Searching for Help

You can perform a search to find the Oracle Applications help information you want. Simply enter your query in the text field located in the top-left frame of the browser window when viewing help, then click the adjacent Find button.

A list of titles, ranked by relevance and linked to the documents in question, is returned from your search in the right-hand document frame. Click on whichever title seems to best answer your needs to display the complete document in this frame. If the document doesn't fully answer your questions, use your browser's Back button to return to the list of titles and try another.

11*i* Sequencing and Scheduling Flow Lines

Chapter 1

11i Sequencing and Scheduling Flow Lines

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Objectives

After completing this course, you should be able to do the following:

- **Schedule production through the Line Scheduling workbench**
- **Name the business drivers that affect the choice of a scheduling policy**
- **Describe how to protect production from demand variability (volume and mix)**
- **Manage your line schedules through the Line Scheduling workbench. View unscheduled orders**
 - **Create, view, and maintain flow schedules**
 - **Check component availability**

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Objectives

After completing this course, you should be able to do the following:

- **List the process steps for creating flow schedules on synchronized feeder lines**
- **Demonstrate when and how to roll flow line schedules**

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Agenda

Agenda

- Overview
- Defining and creating scheduling rules
- Using the Line Scheduling Workbench
- Rolling flow line schedules
- Synchronizing feeder lines

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Agenda

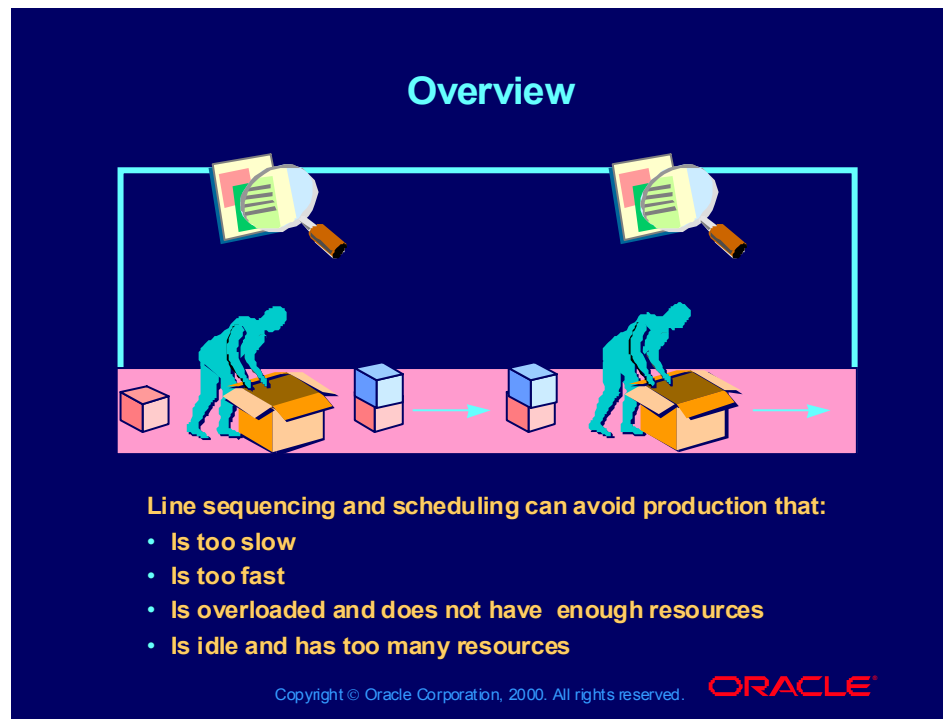
Agenda

- **Overview**
- Defining and creating scheduling rules
- Using the Line Scheduling Workbench
- Rolling flow line schedules
- Synchronizing feeder lines

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Overview



Overview of Line Scheduling

Flow Manufacturing uses production lines and rate-based schedules instead of work orders to control production. Production occurs on lines that have been designed and balanced to synchronize your activities and customer demand.

Line scheduling does the following:

- Sequences and schedules sales orders from Oracle Order Management and planned orders from Oracle Planning to the line capacity. You can create flow schedules that represent a volume and mix of products.
- Synchronizes production to customer demand, and establishes a realistic pace and flow of products throughout your production and supply chain.
- Provides WIP schedulers the ability to plan, simulate, and schedule the production lines using the Line Scheduling workbench.

Prerequisites to Line Scheduling

- Flow routings are fully developed.
- In order to use sales orders, Oracle Order Management is in place.
- In order to use planned orders, Oracle Advanced Planning and Scheduling (APS), Master Production Scheduling (MPS), or Material Requirements Planning (MRP) is in place.
- Production lines are designed and balanced.

Agenda

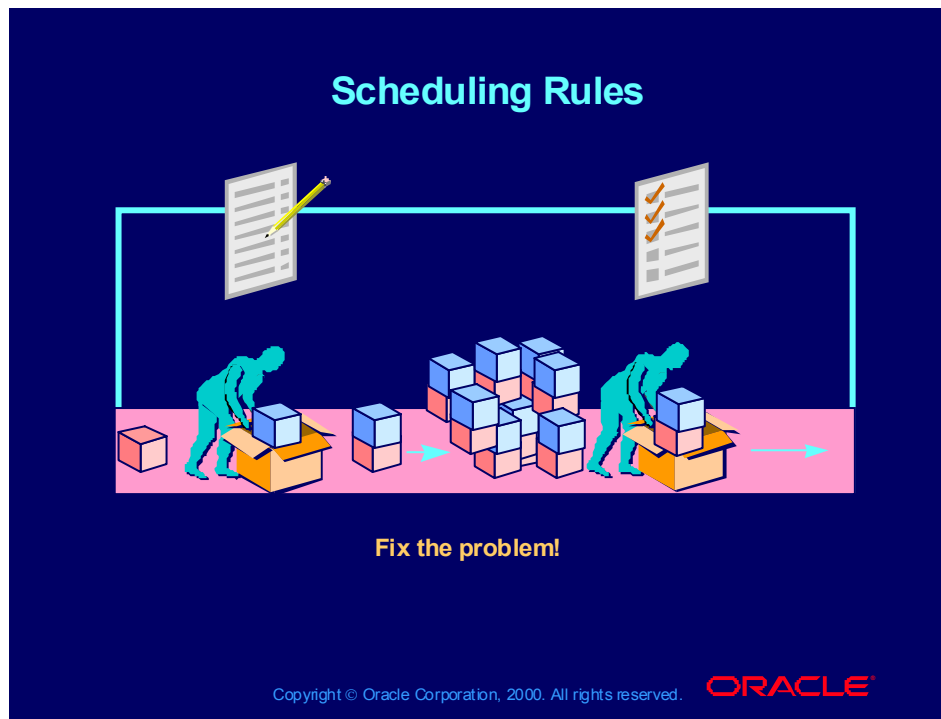
Agenda

- Overview
- **Defining and creating scheduling rules**
- Using the Line Scheduling Workbench
- Rolling flow line schedules
- Synchronizing feeder lines

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Scheduling Rules



Definition and Business Process

Scheduling rules contain the logic used to set the sequence and quantity for the flow schedules. The rule is composed of the criteria used to sequence the orders and an algorithm that determines how much of each item to schedule each day. This logic helps you to pull your demand forward or backward in time in order to meet takt for the current day. Several types of scheduling rules are provided with Oracle Flow Manufacturing. You can define a unlimited number of rules that pertain to all organizations.

Types of Rules

- **Predefined rules:** Predefined scheduling rules combine one sequencing criterion and a system algorithm. Five predefined rules are provided. They are listed on the following page.
- **System definition-type rules:** These are user-defined scheduling rules that you create by combining one or more of the system-provided sequence criteria with a system-provided algorithm.
- **User definition-type rules:** You can also create your own rules by modifying the custom line scheduling procedure that is executed at the time of scheduling flow lines.

