Oracle Fusion Cloud SCM

Using Production Scheduling

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1 Intoduction

Why You Use Production Scheduling

Before answering the question, let's recap what we know about the manufacturing process. Your manufacturing application calculates start times and end times based on the work order start or completion date. The application accounts for the duration of resource usage, but it assumes that your resources have unlimited capacity; it then potentially plans to execute production for multiple work orders simultaneously.

Why Resource Constraints Must Be Considered

Let's say your shop floor has just two machines that can be used for 10 hours a day, due to defined resource or shift exceptions. You need to make 10 items by the end of today and each item takes two hours to make. This means that by your deadline, you can make just half the required number of items because of capacity constraints on your resources. Because your shop floor might be executing more than one work order at a time, daily constraints on resource capacity must considered.

How Production Scheduling Helps

Using Oracle Production Scheduling, you can consider resource capacity constraints and the changeovers on resources that occur throughout production. You can generate a feasible and executable schedule by considering resource capacity and resource availability, attribute-based changeover rules, component availability, and multistage dependencies based on work definitions and item structures. Using changeover rules you can reduce changeover times to increase throughput and reduce lateness of work orders.

How the Production Scheduling Work Area Is Enabled

To enable the Production Scheduling work area, you must perform two setup tasks.

You can perform these tasks in any order, but you must do both before a user can access the work area.

- Opt in to the Production Scheduling feature
- Assign a job role to the applicable users

Opt In to the Production Scheduling Feature

You perform this opt in one time for your overall site.

- Offering: Supply Chain Planning
- Feature: Production Scheduling

For more information regarding how to opt in to features, refer to the Using Functional Setup Manager guide, Offering Configuration chapter in the Oracle Help Center.

Assign the Applicable Job Role to the Applicable Users

Assign a job role that includes the View Production Schedule (MSC_VIEW_PRODUCTION_SCHEDULE_PRIV) privilege to the user associated with each of your production schedulers.

For more information regarding how to assign job roles to users, refer to the Securing SCM guide, Role Provisioning chapter in the Oracle Help Center.

Related Topics

- Role Provisioning and Deprovisioning
- Overview of Configuring Offerings

Production Scheduling Tasks and Business Flows

To carry out production scheduling tasks, you must have production scheduler privileges by your enterprise. This topic is an overview of the tasks and the business flows in the Production Scheduling work area.

Locate the Work Area

Navigate to the Supply Chain Planning cluster and click Production Scheduling.

Know Your Workflow

Here's the sequence of production scheduling activities:

1. Add and set up scheduling organizations.
2. Create a schedule.
3. Refresh, solve, review, and adjust the schedule.
4. Release the schedule.

Begin Your Business Tasks

From the Production Schedules page, you can manage production schedules and scheduling organizations.

- Before creating a schedule for an organization, this organization must be defined as a scheduling organization. Click the **Manage Scheduling Organizations** button to add, manage, and delete scheduling organizations. To know more, refer to the Organization Setup chapter.
- To create a schedule, click **Create** on the Production Schedules page to define and configure your schedule. To know more, refer to the Schedule Setup chapter.
- To work with an existing schedule, use the actions menu for that schedule. To know more, refer to the Schedule Processes chapter.

Manage Data Access for a User

Only users with data access to a specific organization can access schedules and schedule data for the corresponding organization. You can configure the data access using the Manage Data Access task in the Setup and Maintenance work area. Here are some key points to consider when you assign data access to a user.

- You can assign data access to a user via any role, not just the Production Scheduler role.
- If you are assigning data access to a user of manufacturing organization, a security context has to be defined for both inventory organization and manufacturing plant of the manufacturing organization.
- If you are assigning data access to a user of maintenance organization, a security context has to be defined for only the inventory organization of the maintenance organization.

2 Organization Setup

Overview

You schedule production for work centers in manufacturing organizations, which we refer to as scheduling organizations in the Production Scheduling work area. Before you create a schedule for an organization, you need to add the organization as a scheduling organization. You can add and set up a scheduling organization using the **Manage Scheduling Organizations** task on the Production Schedules page.

Add or Remove Scheduling Organizations

Scheduling organizations are sourced from Oracle Fusion Cloud Manufacturing, and you manage them in the Manage Scheduling Organizations UI.

- To add a scheduling organization, click the **Add** button.
- To remove a scheduling organization, click the **Delete** button from the actions menu.

Note: Removing an organization from the Production Scheduling work area does not delete it from other work areas.

Manage Organization Data

Review and manage organization data, such as attributes, changeover rules, item parameters, and resource parameters, using the actions menu. The refresh applies to information that was defined using descriptive flexfields in Oracle Fusion Cloud Manufacturing and extensible flexfields in Oracle Fusion Cloud Product Information Management

Refresh Organization Data

Use the Refresh action to retrieve the most recent attribute values for an organization. The refresh applies to manufacturing attributes, defined using descriptive flexfields for work definition operations in Oracle Manufacturing, and item attributes, defined using extensible flexfields in Oracle Product Information Management.

Note: You can't refresh data before attribute groups are added using the Manage Attributes page.

Attributes

Attributes are aspects of your items, work definition operations, flow schedules, or work orders that impact scheduling. For example, if your organization manufactures ice cream, multiple attributes, such as flavor and size, might be considered, and combinations of these attributes are referred to as attribute groups.

To manage attributes, open the actions menu for an organization and click **Attributes**.

Tip: Refresh organization data after adding manufacturing and item attributes.

Manufacturing Attributes and Attribute Groups

Manufacturing attribute groups are sourced from work definition operations and work order headers in Oracle Fusion Cloud Manufacturing, where they're defined as descriptive flexfields. The Manufacturing attribute values are contained in the descriptive flexfield value sets. These sets must be defined with Validation Type as Independent. In the Manufacturing Attribute Groups tab, add manufacturing attributes by clicking **Add** and selecting an attribute group.

Item Attributes and Attribute Groups

Item attribute groups are sourced from Oracle Fusion Cloud Product Information Management, where they're defined as extensible flexfields; item attribute values are contained in extensible flexfield value sets. These sets must be defined with Validation Type as Independent. In the Item Attribute Groups tab, add item attributes by clicking **Add** and selecting an item class and attribute group.

Attributes

In the Attributes tab, you can specify if an attribute is available for use in Gantt chart highlighting and if the attribute's sort order field from its value set, maintained in the Setup and Maintenance work area, is used.

Attribute-Resource Assignments

You need to assign relevant attributes to specific resources using the **Resource Attributes** tab. These assignments are a prerequisite to defining changeover rules. To assign an attribute to a resource, first select a work center and then pick the resource and specify the attribute you're assigning. You can also dissociate an attribute from a resource using the **Delete** action.

Attribute-Production Line Assignments

You need to assign relevant attributes to specific production lines using the **Production Line Attributes** tab. These assignments are considered by the **Solve** action when sequencing the flow schedules on the production line. To assign an attribute to a production line, select a production line and specify the attribute you're assigning. Only item attributes can be assigned to production lines. You can also dissociate an attribute from a production line using the **Delete** action.

Note: Deleting an attribute assignment from a resource or production line doesn't delete changeover rules, attribute sequences, or flow sequencing rules. When you're editing a flow sequencing rule that uses an attribute that's no longer assigned, then the attribute and attribute value fields won't display any data. You can either assign different attributes or cancel and delete the rule.

Attribute Value Color-Coding

To support schedule analysis, you can color-code attribute values, and use the highlighting features of the Gantt Chart to focus on specific attributes across operation sequences. Here's how:

1. Open the **Attributes** page for an organization.
2. Select the **Attributes** tab.
3. Specify if you want an attribute to be displayed in the schedule views.

4. Specify to use an attribute for highlighting in the Gantt chart.
    a. Select the **Attribute Values** button.
    b. Use the color picker to specify the color used to highlight this attribute.

Attribute color assignments can be also defined and managed using REST services. To know more, see the REST API for Fusion Cloud SCM guide.

Resource Parameters

Use resource parameters to define changeover-related and constraint-related aspects of a resource. To manage resource parameters, open the actions menu for an organization and click the Resource Parameters option.

Define Resource Parameters

> **Note:** You can use the default parameter values listed at the end of this topic.

1. On the Resource Attributes page, click **Add**.
2. Select the work center.
3. Select a resource.
4. Select a constraint mode.
    - If you select **Constrained**, the solver will respect both calendar events and resource capacity constraints.
    - If you select **Relaxed**, the solver ignores calendar events and resource capacity constraints.
    - If you select **Relaxed for capacity only**, the solver will respect only calendar events.
5. Select the changeover calculation type.
    - Use **Concurrent** when multiple attribute changes need to occur simultaneously. The solver will consider the maximum duration of all attribute-based changeover rule durations.
    - Use **Sequential** if multiple attribute value changes need to happen in sequence. The solver will consider the sum of all attribute-based changeover rule durations.
6. Select the changeover position.
    - Use **Cleanup** if attribute-based changeovers on the resource should happen when an operation ends.
    - Use **Setup** if attribute-based changeovers on the resource should happen before an operation begins.
7. Specify whether the horizon start date and time must be enforced.
    - When **Enforce horizon start** is enabled, all work order operations will be scheduled to begin after the horizon start.

      > **Note:** This preference will be overridden if the solver was configured to respect firm work orders in the Schedule Options UI.

    - If you disable it, then firm work order operations can be scheduled to begin before the horizon start.
8. Specify whether the user-defined attribute sequence will be applied.

- If you enable **Apply user-defined attribute sequence**, the solver uses the attribute sequence you defined using the resourceAttributeSequences REST service.
- If the setting remains disabled, the solver devises an attribute sequence.
- For the user-defined sequence to be applied, the schedule must be configured to use scheduling buckets using the Schedule Options UI.

> **Tip:** Apply the user-defined sequence to a single stage in the production process, preferably to a bottleneck stage.

9. Specify the schedule visualization of resources with more than one default units in the Gantt chart.
   - If the **Display Resource Units in Gantt Chart** checkbox is selected, you can view the resource usage levels of that particular resource, and individual work order operations that are scheduled on that resource.
   - If the **Display Resource Units in Gantt Chart** checkbox isn't selected, you can view only the aggregate resource usage levels in Gantt chart.
10. Specify the **Grouping Attribute for Changeover Reduction**. Production Scheduling uses this attribute to group operations with same attribute value for changeover reduction and works with the advanced schedule option **Look Ahead Window in Days.** This is only considered when the user-defined attribute sequence functionality isn't used.

If you don't configure parameters for any resource in your schedule, the following default values will be considered:

- Changeover Calculation: Concurrent
- Changeover Position: Setup
- Constraint Mode: Relaxed
- Horizon start date: Enforced
- User-defined attribute sequence: Not considered

Resource Groups

Use resource groups to simplify data maintenance and schedule analysis.

You can:

- Simplify changeover rule definitions using resource groups instead of resources. For example, you can use a single changeover rule for a group of resources, instead of defining rules for each resource individually.
- Focus on a set of resources for schedule analysis via the Gantt Chart. You can select a set of resources to view operations and adjust the schedule only for those resources.
- Include outside supplier resources that will be relaxed for capacity.

> **Tip:** Limiting the number of resources displayed in the Gantt Chart will improve application performance.

Define a Resource Group

1. In the **Actions** menu for an organization, select **Resource Groups.**
2. On the Resource Groups page, click **Add**.

3. Specify a name and description.
4. Select whether to include an outside processing supplier.
5. Save your group.

When you've created a group, add group members to it.