Predefined Scheduling Rules

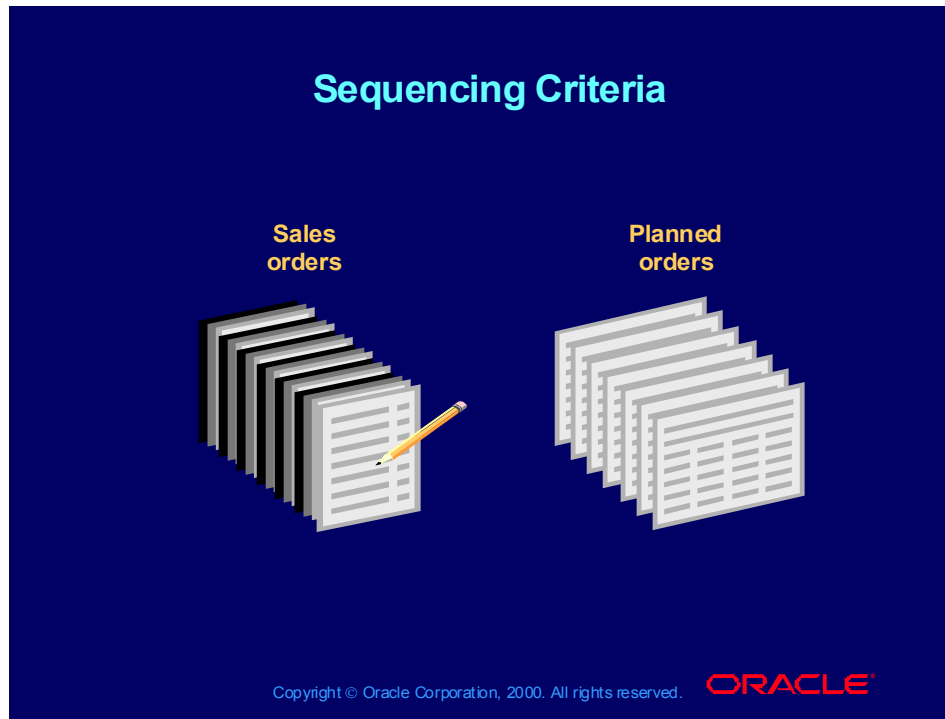
Predefined Scheduling Rules		
Rule Name	Sequencing Criterion	Algorithm
Mixed Model	Order Request Date	Mixed Model
Level Daily Rate	Order Request Date	Level Daily Rate
Request Date	Order Request Date	No Level Loading
Schedule Date	Order Schedule Date	No Level Loading
Promise Date	Order Promise Date	No Level Loading

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(Help) Oracle Flow Manufacturing > Line Scheduling Workbench >
Defining Scheduling Rules

Note: Further discussion follows.

Sequencing Criteria



Sequencing Flow Schedules

Flow schedules can be sequenced on one or more of the following criteria. The sequence in which you enter your selections determines the order of priority:

- Order Entry Date
- Order Priority
- Order Promise Date
- Order Request Date
- Order Schedule Date

Considerations

For unscheduled planned orders, the generated planned order due date is the only criterion used for sequencing.

If you do not select a sequencing criterion, the system defaults to the sales order schedule date or to the planned order suggested due date.

Scheduling Algorithms

Scheduling Algorithms

Scheduling algorithms are used in conjunction with sequencing criteria to create scheduling rules. The three seeded algorithms are:

- No Level Loading
- Level Daily Rate
- Mixed Model

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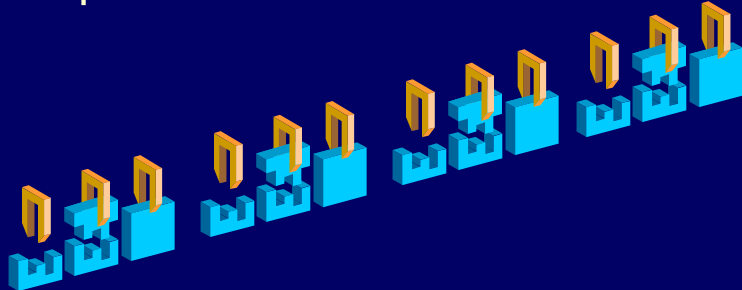
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(Help) Oracle Flow Manufacturing > Line Scheduling Workbench >
Defining Scheduling Rules > Scheduling Algorithms

No Level Loading Algorithm

No Level Loading Algorithm

- Protects production from volume variation
- Schedules to line rate
- Sequence based on criteria



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Definition and Business Process

Flow schedules are sequenced according to the designated sequencing 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.

The sequencing criteria determines the sequence of the flow schedules. Beginning with the sales order line with the lowest sequence (or highest priority), the order lines are scheduled in ascending order. This preserves capacity for future orders.

If you select a scheduling rule that uses the No Level Loading algorithm, the criterion defined in the scheduling rules 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.

This rule protects production from volume variation by scheduling only up to the daily line rate. Any demand exceeding that rate is scheduled for the following day. Therefore this rule is based on the finite capacity in the factory. It sequences orders (sales orders or planned production orders) based on the defined criteria.

No Level Loading Algorithm

No Level Loading Algorithm			
Day 1	Day 2	Day 3	Day 4
Available capacity	Available capacity	Available capacity	Available capacity
800 units/day	800 units/day	800 units/day	800 units/day

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Example

There are three unscheduled booked sales orders that fall within the selection criteria for creating a flow schedule.

Sales Order	Item	Quantity	Request Date
1001	Widgets	1000	Day 1
1002	Gadgets	750	Day 2
1003	Devices	500	Day 3

The sequence criterion specifies Request Date. The sales orders are sequenced in that order, as shown in the table.

The Daily Line Rate is 800 units per day (as defined in the Production Line setup).

In the No Level Loading algorithm, demand mix is not considered. The orders are lined up to be built in request date sequence.

Sales order 1001:

- The order quantity is for 1000 widgets.
- The available capacity on day 1 is 800 units.
- A quantity of 800 widgets is scheduled for day 1. The remaining quantity to be scheduled is 200.
- The available capacity on day 2 is 800 units.
- The remaining quantity of 200 widgets is scheduled for day 2. After sales order 1001 is complete, the remaining capacity on day 2 is 600.

No Level Loading Algorithm

No Level Loading Algorithm

Day 1	Day 2	Day 3	Day 4
S. O. 1001 800 widgets	S. O. 1002 600 Gadgets	Available capacity	Available capacity
	S. O. 1001 200 Widgets	S. O. 1003 500 devices	
		S. O. 1002 150 gadgets	

<u>Sales order</u>	<u>Item</u>	<u>Quantity</u>
1001	Widgets	1000
1002	Gadgets	750
1003	Devices	500

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Example (continued)

Sales order 1002:

- The order quantity is 750 gadgets.
- Available capacity on day 2 is 600 units.
- A quantity of 600 gadgets is scheduled on day 2. The remaining quantity to be scheduled is 150.
- The available capacity on day 3 is 800 units.
- The remaining quantity of 150 gadgets is scheduled for day 3. After sales order 1002 is complete, the remaining capacity on day 3 is 650.

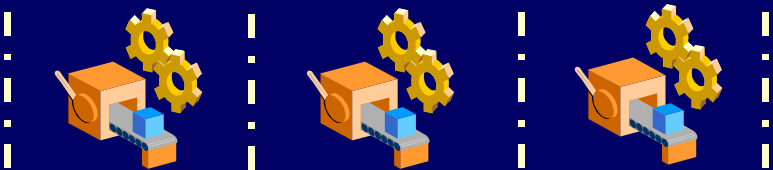
Sales order 1003:

- The order quantity is 500 devices.
- The available capacity on day 3 is 650 units.
- The entire quantity of 500 devices is scheduled on day 3. After sales order 1003 is complete, the remaining capacity on day 3 is 150, and the available capacity on day 4 is 800 units.

Level Daily Rate Algorithm

Level Daily Rate Algorithm

- Protects production from volume and mix variation
- Minimizes setup
- Considers demand ratio of the item (demand for item/demand for family)
- Schedules to demand daily ratio
- Schedules to line rate
- Sequence based on criteria



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Definition and Business Process

If you choose to schedule your line 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 for the item divided by the grand total demand. It is multiplied by each day's available capacity to determine how much of an item will be scheduled every day.

Within a day, all of the same product are scheduled sequentially, thereby minimizing setup on the shop floor.

This rule protects production from volume variation by scheduling only up to the daily line rate. Any demand exceeding that rate is scheduled for the following day. Therefore this rule is based on the finite capacity in the factory.

This rule reduces mix variation by spreading the mix evenly across the scheduling horizon based on demand ratio.

Level Daily Rate sequences orders (sales orders or planned production orders) based on the defined criteria.

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

The day's demand for an item is built consecutively at one time during the day.

Level Daily Rate Algorithm

Level Daily Rate Algorithm			
Day 1	Day 2	Day 3	Day 4
Available capacity	Available capacity	Available capacity	Available capacity
800 units/day	800 units/day	800 units/day	800 units/day

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Example

There are three unscheduled booked sales orders that fall within the selection criteria for creating a flow schedule.

Sales Order	Item	Quantity	Request Date
1001	Widgets	1000	Day 1
1002	Gadgets	750	Day 2
1003	Devices	500	Day 3

The sequence criterion specifies the request date. The sales orders are sequenced in that order, as shown in the table.

The Daily Line Rate is 800 per day (as defined in the Production Line setup).

In the Level Daily Rate algorithm, demand mix is considered. The orders are lined up according to the sequencing criterion and are built according to the following demand ratio:

- There are 2250 total units ($1000 + 750 + 500$).
- The demand ratio for widgets is 44% ($1000/2250$).
- The demand ratio for gadgets is 34% ($750/2250$).
- The demand ratio for devices is 22% ($500/2250$).

Level Daily Rate Algorithm

Level Daily Rate Algorithm			
Day 1	Day 2	Day 3	Day 4
S. O. 1003 176 devices	S. O. 1003 176 devices	Available capacity	Available capacity
S. O. 1002 272 gadgets	S. O. 1002 272 gadgets	S. O. 1003 148 devices	
S. O. 1001 352 widgets	S. O. 1001 352 widgets	S. O. 1002 206 gadgets	
		S. O. 1001 296 widgets	
<u>Sales order</u>	<u>Item</u>	<u>Quantity</u>	
1001	Widgets	1000	
1002	Gadgets	750	
1003	Devices	500	
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Example (continued)

Day 1: Schedule each item to the calculated demand ratio, filling day 1 capacity.

- Widgets = $0.44 \times 800 = 352$ (remaining to be scheduled = $1000 - 352 = 648$)
- Gadgets = $0.34 \times 800 = 272$ (remaining to be scheduled = $750 - 272 = 478$)
- Devices = $0.22 \times 800 = 176$ (remaining to be scheduled = $500 - 176 = 324$)

Day 2: Schedule each item to the calculated demand ratio, filling day 2 capacity.

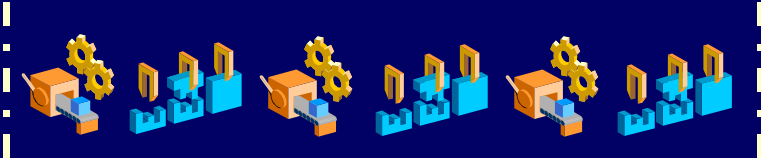
- Widgets = $0.44 \times 800 = 352$ (remaining to be scheduled = $648 - 352 = 296$)
- Gadgets = $0.34 \times 800 = 272$ (remaining to be scheduled = $478 - 272 = 206$)
- Devices = $0.22 \times 800 = 176$ (remaining to be scheduled = $324 - 176 = 148$)

Day 3: Schedule each item to the calculated demand ratio, scheduling day 3 capacity.

- Widgets = $0.44 \times 800 = 352$, but only 296 remain to be scheduled
- Gadgets = $0.34 \times 800 = 272$, but only 206 remain to be scheduled
- Devices = $0.22 \times 800 = 176$, but only 148 remain to be scheduled
- **Note:** Remaining capacity for day 3 = $800 - 296 - 206 - 148$.

Mixed Model Algorithm

- Protects production from volume and mix variation
- Considers demand ratio of the item (demand for item/demand for family)
- Schedules by unit quantities
- Schedules to line rate
- Sequence based on criteria



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Mixed Model Algorithm

Mixed Model Algorithm			
Day 1	Day 2	Day 3	Day 4
Available capacity	Available capacity	Available capacity	Available capacity
800 units/day	800 units/day	800 units/day	800 units/day

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Example

Mixed Model calculations are performed in the same way as Daily Level Rate calculations. The difference between these two algorithms is the pattern in which the different items are built.

Sales Order	Item	Quantity	Request Date
1001	Widgets	1000	Day 1
1002	Gadgets	750	Day 2
1003	Devices	500	Day 3

The sequence criterion specifies Request Date. The sales orders are sequenced in that order.

When using the Mixed Model algorithm, a pattern is set based on the lowest ratio.

1. You first determine the demand ratio.
 - The demand ratio for widgets is 44% (1000/2250).
 - The demand ratio for gadgets is 34% (750/2250).
 - The demand ratio for devices is 22% (500/2250).
- 2. You then take the lowest ratio at the unit level to establish the pattern. The lowest ratio for widgets is 4; for gadgets 3; and for devices 2.
- Therefore the pattern is 4 widgets followed by 3 gadgets followed by 2 devices. This pattern is repeated over and over throughout the day until the full line capacity for each day has been used or until all units have been built.

Mixed Model Algorithm

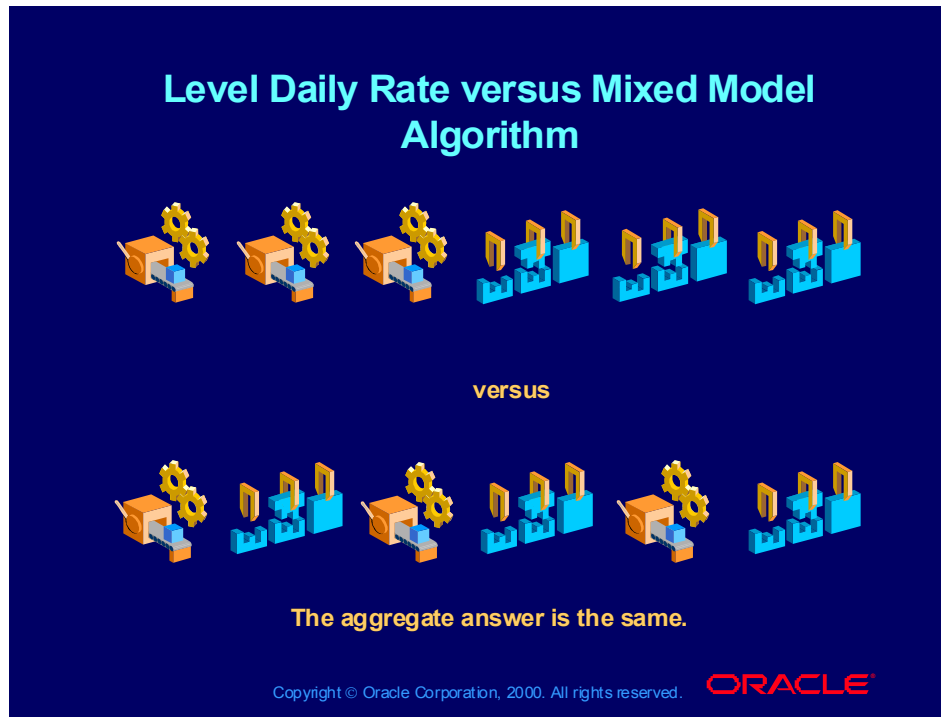
Mixed Model Algorithm			
Day 1	Day 2	Day 3	Day 4
up to 800 Units	up to 800 units	Available capacity	Available capacity
2 devices then 3 gadgets, then 4 widgets,	2 devices then 3 gadgets, then 4 widgets,	up to 650 units 2 devices then 3 gadgets, then 4 widgets,	
<u>Sales order</u>	<u>Item</u>	<u>Quantity</u>	
1001	Widgets	1000	
1002	Gadgets	750	
1003	Devices	500	
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Example (continued)

The resulting mix is that on days 1 and 2, four widgets are assembled, then three gadgets are assembled, and finally two devices are assembled until the line capacity of 800 items is reached.

On day 3 the same mix is assembled, but only until 650 units is reached, which is the entire demand for the three items, resulting in the available capacity of 150 units.

Level Daily Rate versus Mixed Model Algorithm



Comparing Level Daily Rate with Mixed Model Scheduling

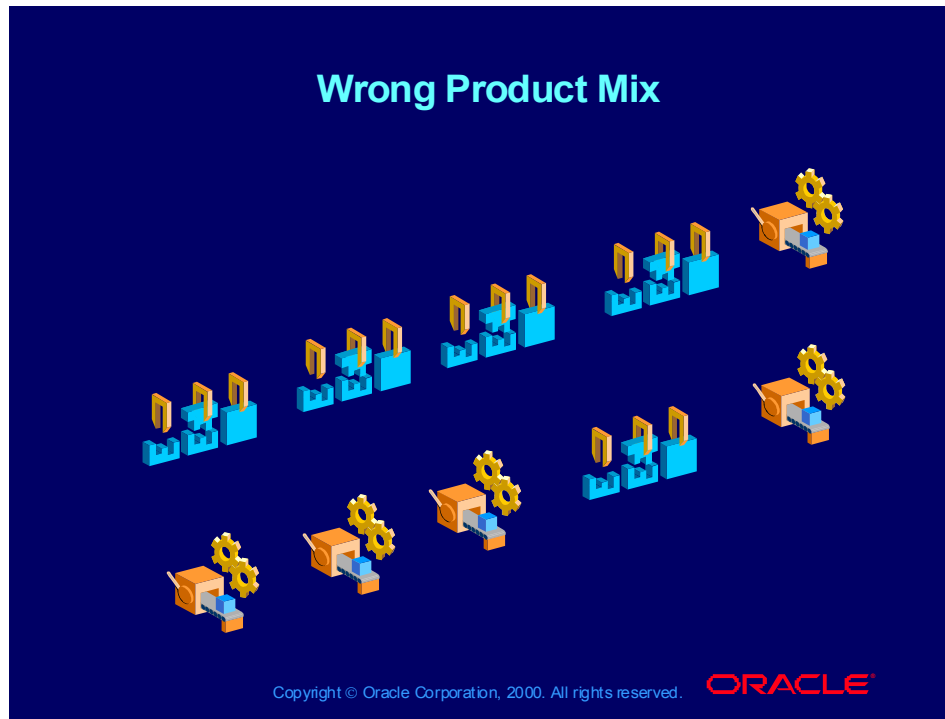
Because both of these algorithms are based on demand ratio, the aggregate answer is the same.

The difference between the two is that in Level Daily Rate, a day's worth of widgets is built one after the other, with no other item built in between. In Mixed Model Scheduling, a pattern of products is built in sequence, and the same item can be built many times during the day, with other items built in between. If the work content of the two items is different at various operations, the Level Daily Rate rule will produce a schedule that creates imbalances, the Mixed Model rule will tend to minimize this type of imbalance.

Mixed Model scheduling approaches a Flow Manufacturing goal of a lot size of one, but it requires more changeovers and sequencing control. You must decide what is most critical to your business.