Define a Resource Group Member

1. In the **Actions** menu for a resource group, select **Members**.
2. Specify the sequence number, to define the order in which the resource appears in the Gantt chart.
3. Select a work center.
4. Select a resource.

> **Note:** Because production lines aren't a part of a work center in SCM Execution, they can't be added to resource groups.

Resource groups can also be defined and managed using the **Supply Chain Planning/Production Scheduling Organizations/Resource Groups** REST service. To know more, see the REST API for Oracle Fusion Cloud SCM guide.

Changeover Rules

Use changeover rules to specify the time it will take to prepare a resource for the production of an item. Preparation activities are cleanups or setups that must be done when the item being produced on a resource changes. To manage changeover rules, open the actions menu for an organization and click the **Changeover Rules** option.

> **Note:** Changeover rules are applied only on resources that have resource type set to equipment and default units available set to 1 in Work Definition work area in Supply Chain Execution.

Define a Changeover Rule

1. On the Manage Changeover Rules page, click **Add**.
2. Specify a sequence number to indicate when the changeover occurs. You can use decimal values.
3. Select either the resource group or the work center and resource. You can edit all fields using the REST service.
4. Select the attribute on which the changeover will occur. If you leave the Attribute field blank, the rule applies to all attributes.
5. Select the current and changed attribute values. If you leave the From and/or To fields empty, the rule applies to all from and/or all to attribute values.
6. Specify the duration of the changeover and the duration unit of measure.
7. Specify the cost of the changeover. It's considered when the user-defined attribute sequence is set to **Reverse**.

During schedule calculation, if multiple changeover rules are applicable between two work order operations, then the rules with a lower sequence number are applied. Hence the more specific rules with respect to resources, attributes, and attribute values should be assigned lower sequence number and the more general catch-all type rules should be assigned higher sequence number.

Changeover rules can also be defined using the **Supply Chain Planning/Production Scheduling Organizations/ Changeover Rules** REST service. To know more, refer to the REST API for Oracle Fusion Cloud SCM guide.

Flow Sequencing Rules

You can define flow sequencing rules to influence how flow schedules that are assigned to a production line are going to be sequenced.

To ensure the solver considers the sequence you define, set the Scheduling Strategy to Rule-based sequence for the applicable production lines on the Production Lines page.

Define Flow Sequencing Rules

1. On the Production Schedules page, select **Manage Scheduling Organizations.**
2. On the Scheduling Organizations page, select the organization.
3. Click the **Actions** icon.
4. From the Actions menu, select Production Lines.
5. Set the Scheduling Strategy value to Rule-based sequence.
6. Click to open the **Action** menu for the selected production line.
7. From the menu, select Flow Sequencing Rules.
8. Select **Add**.
9. In the side drawer, enter the rule priority, select a rule type, and specify the details for the given rule type. You can optionally enter a rule name.
10. Select **OK**.

The flow sequencing rules are now defined for the selected production line.

You can also copy flow sequencing rules from one production line to another production line using the **Copy Flow Sequencing Rules** option. This will replace existing rules on the current production line with the rules from the other production line. Rules are copied from the selected production line only if their attributes are also assigned to the target production line.

The rule types and additional details required by each rule type are as follows:

Rule Type	Additional details to specify
Minimum Run	Minimum Run Size
Maximum Run	Maximum Run Size
Must Follow	Previous Attribute Value
Must not Follow	Previous Attribute Value
At Least K of N	At Least (K Value), Out Of Every (N Value)
At Most K of N	At Most (K Value), Out Of Every (N Value)
Must be First	-

Production Scheduling tries to respect all specified flow sequencing rules. However, this might not always be possible. You might define rules that conflict with each other, or the assigned flow schedules, production lines, days, and

attributes might make the rules impossible to satisfy. If rule violations are necessary, then rules with lower rule priority are less likely to be violated than those with higher rule priority

User-Defined Attribute Sequences

You can define an attribute sequence for use in scheduling and specify how the sequence is considered using a cycle rule.

For work center resources

Enable the following settings so that the solver considers the sequence you define:

- **Apply user-defined attribute sequence**, for applicable resources, on the Resource Parameters page.
- **Use scheduling buckets**, on the Schedule Options page.

Define an Attribute Sequence

1. Open the **Action** menu for an organization.
2. Select **Resource Parameters**.
3. Set the **Apply User-Defined Attribute Sequence** value to Yes.
4. Open the **Action** menu for the resource.
5. Select **Attribute Sequence**.
6. Select **Add**.
7. In the dialog box, select an attribute, its sequence number, and its cycle rule.
8. Select **OK**.

> **Note:** Define attribute sequences on a single production stage only to prevent contradictory scheduling behavior. Attribute sequences are applied only on resources that have resource type set to equipment and default units available set to 1 in Work Definition work area in Supply Chain Execution.

You can also define defined attribute sequences using the Supply Chain Planning/Production Scheduling Organizations/Resource Attribute Sequences REST service. To know more, see REST API for Oracle Fusion Cloud SCM guide.

For Production Lines

Enable the following settings so that the solver considers the sequence you define:

- On the Production Lines page, specify Scheduling Strategy as Attribute Sequence.
- Use scheduling buckets,oin the Schedule Options page.

Define an Attribute Sequence

1. Open the **Action** menu for an organization.
2. Select **Production Lines**.
3. Set the Scheduling Strategy value to Attribute Sequence
4. Open the **Action** menu for the production line.
5. Select **Attribute Sequence**.
6. Select **Add**.

7. In the dialog box, select an attribute, its sequence number, and its cycle rule.
8. Select **OK**.

Define an Attribute Value Sequence

1. Go to the **Attribute Sequence** UI.
2. Open the action menu for an attribute.
3. Click **Attribute Value Sequence**.
4. Open the action menu for an attribute value.
5. Specify the sequence number.
6. Click **OK**.

How the User-Defined Sequence Is Used

Production Scheduling considers the user-defined sequence for each scheduling bucket. The scheduling bucket in which a work order will be scheduled is based on the Need-by Date or the Need-by Override. If there are more work orders than can be accommodated in a scheduling bucket, it will continue with the sequence into the next scheduling bucket until all work orders assigned into that bucket are sequenced.

How Cycle Rules Are Used

Production Scheduling cycles through the user-defined sequence based on the sequence numbers of the attributes and attribute values. You use cycle rules to set the behavior of the user-defined sequence at the start of a scheduling bucket. A cycle rule can be set to restart, continue, or reverse.

- If you select Restart, the attribute value sequence restarts for the new scheduling bucket, in the order of the user-defined sequence. This can effect changeovers across scheduling buckets.
- If you select Continue, the attribute value sequence continues through the new scheduling bucket. This will reduce changeovers across scheduling buckets but will restart the sequence in order.
- If you select Reverse, the attribute value sequence can potentially reverse for the new scheduling bucket. This can be useful when you need to cycle up and down a user-defined sequence. For example, by going from Small to Large and then back down from Large to Small.

Note: Alternate resources must use the same cycle rule, attribute sequence, and attribute value sequence as the primary resource to prevent contradictory scheduling behavior.

Data Setup Reference for Scheduling Organizations

If you can't find data you're looking for while adding and configuring organizations to associate with a schedule, you might need to verify if it was set up in another work area. This table lists such data objects and the work areas they're set up in.

Data Object	Work Area of Origin
Organizations	Setup and Maintenance

Data Object	Work Area of Origin
Manufacturing attributes	Setup and Maintenance, as descriptive flexfields.
Item attributes	Setup and Maintenance, as extensible flexfields
Work definitions	Supply Chain Execution
Resources, resource capacity and resource availability	Supply Chain Execution

Note: Only users with security privileges to access the work area of origin can verify these setups. These privileges are granted by your enterprise administrator.

Related Topics

- Overview of Flexfields

Production Lines

Production lines are scheduled in a manner that spreads the flow schedules with completion date within the same scheduling bucket. Items with given attribute values are distributed evenly across the production lines, based on the flow schedule volume for those attributes.

The spread is based on item attribution from item extensible flexfields that are defined in Production Scheduling Organizations. To spread by item name, populate Item Extensible Flexfield with the name of the item and treat that like any other custom attribute.

Completed flow schedules within the schedule horizon are considered during the schedule calculation to avoid overstating the capacity. This is relevant in the scenarios when a schedule is refreshed sometime during the day and after several flow schedules might have already come off the line and were completed earlier that same day. Completed flow schedules aren't visualized in the Flow Schedules table and Gantt chart and they're solely considered during the schedule calculation.

Availability of required materials and components is checked at the beginning of a scheduling bucket. If not all required materials and components are available for a flow schedule, then it's moved into the next scheduling bucket and sequenced with the flow schedules allocated into that bucket.

Flow sequencing rules are evaluated across scheduling bucket boundaries, with one exception. The Must be First rule is evaluated first and separately within each scheduling bucket. When a flow schedule is placed first in a bucket by this rule, all other sequencing rules, except the K of N rules, are evaluated only within that bucket. This approach prevents conflicts where the Must be First rule could restrict the application of other rules across buckets, such as the Minimum Run rule.

As it isn't always possible to respect all sequencing rules, any rule violations are logged in the respective scheduled processes log file for the Run Scheduling Solve process.

Note that a work order header attribute isn't considered for flow sequencing, if two or more work orders, which produce the same item, have different attribute values for that attribute. Any flow sequencing rule that uses this specific work order header attribute is ignored. Sequencing rules for different attributes that apply to these work orders are still considered. Such circumstance might arise, if an attribute is item-independent, for example, corresponds to a customer categorization or demand classification. The attribute is displayed in the schedule views to support schedule analysis and drive potential manual resequencing by the user.

Define a production line

To define a production line:

1. On the Production Schedules page, click **Manage Scheduling Organizations**.
2. Select an organization.
3. Select the **Actions** icon.
4. Select the Production Lines option.
5. On the Production Lines page, click **Add**.
6. Select the production line.
7. Select a scheduling strategy:
    - If you select **Rule-based sequence**, the solve action spreads the flow schedules within a scheduling bucket based on item attributes. It ensures that appearance ratios and run sizes align with the volume of flow schedules with specific attribute values, relative to the total volume in the bucket. Any defined attribute-specific sequencing rules are considered as well.
    - If you select **Attribute sequence**, the solver considers the specified attribute and attribute value sequences, but not the flow sequencing rules.

3 Schedule Setup

Overview of Schedule Options

Use the Schedule Options page to set up your production schedule and to configure how it gets solved.

While creating a new schedule, you first define schedule options. To edit schedule options for an existing schedule, open the action menu for that schedule and click **Schedule Options**.

Set Up and Configure a Schedule

1. On the Manage Schedule Options page, specify a schedule name and a description.
2. Define the schedule scope. This includes the schedule horizon, the organization you want to schedule production for, and item catalogs and categories. Specify if you want to consider planned orders from supply planning while creating production schedules.
3. Configure schedule parameter values by defining scheduling horizons and fixed time fence settings.
4. Configure advanced schedule options by defining parameters such as resource allocation priorities and scheduling bucket specifications that drive algorithmic decisions during schedule generation.
5. Configure the schedule display by specifying which resources are displayed by default in the Gantt Chart.

Note: All dates and times in a schedule are displayed in the time zone of the scheduling organization.

Guidelines for Working with Planned Orders from Oracle Supply Planning

- You can reference a supply plan with a Fusion source in a production schedule and reference one production schedule per organization in a supply plan.
- The unreleased planned make orders from a supply plan are included in a schedule only if they satisfy the schedule scope criteria.
- Work orders from SCM Execution and unreleased planned orders from a supply plan or an integrated demand and supply plan are scheduled together in the same production schedule.
- In the subsequent supply plan runs, the planned make orders scheduled by Oracle Production Scheduling are considered firm.