Note: The line schedule assigns a build sequence for every item or quantity when using the Mixed Model scheduling algorithm. This results in the need to report production for each build sequence in order to relieve the line schedule of the load.

Wrong Product Mix



Wrong Product Mix Considerations

If the product's demand ratio varies considerably from its allocation during line design, the kanban sizes may be understated and temporarily burdened during production. Additionally, some operations on the line may be idle while others may be over-burdened. If you saved the line design mixed model map as a baseline, you can run the Mixed Model Map against actual production and compare it to your baseline.

Any of the following situations can indicate a wrong mix:

- Kanbans that must be replenished more frequently than anticipated
- Kanbans that seldom need to be replenished, but are taking up valuable production area
- Material runners that are too busy to keep up with all the kanbans
- Material runners that are idle too often
- Production workers who are idle at specific operations

Defining Scheduling Rules

Defining Scheduling Rules

Use the Defining Scheduling Rules window to complete your user-defined scheduling rule.

Manufacturing and Distribution Manager Responsibility
Flow Manufacturing (N) Setup > Scheduling Rules

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How to View the Existing Rules

1. Select Query by Example from the View menu.
2. Select Enter from the drop-down list.
3. Enter a % in the Name field.
4. Press [Ctrl]+[F11] to execute the query. The first existing rule is displayed. It may be one of the seeded rules or your own defined rule.
5. Click Page Down to view the next existing rule.

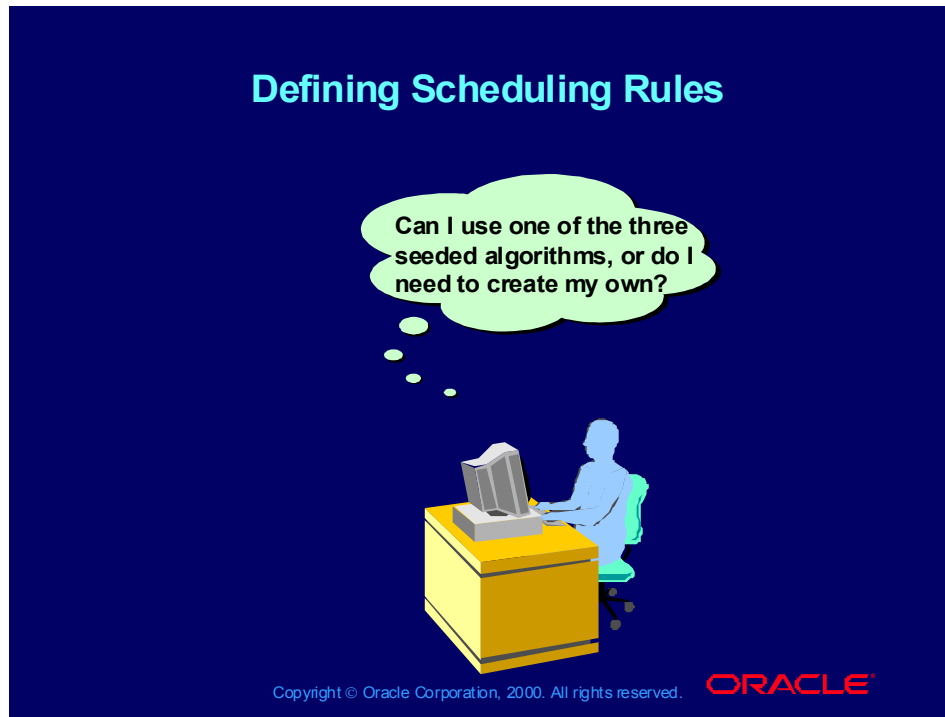
How to Create User-Defined Rules

To define your own rules, enter the following information:

1. Name: User-defined.
2. Description: User-defined.
3. Enabled check box: Specifies whether this rule is in effect.
4. Default check box: Specifies whether this rule is the default rule. The default rule is used unless you override it. There can be only one default rule for scheduling.

(Help) Oracle Manufacturing Applications > Oracle Flow Manufacturing > Line Scheduling Workbench > Defining Scheduling Rules

Defining Scheduling Rules



How to Create User-Defined Rules (continued)

5. Definition Type option buttons:
 - System: Select this option button to create a rule using a system-provided algorithm and sequencing criteria.
 - User: Select this option button to create a rule to meet more complex requirements, which are defined by a user procedure. You enter the name of your procedure in the Name field.
6. Leveling: For system type rules only, select one of the system-provided algorithms from the drop-down list.
7. Criteria Name: For system type rules only, select one or more values from the drop-down list. These values are to be selected in the order of their priority.
8. Criteria Order: System generated in the order in which you made your selection from the Criteria Name drop-down list.
9. Save your work.

Practice LS-1

Instructions:

Using the following information, perform the setup.

Replace *nn* with your initials.

In this practice, you learn how to:

- 1. Create a scheduling rule named nn-Rule that is used to schedule sales orders**

Note: All organization assignments are for M1, Seattle Manufacturing

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1. Create a Scheduling Rule

(N) Flow Manufacturing > Setup > Scheduling Rules

Enter Your Scheduling Rule

1. Navigate to the Define Scheduling Rules window.
2. Enter a name and description for your scheduling rule.
3. Leave the 'Enabled' and 'System' options checked.
4. Select Level Daily Rate from the Leveling drop-down list.
5. In the Criteria Name area, select the following priority sequence from the drop-down list:
 - Order Entry Date
 - Order Priority
6. Save your work.

Agenda

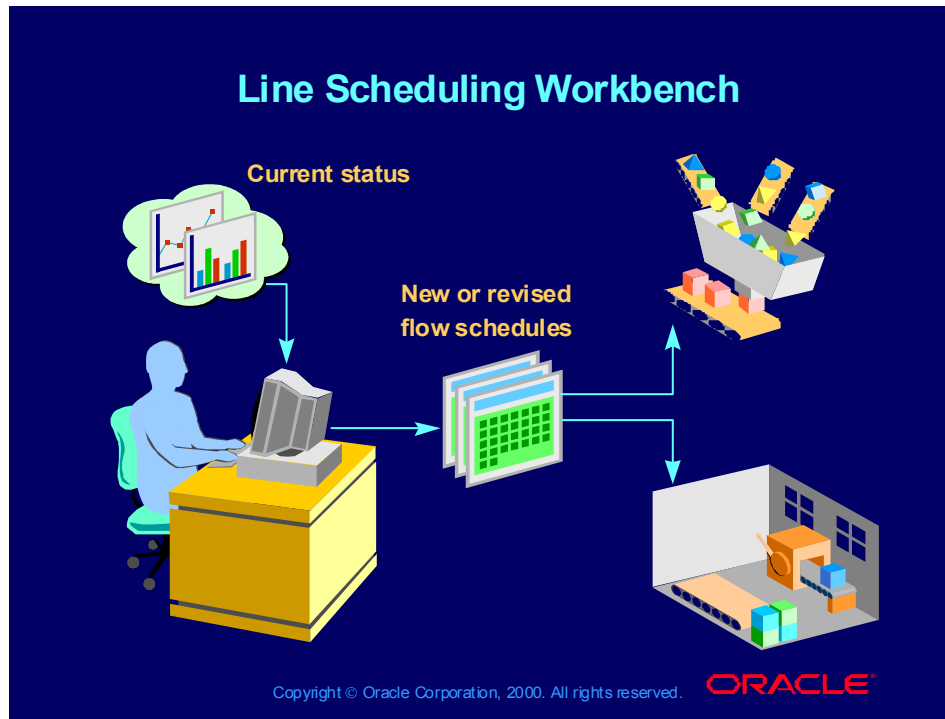
Agenda

- Overview
- Defining and creating scheduling rules
- **Using the Line Scheduling Workbench**
- Rolling flow line schedules
- Synchronizing feeder lines

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Line Scheduling Workbench

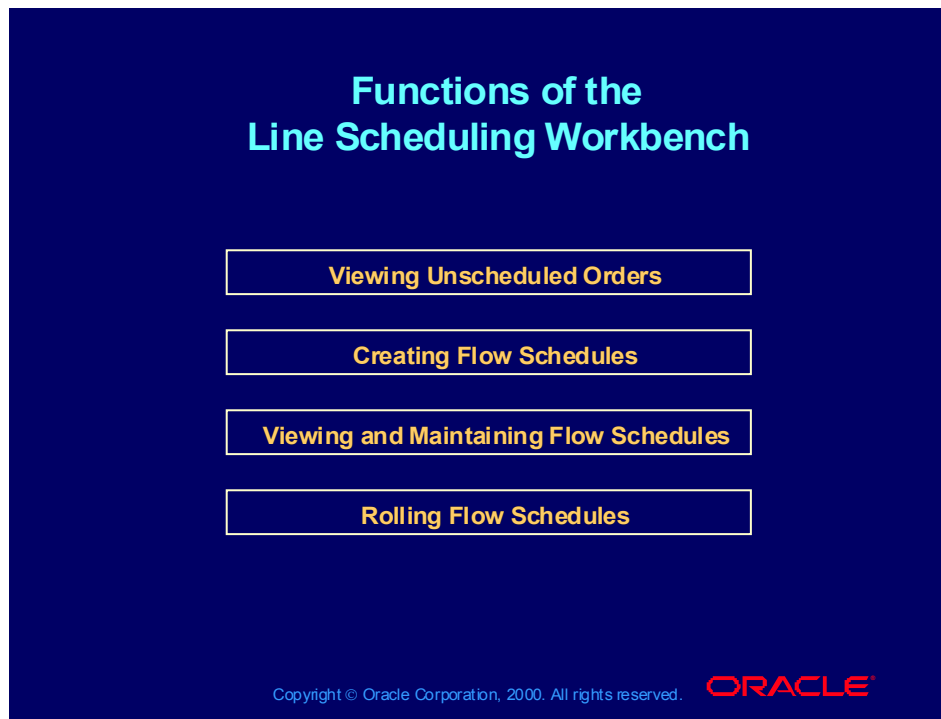


Overview

Schedulers use the Line Scheduling workbench to create and manage flow schedules and to simulate the assignment of work to production lines that schedule work on specific lines. Although you can view all scheduled orders (such as discrete jobs, repetitive schedules, and flow schedules) through the workbench windows, you can only create and schedule a flow schedule.

You can perform a work order-less assembly completion against a flow schedule previously created and scheduled either manually or by using the Line Scheduling workbench. When performing the Work Order-less Completions transaction, you can select from a list of flow schedules that are scheduled to complete on that particular day.

Functions of the Line Scheduling Workbench



Functionality

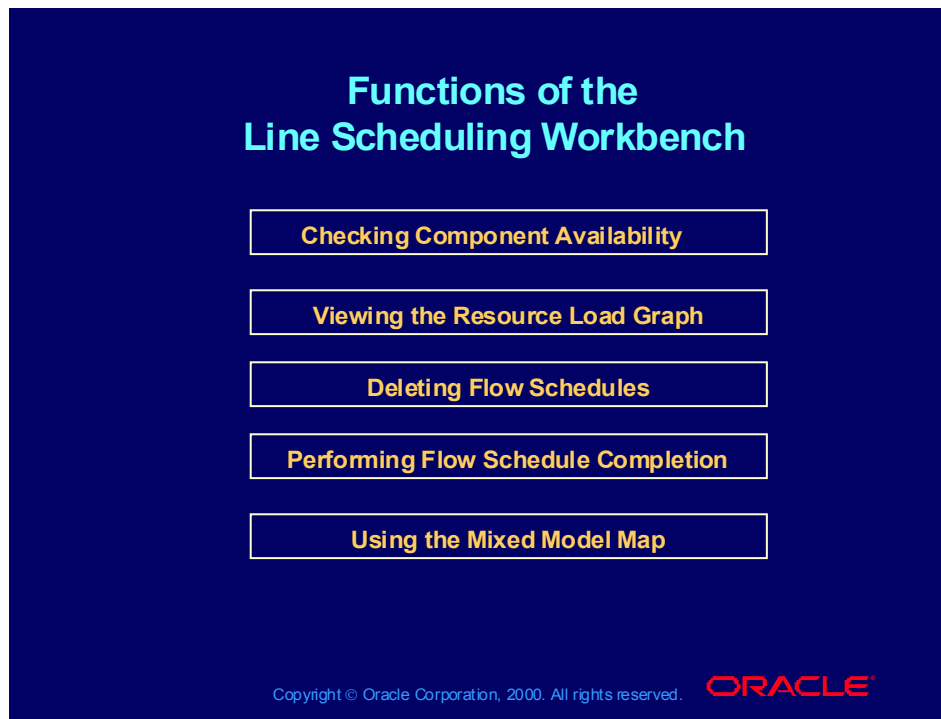
The Line Scheduling Workbench Options window is the interface to the other flow scheduling windows. The available functions in all windows are:

- Viewing unscheduled orders: You can view unscheduled orders in the Unscheduled Orders window. You can display either unscheduled planned orders or sales orders. These unscheduled orders can be converted into flow schedules.
- Creating flow schedules: You can create flow schedules from sales orders or planned orders using your scheduling rules.
- Viewing and maintaining flow schedules: You can view and modify schedule quantities and dates of flow schedules.
- Rolling flow schedules: You can roll flow schedules forward, based on under-completions and over-completions, in order to adjust future production.

(Help) Oracle Manufacturing Applications > Oracle Flow Manufacturing > Line Scheduling Workbench >

Overview of Line Scheduling in Flow Manufacturing

Functions of the Line Scheduling Workbench



Functionality (continued)

- Checking component availability: You can view component availability in the ATP Results window.
- Viewing the resource load graph in relationship to available capacity: You can view a graphical representation of the required load of the line and its associated resources.
- Deleting flow schedules: You can delete flow schedules in order to provide a clean slate for new schedule generation.
- Performing flow schedule completion: You can perform completion transactions for scheduled flow schedules when production is finished.
- Using the mixed model map: You can open the Mixed Model Map window from the workbench. You use this window to monitor your resource requirements against the scheduled production.

Viewing Unscheduled Orders

Viewing Unscheduled Orders

Unscheduled sales orders for the Desktops flow line				
Assembly	Order Date	Unscheduled Qty	Qty to Schedule	
MC31749	22/FEB/2001 00:00:00	100	100	
MC31749	23/MAR/2001 00:00:00	10	10	

Manufacturing and Distribution Manager Responsibility
Flow Manufacturing (N) Line Scheduling > Scheduling Workbench
(B) Unscheduled Orders

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Searching for Unscheduled Orders

1. In the Line Scheduling Workbench Options window, you can either accept the default values displayed in the Unscheduled Orders region or you can select an order type and enter the corresponding dates in that region.
2. Click the Unscheduled Orders button. The Find Unscheduled Orders window is displayed.
3. Enter your search criteria: Field, Condition, From, and To.
4. Click the Find button to open the Unscheduled Orders window. All unscheduled orders for the selected type with a schedule date within your selected date range are displayed.

Note: If you implement any orders from this window, their scheduling rules are ignored. The orders are scheduled for their date regardless of the line's capacity.

(Help) Oracle Manufacturing Applications > Oracle Flow Manufacturing > Line Scheduling Workbench > Viewing Unscheduled Orders

Creating Flow Schedules

Creating Flow Schedules

Use the Scheduling Workbench window to complete:

- Order Type
- Order Dates

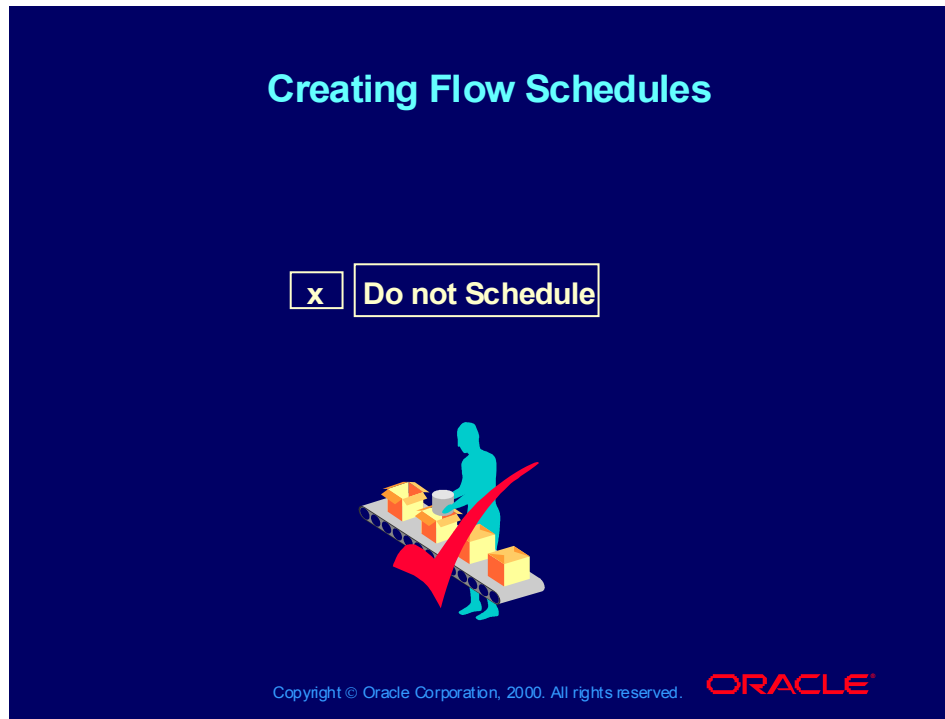
Manufacturing and Distribution Manager Responsibility
Flow Manufacturing (N) Line Scheduling > Scheduling Workbench

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Creating a Flow Schedule

1. Select the order type you want to schedule, either sales or planned.
 2. For Order Dates, enter the date range of the orders you want to schedule.
 3. Optionally enter a schedule group. This is similar to a category of schedules.
 4. Select the appropriate rule from the Scheduling Rules drop-down list.
 5. Enter a date range into which you want to schedule the orders to complete.
 6. Select the Create Flow Schedules button. Upon completion, the Flow Schedule Summary window is displayed with the resulting schedules.
 7. To view if any orders within your selected date range were not scheduled, select the Unscheduled Orders button. If there are orders displayed that fit within your selected range, this can be due to insufficient line capacity.
- (Help) Oracle Manufacturing Applications > Oracle Flow Manufacturing > Line Scheduling Workbench > Viewing, Creating, and Modifying Flow Schedules > Creating Flow Schedules

Creating Flow Schedules



Consideration

By selecting Do Not Schedule from the Scheduling Rules drop-down list, you can bypass the use of a scheduling rule. This option uses the schedule date on your orders without regard to any rule or line capacity. You can use this option either to implement planned orders that have been optimized by APS or to schedule sales orders as they are.