Schedule Scope

The scope determines what data gets considered for scheduling.

Define the Scope of Your Schedule

1. Select the scheduling organization that you want to schedule production for.
2. (Optional) Select the **Schedule a single flow production line** option.

   The **Production Line** field is enabled. The **Item Catalog**, **Item Categories**, and **Include flow schedules** fields are disabled.
3. If you select **Schedule a single flow production line**, select the production line from the drop-down list.

   > **Note:** Schedule refresh and solve sequences the selected production line without considering the upstream and downstream manufacturing. All flow schedules within the schedule horizon on the production line are included in the schedule.

4. Select an item catalog. Consider these points when you select an item catalog:
   - In the Product Information Management work area on the Manage Catalogs page you can set Item Catalogs to be controlled at Organization level or Master level.
   - The schedule refresh considers the category assignment on master organization level only, independent of whether the item catalog is controlled at Master level or Organization level.
   - If controlled at the Organization level, then the item category association must include the item in the master organization for it to be included in the production schedule.
5. Select item categories.
6. Specify the schedule horizon. It's the duration of the scheduling period from the horizon start date. The horizon start date is derived using the anchor date and time.
7. Specify a horizon to allow consideration of past-due demands. Demands that were supposed to be fulfilled before the horizon start date are termed as Past-Due. Past-due demands within this horizon are considered for scheduling.
8. Specify a horizon to allow consideration of past-due supplies. Supplies that were supposed to be available before the horizon start date are termed as Past-Due. Past-due supplies within this horizon are considered for scheduling.
9. Select an option to specify how maintenance work orders must be considered.
   - **Schedule only manufacturing work orders:** Only manufacturing work orders are considered in the Gantt chart and dispatch list.
   - **Consider maintenance downtime in manufacturing schedule:** Both maintenance work orders and manufacturing work orders are considered. Maintenance work orders correspond to resource downtime, and the manufacturing work orders are scheduled accordingly around them.
   - **Schedule only maintenance work orders:** Only maintenance work orders are considered.
10. Specify whether to include unreleased planned make orders from Oracle Supply Planning.
    - If you enable this setting, you can reference a supply plan or integrated demand and supply plan and include its unreleased planned make orders in subsequent schedule runs.
    - The unreleased planned make orders from Supply Planning are included only if they satisfy the schedule scope criteria.
    - After you enable this setting, you can schedule work orders from Supply Chain Execution and planned make orders from Supply Planning at the same time.
    - If unreleased planned make orders from Oracle Supply Planning are included in the production schedule and alternate work definitions are in use, then for data that isn't transactional, specifically work definitions, use targeted collections for Supply Planning instead of net-change collections.
11. You can select the plan from the Plan Name drop-down list. The last run date for the plan is automatically populated.
12. Specify whether to include flow schedules from Oracle SCM Work Execution.

If you select the option **Include flow schedules** then the flow schedules and the relevant production lines are included in the production schedule if the items produced belong to the specified item categories. Planned orders from Supply Planning for items running on production lines aren't included in the production schedule. Production Scheduling sequences flow schedules by their completion dates and build sequence numbers from SCM Execution. Flow schedules that exceed a day's production line capacity are pushed to the next day. For the production line availability, the respective organization calendar is used.

> **Note:** If you include flow schedules, then the time component in schedule parameter **Anchor Date and Time** must be set to midnight to encompass the entire day's sequence.

> **Tip:** You can improve scheduling performance by reducing the number of operation-resource records considered by the application. To do so, limit the schedule horizon, the number of items, or the past-due supply horizon.

Schedule Parameters

Schedule parameters mark key horizon settings and determine scheduling behavior.

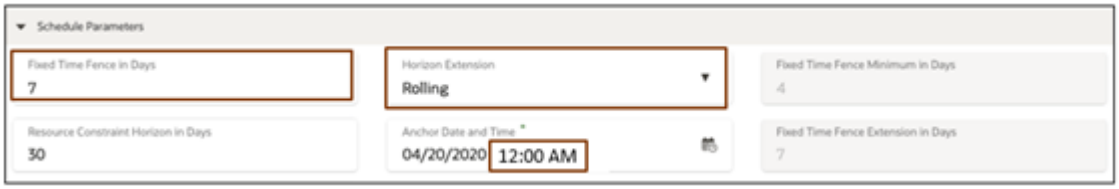
Configure Schedule Parameters

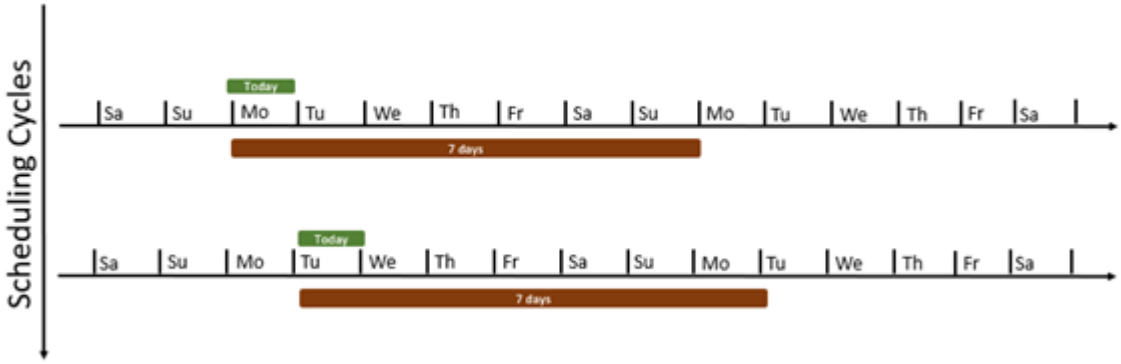
1. Specify the fixed time fence duration. Start dates of firm work orders defined in Oracle Fusion Cloud Manufacturing, and that fall within this horizon, are considered.

2. Specify the horizon extension type to control how the application determines the horizon start and the fixed time fence.

    - If you select **Rolling**, the duration of the fixed time fence stays constant while the start date shifts by a day, each day.

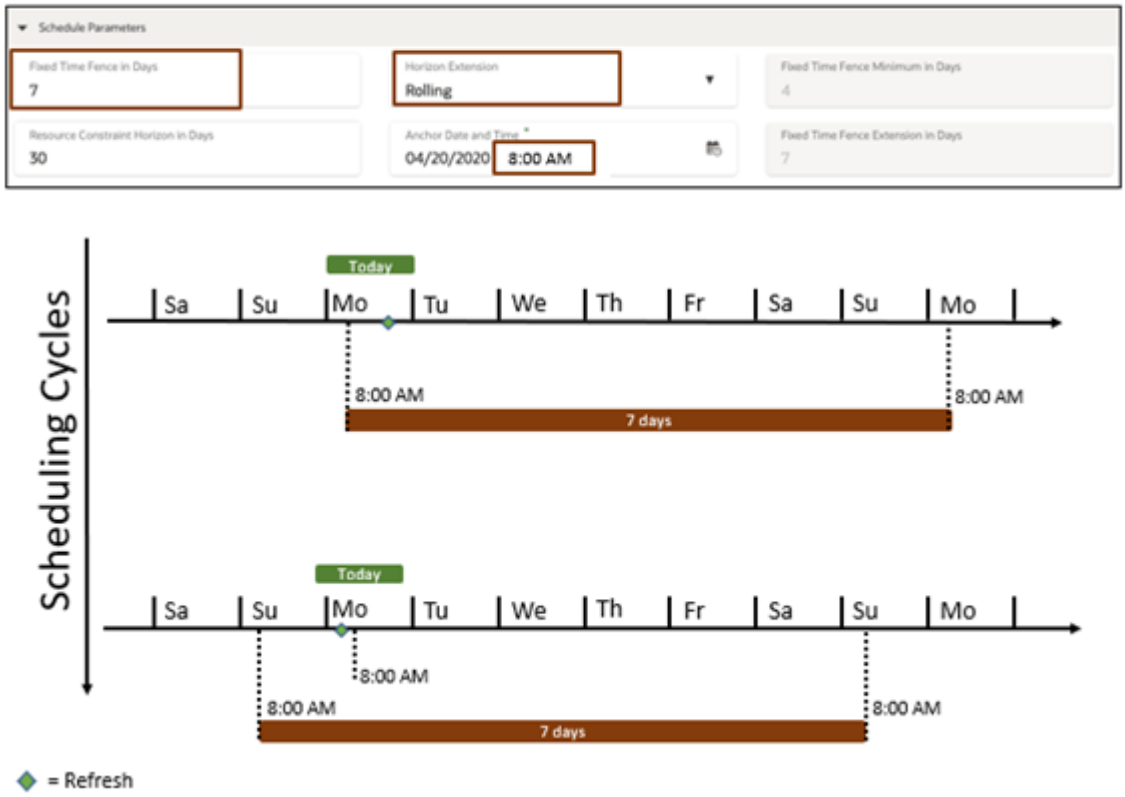
        - If the anchor time is midnight, and the schedule refresh is performed after midnight on the same day, the fixed time fence is counted from midnight on that day, regardless of what time the schedule refresh is performed.





        - If the anchor time isn't midnight, let's say it's 8:00 a.m. today, and a schedule refresh is done after 8:00 a.m. today, then the horizon start and fixed time fence start is 8:00 a.m. today. But if a refresh

is performed before 8:00 a.m. on a given day, the horizon start time fence start is 8:00 a.m. the previous day.



- If you select **Dynamic**, the horizon start is the current day, and the time fence shrinks with each passing day until it reaches a time fence minimum duration. When this minimum value is reached, the time fence gets extended. If you select this extension type, you must also specify the time fence minimum duration and time fence extension duration.

  - The time fence shrinkage is the difference between the fixed time fence duration and the number of days between the current day and the last day of the time fence. So if the anchor date and time is Monday 12:00 a.m., the fixed time fence duration is 7 days, and you're refreshing the schedule at Thursday 12:00 a.m., the time fence has shrunk to 4 days. If you set the minimum as 4 days and the extension as 7 days, then from Friday 12:00 a.m., the time fence will have shrunk to 3 days,

which is below the limit of 4 days, and will extend by the extension duration of 7 days. This results in a total time fence duration of 10 days.

> **Tip:** The dynamic mode works best if the fixed time fence duration is a multiple of 7.

3. Specify the resource constraint horizon, a duration that's counted from the horizon start date. Resource capacity constraints and calendar events within this horizon are considered during scheduling.
4. Select the anchor date and time. This is used to calculate the fixed time fence start, the schedule horizon start, and, if scheduling buckets are used, the scheduling bucket start date and time. The schedule horizon start and fixed time fence start is the last time value of the anchor date and time before a schedule refresh; the scheduling bucket start is the anchor date and time.

> **Note:** If the option **Include flow schedules** in the section Schedule Scope is selected, then the anchor time must be midnight to encompass the entire day's build sequences.

5. Specify the release horizon. It's a duration that's counted from the horizon start. Work orders with start dates within this horizon only are released.
6. Specify the lateness tolerance in hours. Lateness tolerance is the number of hours from a Need By date by which a demand or work order is considered late by the application.
7. Specify whether to firm released work orders that begin during the fixed time fence period.
    - If the **Firm released work orders that begin during the fixed time fence period** option is selected, then during the schedule refresh all the released work orders within the fixed time fence are firmed.
    - When repair, solve, or schedule release is run, the firm status of the other work orders remains unchanged. You can change the firm status of the work orders only through the Work Orders table.
8. Specify the work order release status settings when the schedule is published.

    - If you select Mark work orders as released, the work orders irrespective of their current status are set to the released status when the schedule is published.
    - If you select Retain current work order status, the work orders retain their current status when the schedule is published.

Advanced Schedule Options

Advanced schedule options like resource allocation priorities and scheduling bucket specifications drive algorithmic decisions during schedule generation.

Configure Advanced Schedule Options

1. Select the resource allocation priority type, based on which the solver assigns work order operations to alternate resources.
    - If you select **Earliest completion time**, work order operations are assigned to resources that allow them to be completed relatively sooner.
    - If you select **Changeover and idle time aware**, work order operations are assigned to resources such that changeover and idle time is minimized locally.
2. Specify whether to use scheduling buckets.

    If the **Use scheduling buckets** setting is enabled, the schedule horizon is divided into buckets, and the scheduling bucket starts from the anchor date and time. If you enable this setting, you must also specify the scheduling bucket size.

    > **Note:** To use buckets and the horizon extension is dynamic, your bucket must align with the fixed time fence, in that the end of the fixed time fence must match the bucket limit.

3. Specify whether to use accelerated dispatching.

    If the **Use accelerated dispatching** setting is enabled, the solver uses a simplified algorithm for faster dispatching, used in scheduling models where only one production stage is constrained and many work orders with same need-by dates have to be sequenced. This simplified algorithm might lead to lower overall solution quality in schedules with alternate resources or multiple production stages due to the trade-offs made to increase performance.
4. Specify whether to respect firm work orders within the fixed time fence.

    If the **Respect firm work orders** setting is enabled, the application schedules firm work order operations such that their assigned start dates will be respected throughout the fixed time fence. Production Scheduling might move firm work orders outside the fixed time fence to respect constraints.
5. Specify the duration of a scheduling bucket.
6. Select whether to prebuild relaxed upstream resources.

    If you enable this setting, operations on a relaxed upstream resource will be scheduled regardless of when operations on a constrained downstream resource are scheduled to begin. This means upstream operations can complete well in advance of when downstream operations begin. If you don't enable this option, upstream operations will be scheduled to complete just as downstream operations begin, or to their need-by date or need-by override if that happens to be earlier.
7. Specify a prebuild maximum duration.

    It's the number of days in advance of the Need-by Date, that a work order can be scheduled for. This duration determines the bucket to use for scheduling work orders that run on resources with a user-defined attribute sequence.

> **Note:** The prebuild maximum duration is considered only when scheduling buckets are used.

8. Select whether to use the anchor date as the horizon start date.

   If you enable this setting, the schedule horizon is no longer calculated from your local date and time but from the anchor date and time, making it constant. Then, the schedule data isn't affected by any differences between the anchor date and time and your current date and time. The past-due windows for both supplies and demands also stay constant with respect to the schedule horizon dates.
9. Specify the repair behavior you want to apply during manual scheduling.
   - If you select the **Multistage** checkbox, then the repair reschedules all work order operations in the work definition. This repair behavior minimizes the work order's make span but can lead to overlap of upstream and downstream operations with other work order operations. Multistage repair works well in scheduling models in which only the manufacturing stage on which you performed manual scheduling changes is constrained.
   - If you select the **Single-stage** checkbox, then the repair reschedules only work order operations that were modified during manual scheduling. This repair behavior is preferred if the work order has upstream or downstream operations that run on constrained resources. In some cases, the upstream or downstream operations are rescheduled to ensure start-after-end precedence constraints within the work order.
10. Select whether to prioritize the work order need-by date over the demand requested date.
    - If **Prioritize work order need-by date over demand requested date** is selected, Oracle Production Scheduling uses the work order need-by date for scheduling, even if a work order is reserved for a sales order. This can be helpful because the work order need-by dates already reflect strategic planning decisions made by Oracle Global Order Promising and Oracle Fusion Cloud Supply Chain Planning.
    - If **Prioritize work order need-by date over demand requested date** isn't selected, Production Scheduling prioritizes the pegged demand requested date over the work order need-by date.
11. Specify if the minimum transfer quantity maintained on work definitions should be used for schedule calculation.
    - If the **Consider minimum transfer quantity for schedule calculation** checkbox is selected, then the minimum transfer quantity, if defined on the work definition, is considered for schedule calculation.
    - If the **Consider minimum transfer quantity for schedule calculation** checkbox isn't selected, then the minimum transfer quantity won't be considered for schedule calculation.
12. Specify whether the item lead times should be considered when addressing inventory shortages.
    - If the **Ignore item lead times** option is selected Production Scheduling can schedule the work order operations that depend on a component's shortage quantity as early as the internal data horizon starts, effectively ignoring the material constraint.
    - If the **Ignore item lead times** option isn’t selected, the dependent work order operations respect the lead times and are pushed out to horizon start plus the component item's lead time.

Changeovers

1. Specify if changeovers should be inserted between operations with same attribute values.
   - If the **Insert changeovers between work orders with same attribute values** checkbox is selected, changeovers are inserted between different work orders even if their operation attribute values are the same.
   - If the **Insert changeovers between work orders with same attribute values** checkbox isn’t selected, then changeovers will only be inserted if the operation attribute values are different.
2. Specify if resource calendar and maintenance downtime during changeovers must be respected.
   - If **Respect resource calendar during changeovers** is selected, resource downtimes and maintenance are considered while performing production changeovers such as setups and cleanups.

- If **Respect resource calendar during changeovers** isn't selected, production changeovers might be scheduled during resource downtimes and maintenance.

3. Specify the number of days in **Look Ahead Window in Days.** It's the number of days that Production Scheduling scans into the future to identify operations with the same attribute value specified in the resource parameter, **Grouping Attribute for Changeover Reduction**, to schedule them adjacently and reduce changeovers. This only applies when the user-defined attribute sequence functionality isn't used.

For more information on minimum transfer quantity, see the topic titled *Minimum Transfer Quantity*.

Schedule View Settings

Schedule view settings determine the data that's to be displayed in the Gantt chart in the schedule view UI.

Configure View Settings

1. Select a default resource group for display in the Gantt chart. You can switch to another resource group later from the Gantt chart toolbar.

   > **Note:** Limiting the number of resources to be displayed might improve application performance.

   > **Note:** The selection of a default resource group can be done only after refreshing the schedule.

2. Specify the default display horizon in terms of days. This allows to set the number of days the Gantt chart considers to display data when you open the schedule view.
3. Specify how the labels for work order operations in the Gantt chart will be displayed. These are different combinations of item, work order, and operation that can be used as display label.
   - Work order and operation
   - Work order and item
   - Item and work order
   - Item and operation
4. Specify how the resource labels will be displayed in the Gantt chart, Dispatch List, and Resource Utilization. Select any of these options that will be used as a resource label.
   - Resource code
   - Resource name
5. Specify the time in the field **Flow Schedule Aggregation in Hours**. Individual flow schedules that end within the specified number of hours are merged in the Gantt chart and displayed as an aggregate taskbar. Only the last operation in a flow work definition is included in the aggregation. The aggregation logic gets applied from schedule horizon start. The underlying, individual flow schedules are still visible in the tabular display.

Minimum Transfer Quantity

Minimum transfer quantity is defined on an item's work definition to schedule overlapping and sequential operations of work orders. You can start the next operation when minimum transfer quantity is completed in the prior operation of the work order.

If the **Consider minimum transfer quantity for schedule calculation** checkbox in the Advanced Schedule Options section of Schedule Options page is selected, Oracle Production Scheduling considers the minimum transfer quantity during schedule calculation. If there's a minimum transfer quantity defined on an item's work definition, it will schedule operation resources considering this minimum transfer quantity. This might result in operations overlapping and earlier completion times.

Only operation-resource sequences, with basis set as variable in Oracle Manufacturing, permit overlap if minimum transfer quantity is considered. If the basis is set as fixed, operations are rigidly scheduled one after the other, without overlaps, regardless of minimum transfer quantity.

If the **Consider minimum transfer quantity for schedule calculation** checkbox isn't selected, Oracle Production Scheduling ignores the minimum transfer quantity, and all operations are scheduled sequentially without considering minimum transfer quantities. There won't be any overlaps, and each operation will follow the previous one in a sequential manner.

Minimum transfer quantity defined in the work definition applies to all operations within that work definition.

You can edit the **Consider minimum transfer quantity for schedule calculation** checkbox only if you opt-in to Plan and Schedule Supplies Respecting Minimum Transfer Quantity between Operations feature.

Batch Quantity Scaling

In process work definitions, the batch quantity plays a crucial role in scaling both the quantity and duration values for operation minimum transfer quantity slices.

For instance, if a work order has a quantity of 100, a batch quantity of 10, and an minimum transfer quantity of 20, Production Scheduling will divide the work order into 5 minimum transfer quantity slices. Each slice will be scaled to 1/5th of the total work order duration and will produce 20 units.

Ideally, the minimum transfer quantity in process work definitions should match the batch quantity or be multiples of the batch quantity.

How is Minimum Transfer Quantity Considered During Repair Action

If the **Consider minimum transfer quantity for schedule calculation** checkbox is selected and an operation's duration is less than the duration of an upstream or downstream operation, a Repair action might compress the operation.

- For single-operation work orders, repair always compresses operations.
- For multi-operation work orders, compression depends on the Repair mode:
  - Single-stage repair compresses operations.
  - Multi-stage repair might keep the original duration if the manual schedule change allows.

Reservations

A reservation is a link between a supply document and a demand document.

For example, you can create a reservation for a demand document type of sales order against a supply document type of purchase order. The reservation creates the association between these two documents and ensures that the specified quantity of an item is available on a certain date. Production Scheduling respects reservations while creating a schedule.

You can see the supply reservations in the **Dispatch List** tab. You can view the Reservation details for the components in Oracle Manufacturing using the link to Work Order details.

Following types of reservations are supported (Supply → Demand):

Work Order	• Sales Order • Work Order • Transfer Order
On-hand	• Sales Order • Work Order • Transfer Order
Purchase Order	• Sales Order • Work Order • Transfer Order
Transfer Order	• Sales Order • Work Order • Transfer Order

The consideration of reservations within Production Scheduling are as follows:

- Work order components can be reserved to supplies and work orders can be reserved to demands such as sales orders.
- Nonwork order reservations are considered. Therefore, the appropriate supplies are netted out of the schedule.
- Reservations for work orders that aren't in the schedule scope aren’t considered.
- Reservations are defined in Oracle Fusion Cloud Supply Chain Planning and can't be modified or removed in Production Scheduling.
- You can see the sum of the demand reservation quantity that a work order is reserved to in the Reserved Quantity column.

Data Setup Reference for Schedule Options

If you can't find values you're looking for while configuring a schedule, you might need to verify if they were set up in another work area. This table lists such data objects and the work areas they're set up in.

Data Object	Work Area of Origin
Scheduling organizations	Production Scheduling, added from the Manage Scheduling Organizations UI.
Items, item structures, item catalogs, and item categories	Product Information Management
Calendars and calendar constraints	Supply Chain Execution
Resources, resource capacity, and resource availability	Supply Chain Execution
Work Orders	Supply Chain Execution
Work Definitions	Supply Chain Execution

Note: Only users with security privileges to access the work area of origin can verify these setups. These privileges are determined by your enterprise administrator.

4 Schedule Processes

Overview of Schedule Actions

You can begin scheduling after your schedule has been set up.