Practice LS-2

Instructions:

Using the following information, perform the setup.

Replace *nn* with your initials.

In this practice, you learn how to:

- 1. Add your finished good items to the CORPORATE price list**
- 2. Create a sales order for products nn-M1 and nn-M2**

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1. Add items to the CORPORATE price list

(N) Order Entry > Pricing > Price Lists > Price List Setup

Select the CORPORATE price list and select the icon to add new entries.

- Add item nn-M1 with a price of \$1.00
- Add item nn-M2 with a price of \$2.00
- Save your work.

Practice LS-2

Instructions:

Using the following information, perform the setup.

Replace *nn* with your initials.

In this practice, you learn how to:

2. Create a sales order for products nn-M1 and nn-M2

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2. Enter a Sales Order for Your Master Items

(N) Order Entry > Orders, Returns > Sales Orders

Select the Order Information tab and then the Main tab and enter the following standard order header information:

- Customer Number: 1000 (Business World)
- Order Type: Standard
- Customer PO: nn
- Price List: CORPORATE
- Others tab
 - Warehouse: W1
- Save your work.
- Select the Lines tab.

Note: Record your order number: _____

Practice LS-2

Instructions:

Using the following information, perform the setup.

Replace *nn* with your initials.

In this practice, you learn how to:

- 2. Create a sales order for products nn-M1 and nn-M2**

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Enter a Sales Order for Your Master Items

Select the Line Items tab and enter the following sales order line item data:

1. Line 1: Item nn-M1, for a quantity of 100, from warehouse M1

Note: Set the request date for two weeks from today.

2. Line 2: Item nn-M2, for a quantity of 200, from warehouse M1

Note: Set the request date for two weeks from today.

3. Schedule the order.

Note: Record your request date: _____

4. Book your order.

Practice LS-3

Instructions:

Using the following information, perform the setup.

Replace *nn* with your initials.

In this practice, you learn how to:

- 1. Use the Line Scheduling workbench to view unscheduled orders**

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1. View Your Unscheduled Sales Order

(N) Flow Manufacturing > Line Scheduling > Scheduling Workbench

1. For your nn-LINE flow line, set the order date equal to the request date of your sales order.
2. Set the scheduling rule to your nn-RULE.
3. Set the schedule dates from today for a total of three days.
4. Click the Unscheduled Orders button.
5. Click the Find button in the Find Unscheduled Orders window.

Note: Your master items and the assigned order number that you recorded earlier are displayed. If they are not, exit the form and recheck the data that you entered.

6. Close the form and return to the Line Scheduling Workbench Options window.

Note: Do not press the Implement button.

Practice LS-4

Instructions:

Using the following information, perform the setup.

Replace *nn* with your initials.

In this practice, you learn how to:

- 1. Use the Line Scheduling workbench to create flow schedules**

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1. Schedule Your Sales Order

(N) Flow Manufacturing > Line Scheduling > Scheduling Workbench

1. For your nn-LINE flow line, set the order date equal to the request date of your sales order.
2. Set the scheduling rule to your nn-RULE.
3. Set the schedule dates for one week from today for a total of three days.
4. Click the Create Flow Schedules button.
5. Navigate to the Flow Schedule Summary window.

Question: Why was the order quantity for nn-M1 master item split into 27, 27, and 26?

-
6. Save your work.

Viewing and Maintaining Flow Schedules

Viewing and Maintaining Flow Schedules

Use the Scheduling Workbench window to complete:

- **Scheduled Date**

Manufacturing and Distribution Manager Responsibility

Flow Manufacturing (N) Line Scheduling > Scheduling Workbench
(B) Flow Schedule Summary

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Business Process

You can view your flow schedules in summary form. You can also create and maintain them at this level, but only if they do not have details such as schedule group, project, or task.

Note: All discrete jobs and repetitive schedules are also displayed. However, you can only view them; you cannot update them.

Displaying the Summary Schedule

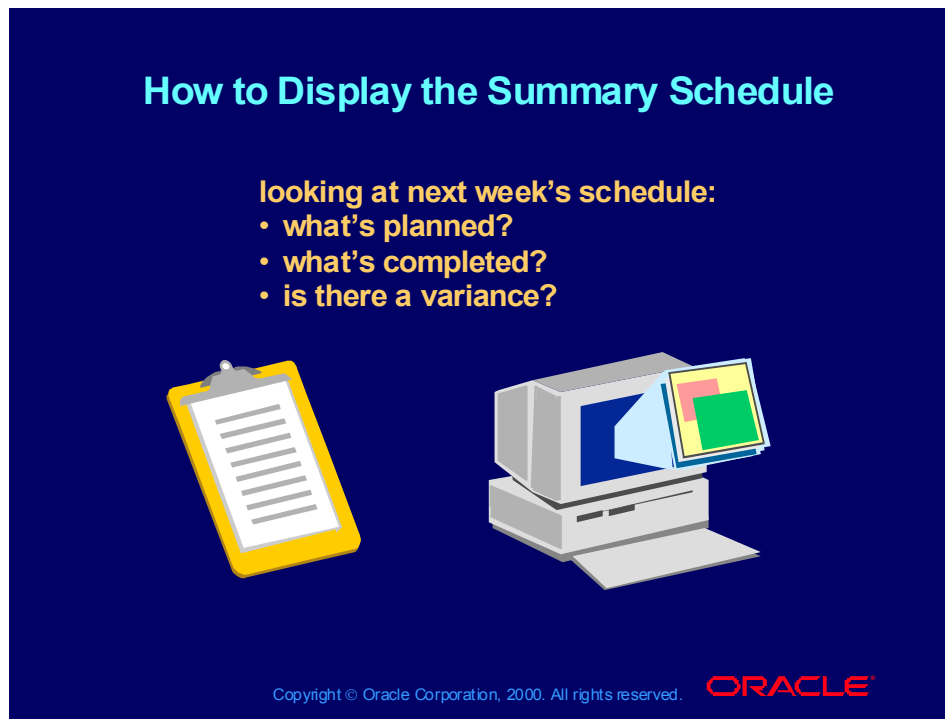
1. In the Line Scheduling Workbench Options window, in the Scheduled Date field, enter the date of the flow schedule that is to be displayed.

Note: The schedule that is first displayed is for the week that contains the date you entered. The date you enter cannot be earlier than today.

2. Click the Flow Schedule Summary button.

(Help) Oracle Manufacturing Applications > Oracle Flow Manufacturing >
Line Scheduling Workbench >
Viewing, Creating, and Modifying Flow Schedules >
Flow Schedule Summary Window

How to Display the Summary Schedule



Displaying the Summary Schedule (continued)

The Flow Schedule Summary window displays the schedules in a bucketed format beginning with the first day of the week. In this window you can scroll backward and forward to view the schedules.

You can control the quantity types that are displayed by selecting Preferences from the Tools menu. The available quantity types are:

- **Planned:** The quantity calculated when you created the flow schedule.
- **Completed:** The quantity reported when you performed a completion on this schedule.
- **Variance:** The difference between the Planned and Completed quantities calculated by the system.

Displaying the Summary Schedule

Displaying the Summary Schedule				
Assembly	Type	Total	08/JAN/2001	09/JAN/2001
MC24713	Planned	250	125	125
	Completed	248	124	124
	Variance	2	1	1
MC97160	Planned	50	25	25
	Completed	27	1	26
	Variance	23	24	-1
Total Planned		300	150	150
Total Completed		275	125	150
Total Variance		25	25	0

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Displaying the Summary Schedule (continued)

You can modify the planned quantity either in the Total column or in specific date columns. Entering a quantity in the Total column triggers the system in spreading weekly quantities across the valid workdays.

The Total and Total Planned Quantity fields for the assembly always reflect the changes that you make.

In the example in the slide, the planned quantity in the Flow Schedule Details window for assembly MC97160 for 08/JAN/2001 was changed from 25 to 125. This change is reflected in the Total column as well as in the column for that specific date in the Flow Schedule Summary window.

From this window you can:

- Navigate to the Unscheduled Orders window
- View the capacity profile at the line level for individual resources for the flow schedule selected
- Navigate to the Flow Schedule Details window for one or multiple assemblies

Viewing the Details of a Flow Schedule

Viewing the Details of a Flow Schedule

Use the Scheduling Workbench window to complete:

- **Scheduled Date**

Manufacturing and Distribution Manager Responsibility
Flow Manufacturing (N) Line Scheduling > Scheduling Workbench
(B) Flow Schedule Summary (B) Details

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Flow Schedule Details

(Help) Oracle Manufacturing Applications > Oracle Flow Manufacturing >
Line Scheduling Workbench >
Viewing, Creating, and Modifying Flow Schedules >
Flow Schedule Details Window

Business Process

From the Flow Schedule Summary window, you can navigate to the Flow Schedule Details window and view or modify your flow schedules at the detail level.