Refresh and Solve a Schedule

Open the actions menu of a schedule to refresh or to refresh and solve a schedule.

- Click **Refresh** to update schedule data.
- Click **Refresh and Solve** to update schedule data and generate a new schedule.

You can review a schedule after either action, by clicking **Open** in the action menu. You can also solve the schedule using the **Solve** button in the schedule view.

> **Note:** You must refresh a schedule after its last release, or else changes to the schedule for some work orders made after that release may not get released in the next one.

Analyze and Adjust a Schedule

In the actions menu for a schedule, click **Open** to enter the schedule view. Here's how you analyze and adjust a schedule:

1. Review schedule analytics.
2. Adjust the schedule using the interactive features of the Gantt chart and the focused data views.
3. Click **Repair** to implement your adjustments. It's best that you repair the schedule after every adjustment.

If you need to undo all your manual adjustments and repairs since the last solve process, click **Solve**.

Release a Schedule

Use release actions to review the number of work orders slated for release, and to release the schedule to your manufacturing application.

1. Click the **Release Schedule** button in the schedule view.
2. Review work order metrics.
3. Click **Release**.

Duplicate a Schedule

1. In the actions menu for a schedule, click **Duplicate** to open the Duplicate a Schedule dialog box.
2. Enter an unique name and description of the duplicated schedule.
3. To copy only the schedule options of the original schedule, select the **Copy schedule options only** check box.
4. Click **Duplicate**.

Refresh and Solve Actions

Use the Refresh action to update your schedule data, such as work order data, attribute data, and resource capacity and availability. You can refresh a schedule at any time.

- A refresh discards the existing scheduling solution to make way for the new data, so if you need to retain an existing solution, release the schedule before refreshing it.
- A schedule refresh updates the schedule with new data from Oracle Fusion Cloud Manufacturing. When you set the resource parameter mode to constrained or relaxed for capacity only, the calendar events are taken into account when refreshing and the work order operations may be moved. But if you choose relaxed mode, the calendar events are ignored and work order operations are as retrieved from Oracle Fusion Cloud Manufacturing.
- Pegging links are accurate only after a solve action.

If you want the solver to automatically generate a new solution after a refresh, click **Refresh and Solve**.

> **Tip:** If you need to review a refreshed schedule before solving it, click the Refresh action, then open the schedule to review it. You can then solve it using the Solve action in the schedule view.

Solve and Repair Behavior

The Solve and Repair processes help in efficiently fine-tuning the schedules before a release, thereby reducing scheduling cycle times.

You can allow or disallow offloading an operation to an alternate resource or fix the start time of a work order operation for consideration in subsequent solves. You can manually adjust the schedule of a single production stage, firm the schedule at that stage, and then align the upstream and downstream stages through a solve action.

After manual scheduling changes like offloading or resequencing, the subsequent repair action implements the changes, ensuring that appropriate production rates are applied, and the correct changeovers are inserted. A manual scheduling change is complete only after the repair action. Changes to the properties only affects the solve action and not the repair action.

Data changes that qualify for Repair action are:

- In the Gantt chart: Drag & drop actions
- In the Dispatch List: Resequencing using the up or down arrows, hanging start time, and selecting alternate resource

All other data changes don't qualify for Repair, but instead require a Solve action as follows:

- In the Gantt chart: Mass edit of work order operations' Fixed Start Time, Offloading Allowed
- In the Dispatch List: Edit Need-by Override
- In the Work Orders table: Edit Need-by Override, Earliest Start Date, Firm Status
- In the On-Hand Inventory table: Edit Override for Lead Time (Days)

- In the Inbound Supplies table: Edit Override for Requested Date and manually adding new supply

Pegging Data

Pegging data is recalculated after each Solve and Repair action. During pegging calculation, reservations are respected, and all non-reserved supplies and demands are pegged in a FIFO manner. Several features on the page are based on pegging data. For example, the display of pegging links, pegging highlighting of operations in the Gantt chart from schedule data tables underneath the Gantt chart, and filtering rows in the schedule tables from the selection of operations in the Gantt chart.

> **Note:** Pegging data isn't reliable for items for which the consumed quantity inside the fixed time fence exceeds the item's supply inside the FTF, and in case a consuming operation was moved prior its supplying operations using manual scheduling.

Properties Impacting Schedule Calculation

There are several work order and work order operation properties that impact schedule calculation. Some of these simply describe the work order and its operations, such as the item produced by the work order, the work order quantity, the resource hours needed by the various operation resource sequences, and the materials and quantities required by each work order operation. Other properties provide additional guideposts that the solve action must consider. These include the work order firm status, the work order operation firm status, and the work order operation offloading allowed with the latter two being available only in Oracle Production Scheduling.

- Work Order
  - Firm status: This status is displayed in the **Work Orders** tab. After a schedule refresh, the the toggle switch in the **Firm** status column is on for all work orders that are firm in SCM Work Execution and for all released work orders that start inside the fixed time fence, if the **Firm released work orders that begin during the fixed time fence period** option is selected on the Schedule Options page. You can toggle this switch on or off.
- Work Order Operation
  - Firm status: This status of work order operation is displayed in the **Dispatch List** tab and is available only in Production Scheduling. After a schedule refresh, the status is displayed as Firm for all operations of a firm work order and as an empty cell for all unfirm work order operations. If you set the **Fixed Start Time** then this status will display Fixed start time for those work order operations that were changed, regardless of the status of the work order.
  - Offloading Allowed: This status of work order operation is displayed in the **Dispatch List** tab and is available only in Production Scheduling. After a schedule refresh, the default status is displayed as off for all operations of a firm work order, and on for all operations belonging to nonfirm work orders.

Change the status of the properties manually.

1. Select one or more work order operations in the Gantt chart or Dispatch List.
2. Click **Edit** to open the drawer.
3. On the work order operations page, set the values of **Fixed Start Time** and **Offloading Allowed** properties as required.
4. Select **Update**. The corresponding values are changed.
5. Click Solve. The solve action considers these properties and aligns the upstream and downstream operations.

Note: The data in the dispatch list isn't refreshed automatically. You need to switch between resources or run the solve process.

Note: It's recommended to change the Work Order Operation's Firm Status and Offloading Allowed properties only after completing all manual scheduling changes via a repair action.

How the Properties Interact and are Considered During Solve and Repair

While the work order operation's firm status and the offloading allowed properties are independent of one another, they both interact individually with the work order's firm status. The following tables explain the solve and repair behavior for various combinations. It also explains whether the work order operation dates can be changed by the solve or repair actions depending on the work order firm status and operation firm status.

Work Order Firm Status	Operation Firm Status	Solve	Repair
Firm	Fixed start time	Solve action respects the dates inside fixed time fence. It tries to respect the dates outside the fixed time fence but might change it if necessary.	You can change work order operation dates through manual scheduling and subsequent repair action.
Firm	Firm (inherited from work order firm status)	Solve action respects the dates inside fixed time fence. It tries to respect the dates outside the fixed time fence but might change it if necessary.	You can change work order operation dates through manual scheduling and subsequent repair action.
Not Firm	Fixed start time	Solve action respects the dates inside fixed time fence. It tries to respect the dates outside the fixed time fence but might change it if necessary.	You can change work order operation dates through manual scheduling and subsequent repair action.
Not Firm	Not Firm	Work order operations are scheduled flexibly, and their dates will typically change	You can change work order operation dates through manual scheduling and subsequent repair action.

Note: Inside the fixed time fence, the solve action removes precedence constraints between two operations with operation firm status set to Firm or Firm start time if their firm dates conflict with each other and advanced solver option **Respect firm work orders** is selected.

Work order operations can be offloaded to alternate resources by the solve and repair actions depending on the work order firm status and operation allow offloading values. The following table explains the various scenarios.

Work Order Firm Status	Operation Offloading Allowed	Solve	Repair
Firm	Yes	Work order operation might be offloaded to an alternate resource.	Work order operation can be offloaded to an alternate resource, if operation hasn't been transacted yet.

Work Order Firm Status	Operation Offloading Allowed	Solve	Repair
Firm	No	Work order operation won't be offloaded to an alternate resource.	Work order operation can't be offloaded to an alternate resource.
Not Firm	Yes	Work order operation might be offloaded to an alternate resource.	Work order operation can be offloaded to an alternate resource, if operation hasn't been transacted yet.
Not Firm	No	Work order operation won't be offloaded to an alternate resource.	Work order operation can't be offloaded to an alternate resource .

Schedule Analysis and Adjustment

Analysis and Adjustment Using the Gantt Chart

Review schedule analytics and use the Gantt Chart to review detailed aspects of your schedule using various filtering and highlighting features, and to perform manual schedule adjustments.

Analyze

Before working with the Gantt Chart, review these analytics:

- **Late Work Orders:** Number of work orders and planned orders scheduled for completion after their Need-by dates.
- **Late Demands:** Number of demands with available date after requested date.
- **Changeover Time:** Sum of all changeover time durations.
- **Labor Utilization:** Percentage of labor resource usage
- **Equipment Utilization:** Percentage of equipment resource usage.

Understanding the Gantt chart

- On work center resources that are setup with default units greater than one, the work order operations can't be seen individually on the Gantt chart. In such cases, the resource usage is indicated through different colors. The darker shades of the color are used to denote heavier usage of resources.
- Maintenance work orders are displayed as thin, colored taskbars. The tooltip provides detailed information about the maintenance work order.
- Darker shade of color is used for operations belonging to planned orders from Oracle Supply Planning, while lighter shade is used for operations belonging to work orders from SCM Execution.
- The first solid vertical line represents the start of the schedule horizon; the second solid vertical line represents the end of the schedule horizon.
- The first dashed vertical line represents the end of the fixed time fence; the second dashed vertical line represents the end of the resource constraint horizon.
- Gray areas in the background of a schedule indicate downtime for that specific resource or production line.

- To view the resource usage levels of a particular resource, and individual work order operations that are scheduled on that resource, select the option **Display of Resource Units in Gantt Chart** on the Resource Parameters page. If you don't select this option, then you can only view the aggregate resource usage levels.

  > **Note:** For constrained pooled resources, the number of child rows will be only as many as necessary to display the assigned operations without overlap, and at most equal to the resource's default units available. Outside the resource constraint horizon, that's specified in the schedule options, any operations that exceed the Default Units Available are drawn on the last child row. For pooled resources that are capacity-relaxed, only one child row is shown, and the assigned operations are displayed in overlapping fashion just like on relaxed single-capacity resources.

- An icon before the resource name indicates whether this is a labor or equipment resource. A tooltip appears when you hover over the resource, that provides some additional information, such as the default units available, the constraint mode of a resource, or the number of line operations for a flow line.
- To collapse or expand the Gantt chart and view the data in a tabular form, click the small solid line at the end of the page.

Use the various options available on the Gantt chart toolbar to help you analyze and understand your schedule.

- Resource Group: Use this filter to choose whether to review data for all resources or for a group of resources for schedule analysis.

  > **Note:** When the Default Units Available value for a work center resource is more than 1, you can review resource levels using colors in the Gantt chart. Individual operations aren't displayed.

- Filter By and Filter Value: Use these fields to identify specific work orders or work orders that produce specific items. More information is displayed when you hover over an operation in the Gantt chart.

  > **Note:** The Filter By values, Asset and Type, apply to Maintenance work orders only.