How to View the Schedule Details

1. From the Line Scheduling Workbench Options window, select the desired schedule dates.
2. Select the Flow Schedule Summary button.
3. Select your items.
4. Click the Details button.

Note: All discrete jobs and repetitive schedules are also displayed. You can only view them at this level; you cannot update them. You can view the order type by using the Folder tools on the tool bar.

Practice LS-5

Instructions:

Using the following information, perform the setup.

Replace *nn* with your initials.

In this practice, you learn how to:

1. View line schedule details

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1. View Line Schedule Details

(N) Flow Manufacturing > Line Scheduling > Scheduling Workbench

1. For your nn-LINE flow line, set the schedule dates equal to one week from today.
2. Click the Flow Schedule Summary button.
3. Choose Select All from the Edit menu.
4. Navigate to the Flow Schedule Details window.
5. Verify the build sequence numbers, order numbers, and line numbers.

Question: What date range are the assemblies scheduled for?

From _____ To _____

Note: These dates are used in the next practice.

Agenda

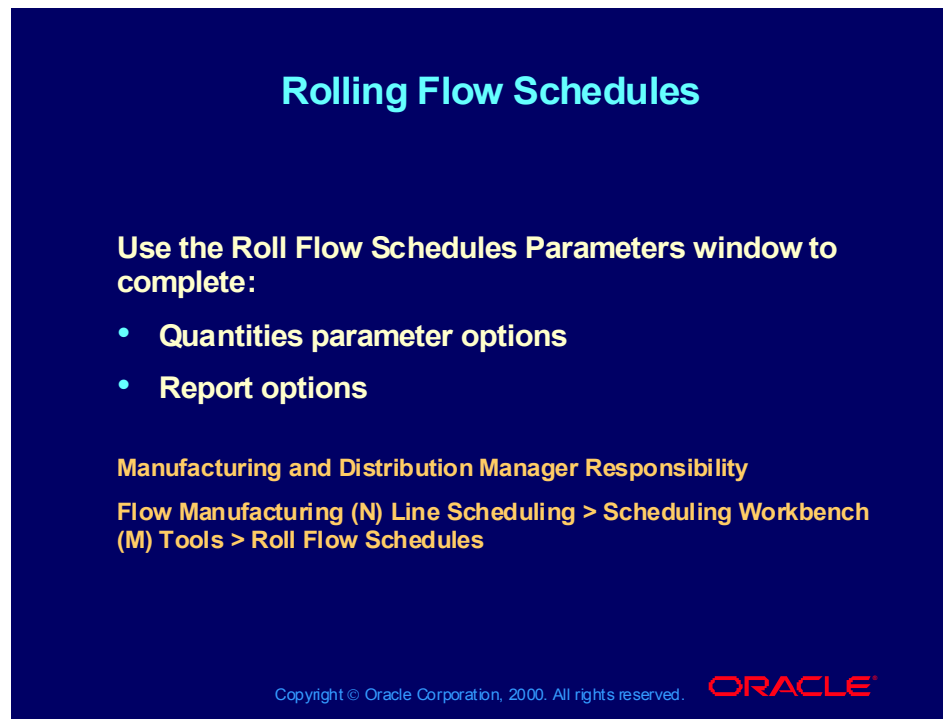
Agenda

- Overview
- Defining and creating scheduling rules
- Using the Line Scheduling Workbench
- **Rolling flow line schedules**
- Synchronizing feeder lines

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Rolling Flow Schedules



Rolling Flow Schedules

Use the Roll Flow Schedules Parameters window to complete:

- **Quantities parameter options**
- **Report options**

Manufacturing and Distribution Manager Responsibility

Flow Manufacturing (N) Line Scheduling > Scheduling Workbench
(M) Tools > Roll Flow Schedules

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Roll Flow Schedules Parameters

(Help) Oracle Manufacturing Applications > Oracle Flow Manufacturing >
Line Scheduling Workbench > Line Scheduling Tools Menu >
Roll Flow Schedules

Flow schedules must be maintained to keep the production schedule information and planning information current. **Note:** MRP calculations do not consider flow schedules with past due dates. You can use the Roll Flow Schedules window to update your flow schedules to keep your MRP accurate. The Roll Flow Schedules program is designed to assist you to adjust future schedules based on actual past performance. You can adjust the quantity on future production schedules based on the completion quantities. You can change schedules for a line, for a range of lines, or for all lines at once.

Rolling flow schedules forward adds undercompletion quantities to the schedule and subtracts overcompletion quantities from the schedule. The past planned quantities are not reduced or increased. They are maintained for linearity reporting.

Roll Schedule Example: Undercompletion

Roll Schedule Example: Undercompletion				
	Original scheduled quantity		After rolling forward	
	01/08/00	01/15/00	01/08/00	01/15/00
Scheduled	20	20	20	30
Completed	10	0	10	0
Variance	10	20	10	30

A quantity of 10 was not completed in the 01/08/00 schedule.

After the roll forward, the planned quantity for the 01/15/00 schedule was increased from 20 to 30.

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Roll Flow Schedules Program (continued)

Considerations

Two parameter options are available for spreading the quantities:

- Spread Quantities Evenly: The production quantity is spread evenly over your specified date range, beginning with the first day of the specified range.
- Do Not Spread Quantities: Each date is filled to capacity.

Report Options

- Report Only: Creates a report but does not update your flow schedules. Use this option to simulate the effects on your schedule.
- Report and Update: Creates a report and rolls the dates forward on your schedules.

Note: If you roll the same flow schedules multiple times, it is possible to create excess supply. Flow schedules with past or current dates are used in the process of rolling schedules to a future date.

Roll Schedule Example: Overcompletion

Roll Schedule Example: Overcompletion

	Original scheduled quantity		After rolling forward	
	01/08/00	01/15/00	01/08/00	01/15/00
Scheduled	20	20	20	10
Completed	30	0	30	0
Variance	-10	20	-10	10

The 01/08/00 schedule was overcompleted by a quantity of 10.

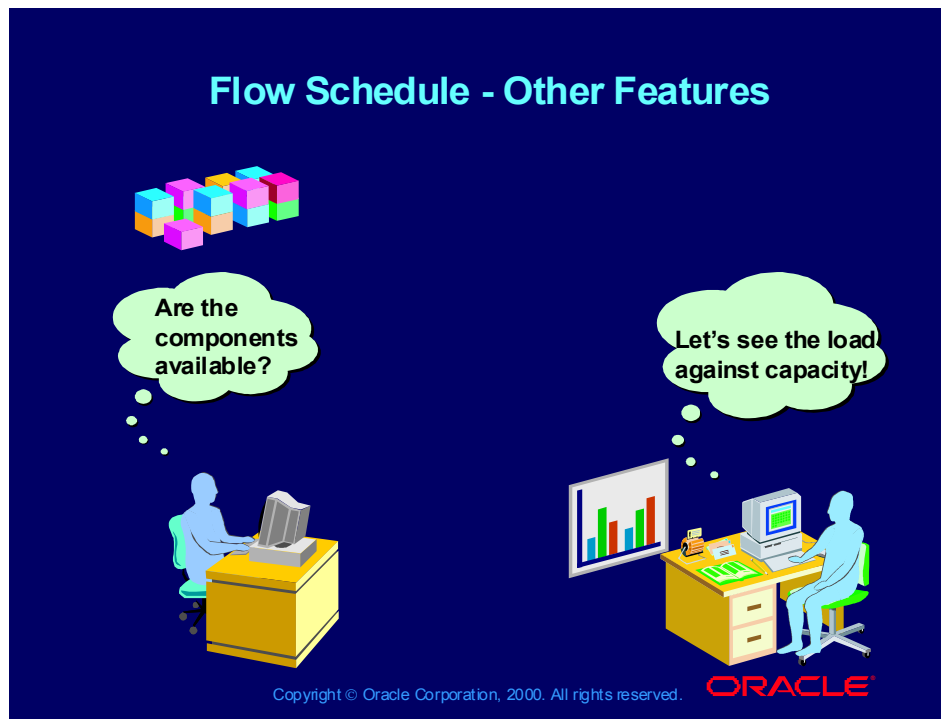
After the roll forward, the planned quantity for the 01/15/00 schedule was reduced from 20 to 10.

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Note: The scheduled quantity is not adjusted by the overcompletion if a build sequence number or order information exists for the schedule. In this case the original quantity of 20 scheduled for 01/15/00 remains at 20 if the information is present in the Flow Schedule Details window.

Flow Schedule - Other Features



Other Features

Checking Component Availability

(N)Flow Manufacturing > Line Scheduling > Line Scheduling Workbench > Flow Schedule Summary (B) Details (B) Component Availability

(Help) Oracle Manufacturing Applications > Oracle Flow Manufacturing > Line Scheduling Workbench > 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. The components for each flow schedule are listed individually on separate rows.

Note: Only those components whose Check ATP attribute is set to Yes are displayed.