- Highlight Attribute: Use this option to select a specific attribute to highlight all work orders or items defined with that attribute. For example, if you select attribute as Pack Size, then all operations with the Pack Size attribute will be highlighted, and those with the same pack size value will be displayed in the same color that was assigned to that size.
- Highlight: Use this option to highlight work orders and work order operations based on:
  - Firm
  - Fixed start time
  - Late
  - Offload to alternate source
  - Offloading allowed
  - Pegged to shortage
  - Released
- Show Supplies: Use this option to identify the supplies and view the upstream and downstream pegging links. A Supplies row in the Gantt chart displays the purchase orders and inbound transfer orders.
- Show Demands: Use this option to identify the demands and view the upstream and downstream pegging links. A Demands row in the Gantt chart displays the sales orders and outbound transfer orders.

  > **Note:** Only the earliest 200 supplies and earliest 200 demands are displayed in the Gantt chart.

- Pegging link button: Use this option to identify task dependencies. Task dependencies are represented by solid and dashed lines known as pegging links. Straight vertical lines indicate highly synchronized production, and diagonal lines indicate less synchronized production. Select a work order operation, or a diamond in the supplies or demands rows to view the pegging links.

  Solid lines indicate successive operations within the same work order routing. Dashed lines indicate inventory relationships between supplies and operations, operations belonging to different work orders, operations and demands, or supplies and demands.

  Dashed lines indicate these scenarios:
  - A producing work order feeding one or more downstream consuming work orders or demands.
  - A consuming work order receiving components from one or more upstream work orders or supplies.
  - A supply feeding one or more demands.
  - A demand receiving components from multiple supplies.

  > **Note:** The pegging links are visible only when the **Show Pegging Links** button is selected.

  Pegging is calculated at the end of each solve action. You can use the production scheduling pegging REST services to access the pegging data, which is the basis for pegging visualization in the Gantt chart. See REST documentation for more details.

  Pegging links are only visible for objects that are currently displayed on the Gantt chart based on the selected resource group. For resources with default available units greater than one, pegging links are displayed only if the resource is displayed by resource units, defined through resource parameters, and if the resource is expanded.

  If an operation has a primary resource and also simultaneous resources, then its drawn in the Gantt chart on each of those resources, but the pegging links to/from the operation is displayed only for the operation object drawn on the primary resource.

  For links between operations of the same work order, the dependency type is shown in the pegging link tooltip.
- Panning mode: Use this option to enable smooth exploration of the content, making it easier to focus on different areas while maintaining context.
- Edit Resource Availability: Use this option to add or remove downtime, add availability, or modify resource availability. In this mode, the resources that are defined with default units available greater than one in Work Execution are displayed using a color scheme. The scheme uses ten colors ranging from green to red, where green indicates more units available and red indicates fewer units available.
- Clear Pegging Highlights
- Zoom to Fit: Use this option to resize the page.
- Edit: Use this option to modify work order operation.
- Show Pegging Data: Use this option to view pegging data for a work order. This button is only active, if a single work order operation in the Gantt chart is selected.
- Flow Schedules: Flow schedules on a production line aren't visualized individually in the Gantt chart. Instead, they're shown as a flow schedule group. The grouping depends on schedule option **Flow Schedule Aggregation in Hours**. Only the last operation of a flow work definition that indicates the expected completion

of the flow schedule, is included in the Flow Schedule Group. Preceding operations in a flow schedule aren't displayed. Flow schedule groups are visualized only and can't be interacted with for manual scheduling.

Selecting a flow schedule in the Gantt chart also selects the contained individual flow schedules in the Flow Schedules table. Pegging links to and from an individual flow schedule are visualized to and from the flow schedule group that contains the respective flow schedule. Because the production lines aren't a part of a work center in SCM Execution, they can't be added to a resource group, and they're always displayed below the work center resources.

Production lines aren't included in the calculation for equipment utilization.

Adjust

You can change resource assignments, manage downtime events, and operation properties in the Gantt Chart.

Change the resource or start time for an operation.

1. Move an operation from a resource to an alternate resource by dragging and dropping it or move it backward or forward in time on the same resource. You can also select a sequence of operations to drag and drop.
    - For resource offloading to work within Production Scheduling, the resource sequence number of the work order operation must match the resource sequence number of the work definition operation in the Supply Chain Execution work area.
    - If you can't offload an operation to an alternate resource, then verify the presence of alternate resources in the respective work definition operation-resource sequence in Supply Chain Execution, Work Definition, and that the work order isn't firm.
    - Phantom components with resource alternates in their work definition might not be offloaded by the system. This might be because the phantom explosion process in Work Execution during work order creation can introduce inconsistencies in resource sequence numbers.
    - Alternate resources and operation attributes exist on the work definition but not on the work order within the SCM Execution. To ensure they're included in a production schedule, the work definition should be setup such that the phantom items are consumed by a separate (upstream) operation-resource sequence with Scheduled option set to No.
2. Specify the operation start time and click **Save**. If you selected multiple operations, specify the new start time of the first operation in the sequence.
3. Click **Repair** to ensure that the schedule accommodates the adjustment. Here are some things to consider when you do a repair after a drag-and-drop operation:
    - Dropped operations are scheduled one after the other without any time gap.
    - For constrained resources with default units available set to one, any overlaps among the moved operations will be resolved and changeovers will be inserted as per the defined changeover rules.
    - The target resource, and not the original resource, are rescheduled only when the operations are offloaded.

Manage downtime events and availability.

You can add or remove downtime or add availability by using the option **Edit Resource Availability** for work center resources of type machine and labor and for production lines. After making the changes, click the button again to deactivate the edit mode.

To add a downtime event:

1. Right-click the schedule.
2. Select **Add Downtime**.
3. Enter the resource or resource group, start date, start time, end date and end time.

4. To modify downtime over a specific period of the schedule horizon, select **Recurrence** . You can define recurrence only if the events have duration of up to 24 hours.
    a. Enter the **Start On** date and the **End By** date. The period should be within the schedule horizon.
    b. Select the weekdays for which the downtime must be applied.
5. Select **OK**

To remove a downtime event:

1. Right-click the schedule.
2. Select **Remove Downtime**.

To add availability:

1. Right-click the schedule.
2. Select **Add Availability**.
3. Enter the resource or resource group, start date, start time, end date and end time.
4. To modify downtime over a specific period of the schedule horizon, select **Recurrence**. You can define recurrence only if the events have duration of up to 24 hours.
    a. Enter the **Start On** date and the **End By** date. The period must be within the schedule horizon.
    b. Select the weekdays for which the availability must be added.
5. Select **OK**
6. Click **Solve** to ensure that the schedule accommodates the new resource availability and new downtime.

To edit resource units:

1. Right-click the schedule.
2. Select **Edit Resource Units**.
3. Enter the resource, start date, start time, end date, end time, and resource units.
4. To modify downtime over a specific period of the schedule horizon, select **Recurrence**. You can define recurrence only if the events have duration of up to 24 hours.
    a. Enter the **Start On** date and the **End By** date. The period must be within the schedule horizon.
    b. Select the weekdays for which the availability must be added.
5. Select **OK**
6. Click **Solve** to ensure that the schedule accommodates the new resource availability and new downtime.

> **Note:** The solve process discards manual adjustments to work order operations, including those saved using the **Repair** action, and calculates a new schedule

> **Note:** To ensure predictable repair solve results, avoid performing both drag-and-drop actions in the Gantt chart and resequencing actions in the Dispatch List involving the same work order operations. Repair the schedule after Dispatch List resequencing and also after Gantt chart drag actions.

Change operation properties that impact the solve behavior.

1. Select one or more operations on the Gantt chart.
2. Click **Edit** on the toolbar to open the drawer.
3. In the drawer, specify the desired values for the attributes **Fixed Start Time** and **Offloading Allowed** as required.
4. Select **Update**.
5. Click **Solve** to implement the operation attribute changes. Only after this solve action will subsequent repair actions consider these operation attribute changes.

Note: The values for offloading allowed and fixed start time aren't released to Oracle Fusion Cloud Manufacturing nor are they persisted across scheduling cycles.

Analysis and Adjustment Using the Dispatch List

Use the dispatch list to review and manage operation start times and sequences on a specific resource.

Analyze

Select a resource from the resource list, and review operation details for each work order. Filter for relevant columns by using the View By field to review only scheduling attribute data, customer service data, maintenance work order data, or work order operation data. For more work order information, you can click the **View Work Order** icon in the Work Order Column to view the work order in the Supply Chain Execution work area.

Select a single row to navigate to the pegging table. View the pegging data for the respective work order using the action button above the table. Click the value in the Pegged Demands field to open the side drawer with details about the pegged demands of the current row's work order.

Adjust

Here's a list of actions you can do to influence scheduling using the dispatch list.

- Change the sequence of work order operations. Use the sequence arrows to move an operation or block of consecutive operations ahead of or behind other operations. Repair the schedule to save your sequence.

  Note: Production Scheduling will attempt to schedule contiguous operation-resources on the same resource only if the same set of resources and resource alternates are defined.

- Change an operation's start time. Double-click the Start Time cell for a work order and specify the date and time. Repair the schedule to save this change.
- Override the need-by date. Double-click the Need-by Override cell for a work order and specify the date and time and then solve the schedule to save the override. The solve process uses the new date to target the work order's completion. The override date isn't released to your manufacturing application when you release the schedule.
- Change the alternate resource of a selected work order operation. Double-click the Alternate Resource cell for the work order operation and select the required alternate resource from the drop-down list.
  If the following conditions are satisfied, offloading of work order operation with alternate resources can be completed:
  - Alternate resource for a work order must be defined in the corresponding work definition resource record.
  - Work Order isn't firm in SCM Work Execution and the work order operation hasn't been transacted.
  - The resource sequence number of the work order operation must match the resource sequence number of the work definition operation in the Supply Chain Execution work area. Phantom components with resource alternates in their work definition might not be offloaded by the system. This might be because the phantom explosion process in Work Execution during work order creation can introduce inconsistencies in resource sequence numbers. Alternate resources and operation attributes exist on the work definition but not on the work order within the SCM Execution. To ensure they're included in a

production schedule, the work definition should be setup such that the phantom items are consumed by a separate (upstream) operation-resource sequence with Scheduled option set to No.

- Change operation properties that impact the solve behavior.
  a. Select one or more operations in the dispatch list.
  b. Click the Edit button above the dispatch list to open the side drawer.
  c. In the side drawer, specify the desired values for attributes Fixed Start Time and Offloading Allowed as desired
  d. Click Apply.
  e. Click Solve to implement the operation attribute changes.

  Only after this solve action will the subsequent repair actions consider these operation attribute changes. The values for offloading allowed and fixed start time aren't released to Manufacturing nor are they persisted across scheduling cycles.

Note: Null value for an alternate resource indicates that offload isn't allowed for the corresponding work order operation.

Note: The solve process discards manual adjustments to work order operations, including those saved using the repair process, and calculates a new schedule.

Note: To ensure predictable repair solve results, avoid performing both drag and drop actions in the Gantt chart and resequencing actions in the Dispatch List involving the same work order operations. Repair the schedule after Dispatch List resequencing and also after Gantt chart drag & drop actions.

Analysis and Adjustment Using Work Orders

Use the Work Orders tab to review and adjust work orders. Unreleased planned make orders from Oracle Supply Planning are included in the table if a supply plan or an integrated demand and supply plan is referenced within the schedule.

If the **Include unreleased planned make orders from supply plan** checkbox is enabled before the production schedule is run, the unreleased planned make orders from Oracle Supply Planning are included in the Work Orders table.

You can also filter records by work orders or produced items. When you select a work order, its operations are highlighted in the Gantt chart. Click the **Clear Pegging Highlights** button to remove the highlighting. For more work order information, you can click the **View Work Order** icon in the **Work Order** column to view the work order in the Supply Chain Execution work area.

Note: Execution runs aren't considered by Production Scheduling. The Schedule Refresh retrieves all relevant data from the work order operation in Work Execution, that reflects the completion status of the contained execution runs.

Analyze

Here are things you need to know when you review and analyze the work orders using the Gantt chart:

- You can review start and end times for each work order with their Need-By dates to understand whether they will be completed on time.

- The work orders can have statuses as released and unreleased while planned orders can have status only as planned.
- A work order's Need-By date in Oracle Production Scheduling is set to the work order's Need-By date in Work Execution, if it's populated. If it isn't populated, then the work order's Need-By date in Production Scheduling is set to the work order's planned completion date in Work Execution.
- A planned order's Need-By date in Production Scheduling is set to the planned order's need-by date in Supply Planning, if it's populated. If it isn't populated, then the planned order's Need-By date in Production Scheduling is set to the planned order's new schedule date in Supply Planning. For firm planned orders, the Need-By date in Production Scheduling is always set to the new schedule date in Supply Planning.
- You can select a single work order and select the **Show Pegging Data** icon above the table to navigate to the pegging table. In the displayed table, for the respective work order, you can see and analyze both upstream pegging for all work order components and downstream pegging for the produced items.

Adjust

The attributes that you can edit to influence scheduling are:

- Need-By Override
- Earliest Start Date
- Firm Status
- Selected for Release

You can mass-edit these attributes for multiple selected work orders with one action. Select multiple work orders, then click the **Edit** icon to open the drawer. Change the attribute values and select **Update**. All the selected work orders are updated.

> **Note:** Need-By Override and Earliest Start dates aren't released to the manufacturing application.

Analysis and Adjustment Using On-Hand Inventory

Use the On-Hand Inventory table to review item on-hand inventory.

- You can filter data by items, item descriptions, or by a selection in the Gantt chart. Selection in the Gantt chart is only possible on single-capacity resources.
- When you select an item in the table, its consuming operations are highlighted in the Gantt chart. Highlighting is possible on single-capacity resources only. This readily helps you note the scheduling impact of unexpected supply delays. Click the **Clear Pegging Highlights** button to remove the highlighting.

  > **Note:** Filtering data by Gantt chart selection and operation highlighting are accurate only after a solve action.

- An item isn't listed in the table if the On-Hand Quantity, On-Hold Quantity, and Shortage Quantity value are zero for the item. The item is listed only if one of the values is greater than zero. For lot-based inventory, the lots must be received before schedule horizon start and not yet expired. Lots that are on hold are considered if the hold date is before schedule horizon end.
- Inventory lots are displayed in the on-hand inventory table. You can only view up to 25 inventory lots in the table. All the other inventory lots can be accessed through the deep links from the items. Click the **View Item**

Quantities icon to view item quantity information and all inventory lots in the Inventory Management work area.

Analyze

Use the On-Hand Inventory View to review on-hand supply, on-hold supply, and supply shortages for items.

- If there's more demand than supply, say, due to the cancellation of a work order, a shortage quantity is reported. The operations that consume shortage quantity are scheduled after the shortage resolution date considering item's lead time. These operations are highlighted separately on the Gantt chart.

  > **Note:** The highlighting for items with shortage inside the fixed time fence isn't accurate and should be ignored.

- Hold date is the date when an inventory lot that's currently on hold comes off hold and can be consumed. Inventory lots are listed only if their hold date is after the horizon start. All other inventory lot quantities are aggregated and displayed as the on-hand quantity.
- You can select a single row and select the **Show Pegging Data** icon above the table to navigate to the pegging table. In the displayed table, you can analyze how this item's on-hand, on-hold, and shortage quantities are pegged to downstream consumers.

Adjust

To override the lead time of items that have shortages:

1. Double-click the **Override for Lead time (Days)** cell in the On-hand inventory table.
2. Specify the new lead time in the **Override for Lead time (Days)** cell. The new shortage resolution date based on the new lead time is displayed in the Shortage Resolution On field.
3. Click **Solve** to solve the schedule if you're ready to solve, otherwise continue to other adjustments.

The solve process considers the new shortage resolution date during subsequent solves.

> **Note:** The override value isn't released to Supply Chain Execution when you release the schedule.

Analysis and Adjustment Using Inbound Supplies

Use the Inbound Supplies table to review the impact of inbound material constraints on the schedule. You can adjust dates and add supplies to influence schedule results and evaluate different inbound supply scenarios.

- You can filter data by items, orders, suppliers, supplier numbers, or by a selection in the Gantt chart. Selection in the Gantt chart is only possible on single-capacity resources.
- When you select an order in the table, its consuming operations are highlighted in the Gantt chart. Highlighting is possible on single-capacity resources only. This readily helps you note the scheduling impact of unexpected supply delays. Click the **Clear Pegging Highlights** button to remove the highlighting.

> **Note:** Filtering data by Gantt chart selection and operation highlighting are accurate only after a solve action.

Open the Inbound Supplies Table

1. In the Production Scheduling work area, on the Production Schedules page, click the required schedule.
2. In the Details section, select **Inbound supplies** from the **View** drop-down list.

Analyze

Review inbound quantities and their requested dates for purchase orders or transfer orders to know whether they'll arrive on time. Orders are included for scheduling based on the schedule options.

- Purchase orders are included if their requested date falls within the schedule horizon and the horizon to include past-due supplies. In addition, the purchase order line status must be open. Click the deep link to view the corresponding Purchase order details in Oracle Fusion Cloud Procurement. The link is accessible only if you've logged in as a user with Purchase Analysis role.
- Transfer orders are included if their Expected Delivery date or Need-By date falls within the schedule horizon and the horizon to include past-due supplies. In addition, the fulfillment line status must be open.
- For In-transit shipments, the Expected Receipt Date in Supply Chain Execution is used to determine availability and inclusion in the Production Schedule.
- You can select a single row and select the **Show Pegging Data** icon above the table to navigate to the pegging table. In the displayed table, you can analyze how this inbound supply (purchase order or transfer order) is pegged to the downstream consumers.

Adjust

Here's what you can change to influence the schedule result and evaluate different inbound supply scenarios.

- To change the request dates of an existing supply:
  a. Double-click the content in the **Override for Requested Date cell.**
  b. Specify the new date and time in the **Override for Requested Date** cell.
  c. Click **Solve** to solve the schedule if you're ready to solve, otherwise continue to other adjustments.
- To add new supplies for items manually:
  a. In the Inbound supplies table, click the **Add** button.
  b. In the Add Supply dialog box, specify the item, quantity and requested date.
  c. Click **Solve** to solve the schedule if you're ready to solve, otherwise continue to other adjustments.

  The solve process uses the new supply of the item, and schedules dependent work order operations accordingly.

Consider these two points when making your adjustments:

1. Supplies you add manually exist only in Production Scheduling and not in Supply Chain Execution. As a result, deep links for these supplies aren't displayed
2. Override for Requested Date values and inbound supplies that are added manually aren't released to Supply Chain Execution.

Analysis Using Demand

Use the Demand table to review the impact of outbound sales orders and transfer orders on the schedule.

- You can filter data by items, orders, customer, customer numbers, or by a selection in the Gantt chart. Selection in the Gantt chart is only possible on single-capacity resources.
- When you select an order in the table, its producing operations are highlighted in the Gantt chart. Highlighting is possible on single-capacity resources only. This readily helps you note the scheduling impact of unexpected manufacturing delays. Click the **Clear Pegging Highlights** button to remove the highlighting.

Note: Filtering data by Gantt chart selection and operation highlighting are accurate only after a solve action.

Analyze

Review demand quantities and their requested dates for sales orders or outbound transfer orders to know whether they'll be met on time.

Orders are included for scheduling based on the schedule options.

- Sales orders are included if their requested ship date falls within the schedule horizon and the horizon to include past-due demands.
- Transfer orders are included if their scheduled ship date or requested delivery date falls within the schedule horizon and the horizon to include past-due demands.

You can select a single row and select the **Show Pegging Data** icon above the table to navigate to the pegging table. In the displayed table, you can analyze how this demand (sales order or transfer order) is pegged to the upstream supplies.

In addition, the schedule refresh ignores fulfillment lines if one or more of the following is true:

- Fulfillment line is canceled
- Fulfillment line is closed
- Fulfillment line doesn't have a ship quantity specified
- Fulfillment line doesn't have a requested ship date specified
- Fulfillment header isn't submitted

Analysis Using Pegging

Visualize and analyze upstream and downstream pegging relationships for effective schedule analysis and decision-making in Production Scheduling.

You might come across situations where a work order appears to be scheduled later than expected, yet the underlying constraint isn't immediately visible. This is especially true when material dependencies originate from operations that are unscheduled or associated with resources that aren't currently displayed.

Using pegging information across all supplies and demands in the schedule gives you direct visibility into the true drivers of scheduling outcomes. It enables faster root-cause analysis, reduces time spent investigating schedule anomalies, and supports more informed decision-making through dynamic interaction between tabular and Gantt-based schedule views.

Use the Pegging table to review:

- Downstream pegging for inbound supplies and on-hand inventory data to see which consumers depend on them.
- Upstream pegging for demands to understand which supplies deliver the required product.
- Both upstream and downstream pegging for a work order of interest to gain insights as to why a work order operation might be scheduled later than expected.

Analyze

For a non-lot-controlled item, the on-hand and shortage quantities are pegged, while for a lot-controlled item all its on-hold lots and the shortage quantity are pegged.

For a work order, all items consumed (or produced) by any of the contained work order operations are pegged one level upstream (or one level downstream).

Upstream supply can be on-hand inventory, inbound supplies, producing work orders, or shortage quantities, and downstream consumers can be sales orders, outbound transfer orders, or consuming work orders.

To view pegging data, select an item, a demand, an inbound supply, a work order, or a flow schedule above the Pegging table. Alternatively, you can initiate the pegging data display as follows:

- Select a work order operation in the Gantt chart and click the **Show Pegging Data** icon in the Gantt toolbar.
- Select a single row in one of the tables like dispatch list or work orders and click the **Show Pegging Data** icon above the respective table.

You can select a single row in the pegging table and initiate further pegging:

- If the selected row's Direction field is Upstream, then you can trigger the display of pegging data for the data element listed in Supply By, which can be an inbound supply, a flow schedule, or a work order. In case Supply By is empty because the supply is an on-hand, on-hold, or shortage quantity, then you can trigger pegging data display for the item listed in the Item field.
- If the selected row's Direction field is Downstream, then you can trigger the display of pegging data for the data element listed in the Consume By, which can be a demand, a flow schedule, or a work order.

You can see the generated pegging data in the tooltip of the action button. This tooltip changes dynamically based on the selected row.

Analysis Using Maintenance Work Orders

Use the Maintenance table to review and adjust maintenance work orders.

The Maintenance table contains maintenance work orders for resources that are associated with the respective assets. It's only visible if you select the schedule option **Consider maintenance downtime in manufacturing schedule**.

You can filter records by work center or resource. When you select a maintenance work order in the table, its operations are highlighted in the Gantt chart. Click the **Clear Pegging Highlights** button to remove the highlighting. For more information about the maintenance work order, you can click the **View Work Order** icon in the **Work Order** column to view the maintenance work order in the Supply Chain Execution work area.

Analyze

Review and analyze maintenance work orders and their impact by checking the start and end times to understand where they'll be scheduled. The work center resources for these orders are linked to assets and can have different types and subtypes, such as Corrective or Emergency.