Graphical Data Display in Relationship to Capacity

(N) Flow Manufacturing > Line Scheduling > Line Scheduling Workbench > Flow Schedule Summary (B) Capacity Graph

(Help) Oracle Manufacturing Applications > Oracle Flow Manufacturing > Line Scheduling Workbench > Other Features > Viewing Load and Capacity

You can view the capacity profile at the line level prior to scheduling your flow schedules. The graph display shows the load by item for the line and its resources. The capacity is based on the routings for the assemblies scheduled on the selected dates.

Flow Schedule - Other Features

- **Deleting Flow Schedules**
- **Performing Flow Schedule Completions**
- **Using the Mixed Model Map**

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Agenda

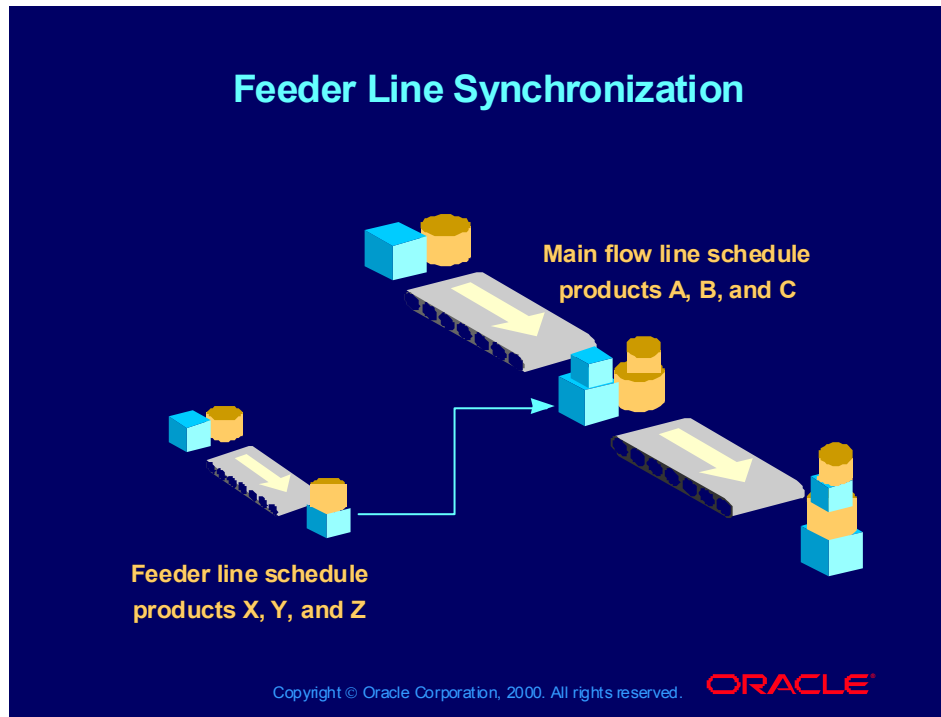
Agenda

- Overview
- Defining and creating scheduling rules
- Using the Line Scheduling Workbench
- Rolling flow line schedules
- **Synchronizing feeder lines**

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Feeder Line Synchronization



Definition and Business Process

(Help) Oracle Manufacturing Applications > Oracle Flow Manufacturing >
Line Scheduling Workbench > Other Features >
Feeder Line Synchronization

With Flow Manufacturing you can create schedules for subassemblies that are directly derived from parent assembly line schedules. You can specify a line, or range of lines, and a date range as input. These subassembly feeder lines use sequence information from the parent assembly schedules to synchronize their production.

Benefits

- With a synchronized feeder line schedule, you can control the sequences of subassemblies produced on the feeder line in support of customer demand.
- You can support complex mass customization environments.
- Kanban and in-process kanban inventory can be reduced.

•Setup

- This functionality relies on:
 - Existing multilevel bills of material
 - Flow routings for nonphantom subassemblies
 - Feeder line completion date equal to primary line start date

Synchronizing Your Feeder Line

Synchronizing Your Feeder Line

Use the Scheduling Workbench window to complete:

- From and To Flow Line(s)
- From and To Dates

Manufacturing and Distribution Manager Responsibility

Flow Manufacturing (N) Line Scheduling > Scheduling Workbench
(B) Flow Schedule Summary

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Submitting Your Request for Synchronization

- Fill out the parameters for your selected flow line and schedule dates.
- Submit your request.
- **Note:** The From Line and To Line parameters refer to the range of parent lines you are synchronizing. The From Date and To Date parameters refer to the range of start dates for schedules of your selected parent lines.

Practice LS-6

Instructions:

Using the following information, perform the setup.

Replace *nn* with your initials.

In this practice, you learn how to:

1. Create a sub-assembly and feeder line.
2. Synchronize a feeder line for sub-assembly production.

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1. Create a Sub-assembly and Feeder Line

1. Create a new sub-assembly item, nn-M3.
 - Description: nn Sub Item M3, Flow Subassembly
 - Copy from template: Subassembly
 2. Assign to organization M1.
 3. Update the lead time and variable lead time on the organizational item nn-M1 to the TPCT time and line TAKT respectively. Express the times as decimal portions of the work day (0.078 lead time; 0.025 variable lead time).
 4. Create a bill of material for your nn-M3 sub item, where its component is nn-KB1, for a quantity of 1, in subinventory RIP.
 5. Update your master item nn-M1 bill of material.
 - Add component nn-M3 for a quantity of 1, in subinventory RIP
 - Assign it to the third operation sequence number (30).
 6. Create a new production line, nn-LINE2, using the same data as your nn-LINE.
 7. Create one standard event, one process, and one line operation.
 8. Create a flow routing for your nn-M3 master item on your nn-LINE2.
- Note:** Make sure that there is at least one resource with scheduled time.
9. Calculate operation times and total product cycle times.
 10. Save your work.

Practice LS-6

Instructions

Using the following information, perform the setup.

Replace *nn* with your initials.

In this practice, you will learn how to:

1. Create a subassembly and feeder line.
2. Synchronize a feeder line for sub-assembly production

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2. Synchronize a Feeder Line for sub-assembly production

Feeder line synchronization allows you to create schedules for feeder flow lines that are directly derived from parent assembly line schedules. This makes it possible for you to synchronize the production of feeder lines with final assembly lines. This synchronization also allows material to be produced when needed at final assembly without requiring buffer inventories.

(N) Flow Manufacturing > Line Scheduling > Feeder Line Synchronization

Note: The Parameters window is displayed.

1. Enter your nn-LINE flow line in the From Line and To Line fields.
2. In the Date range, enter today's date and the last scheduled date for your nn-M1 master item from the previous practice.
3. Submit your request.

4. Navigate to the Line Scheduling workbench.

(N) Flow Manufacturing > Line Scheduling > Scheduling Workbench

5. For your nn-LINE2 flow line, change the schedule date to one week from today and click the Flow Schedule Summary button.
6. Verify the build sequence numbers of your nn-M3 master item detail records.

Practice LS-7

Practice LS-7

Instructions:

Using the following information, perform the setup.

Replace *nn* with your initials.

In this practice, you learn how to:

1. Use the Line Scheduling workbench to create flow schedules from planned orders

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Create Planned orders from MRP

(N) Material Planning > MDS > Names

1. Create an MDS schedule, nn-MDS.
2. Create MDS entries for your items as follows:

<u>Item</u>	<u>Quantity</u>	<u>Date</u>
nn-M1	100	1 week + 3 days
nn-M2	200	1 week + 3 days

3. Save your work.
 4. Create an MPS plan, nn-MPS.
- (N) Material Planning > MPS > Names

Note: Ensure that your nn-M1 and nn-M2 items are set for MPS planning.

5. Click the Production checkbox.
6. Set the demand schedule to your nn-MDS schedule. Select 'Demand scheduled items only' for planned items.
7. Save your work.
8. Launch your MPS plan.

Note: Record your request number _____

Practice LS-7

Instructions:

Using the following information, perform the setup.

Replace *nn* with your initials.

In this practice, you learn how to:

- 1. Use the Line Scheduling workbench to create flow schedules from planned orders**

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Schedule Your Plan

(N) Flow Manufacturing > Line Scheduling > Scheduling Workbench

1. For your nn-LINE flow line, set the order type to Planned Orders and the order dates to the due date of your MDS entries.
2. Set the Scheduling Rule to you nn-RULE.
3. Set the Schedule Dates from today for a total of 3 working days.
4. Select the Create Flow Schedules button.
5. Navigate to the Flow Schedule Summary window.

Question: Why was the order quantity for nn-M1 master item split into 27, 27, and 26?

-
6. Save your work.

Select the Unscheduled Orders button. Because the planned order quantities are greater than the line capacity, there remains some unscheduled quantities for your master items.

Question: What quantity remains unscheduled for your nn-M1 item?

Summary

- You can use seeded algorithms and sequencing criteria to create your scheduling rules; or, because the system is extensible, you can specify a custom procedure to sequence complex problems.
- You can manage your line schedules through the Line Scheduling workbench. With the workbench, you can:
 - View unscheduled orders
 - Create, view, and maintain flow schedules
 - Check component availability
- Derive schedules for feeder lines from parents

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