Adjust

You can edit the **Start Time Override** field to influence where the maintenance work order is placed.

Note: The Start Time Override isn't released to the manufacturing application.

Analysis Using Resource Utilization Chart

You can review how resources or resource groups are used over time with the Resource Utilization chart. For example, you can make informed decisions about adding or removing shifts for a resource with the help of this chart.

To view the Resource utilization chart for a schedule:

1. In the Production Scheduling work area, on the Production Schedules page, click the required schedule.
2. In the Details section of the schedule, select **Resource utilization** from the **View** drop-down list.
3. Select the required resource or resource group from the **Resource or Resource Group** drop-down list.
4. Select the **Day** or **Week** option from the **View By** drop-down list.

   The Day option displays results in daily time buckets; the Week option displays results in weekly time buckets.

Analyze

Each bar in the chart displays the runtime, changeovers, maintenance, and downtime percentages for each resource or resource group. You also can view the idle time, downtime, changeovers, maintenance, and runtime in hours for each resource or resource group in the tooltip.

Analysis and Adjustment Using Flow Schedules

Use Flow Schedules to review and manage the end time and scheduled build sequence of your flow schedules on a given production line.

The completion date and build sequence are the current values from Oracle Fusion Manufacturing for the flow schedules. The scheduled completion date and scheduled build sequence numbers correspond to the results calculated by the solve or repair actions. These are used to update the flow schedules' completion dates and build sequence numbers in Oracle Fusion Manufacturing upon schedule release.

Analyze

Select a production line from the list, and review details for each flow schedule. The flow schedules are sorted in ascending order by the end time and scheduled build sequence number.

The start time of a flow schedule is calculated backward from the last operation's end time, considering the takt time and the number of operations of the production line, together with the associated organization calendar. The exact usage durations of operation-resource sequences of the associated flow work definition aren't considered.

Selecting flow schedules in the table highlights the flow schedule group that the selected flow schedules belong to.

Adjust

Here's the list of actions you can do to influence scheduling using the flow schedules:

- Change the sequence of flow schedules. Use the sequence arrows to move a flow schedule or block of consecutive flow schedules ahead of or behind other flow schedules. Repair the schedule to save your sequence. The scheduled build sequence is recalculated at the end of each solve and repair action, considering each flow schedule's completion date.
- Edit the **Completion Date Override** option to influence scheduling for individual flow schedules in the table or via mass-edit. Note that the Completion Date Override isn't released to the manufacturing application.

Consideration of Material Constraints

In Production Scheduling, the On-Hand Inventory table shows an item's shortage quantity, in addition to on-hand, reserved, and on-hold quantities.

For all items in the production schedule, existing supplies (on-hand, inbound transfer order, purchase order, and work order) and existing demands (sales order, outbound transfer order, and work order component demand) are considered.

- If total demand for an item exceeds total supply for an item, then a shortage quantity will be reported in the On-Hand Inventory table for that item. Work order operations that consume shortage quantity are scheduled after the Shortage Resolution On date, which is set to horizon start + item's lead time. The date Earliest Shortage Usage displays the start of the earliest operation that consumes this shortage quantity. Note that an item's lead time is only considered, if advanced schedule option, **Ignore item lead times** is deselected.

  > **Note:** The Solve process relaxes all inventory constraints at the end of the schedule horizon. If an item's lead time exceeds the schedule horizon, then the Shortage Resolution On date will be set to equal the schedule horizon end date.

- If the total supply exceeds the total demand for an item, then there's no shortage. If inbound supplies, such as purchase orders, arrive later than the consuming work orders require based on their need-by date, the work orders are delayed and scheduled to start after the supplies become available.

A work order can be late for various reasons. For example, sub-assemblies can't be completed early enough, inbound supply issues, resource capacity and availability constraints, or a combination of these. If a work order is scheduled late, and capacity constraints don't explain the lateness (you see idle time on the relevant resources), then you can use the schedule analysis capabilities in the Gantt chart and the tabular schedule views to get more insights. To do this:

- Select the operation and activate **Show Pegging Links** to see which upstream processes it depends on and possibly must wait for. Only pegging links to work order operations that are currently displayed in the Gantt chart are displayed.
- Use Highlight **Pegged to shortage** in the Gantt toolbar, that will highlight all operations that are pegged to a shortage quantity as defined above.
- Select one of these highlighted operations in the Gantt chart. Navigate to the On-Hand Inventory table, and toggle on **Filter by Gantt Selection** above the table. The table shows only those items that are consumed by

that operation, and in this case at least one of them will have a shortage quantity. Then evaluate the item's lead time and compare the dates **Shortage Resolution On** and **Earliest Shortage Usage** and see whether this explains the lateness. For evaluation of the scenario, you can override the lead time and run another solve.

- If there's no shortage shown, then switch to the **Inbound Supplies** tab and do the same. Select operation of interest in the Gantt chart and toggle on **Filter by Gantt Selection** above the table. Only those inbound supplies that are pegged to the selected operation will be shown. Evaluate their **Requested Date** and see whether this explains the lateness. For evaluation of the scenario, you can override the requested date and/or add new supplies, none of which will be released to SCM Execution.

Note: If the same material is issued multiple times to a work order operation, then during schedule refresh, the quantities of these multiple occurrences are aggregated and assigned to the first operation-resource sequence with the option **Scheduled** set to Yes. So, the resulting production schedule consumes the whole amount of such material slightly earlier than actually necessary.

Release Analysis and Actions

View the number of work orders for release and then release them to send the schedule to your manufacturing or maintenance application.

Work Order Metrics

Review these metrics about the work orders you're about to release:

- **Work Orders:** Number of work orders and planned orders in the schedule.
- **Selected for Release:** Number of work orders selected for release.
- Flow Schedules: Number of flow schedules in the schedule.

Release and Integration

To release a schedule, click the **Release** button. The following data in your manufacturing application is updated with released information:

- Work order header start and end times
- Work order operation start and end times
- Work order operation resource assignments
- Work order status changes to **Released** if the schedule option release status setting is set to Mark work orders as released on the Schedule Options page. If not, the work orders status is retained.
- Firm status for non-firm work orders within the fixed time fence horizon, now marked as firm, if the **Firm work orders that begin during the fixed time fence period** setting was enabled during schedule configuration.
- Flow schedule completion date.
- Flow schedule build sequence number.

Guidelines to Release a Schedule

Here are some guidelines you must know before you release a schedule:

- If the schedule isn't refreshed after the previous release, changes to the schedule for some work orders might not be released.
- After each Solve and Repair process, if the start date of a work order falls within the Release Horizon, the work order is automatically selected for Release. Using the Selected for Release switch in the work order table, you can select or deselect individual work orders for release.
- Work orders in Pending Approval status aren't updated in SCM execution.
- Planned orders from Oracle Supply Planning won't be released to SCM Execution.
- Only those flow schedules that are in open status in SCM Execution at the time of schedule release are updated with new completion dates and build sequence numbers.

5 Troubleshooting and Best Practices

Troubleshoot Production Scheduling Setup Issues

This section includes troubleshooting for data issues and other issues while setting up production schedule in Oracle Production Scheduling.

Troubleshooting Data Issues

Issue: Data not visible while setting up organizations and schedules.

Check these settings:

- Check if the data is set up in their source work areas, Oracle Fusion Cloud Manufacturing and Oracle Fusion Cloud Product Management.
- Check the data setup reference topics at the end of each chapter for details on where the data discussed in that chapter is configured within the work areas.

> **Note:** Access to these work areas is granted by your enterprise administrator by means of roles, privileges, and additional security entitlements. For an exhaustive list of security roles, privileges, and other access entitlements see the Security Reference for Supply Planning.

Issue: Production schedule doesn't contain any data.

Check these settings:

- Ensure that within Oracle Supply Chain Execution and Work Execution, there are open work orders that are within the scope of the production schedule. These work orders should involve the production of items belonging to the specified item categories and overlapping with the schedule horizon.
- Confirm that at least one operation-resource in work orders has its Scheduled option set to Yes.
- Using the Manage Data Access for Users task in the Setup and Maintenance work area, confirm the user data access to the relevant organization. Assign appropriate security contexts and their corresponding values to the user as required.

Issue: Work definition operation attribute values missing.

Check these settings:

- The descriptive flexfield of the work definition operation is configured with a value set validation type set to Independent.
- The appropriate context and attribute values are assigned to the work definition operation.
- The work definition is effective at the start of the schedule horizon.

Troubleshooting Non-Data Issues

Issue: Resource capacity is violated.

Check these settings:

- Verify the constraint mode for that resource in Scheduling Organizations and Resource Parameters
- Verify the resource constraint horizon in Schedule Options in the Schedule Parameters section.

Issue: Manufacturing attribute groups or item attribute groups are defined but the underlying attributes and attribute values aren't visible in Oracle Production Scheduling even after Scheduling Organization Refresh

Check these settings:

- Verify that the underlying flexfield segment value sets are defined with Validation Type as Independent in Setup and Maintenance work area.

Issue: Effective dates aren't considered

Oracle Production Scheduling doesn't consider work definition or item structure effective dates.

Issue: Item attribute value missing.

Check these settings:

- The extensible flexfield of the item is configured with a value set validation type set to Independent.
- The Master to Child Organization property for the respective attribute group in Oracle Fusion Product Information Management (PIM), must be set to either None or Inherited, but not Default.
- The appropriate context and attribute values are assigned to the item.

Troubleshoot Production Scheduling Performance Issues

If your production scheduling requests take too long to complete, it's possibly because of the schedule or organization configuration. This topic covers best practices and related configuration settings to optimize scheduling performance.

Reduce the Scope

Use the Schedule Options UI to limit the scope of the production schedule to what is essential.

- Specify a short schedule horizon. For example, if a schedule is generated every day, and the longest lead times are less than a week, then having a schedule horizon of several months adds no value, but unnecessarily increases the data volume and the size of the schedule.
- Select only those item categories that need to be included in the schedule.

> **Note:** In the Product Information Management work area, item categories can be defined with scheduling needs in mind. This would allow for scope definitions with items that are actually relevant to scheduling. Access to the Product Information Management work area is managed by your administrator.

Limit Resource Constraints to Bottleneck Resources

Use the Resource Parameters UI to control the constraint mode of a resource. Use the **Constrained** value for such cases, and for others use **Relaxed** or **Relaxed for capacity only**. The default mode is Relaxed.

Use a Resource Constraint Horizon

In the Schedule Options UI, specify a resource constraint horizon to specify the length of time during which capacity constraints are enforced. The horizon is calculated from the schedule horizon's start date. Beyond the constraint horizon period, constrained resources will be considered relaxed.

Review the Number of Records for Production Scheduling Objects

Use REST services to retrieve and review the volume of data you're working with for specific production scheduling objects, like items, resources, and work orders.

Review Request Logs for Production Scheduling Processes

A log file is created during production scheduling processes, like refreshes, solves, and releases. To view details of any process warnings or errors, copy the process request ID from the Production Schedules page and use it to search for the request log file in the Scheduled Processes UI.

Download Binary Schedule Files to Share with Oracle Support

If you need to file a service request with Oracle Support, you can be asked to attach binary schedule files to your service request. These files help in analysis and troubleshooting for your service request.

You can download the Refreshed Schedule and Solved Scheduled binary schedule files from the Schedule Administration page in the Production Scheduling work area. On the Action menu of a schedule, select Schedule Administration to access the Schedule Administration page of that schedule.